

October 23, 2012

Mr. John DeBonis, Quality Assurance Manager
Curtiss-Wright Flow Control Company
Target Rock Division
1966E Broadhollow Road
East Farmingdale, NY 11735-1768

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT
NO. 99900060/2012-201 AND NOTICE OF NONCONFORMANCE

Dear Mr. DeBonis:

From September 10 to September 14, 2012, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Target Rock (TR) facility in East Farmingdale, NY. The enclosed report presents the results of the inspection.

The purpose of the limited-scope inspection was to assess TR's compliance with the provisions of selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." This technically focused inspection specifically evaluated TR's implementation of quality activities associated with the design, procurement, manufacture, and test of valves with an emphasis on the 1-inch solenoid and 6-inch by 10-inch relief valves. The NRC inspection team included inspectors from the Korean Institute of Nuclear Safety (KINS) as part the first NRC-led inspection under the Multinational Design Evaluation Program. The KINS inspectors used NRC inspection procedures and requirements and their findings and conclusions are included in this inspection report. This NRC inspection report does not constitute NRC endorsement of TR's overall quality assurance (QA) program.

During this inspection, the team found that TR has established a QA program that adequately controls quality-affecting activities in accordance with the regulatory requirements of Appendix B to 10 CFR Part 50. However, implementation of the QA program did not meet certain NRC requirements contractually imposed on TR by its customers or NRC licensees. Specifically, the inspection team determined that TR was not implementing aspects of its commercial-grade dedication program consistent with regulatory requirements. The specific findings and references to the pertinent requirements are identified in the enclosures to this letter. In response to the enclosed Notice of Nonconformance (NON), TR should document the results of the extent of condition and determine if there are any effects on other safety-related components.

Please provide a written explanation or statement within 30 days of this letter in accordance with the instructions specified in the enclosed NON. The 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 a copy of this letter, its enclosures, and your response available electronically for public inspection in the NRC Public Document Room or from the NRC's document system, Agencywide Document Access and Management System, accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, 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, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material 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 will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/

Richard A. Rasmussen, Chief
Electrical Vendor Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99900060

Enclosures:

1. Notice of Nonconformance
2. Inspection Report 99900060/2012-201

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Sincerely,

Richard A. Rasmussen, Chief
 Electrical Vendor Branch
 Division of Construction Inspection
 and Operational Programs
 Office of New Reactors

Docket No.: 99900060

Enclosures:

1. Notice of Nonconformance
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| OFFICE | NRO/DCIP/CEVB | | | |
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NOTICE OF NONCONFORMANCE

Target Rock Division
Curtiss-Wright Flow Control Company
1966E Broadhollow Road
East Farmingdale, NY 11735-1768

Docket No. 99900060
Inspection Report No. 99900060/2012-201

Based on the results of a U.S. Nuclear Regulatory Commission (NRC) inspection conducted from September 10 to September 14, 2012, of activities performed at Target Rock (TR), a business unit of Curtiss-Wright Flow Control Company, it appears that certain activities were not conducted in accordance with NRC requirements contractually imposed upon TR by its customers or NRC licensees.

- A. Criterion III, "Design Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," states, in part, "Measures shall be also 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."

Contrary to the above, as of September 14, 2012, TR failed to perform a review for suitability of application of materials and processes essential to the safety-related functions of the structures, systems, and components as part of commercial grade dedication (CGD) of terminal block part number (P/N) 205674-2. Specifically, TR failed to require verification of critical characteristics of acceptance that were identified during the technical evaluation of a commercially purchased terminal block. Electrical performance characteristics such as voltage rating, amperage rating, and dielectric rating, identified as design basis performance characteristics critical for safe operation of a solenoid valve, were not identified on the Critical Characteristics Attribute Verification (CCAV) form or verified by the quality control inspector during receipt inspection.

This issue has been identified as Nonconformance 99900060/2012-201-01.

- B. Criterion VII, "Control of Purchased Material, Equipment, and Services" of Appendix B to 10 CFR Part 50, states in part, "Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery."

Section 9.0, "Inspection (Dedication of CG items by method 1)," of Target Rock Report No. 5041 (TRP-5041), "Dedication Requirements for Commercial Grade Items," Revision S, dated August 23, 2012, states in part, that for plated or coated parts, when an unplated sample is not provided, per paragraph 4.1.2, remove plating/coating from one item per lot to enable alloy identification.

Contrary to the above, as of September 14, 2012, TR failed to adequately verify that commercial items received from its suppliers conformed to the applicable specification requirements and failed to validate required critical characteristics of acceptance during CGD receipt inspection and testing of terminal block P/N 205674-2. Specifically, TR did

not perform the necessary inspection to verify that the material for the terminal screws and plate met the material acceptance criteria in accordance with the requirements of TRP-5041 and as specified in the terminal block CCAV form No. 205674, 205675, and 205676.

This issue has been identified as Nonconformance 99900060/2012-201-02.

- C. Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50, states in part, "Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery."

Section 7.3.200, "Supplier Evaluation and Selection," of the Target Rock QMP-1023, "Energy Products Nuclear Quality Assurance Manual, Edition 9," Revision 1, dated March 16, 2012, states, in part, that before the award of a contract, TR shall evaluate a supplier's capability to provide items and services in accordance with the requirements of the procurement documents.

Contrary to the above, as of September 14, 2012, TR failed to adequately verify that commercial items received from its suppliers conformed to the applicable specification requirements and failed to validate required critical characteristics of acceptance during CGD receipt inspection and testing of terminal block P/N 205674 and pressure actuated switch P/N 200372. Specifically, TR relied on a commercial supplier-issued certificate of conformance as the sole method to verify critical characteristics of acceptance without conducting a commercial-grade survey, source verification, or other surveillance of the supplier, to verify that the supplier's quality program was capable of appropriate control of required critical characteristics.

This issue has been identified as Nonconformance 99900060/2012-201-03.

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, Electrical 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 noncompliances; and (4) the date when your corrective action will be completed. Where good cause is shown, the NRC will consider extending the response time.

Because the NRC will make your response available electronically for public inspection in the NRC Public Document Room or from the NRC's document system, Agencywide Documents Access and Management System, which is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide

an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this xxth day of October 2012.

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

Docket No.: 99900060

Report No.: 99900060/2012-201

Vendor: Target Rock Division
Curtiss-Wright Flow Control Company
1966E Broadhollow Road
East Farmingdale, NY 11735-1768

Vendor Contact: Mr. John DeBonis, Quality Assurance Manager
Phone: 631-396-4429
jdebonis@curtisswright.com

Background: Target Rock, a business unit of Curtiss-Wright Flow Control Company, is an American Society of Mechanical Engineers certificate holder with its scope of supply including, but not limited to, commercial grade dedication, design, fabrication, assembly, and testing of valves for safety-related applications for the commercial operating fleet.

