

February 25, 2016

Mr. Chuck Rogers, Director of Quality & Safety  
Cameron Measurement Systems  
4040 Capitol Avenue  
City of Industry, CA 90601

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION OF  
CAMERON MEASUREMENT SYSTEMS REPORT NO. 99901370/2016-201

Dear Mr. Rogers:

On February 1 to February 4, 2016, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Cameron Measurement Systems (Cameron) facility in City of Industry, CA. The purpose of the limited-scope inspection was to assess Cameron'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," and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

This technically-focused inspection specifically evaluated Cameron's implementation of quality activities associated with the fabrication, design, testing, and commercial-grade-dedication (CGD) activities for safety-related switches and pressure transducers supplied to U.S. operating nuclear power plants. The enclosed report presents the results of this inspection. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance (QA) or 10 CFR Part 21 programs.

Within the scope of this inspection, no violations or nonconformances were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible 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 is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of

information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information).

Sincerely,

*/RA/*

Terry Jackson, Branch Chief  
Quality Vendor Inspection Branch-1  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Docket No.: 99901370

Enclosure:  
Inspection Report 99901370/2016-201  
and Attachment

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).

Sincerely,

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Quality Vendor Inspection Branch-1  
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and Attachment

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Chuck.Rogers@c-a-m.com

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<b>OFFICE</b>	NRO/DCIP/QVIB-1	NRO/DCIP/QVIB-1	NRO/DCIP/QVIB-1
<b>NAME</b>	EHuang	GLipscomb	JJimenez
<b>DATE</b>	02/24/16	02/23/16	02/23/16
<b>OFFICE</b>	NRO/DCIP/QVIB-1	NRO/DCIP/QVIB-1	
<b>NAME</b>	NSavwoir	TJackson	
<b>DATE</b>	02/19/16	02/25/16	

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

Docket No.: 99901370

Report No.: 99901370/2016-201

Vendor: Cameron Measurement Systems  
4040 Capitol Avenue  
City of Industry, CA 90601

Vendor Contact: Mr. Clayton Timbs, Quality Manager  
Clayton.Timbs@c-a-m.com  
(562) 321-9183

Nuclear Industry Activity: Cameron Measurement System designs, manufactures, and distributes measurement and control instrumentation and dedicates indicators, switches and electric pressure transducers for the operating reactor fleet. Cameron Measurement Systems, is located in City of Industry, CA.

Inspection Dates: February 1, 2016 - February 4, 2016

Inspectors: Eugene Huang NRC/NRO/DCIP/QVIB-1  
George Lipscomb NRC/NRO/DCIP/QVIB-1  
Jose Jimenez NRC/NRO/DCIP/QVIB-1  
Nicholas Savwoir NRC/NRO/DCIP/QVIB-1

Approved by: Terry Jackson, Chief  
Quality Vendor Inspection Branch-1  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Enclosure

## **EXECUTIVE SUMMARY**

Cameron Industries Inc.  
99901370/2016-201

The U.S. Nuclear Regulatory Commission (NRC) conducted a vendor inspection to verify Cameron Measurement Systems (hereafter referred to as Cameron) implemented an adequate quality assurance (QA) program that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

This technically-focused inspection evaluated Cameron's implementation of quality activities associated with the fabrication, design and commercial grade dedication (CGD) of safety-related switches, indicators, electronic transmitters, and other measurement and control instrumentation for operational U.S. commercial nuclear power plants. In addition to observing implementation of quality-affecting activities, the NRC inspection team evaluated completed documentation relating to receipt and in-process inspections, special processes, problem resolution and reporting, manufacturing controls, test controls, control of measuring and test equipment (M&TE), and design control, including effects on component qualification.

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"; IP 43004, "Inspection of Commercial-Grade Dedication Programs"; and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance."

The information below summarizes the results of this inspection.

### **10 CFR Part 21 Program Implementation**

The NRC inspection team issued unresolved item (URI) 99901370/2016-201-01 pending Cameron's full evaluation on design differences between Cameron's current Model 580A differential pressure switch and the legacy Barton Model 580A, which may have potential 10 CFR Part 21 reportability. The NRC inspection concluded that other than the above URI, Cameron has established a defect and noncompliance reporting program in accordance with the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its 10 CFR Part 21 reporting program.

### Commercial Grade Dedication

The NRC inspection team concluded that Cameron established CGD activities in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, which are supported by the CGD definitions in 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its CGD program. No findings of significance were identified.

