

September 11, 2007

MEMORANDUM TO: Glenn M. Tracy, Director  
Division of Construction Inspection and Operational Programs  
Office of New Reactors

THRU: Juan D. Peralta, Chief  
Quality and Vendor Branch 1  
Division of Construction Inspection and Operational Programs  
Office of New Reactors

FROM: Kerri A. Kavanagh, Senior Reactor Engineer */RA/*  
Quality and Vendor Branch 1  
Division of Construction Inspection and Operational Programs  
Office of New Reactors

SUBJECT: TRIP REPORT BY DIVISION OF CONSTRUCTION INSPECTION AND  
OPERATIONAL PROGRAMS STAFF OF THE NUCLEAR  
PROCUREMENT ISSUES COMMITTEE AUDIT AT CAMERON  
MEASUREMENT SYSTEMS

On August 6-10, 2007, Kerri Kavanagh and Andres DuBouchet of the Division of Construction Inspection and Operational Programs (DCIP), NRO, and Kerby Scales of Division of Engineering (DE), NRR, observed the performance of a Nuclear Procurement Issues Committee (NUPIC) joint utility audit conducted at Cameron Measurement Systems located in City of Industry, California. The purpose of the observation was to assess the NUPIC quality assurance audit process used for suppliers of components to the nuclear industry. The DCIP and DE staff also provided clarification on issues related to NRC regulations. Attached is the trip report of the NRC staff's observations and a list of the persons contacted during the trip.

Enclosure: As stated

CONTACT: Kerri Kavanagh, DCIP/CQVP  
301-415-3743

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## **NRC TRIP REPORT**

### **Subject**

This trip report documents observations by members of the Nuclear Regulatory Commission (NRC) Office of New Reactors (NRO), Division of Construction Inspection and Operational Programs (DCIP) and Nuclear Reactor Regulation (NRR), Division of Engineering (DE) of a Nuclear Procurement Issues Committee (NUPIC) joint utility audit.

### **Dates of Travel and Organization Visited**

August 6-10, 2007  
Cameron Measurement Systems  
City of Industry, California

### **Author, Title and Agency Affiliation**

Kerri A. Kavanagh, Team Leader  
Senior Reactor Engineer  
Quality and Vendor Branch 1  
Division of Construction Inspection and Operational Programs  
Office of New Reactors

### **Sensitivity**

There were no documents removed from the facility during the conduct of the audit. This document is available to the public (ADAMS Accession # ML072480675).

### **Background/Purpose**

NUPIC was formed in 1989 by a partnership involving all domestic and several international nuclear utilities. The NUPIC program evaluates suppliers furnishing safety-related components and services and commercial grade items to U.S. nuclear utilities.

This trip report documents the staff's assessment of a NUPIC joint utility audit conducted at Cameron Measurement Systems on August 6-10, 2007. Cameron Measurement Systems (Cameron), formerly PRIME Measurement Products, Barton Instrument Systems, and ITT Barton, designs, manufactures, and distributes measurement and control sensors and subsystems to U.S. nuclear utilities in accordance with Appendix B to 10 CFR Part 50 and 10 CFR Part 21 requirements. On March 23, 2007, Cameron acquired the range of products and intellectual assets of PRIME Measurement Products. At the time of the NUPIC audit, Cameron had approximately 75 nuclear safety-related orders "on hold" pending the results of the NUPIC audit.

The purpose of the staff's observation of NUPIC audits is to verify the effectiveness of the NUPIC joint utility audit process. In addition, the NRC staff piloted draft NRC Inspection Procedure (IP) 43005, "NRC Oversight of Third-Party Organizations Implementing Quality Assurance Requirements." This draft inspection procedure documents the NRC staff's direct observation of third-party organizations' independent oversight activities to qualify vendors and

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directs the NRC staff to verify that the vendor has established and implemented an adequate system for evaluating deviations and reporting of defects and noncompliance in accordance with 10 CFR Part 21 requirements. The results of the staff's inspection of Cameron's implementation of 10 CFR Part 21 requirements is documented in an NRC letter to Cameron dated September 28, 2007 (ADAMS Accession # ML072640456).