Inspection Dates: September 10–14, 2012

Inspection Team Leader: George Lipscomb, NRO/DCIP/CEVB

Inspectors: Greg Galletti NRO/DCIP/CEVB
Raju Patel NRO/DCIP/CMVB
Dr. Mike Jung KINS
Dr. Hong-key Kim KINS

Approved by: Richard A. Rasmussen, Chief
Electrical Vendor Branch
Division of Construction Inspection and Operational Programs
Office of New Reactors

EXECUTIVE SUMMARY

Target Rock
99900060/2012-201

The U.S. Nuclear Regulatory Commission (NRC) conducted this inspection to verify that Target Rock (TR) implements an adequate quality assurance (QA) program that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." This technically focused inspection specifically evaluated TR's implementation of quality activities associated with the design, procurement, manufacture, and test of valves with an emphasis on the 1-inch solenoid and 6-inch by 10-inch relief valves. The NRC identified these product lines because they are representative types of valves that are anticipated to be used in new reactor construction and are already in use in both the Korean and United States operating fleet. The NRC conducted this inspection at TR's manufacturing facility in East Farmingdale, NY.

The following regulation served as the basis for this NRC inspection:

- Appendix B to 10 CFR Part 50

The inspectors used Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," dated April 25, 2011; and IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated April 25, 2011, to conduct this inspection.

The NRC inspection team included inspectors from the Korean Institute of Nuclear Safety (KINS) as part of the first NRC-led inspection under the Multinational Design Evaluation Program. The inspection team referenced "Multinational Design Evaluation Programme Vendor Inspection Cooperation Working Group Witnessed and Joint Vendor Inspection Protocol," Revision 1, dated December 3, 2010, for this inspection.

The previous NRC inspection of the TR facility in East Farmingdale, NY, occurred in 2007, and identified Nonconformance 99900060/2007-201-01 (available in the Agencywide Documents Access and Management System under Accession No. ML072470273) related to verification of supplier quality controls of critical characteristics. Nonconformance 99900060/2007-201-01 was closed as part of this inspection.

With the exception of the nonconformances described below, the NRC inspection team concluded that TR is effectively implementing its QA program in support of the design, manufacturing, and testing of the sampled valve models. The results of this inspection are summarized below.

Commercial-Grade Dedication

The NRC inspection team concluded that TR has established a program that adequately controls commercial grade dedication (CGD) in accordance with the regulatory requirements of Appendix B to 10 CFR Part 50. However, TR is not effectively implementing its CGD program consistent with the requirements of Criterion III, "Design Control," and Criterion VII, "Control of Purchased Materials, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team issued Nonconformance 99900060/2012-201-01 for TR's failure to perform a review for suitability of application of materials and processes essential to the safety-related

functions of the structures, systems, and components. The NRC also issued Nonconformance 99900060/2012-201-02 and Nonconformance 99900060/2012-201-03 for TR's failure to verify required critical characteristics during dedication of commercial-grade items, which provides reasonable assurance that commercial items received from its suppliers conform to the applicable specification requirements.

Design Control

With the exception of Nonconformance 99900060/2012-201-01, the NRC inspection team concluded that TR has established a program that adequately controls design under the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Based on the limited sample of TR design-relevant documentation reviewed, and interviews with TR staff, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve design.

Procurement / Supplier Control

With the exception of Nonconformance 99900060/2012-201-02 and Nonconformance 99900060/2012-201-03, the NRC inspection team concluded that TR has established a program that adequately controls procurement of equipment and services under the regulatory requirements of Criterion IV and VII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and personnel interviewed, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing.

Special Processes

The NRC inspection team concluded that TR has established a program that adequately controls special processes under the regulatory requirements of Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50. Based on the limited sample of records reviewed and on the observation of in-process special processes, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing.

Inspection

The NRC inspection team concluded that TR has established a program that adequately controls inspection activities under the regulatory requirements of Criterion X, "Inspection," of Appendix B to 10 CFR Part 50. Based on the limited sample of inspection activities observed and documents reviewed, the inspectors determined that TR is effectively implementing its inspection programs in support of safety-related valve manufacturing.

Test Control

The NRC inspection team concluded that TR has established a program that adequately controls testing under the regulatory requirements of Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of test activities observed and documents reviewed, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing.

Nonconformance and Corrective Action

The NRC inspection team concluded that TR has established a program that adequately controls nonconforming items and corrective actions under the regulatory requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. Based on the sample of documents reviewed, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing.

Measuring and Test Equipment

The NRC inspection team concluded that TR has established a program that adequately controls calibration and use of measurement and test equipment (M&TE) under the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Based on the limited sample of calibration and measurement activities observed and documents reviewed, the inspectors determined that TR is effectively implementing its M&TE program in support of safety-related valve manufacturing.

REPORT DETAILS

1. Commercial Grade Dedication

a. Inspection Scope

The NRC inspection team reviewed Target Rock's (TR) policy, procedures, and implementation for commercial grade items and commercial grade calibration dedication activities for use in safety-related applications to verify compliance with applicable regulatory requirements. This assessment included a review of the procedures governing the implementation of commercial-grade dedication (CGD) activities, interviews with TR personnel, observation of dedication activities, and review of related documentation.

The inspectors also sampled five ongoing CGD orders (a piston ring, diaphragm, expander ring, reed switch assembly, and a terminal block) and one completed dedication package for 13 solenoid assemblies to evaluate CGD implementation.

b. Observations and Findings

TR Procedure Report (TRP)-5041, "Dedication Requirements for Commercial Grade Items," is a high-level document governing TR's CGD process that establishes the requirements and responsibilities for dedicating commercial grade items procured for use in safety-related applications.

Appendix I, "Preparation of Technical Evaluation of Alternate or Replacement Items (TERI)," of TRP-5041 requires that the failure modes and effect analysis (FEMA) serve as a basis to establish an item's design basis critical characteristics.

Appendix II, "Preparation, Review, Approval, Issuance and Control of Design Based Critical Characteristics Forms and Critical Characteristics Attribute Verification Sheets," of TRP-5041 states that the assigned commercial project engineer is responsible for determining and documenting an item's critical characteristics and verification methods.

The implementing document for TR's CGD process is the Critical Characteristics Attribute Verification (CCAV) form, which documents the commercial project engineer's evaluation of the specific item's safety function and critical characteristics which, once verified, provide reasonable assurance that the item will effectively perform its safety functions. Additionally, the CCAV form serves as the receipt Quality Control (QC) inspector's source to develop the Inspection Attribute form, and to record the verification of all required measurements.