### Design Control

The NRC inspection team concluded that Cameron has established a design control program in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with design change control and its effect on equipment qualification. No findings of significance were identified.

### Manufacturing Control / Control of Special Processes

The NRC inspection team concluded that Cameron established a manufacturing process and special processes activities in accordance with the regulatory requirements of Criterion V, "Instructions, Procedures, and Drawings," Criterion IX, "Special Processes," and Criterion X, "Inspections," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its manufacturing and special processes activities. No findings of significance were identified.

### Inspections and Test Control

The NRC inspection team concluded that Cameron has established inspections and test control in accordance with the regulatory requirements of Criterion X, "Inspections" and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with inspections and test control. No findings of significance were identified.

### Nonconformance Control and Corrective Action Program

The NRC inspection team concluded that Cameron has established nonconformance and corrective action programs in accordance with the regulatory requirements of Criterion XV, "Nonconforming Material, Parts and Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its nonconformance and corrective action programs. No findings of significance were identified.

### Control of Purchased Material, Equipment, and Services

The NRC inspection team determined that the implementation of Cameron's programs for governing the oversight of contracted activities to verify compliance was consistent with the requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. Based on the limited sample of activities observed and documents reviewed, the inspectors also determined that Cameron is implementing its policies and procedures associated with purchased materials, equipment and services. No findings of significance were identified.

### Control of Measuring and Test Equipment (M&TE)

The NRC inspectors concluded that Cameron 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 activities observed and documents reviewed, the inspectors also determined that Cameron is implementing its policies and procedures associated with measuring and test equipment. No findings of significance were identified.

## REPORT DETAILS

### 1. 10 CFR Part 21 Program Implementation

#### a. Inspection Scope

The NRC inspection team reviewed Cameron's policies and implementing procedures that govern compliance with the requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance." The inspectors evaluated Cameron's 10 CFR Part 21 procedure regarding evaluation and reporting timeframes, 10 CFR Part 21 records retention policy, and that corrective action procedures provide a link to the 10 CFR Part 21 program. The NRC inspection team also verified the content of Cameron's 10 CFR Part 21 posting, and that a sample of Cameron deviation evaluations met the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation."

The inspectors also sampled 10 CFR Part 21 notifications related to safety-related sub-components, changes in the availability of dedicated sub-components, and the modification of printed circuit boards (PCBs) during assembly, to assess effect of these notifications and modifications on system design and qualification. The sample included QualTech/EGS connectors, Honeywell micro-switches, and NUS PCBs.

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

#### b. Observations and Findings

The NRC inspection team identified that during an engineering evaluation that was used to support a 10 CFR Part 21 evaluation, Cameron identified differences during a troubleshooting breakdown of their current Cameron Model 580A differential pressure switch and a legacy Barton Model 580A differential pressure switch. Out of the differences, Cameron noted that the legacy Barton model bellows valve seat contained four vent grooves while the current Cameron model only contained three. Cameron performed a historical review and verified that the design drawings always required three vent grooves. However, it appears that there was an undetermined time period where Barton machined their own parts and the tooling at the time used a device that cut four grooves rather than three. The NRC inspection team questioned why Cameron did not perform an engineering evaluation to determine whether the difference would affect any design or qualification assumptions, but there was no available supporting documentation. Additionally, Cameron was unsure of what other product lines used the machine at the time and whether there was a past engineering evaluation or operating experience that necessitated the use of four grooves over three and if design drawings should have been updated to reflect that.

The NRC is issuing an unresolved item (URI) pending Cameron's full evaluation and potential impact on any applicable qualification reports and product models during the time period where Barton machined their own parts and used a tool that cut four vent grooves in the bellows valve seat. The evaluation should encompass all other affected models and configurations in addition to the Cameron Model 580A that was identified. Additionally, the evaluation should also determine if there was an engineering reason behind the usage of the legacy tool that may have been attributed to failures in operating



experience or another reason where the affected qualification reports and design drawings should have been changed from three vent grooves to four.

This has been identified as URI 99901370/2016-201-01.

c. Conclusions

The NRC inspection team issued URI 99901370/2016-201-01, pending Cameron's full evaluation on the design differences between Cameron's current Model 580A differential pressure switch and the legacy Barton Model 580A. The NRC inspection concluded that other than the above URI, Cameron has established a defect and noncompliance reporting program in accordance with the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its 10 CFR Part 21 reporting program.