The NRC conducted an inspection of PRIME Measurement Products on July 25 - 27, 2006 (NRC inspection report number 09991360/2006-201), which resulted in two nonconformances of Appendix B to 10 CFR Part 50 and one notice of violation (NOV) of 10 CFR Part 21. As part of the staff's current inspection, the staff evaluated Cameron's implementation of corrective actions related to the NOV.

## **Discussion**

The NUPIC audit scope was to determine the acceptability and verify the effective implementation of Cameron's quality assurance program in accordance with the requirements of Appendix B to 10 CFR Part 50. The NUPIC audit team utilized the NUPIC audit checklist for this audit, which is essentially divided into the 18 criteria of Appendix B. This checklist was supplemented by American Society of Mechanical Engineers, American National Standards Institute and other recognized consensus standards relevant to the supplier being audited. The NUPIC audit checklist can be downloaded from the NUPIC web site ([www.nupic.com](http://www.nupic.com)).

The performance-based NUPIC checklist was used by the audit team to assess the adequacy and effectiveness of Cameron's quality program. The audit checklist delineated the activities to be examined within each section and how to utilize the referenced data sheets to record the objective evidence reviewed for each section. The review included an analysis of Cameron's order entry process, an examination of design, software QA, procurement and material controls associated with specific utility orders, and field (shop) observations of fabrication, assembly, special processes, tests, and inspection activities. Also, the NUPIC audit team completed a review of calibration of measuring and test equipment, handling, storage, and shipping activities.

A Performance Based Supplemental Audit (PBSA) worksheet was also used by the technical specialist and an audit team member to 1) review the physical characteristics and mechanical and electrical attributes of models of pressure and differential pressure transmitters, switches, indicators, and sensors, 2) review the environmental/seismic qualification report, 3) review shelf life controls, and 4) review 10 CFR Part 21 implementation. The PBSA worksheets were specific to Cameron-supplied transmitters, indicators, and switches. The review of Cameron's implementation of 10 CFR Part 21 was performed since the next revision of the NUPIC checklist, which has been approved by the membership, will incorporate this review.

The NRC staff observed all aspects of the NUPIC team's conduct of the audit at the Cameron facility including participating in a meeting held the day before the audit commenced to go over details of the audit and all audit expectations. For observance of the conduct of the audit, the NRC staff divided the audit checklist review areas among three staff members. The staff then observed the auditors as they conducted a performance-based review of a specific audit checklist section. The staff observed how documents were selected for review and interviews conducted of Cameron technical personnel, and observed on-going work and testing activities in the Cameron facility. The staff also observed the daily audit team meetings, the daily debrief with Cameron personnel, and the formal exit meeting with Cameron management.

The NUPIC audit team included six utility auditors and a technical specialist. The seven-person NUPIC audit team included representatives from Ameren AU (Callaway), PPL Susquehanna, First Energy (FENOC - Beaver Valley), Florida Power and Light (FP&L - Seabrook), and Ergytech Iberdrola (Spain). The checklist sections were divided among the audit team members, with one of the three Ameren AU auditors functioning as the audit team lead. In addition to the generic audit checklist, the NUPIC audit team focused on design controls for software verification and validation, proper use of measuring and test equipment, and welding activities.

The audit team reviewed Cameron's QA manual and other lower tier implementing documents such as procedures and work instructions. The audit was performed by reviewing the requirements of the QA program and supporting implementing procedures, evaluating the documentation associated with the activities that had been performed, and discussing the activities with Cameron personnel. Observations of ongoing work and inspection activities were also performed.

All NUPIC audit team members were observed by the staff in part or in whole on their portion of the audit conducted. Specific areas of the checklist that the staff focused on for review were adequately addressed by members of the audit team. In general, the audit team performed a sound, thorough, performance-based review of the audited areas.