Technical Evaluation

The inspectors noted that TERI-010, "Technical Evaluation for Replacement Item for Terminal Block (General)," provided specific requirements for a replacement terminal block technical evaluation, which included a FEMA, applicable design basis critical characteristics, and acceptance criteria. The results of the terminal block FEMA identified design basis critical characteristics, such as voltage rating, amperage rating, dielectric rating, insulation environmental characteristics, terminal corrosion resistance,

and structural characteristics that are required to be verified to ensure safe operation of a solenoid valve.

During CGD of a terminal block part number (P/N) 205674-2, procured from Beyond Components, LLC, on purchase order (PO) 37485, the NRC inspection team observed the TR QC inspector (1) select an adequate sample size from the lot, (2) select the approved CCAV form and design drawing to establish an Inspection Attribute form, and (3) use calibrated Measuring and Test Equipment (M&TE) to record required data to verify the item's critical characteristics. However, upon evaluation of the terminal block CCAV form, the inspectors noted that the performance characteristics, such as voltage rating, amperage rating, and dielectric ratings, which are critical for the safe operation of a solenoid valve, were missing.

The inspectors determined that the approved CCAV form failed to include, and the QC inspector failed to verify, key electrical performance characteristics included in the terminal block FEMA and required by TERE 010 to ensure safe operation of a solenoid valve. Additionally, the inspectors determined the performance characteristics were not verified by another method.

This issue is identified as Nonconformance 99900060/2012-201-01.

Witness of CGD Activities

Section 9.0, "Inspection," of TRP-5041, establishes requirements for testing of plated or coated parts by removing the plating and testing by the alloy identification, when an unplated sample is not provided.

The inspectors noted terminal block CCAV form No. 205674, 205675, and 205676, stated that samples tested for material analysis shall have nickel plating removed from terminal screws and plates to verify they are made of brass material.

During witnessing of CGD receipt inspection for terminal block P/N 205674-2, the inspectors evaluated the CCAV form and observed the QC inspector performed the receipt inspection using the proper CCAV form, proper drawing, and calibrated M&TE. However, the inspectors observed that the material critical characteristics of the terminal screws and plate were not verified as the CCAV form requires.

The inspectors learned that the verification of material for terminal block screws and plate for P/N 205674-2 was subcontracted. The inspectors requested and reviewed the associated supplier documentation (TR certification number 12-2280) and determined that the analytical report did not include the appropriate material analysis to verify the terminal screws and plate material. Additionally, the inspectors sampled other terminal block final inspection acceptance reports and noted that the records also did not include the appropriate material analysis to verify the material for the terminal screws and plate.

The NRC inspection team determined that TR's QC inspectors failed to verify required material composition for screws and plate as specified in the terminal block CCAV.

This issue is identified as Nonconformance 99900060/2012-201-02.

Review of CGD Documentation

Section 7, "Control of Purchased Items and Services," of the TR Energy Products Nuclear Quality Assurance Manual (QAM) establishes requirements for supplier source evaluation and selection to validate a supplier's capability to provide items or services under procurement specifications.

The NRC inspection team evaluated a sample of subcontractor-provided certificates of conformance (COCs), which stated the supplier had complied with the terms of the PO, and related documentation for CGD receipt inspection of terminal blocks and pressure actuated switches. The inspectors learned that TR selected and approved distributors and suppliers based on complexity of procured items and, in some cases, without performing commercial grade survey, source verification, or other surveillance of the supplier.

The inspectors noted for CGD of terminal blocks (P/N 205674) from Beyond Components and pressure actuated switches (P/N 200372) from Custom Control Sensors, Inc., TR accepted subcontractor-supplied COCs as evidence of supplier verification of required critical characteristics. The inspectors also noted that TR did not conduct a commercial grade survey, source verification, or other surveillance of the supplier to verify that the supplier's quality program was capable of appropriate control of required critical characteristics. The inspectors determined that complete reliance on a commercial supplier COC without verification of appropriate supplier QA controls of required critical characteristics was inadequate.

This issue is identified as Nonconformance 99900060/2012-201-03.

TR initiated corrective action request (CAR) No. 12-063 on September 12, 2012, related to the deficiencies identified in the three previously mentioned nonconformances.

Closure of Nonconformance 99900060/2007-201-01

The NRC issued Nonconformance 99900060/2007-201-01 in the 2007 inspection and identified that the TR survey report for Stonite Coil Corporation did not provide objective evidence that the critical characteristics of the hi-pot electrical resistance testing and insulation resistance testing for a solenoid valve coil assembly were controlled under the supplier's documented commercial quality program. These tests provided a basis for establishing reasonable assurance that the supplied item will perform its intended safety function.

During the current inspection, the NRC inspection team sampled five of TR's supplier surveys to ensure that required supplier-verified critical characteristics were documented in the supplier survey checklist and appropriately evaluated during each survey to close Nonconformance 99900060/2007-201-01.

The inspectors determined that TR's supplier survey checklist adequately included audit requirements for evaluation of supplier control of required critical characteristics, and the survey reports provided sufficient objective evidence of supplier critical characteristic control.

The NRC inspection team did not identify any issues in this area and has closed Nonconformance 99900060/2007-201-01.

Commercial Grade Calibration Services

Section 7, "Control of Purchased Items and Services," of the Quality Manual Procedure (QMP) 1023, "Energy Products Nuclear Quality Assurance Manual, Edition 9," describes the process of acceptance of commercial-grade calibration services through CGD.

The NRC inspection team evaluated three commercially calibrated M&TE samples to verify TR's CGD of commercial-grade calibration services. The sample included a granite surface plate, a digital thermometer, and a light meter. The inspectors observed that the dedication process consists of: (1) TR QA review and acceptance of calibration certificate documenting the as-found and as-left condition, supplier's quality system accreditation to ANSI/ISO/IEC 17025 or equivalent, and the standards used that are traceable to known national standards; (2) an M&TE CCAV form documenting the results of verification of critical characteristics upon receipt inspection; (3) a TR PO invoking the technical and quality requirements; and (4) TR acceptance of commercial supplier's ANSI/ISO/IEC 17025 accreditation certificate or any other accreditation service provided by a domestic accrediting body, as recognized through the mutual recognition arrangement of the International Laboratory Accreditation Program, in lieu of a commercial-grade survey or audit.

The NRC inspection team did not identify any issues in this area.

c. Conclusions

The NRC inspection team determined that TR has established a program that adequately controls CGD in accordance with the regulatory requirements of Appendix B to 10 CFR Part 50. However, TR is not effectively implementing its CGD program consistent with the requirements of Criterion III, "Design Control," and Criterion VII, "Control of Purchased Materials, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team issued Nonconformance 99900060/2012-201-01 for TR's failure to perform a review for suitability of application of materials and processes essential to the safety-related functions of the structures, systems, and components, and Nonconformance 99900060/2012-201-02 and Nonconformance 99900060/2012-201-03 for TR's failure to verify required critical characteristics during dedication of commercial-grade items, which provides reasonable assurance that commercial items received from its suppliers conform to the applicable specification requirements.