**2. Commercial-Grade Dedication Program**

a. Inspection Scope

The NRC inspection team reviewed Cameron's CGD policies and procedures to verify compliance with Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, which is supported by the CGD definitions in 10 CFR Part 21, and Criterion VII, "Control of Purchased Materials, Equipment, and Services." In addition, the NRC inspection team reviewed a sample of dedication packages and ensured that qualification requirements were being verified for the following qualified models: Q1 Structural and/or pressure boundary only qualifications (some variations of the Models 200A, 227A, 288A & 289A); Q2 Mild environment full functional qualification (Models 752, 753 and 768B); Q3 Radiation augmented mild environment full functional qualification (Models 200A, 227A, 288A & 289A); Q4 Limited harsh environment full functional qualification (Models 580A & 581A); and Q5 Harsh environment full functional qualification (Models 351, 352, 353, 763A & 764 & 768A). The sample of completed documentation included evaluation of management reviews, drawings, and determination of critical characteristics, technical evaluations, and selection of methods of acceptance.

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

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that Cameron established CGD activities in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, which are supported by the CGD definitions in 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its CGD program. No findings of significance were identified.

### **3. Design Control**

#### **a. Inspection Scope**

The NRC inspection team reviewed Cameron's policies and implementing procedures that govern design control to verify compliance with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team specifically evaluated control of design changes, conformance to customer purchase order (PO) requirements, and the effect of other QA processes on component design. The main emphasis was an assessment of the effect of various design control activities on equipment qualification.

The samples reviewed included Model 752B PCB changes, a Model 580A switch actuator modification, and Model 763 / 764 PCB component changes. Additionally POs from Dominion, Exelon, First Energy, and Entergy, for Model 288 and 289 switches were reviewed to verify adherence of select portions of equipment qualification to customer requirements and if that was reflected in Cameron's certification documentation.

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

#### **b. Observations and Findings**

No findings of significance were identified.

#### **c. Conclusions**

The NRC inspection team concluded that Cameron has established a design control program in accordance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with design change control and its effect on equipment qualification. No findings of significance were identified.

### **4. Manufacturing Control / Control of Special Processes**

#### **a. Inspection Scope**

The NRC inspection team reviewed policies and procedures associated with a selection of manufacturing control and special processes for safety-related sensors and pressure switches to verify compliance with Criterion V, "Instructions, Procedures, and Drawings," and Criterion IX, "Special Processes," of Appendix B to 10 CFR Part 50. The selection included a review of processes for hand tools, soft soldering differential pressure (DP) switch components, assembly of cables, circuit board and calibration of sensors and switches, in-process inspection of circuit boards and component sensors, maintenance records, and training and qualification records.

The NRC inspection team reviewed and observed assembly of various Models 580, 581A, and 583 switches, 752 and 764 electronic transmitters, and various additional components including string gages. The NRC inspection team specifically assessed Cameron's in-process inspection of circuit boards and sensors used in the assembly of

these pressure switches to verify no potential failures modes associated with proper circuit board solder application. Also, the NRC inspection team reviewed Cameron's manufacturing procedures for the pressure sensor and XMTR torque specifications, calculation of bellows spring rates for Model 752 & 764 Electronic Transmitters, and the training and qualification records for the individuals designated as qualified to assemble the different components of the pressure sensors and transmitters.

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

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that Cameron established a manufacturing process and special processes activities in accordance with the regulatory requirements of Criterion V, "Instructions, Procedures, and Drawings," Criterion IX, "Special Processes," and Criterion X, "Inspections," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its manufacturing and special processes activities. No findings of significance were identified.

**5. Inspections and Test Control**

a. Inspection Scope

The NRC inspection team reviewed Cameron's test control policies and procedures to verify compliance with Criterion X, "Inspections," and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. In addition, the NRC inspection team observed a sample of Cameron's inspection activities ranging from visual electrical receipt inspections to dimensional mechanical receipt inspections. The NRC inspection team verified implementation of Cameron's test control by sampling final acceptance testing packages and by witnessing the final calibration of the safety-related Models 580 and 581 pressure switches. Inspection samples included verification of checklists, qualification of personnel, dates, tables, signatures, reviews by authorized personnel, inspection requirements, acceptance criteria and results as compared to PO's and procedural requirements. Test control samples included verification of objectives, requirements, prerequisites and acceptance criteria based on designs and technical documents. In addition, the NRC inspection team verified the final testing of the pressure switch assembly which included the string gage calibration and verification process that was independently performed by electrical technicians and QA inspectors to verify it complied with the design requirements stated by the POs. The attachment to this inspection report lists the individuals interviewed and documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that Cameron has established inspections and test control in accordance with the regulatory requirements of Criterion X and Criterion XI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with inspections and test control. No findings of significance were identified.