At the exit meeting, the NUPIC audit team identified numerous nonconformances with Cameron's quality program and regulatory requirements that resulted in fifteen potential audit findings and an Immediate Notification of Significant Condition to all NUPIC member utilities. Eleven of the potential findings were determined by the audit team to be significant, some of which are repeat occurrences of deficiencies identified during the 2005 NUPIC audit. The significant deficiencies in Cameron's implementation of its quality program controls affected design control, including design changes, corrective action, supplier evaluation, document control, training/qualification, quality assurance records, and 10 CFR Part 21 program requirements. The NUPIC audit report was not issued at the time of this trip report.

The audit team's Immediate Notification of Significant Condition at the conclusion of the audit informed the NUPIC membership that Cameron's 10 CFR Part 21 implementation of its quality assurance program did not meet the requirements of Appendix B to 10 CFR Part 50. In addition, it stated that the audit team determined that the nuclear safety-related orders should remain on hold pending Cameron's written response to the fifteen Requests for Corrective Action (RCA). It was the opinion of the NUPIC audit team that source surveillances would not be effective given the nature of some of the identified deficiencies.

One of the significant deficiencies identified by the NUPIC audit team was related to the environmental qualified, quick-disconnect connectors supplied by Scientech EGS. These connectors were procured from Scientech EGS as basic components but Cameron (PRIME) did not have Scientech EGS listed on their approved supplier list nor had Scientech EGS been audited by Cameron (PRIME). The majority of these connectors were supplied to Westinghouse and six were supplied directly to US nuclear utilities. The use of the Scientech EGS connectors was the basis for the corrective actions cited by Cameron in their response to the Notice of Nonconformance (NON) in NRC inspection report number 09991360/2006-201. Inspection report number 99901360/2006-201 stated that PRIME (Cameron) manufactured pressure and

differential pressure transmitter connector assemblies supplied to NRC licensees for use in applications that required components to be environmentally qualified in accordance with 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants" requirements without appropriate documented manufacturing instructions or quality control inspection criteria (NON 99901360/2006-201-01); and PRIME (Cameron) had not demonstrated the environmental qualification for Barton Model 763, 763A, and 764 transmitter connector assemblies without heat-shrink sleeving over the individual external lead wires extending into the epoxy potting material (NON 99901360/2006-201-02). This deficiency was documented in one of the RCAs by the NUPIC audit team.

### **Conclusions**

The NUPIC audit team leader conducted effective daily briefings with the audit team and Cameron on issues and potential findings. These daily briefings enhanced the audit team's understanding of issues and findings and provided an effective feedback mechanism from experienced audit team members on the significance of individual team findings. The staff noted that the NUPIC team leader was effective at communicating findings to Cameron's management. The auditors supported their findings with comprehensive, objective evidence and with sufficient depth in their respective areas of focus. Based on the review of the audit areas covered, the staff concluded that the NUPIC audit process was effectively implemented by the audit team and resulted in sound performance-based findings for Cameron's failure to adequately implement its QA program requirements.

### **Pending Actions/Planned Next Steps for NRC**

This NRC observation was the second of at least three planned during 2007. This oversight process is documented in draft IP 43005. Minor revisions of draft IP 43005 and its associated inspection manual chapter may be required based on this NUPIC observation/NRC Part 21 inspection. Depending on the adequacy of Cameron's response to the NUPIC RCAs, the staff may conduct a follow-up inspection. In addition, the staff plans to attend the October 9 -11, 2007, NUPIC meeting to discuss staff observations of the Cameron audit and to better understand the industry's long-term responses to the issues identified at Cameron.

### **Points for Commission Consideration/Items of Interest**

None.

### **List of Meeting Participants**

#### **U.S. NRC**

Kerri Kavanagh  
Andres DuBouchet  
Kerby Scales

#### **Position**

Team Leader, Senior Reactor Engineer  
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Operations Engineer

#### **NUPIC**

Earl Mayhorn  
Joe Macel  
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**Cameron**

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