2. Design Control

a. Inspection Scope

The NRC inspection team reviewed the design control program, related procedures, a sample of design documents related to solenoid operated globe valves for Shin-Kori Unit 3&4 project 07Q, and interviewed related engineering personnel to determine if TR design controls conform with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50.

b. Observations and Findings

Section 3, "Design Control," of the TR Energy Products Nuclear QAM describes how to control design inputs, the design process, design analysis, design verification, and interfaces to ensure that design control meets regulatory requirements. QMP-1004, "Design Control," also provides the detailed requirements and responsibilities for implementation of the TR design process.

The inspectors verified that the design control procedures and a sample of documentation associated with the Shin-Kori project met design control requirements. The sample of documentation included: the project review record, the bill of material, the calculation sheets, the design report, and the equipment qualification report.

The inspectors also verified in interviews with engineering staff that TR's design process was performed properly, focusing on interface control and feedback of operating experience for design changes.

c. Conclusions

With the exception of Nonconformance 99900060/2012-201-01 outlined in Section 1 of this report, the NRC inspection team determined that TR has established a program that adequately controls design in accordance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Based on the limited sample of TR design relevant documentation reviewed and interviews with TR staff, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve design. The inspection team identified no findings of significance.

3. Procurement/Supplier Control

a. Inspection Scope

The NRC inspection team reviewed procurement and supplier related procedures, a sample of purchasing records, and interviewed related personnel to determine if TR procurement and supplier controls were in compliance with the regulatory requirements of Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Materials, Equipment, and Services," of Appendix B to 10 CFR Part 50.

The inspectors also selected a sample of POs, associated approved supplier list entries, and other related TR documents for evaluation.

b. Observations and Findings

Section 4, "Procurement Document Control," and Section 7, "Control of Purchased Items and Services," of the TR Energy Products Nuclear QAM describes the processes and controls established to ensure purchased items and services meet applicable technical and quality requirements. QMP-1006, "Purchasing," and QMP-1017, "Quality Audits," detail the TR procurement processes and qualification of approved suppliers. As required by these procedures, suppliers were evaluated during procurement and applicable requirements were passed down to TR suppliers through purchase orders.

The inspectors noted that the technical requirements of TR purchase requisitions (PRs) automatically transferred to related POs through the Oracle system and were issued to suppliers. The inspectors confirmed that technical requirements of PRs were transferred to the relevant POs without modification or amendment. The inspectors found that all supplier qualification was conducted by TR survey or by evaluation of Nuclear Industry Assessment Committee (NIAC) audit. The inspectors found that the lead auditor and supply chain personnel were knowledgeable of supplier control and purchasing control procedures and appropriately implemented TR purchasing requirements.

c. Conclusions

With the exception of Nonconformance 99900060/2012-201-02 and Nonconformance 99900060/2012-201-03 outlined in Section 1 of this report, the NRC inspection team determined that TR has established a program that adequately controls procurement of equipment and services in accordance with the regulatory requirements of Criterion IV and VII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and personnel interviewed, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing. The inspection team identified no findings of significance.

4. Special Processes

a. Inspection Scope

The NRC inspection team reviewed special process control procedures, a sample of welding and nondestructive examination (NDE) records, and observed in-process welding and liquid penetrant inspection (LPI) activities to determine if TR special process controls complied with the regulatory requirements of Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50.

b. Observations and Findings

Section 9, "Control of Processes," of the TR Energy Products Nuclear QAM describes the procedure qualification requirements, personnel qualification requirements, and programmatic controls that ensure special processes meet Section III and Section IX of the ASME Code and other regulatory requirements. TRP-7265, "Control of Special Processes Welding and Hardsurfacing," provides the detailed requirements and responsibilities for implementation of welding and hardsurfacing processes. TRP-1689, "Liquid Penetrant Inspection Procedure," and TRP-2297, "Liquid Penetrant Acceptance Criteria," provide detailed requirements on LPI inspection procedures and acceptance criteria.

The inspectors verified that the special processes were properly controlled in accordance with TR requirements by interviewing NDE and welding personnel, observing in-process LPI for a 1-inch solenoid valve body, and observing in-process hardsurfacing for a 6-inch by 10-inch relief valve main disk and for a main seat 1-inch solenoid valve. The inspectors verified that the welders were using the appropriate welding procedures, were cognizant of the prerequisite setup requirements, and had established setup conditions (amperage, voltage, deposition rate, pre-heat conditions) consistent with requirements. The inspectors verified that all measurement equipment,

such as contact pyrometers, were within current calibration schedule and capable of measuring within the required temperature range.

In addition, the inspectors verified, by review of a sample of qualification and certification documentation for personnel performing LPI, that NDE personnel met the requirements of SNT-TC-1A, which is the recommended guideline of ASME Code, Section III, Subsection NX-5521. Also, the inspectors verified that a sample of Shin-Kori project welders and those welders observed during this inspection were properly qualified in accordance with requirements of Section III and Section IX of the ASME Code.

c. Conclusions

The NRC inspection team determined that TR has established a program that adequately controls special processes in accordance with the regulatory requirements of Criterion IX of Appendix B to 10 CFR Part 50. Based on the limited sample of records reviewed and on the observation of in-process special processes, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing. The inspection team identified no findings of significance.

5. Inspection

a. Inspection Scope

The NRC inspection team reviewed inspection policies and procedures to determine if TR's controls were in compliance with the regulatory requirements of Criterion X, "Inspection," of Appendix B to 10 CFR Part 50. In addition, the inspectors discussed the inspection program with TR inspection personnel responsible for implementation, reviewed documented results of final inspections, and observed inspections performed as part of the ongoing nuclear-related fabrication activities, including receiving, receipt-inspection, and in-process inspections, to verify inspection program implementation.

b. Observations and Findings

Receiving

The NRC inspection team evaluated QMP-1015, which describes the process for performance of receiving activities at TR including: receipt of incoming shipments; performance of initial review of package documentation to verify the purchase was consistent with PO information retrieved from the Oracle Enterprise Resource Program (ERP) system; review for obvious shipping damage; and verification of the quality of the items received. The procedure also documents the process for creating the receipt traveler, which is attached to the item and then staged in the QA storage rack area.

The NRC inspection team verified through observation the receipt of several items, including PO No. 37696, "Piston Rings," and PO No. 37204, "Machined Bar Stock," that the material handler was performing activities in accordance with QMP-1015. These activities include review of packaging documentation, confirmation of the PO information, review for any obvious damage, verification of the quantity received, and generation of the receipt traveler.

In-Process and Final Inspection

The NRC inspection team evaluated QMP-1010, "Inspection and Testing," which describes the various inspection and testing activities that TR personnel performed in support of the commercial nuclear product fabrication. The inspectors confirmed that the procedure included pertinent information that clearly identified and controlled the production activities at the inspection workstations including: inspection requirements and acceptance criteria hold points, planning, sampling, in-process inspection, final inspections, rework inspection requirements, and recording.

The inspectors evaluated several in-process inspection activities and documents including: (1) a bonnet assembly for a 2-inch solenoid valve, which included verification of required dimensional measurements; (2) manufacturing and inspection (M&I) checklist for a 2-inch solenoid valve; (3) M&I checklist for a 2-inch 900 pound fail-open solenoid valve; and (4) inspection of a reed switch assembly. The inspectors observed the TR QC inspector using various M&TE during the inspections, and confirmed that the QC inspector was knowledgeable about the proper use and configuration of each instrument. The inspectors verified that the production documentation described all major machining and inspection activities from receipt of raw material to shipping of finished product, and included required customer and authorized nuclear inspector hold or witness points.

The inspectors also evaluated final acceptance inspection report TR form 2A 6/09 and inspection attribute sheet TR form 2A, and confirmed that the QC inspector generated the attribute sheet in accordance with the requirements of QMP-1010. The inspectors verified that the QC personnel used the applicable CCAV and design drawings to generate the attribute sheets; the final inspection report was generated in accordance with the requirements specified in Addendum 2, "Inspection Report," of QMP-1010; and QC personnel recorded data appropriately.

The inspectors also reviewed a sample of inspection-related nonconformance reports (NCRs) and verified that the QC inspectors were knowledgeable about the NCR process for inspection-identified anomalies.

Qualification of QC Inspectors

The NRC inspection team evaluated training and qualification requirements for quality control inspection personnel as defined in QMP-1018, "Training." The inspectors verified that the procedure described methods to qualify and certify personnel who perform inspections and testing activities. The NRC inspectors also sampled several QC inspector qualification records and confirmed completion of required training.

c. Conclusions

The NRC inspection team determined that TR has established a program that adequately controls inspection activities in accordance with the regulatory requirements of Criterion X, "Inspection," of Appendix B to 10 CFR Part 50. Based on the limited sample of inspection activities observed and documents reviewed, the inspectors determined that TR is effectively implementing its inspection programs in support of safety-related valve manufacturing. The inspection team identified no findings of significance.

6. Test Control

a. Inspection Scope

The NRC inspection team reviewed test procedures, a sample of test records, and observed in-process test activities with an emphasis on the 1-inch solenoid valve to determine if TR test controls were in compliance with the regulatory requirements of Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50.

b. Observations and Findings

The NRC inspection team evaluated QMP-1010, "Inspection and Testing," which describes the various inspection and testing activities that TR personnel performed in support of the commercial nuclear product fabrication. The inspectors confirmed that the procedure clearly identifies and controls testing associated with safety-related valve production.

The inspectors observed and interviewed TR test personnel during all static and functional tests for a 1-inch solenoid valve, and compared the observed testing activities to the related test procedures. Testing for the 1-inch solenoid valve was selected because it is common to both the Korean and United States (U.S.) operating fleets, and is considered representative of similar tests for solenoid valves of other sizes. The inspectors noted that all tests were manually controlled, and the test technician recorded and interpreted results at the time of the test. The inspectors found that the test personnel were knowledgeable about the testing procedures and their testing activities appropriately implemented TR test control requirements. Additionally, the inspectors verified that test technician qualification documentation met TR requirements for the observed testing.

A sample of completed 1-inch and 1.5-inch solenoid valve test documentation was selected for verification. The inspectors established that the format and content of the test documentation was representative of other completed test reports, that a qualified test technician appropriately recorded required test data, and the test documentation met QMP-1010 requirements.

c. Conclusions

The NRC inspection team determined that TR has established a program that adequately controls testing in accordance with the regulatory requirements of Criterion XI of Appendix B to 10 CFR Part 50. Based on the limited sample of test activities observed and documents reviewed, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing. The inspection team identified no findings of significance.

7. Nonconformance and Corrective Action

a. Inspection Scope

The NRC inspection team reviewed nonconformance and corrective action programs, related procedures, a sample of NCRs and CARs for the U.S. and Korean projects, and interviewed related QA personnel to determine whether TR is in conformance with the

regulatory requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50.

The inspection team also reviewed TR's process to control nonconformance to ensure a connection to the 10 CFR Part 21, "Reporting of Defects and Noncompliance," reporting procedures.

b. Observations and Findings

The NRC inspection team verified the TR procedures for nonconformance control includes identification, segregation, documentation, disposition processes, and is connected to the TR corrective action program for valve manufacturing. The inspectors selected seven NCRs and six CARs for U.S. and Korean projects for review to verify the proper implementation of requirements.

The inspectors noted that TR has issued about 1,500 NCRs per year for hardware-related deviations, most of the NCRs were raised during receipt and in-process inspections, and TR appropriately disposed of the nonconformance samples evaluated.

Additionally, the inspector verified that a sample of CARs related to customer returned items were evaluated appropriately for 10 CFR Part 21 reporting.

c. Conclusions

The NRC inspection team determined that TR has established a program that adequately controls nonconforming items and corrective actions in accordance with the regulatory requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. Based on the sample of documents reviewed, the inspectors determined that TR is effectively implementing these control processes in support of safety-related valve manufacturing. The inspection team identified no findings of significance.

8. Measuring and Test Equipment

a. Inspection Scope

The NRC inspection team reviewed M&TE policies and procedures to determine if TR's controls were in compliance with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. In addition, the inspectors verified the implementation of M&TE control through direct observation of inspection activities of TR personnel and review of certificates of calibration for a sample of M&TE.

b. Observations and Findings

The NRC inspection team evaluated a sample of M&TE and related documentation, including two pressure gauges used to perform hydro and nitrogen leak-rate testing on a 1-inch solenoid valve, the calibration of a dead weight tester, and instruments used during inspection activities. The inspectors confirmed the instruments were calibrated and appropriate for the range of operation for each inspection activity.

The inspectors evaluated TR's calibration frequency for common items listed in QMP-1011, section 5.2.4.6, "Frequency of Calibration Intervals," and discussed the basis for the calibration frequency with TR personnel. The inspectors confirmed that the calibration frequency was based on original equipment manufacturer recommended standards, operational experience, and frequency of use.

The inspectors evaluated a sample of calibration discrepancy reports and verified that information, including instrument identification, description of out of tolerance condition, method of discovery, period of use, and determination if there was an impact on other products, was recorded. The inspectors verified that all required information was recorded on the sampled reports.

Additionally, TR's supplier calibration services oversight process was evaluated. Specifically, the inspectors reviewed calibration laboratory accreditation documentation and confirmed that the accreditation covered the ranges of parametric values for which these devices were used during testing. The inspectors confirmed traceability to National Institute of Standards and Technology calibration standards and that all test and inspection equipment used for the observed inspection and test activities were controlled, documented, and current for calibration requirements.

c. Conclusions

The NRC inspection team determined that TR has established a program that adequately controls calibration and use of M&TE in accordance with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Based on the limited sample of calibration and measurement activities observed and documents reviewed, the inspectors determined that TR is effectively implementing its M&TE program in support of safety-related valve manufacturing. The inspection team identified no findings of significance.

9. Entrance and Exit Meetings

On September 10, 2012, the inspectors presented the inspection scope during an entrance meeting with Mr. James D. White, TR General Manager, and other TR personnel. On September 14, 2012, the inspectors presented the inspection results during an exit meeting with Mr. Steve Pauly, TR Vice President–Energy Products, and other TR personnel.

ATTACHMENT

1. Persons Contacted and NRC Staff Involved:

| Name | Title | Affiliation | Entrance | Exit | Interviewed |
|------------------|-------------------------------------|-------------|----------|------|-------------|
| James D. White | General Manager | Target Rock | X | | |
| Steve Pauly | Vice President – Energy Products | Target Rock | | X | |
| Bill Brunet | Director, QA | Target Rock | X | X | |
| Michael Cinque | Director of Program Management | Target Rock | X | X | |
| Michael Grant | Director, Operations | Target Rock | X | | |
| Lisa King | Director, HR | Target Rock | X | X | |
| John DeBonis | QA Manager | Target Rock | X | X | X |
| William Meehan | Supplier QA Manager | Target Rock | X | X | X |
| Alex Dimeo | Engineering Manager | Target Rock | X | X | X |
| Steve Suntzenich | Production Control Manager | Target Rock | X | X | |
| Ed Bradshaw | Energy Products Program Manager | Target Rock | X | X | |
| Dave Bryan | QA Engineer | Target Rock | X | X | X |
| Denise DelPino | Senior HR Generalist | Target Rock | X | X | |
| Robert Frole | Consultant | Target Rock | X | X | X |
| Mark McCain | Assembly & Test Manager | Target Rock | X | | X |
| Joseph Simonetti | Energy Products Project Engineer | Target Rock | X | | |
| Brian Maher | QC Manager | Target Rock | | X | |
| James Chappina | Welder | Target Rock | | | X |
| Johnathan Brown | Welding Engineer | Target Rock | | | X |
| Hugo Zunino | Assembly Supervisor | Target Rock | | | X |
| Dave Crayton | Test Technician | Target Rock | | | X |
| Adam Scheiber | Inspection Supervisor | Target Rock | | | X |
| Nick Campanelli | Senior Manager, Defense Engineering | Target Rock | | | X |

| Name | Title | Affiliation | Entrance | Exit | Interviewed |
|---------------------|---|-------------|----------|------|-------------|
| Kevin Cordle | Electro/Mechanical Engineer | Target Rock | | | X |
| Sandy Castelli | Welding Supervisor | Target Rock | | | X |
| Elizabeth LoPiccolo | 1 st Class Dimensional Inspector | Target Rock | | | X |
| Manual Ortiz | 1 st Class Dimensional Inspector | Target Rock | | | X |
| Christopher Gregg | Metallurgy Laboratory Technician | Target Rock | | | X |
| Brian Zatkowski | Inspection Supervisor | Target Rock | | | X |
| Jim Baccoli | Supply Chain Manager | Target Rock | | | X |
| Hwan-Yong Yu | Deputy General Manager of PM | Doosan | X | X | |
| Moon-Taek Lim | QA Manager | Doosan | X | X | |
| Richard Rasmussen | Branch Chief, CEVB | NRC | X | X | |
| George Lipscomb | Inspection Team Leader | NRC | X | X | |
| Greg Galletti | Inspection Team Member | NRC | X | X | |
| Raju Patel | Inspection Team Member | NRC | X | X | |
| Myung-Mo Jung | Inspection Team Member | KINS | X | X | |
| Hong-Key Kim | Inspection Team Member | KINS | X | X | |

2. Inspection Procedures Used:

IP 43002, "Routine Inspections of Nuclear Vendors"

IP 43004, "Inspection of Commercial-Grade Dedication Programs"

3. Items Opened, Closed, And Discussed:

| <u>Item Number</u> | <u>Status</u> | <u>Type</u> | <u>Description</u> |
|----------------------|---------------|-------------|-----------------------|
| 99900060/2007-201-01 | Closed | NON | App. B, Criterion VII |
| 99900060/2012-201-01 | Opened | NON | App. B, Criterion III |
| 99900060/2012-201-02 | Opened | NON | App. B, Criterion VII |
| 99900060/2012-201-03 | Opened | NON | App. B, Criterion VII |

4. **Documents Reviewed:**

Quality Management Procedures

QMP-1001, "Index to Quality Management System Procedures," Revision E, December 3, 2007

QMP-1004, "Design Control," Revision E, October 19, 2007

QMP-1006, "Purchasing," Revision G, June 2, 2011

QMP-1007, "Control of Customer Supplied Product," Revision E, April 12, 2010

QMP-1010, "Inspection and Testing," Revision G, May 25, 2010

QMP-1011, Form 2, "Calibration Discrepancy Report," Revision B, April 13, 2012

QMP-1012, "Inspection and Test Status," Revision B, November 30, 2005

QMP-1013, "Control of Nonconforming Product," Revision K, March 2, 2011

QMP-1014, "Corrective and Preventive Action," Revision G, April 17, 2012

QMP-1015, "Material Handling, Storage, Packaging, Preservation, and Delivery," Revision G, May 15, 2012

QMP-1017, "Quality Audits," Revision G, April 18, 2012

QMP-1018, "Training," Revision C, December 10, 2009

QMP-1023, "Energy Products Nuclear Quality Assurance Manual, Edition 9," Revision 1, March 16, 2012

QCP-1007, "X-Ray Fluorescence Spectroscopy Alloy Identify Testing," Revision B, April 30, 2009

QCP-1010, "Supplier Certification Review & Raw Material Verification," Revision D, June 26, 2012

QCP 1012, "Preferred Supplier Inspection Program," Revision A, September 27, 2011

QCP-1013, "Material Approval Control," Revision A, November 11, 2010

Manufacturing/Testing Procedures

A&T-001, "Organization and Operation of the Assembly and Test Department," Revision C, June 24, 2011

TRP-1689, "Liquid Penetrant Inspection Procedure," Revision N, November 1, 2004

TRP-1899, "Production Test Procedure Model 76HH-001 thru -023 Solenoid Valve Assemblies and Models 83AQ-001, 85Z-530-001, 85Z-562-001, 84Z-129-001, and 85Z-577-001," Revision S, Project No. 76HH, July 29, 2011

TRP-2001, "Hardware Cleanliness and Control of Detrimental Materials," Revision P, October 20, 2005

TRP-2036, "Indoctrination and Orientation Engineering Department," Revision N, April 13, 2005

TRP-2297, "Liquid Penetrant Acceptance Criteria," Revision N, April 19, 2005

TRP-5041, "Dedication Requirements for Commercial Grade Items," Revision S, August 23, 2012

TRP-5087, "Sample Inspection Procedure," Revision E, July 19, 2001

TRP-5134, "Generic Elastomer Identity Test," Revision A, March 21, 1995

TRP-5823, "Shrink/Interference Fit Assembly Procedure," Revision C, February 21, 2005

TRP-7265, "Control of Special Processes Welding and Hardsurfacing," Revision F, January 15, 2010

TRP-8009, "Work Instructions for Assembly and Test, Assembly/Sub-Assembly Welding, and Model Shop," Revision C, September 13, 2011

Assembly/Test Records

Model 76HH-004BB, S/N-71&72, Project C-11Z501, "1.5 inch Solenoid Operated Valve," completed March 19, 2012

Model 76HH-007BB, S/N-4&5, Project C-10Z528, "1 inch Solenoid Operated Valve," completed November 16, 2011

Model 76HH-007BB, S/N-6, Project 76HH, "TRP-1899, Revision S - Test Data Sheet," in-process (undated)

Model 76HH-007BB, "TR Assembly Operation Sheet – Routing," June 1, 2012

WO#212924, "Job Traveler and Routing Sheet," printed August 17, 2012

Design Documents

Report No, 8338, "Design Report for Solenoid Operated Globe Valve Code Class 2 or 3," Revision 1, November 5, 2010

Report No, 8347, "Environmental Qualification and Dynamic Report for the Target Rock Project 07Q Nuclear Service Process Solenoid Operated Globe Valves," Revision 1, November 5, 2010

TR drawing No. 100656, "Ring-Piston," Revision 5, May 26, 2005

TR drawing No. 102993, "Wire: Kapton," March 25, 1982

TR drawing No. 200372, "Switch Pressure Actuated," Revision F, September 6, 2002

TR drawing No. 200463, "Diaphragm," Revision I, June 2, 1977

TR drawing No. 205674, "Terminal Block," Revision E, October 14, 2003

TR drawing No. 206321, "Reed Switch Assembly," June 6, 2007

Nonconformance Documents

NCR No. 4422, "Seat crack," May 7, 2012

NCR No. 3989, "Part dimpled 5 times," February 21, 2012

NCR No. 4565, "10 degree F over," May 31, 2012

NCR No. 4800, "Dimension tolerance," July 15, 2012

NCR No. 4950, "LPI per 1689 req. linears in threads," August 17, 2012

NCR No. 4824, "Features omitted," July 19, 2012

NCR No. 5100, "Diaphragm dimension tolerance (bead)," September 11, 2012

Corrective Action Documents

Trend Analysis Report (2011), February 29, 2012

Trend Analysis Report (2010), February 25, 2011

QMP 1014 Corrective Action Request Log Year 2011 and 2012

CAR No. 11-001, "Farris relief valve tag #3-451-v-0657, #3-451-v-0705 were surface corrosion and rust," January 10, 2011

CAR No. 11-079, "Incorrect painting requirements were passed down to the supplier resulting in 12 valves were having to be returned to vendor for requirements," December 1, 2011

CAR No. 11-080, "Several valves have been issued by PC and built by AYT using travelers and metal tags taps which reference unit 4 tag numbers instead of unit 3," December 1, 2011

CAR No. 12-009, "Pilot body assembly dimension problem," February 17, 2012

CAR No. 12-048, "Burn in test results for PO 37029 P/N 30098-2 do not meet PRS 08-25 para 9.1.4.b acceptance criteria," June 20, 2012

CAR No. 12-048, "Load testing related TR witness matters," June 20, 2012

CAR No. 12-063, "Terminal Block P/N 205674-2," September 12, 2012

PR-066, "Problem Report for Embrittled Buna-N Thread Seals," December 4, 2010

Procurement Documents

Supplier Audit Report No. 12-04-03 for Scott Forge Co, December 4, 2003.

Supplier Audit Report No. 12-05-04 for Nova Machine Products Co, December 5, 2004

Supplier Audit Report No. 11-10-01 for Scott McWilliams Forge Inc, November 10, 2001

Supplier Audit Report No. 09-09-06 for Pacific Piston Ring Co. Inc, September 9, 2006

Supplier Audit Report No. 11-10-03 for Kropp Forge Inc, November 10, 2003

Current Supplier Audit and Surveillance Schedule, September 10, 2012

PO No. 24894 to McWilliams Forge Inc. for Set-up Forging (carbon Steel), June 5, 2009

PO No. 31564-1 to Kropp Forge Co. for 18" Body Forging, January 5, 2010

PO No. 31658-0, to Certified Service Company for Calibration of (14) Granite Surface Plates, January 21, 2010

PO No. 32179 to Nova Machine Products Co. for Studs, April 21, 2010

PO No. 34374-0, to Parker Hannifin Corporation Advance Products for O-Rings, P/N 354-0175, Revision 0, January 21, 2011

PO No. 35132-0, to Baron Consulting Co Inc. for Material Composition of non-metallic potting RTV 511, "Silicone by Infrared Spectroscopy Analysis for P/N 206321-1 S/N 0017," April 20, 2011

PO No. 36879 to Gred Suth Co. for Spring Retainer, January 26, 2012

PO No. 37096 to Larry Walker Co. for SLV, February 21, 2012

PO No. 37472-1, to Hermetic Switch Inc for Reed Switch Assembly P/N 205321-1, April 10, 2012

PO No. 37488-0, to Pacific Piston Ring Inc. for Expander Ring P/N 104225-1, Revision B," April 11, 2012

PO No. 37827-0, to Nutley Equipment Repair, Inc. for calibration service for Light Meter, June 6, 2012

PO No. 37851 and PR No. 51527 to Kropp Forge Inc. for 4" Body Forging, June 11, 2012

PO No. 38019 and PR No. 51478 to Pacific Piston Ring Co. Inc. for Ring Piston (SS17), July 7, 2012

PO No. 38283 to Nova Machine Products Co. for Bar, August 28, 2012

PRS 07-16, "Procurement Specification for Calibration Services," Revision 1, May 8, 2012

PRS 08-25, "Procurement Specification for Solenoid Assemblies and Coil Assemblies," Revision C, July 3, 2012

PRS 08-28, "Procurement Specification for Calibration Grade Items for Commercial Nuclear Applications," Revision B, August 9, 2011

PRS 91-24, "Procurement Specification for Terminal Blocks," Revision 3, March 18, 1998

Calibration Certificates and Records

"Vernier Calipers," S/N 00407, September 11, 2012

"Granite Surface Plate," S/N 00543, calibrated by Certified Service Company, February 6, 2012

"Weksler Pressure Gage," S/N TR 0757-M, September 11, 2012

"Light Meter," S/N 5146, calibrated by Nutley Equipment Repair, Inc., June 12, 2012

"MCS Calibration Inc. Digital Thermometer," S/N 6087, December 5, 2011

"Intri-Micrometer," S/N 6334, September 11, 2012

"Surface Plate," S/N 6453, calibrated by Certified Service Company, February 15, 2012

"Radius Gage Set," S/N 7075, September 11, 2012

"Digital Caliper," S/N 7162, September 11, 2012

“Digital thermometer,” S/N 7176, calibrated by MCS Calibration Inc’s August 7, 2012

“Dimensional Blocks,” S/N 7830, September 11, 2012

“Light Meter,” S/N 7848, calibrated by Nutley Equipment Repair, Inc., June 13, 2012

Commercial Grade Survey Reports

Supplier Survey Report No 09-09-6 of Pacific Piston Ring Company, Inc., issued September 23, 2009.

Supplier Survey Report No. 09-10-1 of Precision Rings, Inc., issued October 6, 2009.

Supplier Survey Report No. 11-0301 of HIS Sensing/Hermetic Switch Inc, a supplier of sensors and switch, issued March 1, 2011

Supplier Survey Report No. 11-05-1 of Marsh-Bellofram Corporation, issued May 14, 2011

Supplier Survey Report No. 12-04-1 of Stonite Coil Corporation, issued May 15, 2012

Supplier Audit Evaluation of NIAC Audit No. 09-03 of Nutley Equipment Repair, Inc., issued September 30, 2009

Commercial Grade Dedication Documents

TR TERI 010 – “Technical Evaluation of Replacement Item – Terminal Block (General),” Revision A, November 5, 1990

“Receipt Traveler with Receipt Inspection for Expansion Ring, P/N 104225-1, Revision B, August 31, 2012

“Receipt Traveler with Receipt Inspection for Diaphragm, P/N 200463-1, Revision 1,” August 17, 2012

“Receipt traveler with Receipt inspection for Reed Switch Assembly,” Revision 1, August 23, 2012

“CCAV form for Ring (Piston, Seal, Wear, Expander- Metallic),” Revision F, July 11, 1996

“CCAV form No 200372-1 for Switch, Pressure Actuated,” Revision C, May 5, 2011

“Addendum 1 “Design Based Critical Characteristics to CCAV form No 200372-1 for Switch, Pressure Actuated,” Revision A, September 8, 1992

“CCAV form No. 205674, 205675, and 205676 for Terminal Block,” Revision E, March 28, 2008

"CCAV form No.200463-1 for Diaphragm," Revision C, November 2, 1999

"CCAV form for Reed Switch Assembly," Revision L, October 7, 2002

"Addendum 1 "Design Based Critical Characteristics to CCAV No.200463-1 for Diaphragm," Revision B, June 30, 1994

"Final Acceptance Inspection Report for Expander Ring, P/N 104225-1, for Project No. C-10Q," September 12, 2012

"Final Acceptance Inspection Report for Solenoid Assembly P/N 300983-1 S/N 983 – 995," April 3, 2011

"Inspection Attribute Sheet for Diaphragm, P/N 200463-1, for Project No. C-10sk03-30," September 11, 2012

"Inspection Attribute Sheet for Expander Ring, P/N 104225-1, for Project No. C-10Q, September 11, 2012

"Inspection Attribute Sheet for Reed Switch Assembly, for Project No. C-110," September 10, 2012

"TR Certificate No. 12-2280 for certificate of compliance from Beyond Components for Terminal Block P/N 205674-2, for Molding Batch No. K6267-26, on PO No. 37845-" September 4, 2012

"TR Certificate No. 12-2259 for certificate of compliance from Pacific Piston Ring for Expander Rings P/N 104225-1 Revision B, on PO No. 37488-1," August 31, 2012

Certificate of Conformance for Pressure Actuated Switch P/N 200372-1, S/N 421-445, procured from Custom Control Sensors Inc., September 30, 2010

"Certified Service Company of Ohio, LLC, Laboratory Accreditation Certification No. L1054-1," accreditation through January 16, 2015

Miscellaneous Documents

"Certificate of Qualification – Dave Crayton," February 11, 2010

"Certificate of Qualification – James Conerford," September 30, 2011

"Certificate of Qualification – Ron Squire," January 16, 2012

5. **Acronyms Used:**

| | |
|-------|--|
| ADAMS | Agencywide Documents Access and Management System |
| ASME | American Society of Mechanical Engineers |
| CAEB | Construction Assessment & Enforcement Branch |
| CAR | Corrective Action Request |
| CCAV | Critical Characteristic Attribute Verification |
| CEVB | Electrical Vendor Branch |
| CFR | <i>Code of Federal Regulations</i> |
| CGD | Commercial-Grade Dedication |
| CMVB | Mechanical Vendor Branch |
| COC | Certificate of Conformance |
| DCIP | Division of Construction Inspection and Operational Programs |
| ERP | Enterprise Resource Program |
| FEMA | Failure Modes and Effect Analysis |
| ILAC | International Laboratory Accreditation Program |
| IP | Inspection Procedure |
| KINS | Korean Institute of Nuclear Safety |
| LPI | Liquid Penetrant Inspection |
| M&I | Manufacturing and Inspection |
| M&TE | Measuring and Test Equipment |
| MDEP | Multinational Design Evaluation Program |
| NCR | Nonconformance Reports |
| NDE | Nondestructive Examination |
| NIAC | Nuclear Industry Assessment Committee |
| NIST | National Institute of Standards and Technology |
| NON | Notice of Nonconformance |
| NRC | (U.S.) Nuclear Regulatory Commission |
| NRO | Office of New Reactors |
| OEM | Original Equipment Manufacturer |
| PO | Purchase Order |
| PR | Purchase Requisition |
| QA | Quality Assurance |
| QAM | Quality Assurance Manual |
| QC | Quality Control |
| QMP | Quality Manual Procedure |
| TERI | Technical Evaluation for Replacement Item |
| TR | Target Rock |
| TRP | TR Procedure Report |
| U.S. | United States (of America) |