**6. Nonconformance Control and Corrective Action Program (CAP)**

a. Inspection Scope

The NRC inspection team reviewed Cameron's policies and implementing procedures that govern the nonconformance and corrective action programs to verify compliance with the requirements of Criterion XV, "Nonconforming Material, Parts and Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50.

The NRC inspection team discussed the nonconformance and corrective action programs with Cameron staff and reviewed a sample of nonconformances and corrective action reports for appropriate evaluation and disposition. In addition, the NRC inspection team verified that both programs provided a connection to the 10 CFR Part 21 program.

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

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that Cameron has established nonconformance and corrective action programs in accordance with the regulatory requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with its nonconformance and corrective action programs. No findings of significance were identified.

**7. Control of Purchased Materials, Equipment, and Services**

a. Inspection Scope

The NRC inspection team reviewed Cameron's policies and procedures in compliance with Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed samples from

Cameron's "Supplier CGI Survey and 10CFR50 Audit" and "Surveyed Supplier List" to ensure suppliers were qualified and approved. The NRC inspection team verified Cameron implemented provisions in their quality plans to verify the capabilities of their suppliers. Specifically, the NRC inspection team verified that applicable quality requirements, including technical, regulatory, and reporting requirements, were specified in the procurement documents and that these were reviewed and extended to lower-tier suppliers when necessary.

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

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that Cameron is implementing Control of Purchased Material, Equipment, and Services program in accordance with the regulatory requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated control of purchased material, equipment, and services. No findings of significance were identified.

**8. Control of Measuring and Test Equipment (M&TE)**

a. Inspection Scope

The NRC inspection team reviewed M&TE policies and procedures to determine if Cameron's was in compliance with Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspection team verified the implementation of M&TE control through direct observation of Cameron activities and samples of M&TE. Specifically, the NRC inspection team verified calibration of various items ranging from thread gauge sets to ovens used during environmental testing. The NRC inspection team also sampled multiple gauges used for hydro testing along with frequently used tig and resistance welder monitoring equipment. The NRC inspection team reviewed calibrated alloy sources and samples of certificates to ensure that they were traceable to nationally recognized standards. The NRC inspection team also selected samples to verify Cameron M&TE was calibrated and appropriate for the range of operation for each described activity.

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

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The NRC inspection team concluded that Cameron has established control of M&TE in accordance with the regulatory requirements of Criterion XII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Cameron is implementing its policies and procedures associated with controlling M&TE. No findings of significance were identified.

**9. Entrance and Exit Meetings**

On February 1, 2016, the NRC inspection team discussed the scope of the inspection during an entrance meeting with Mr. Manny Gonzalez, Plant Manager, and other members of Cameron management and technical staff. On February 4, 2016, the NRC inspection team presented the inspection results and observations during an on-site exit meeting with Mr. Manny Gonzalez, Plant Manager, and other members of Cameron management and technical staff. The attachment to this report lists the attendees at the entrance and exit meetings, as well as those individuals whom the NRC inspection team interviewed.

## ATTACHMENT

### 1. ENTRANCE/EXIT MEETING ATTENDEES

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
Manny Gonzalez	Plant Manager	Cameron	X	X	
Clayton Timbs	QA Manager	Cameron	X	X	X
Adam McCartney	QA Auditor	Cameron	X	X	X
Arif Ozer	Manufacturing Manager	Cameron	X	X	X
Thomas Kunkel	Materials Manager	Cameron	X		
Michael Graves	Engineer, Nuclear Products	Cameron	X	X	X
Tom Roidie	Manufacturing Engineer	Cameron	X	X	X
Jim Geer	Engineering Manager	Cameron	X	X	X
Matty Ongchangco	QA Engineer	Cameron	X	X	X
Mark Larson	Principal Engineer	Cameron		X	X
Chuck Rogers	Director QA	Cameron		X	
Mabel Loo	Inside Sales Manager	Cameron	X	X	X
Barbara Hamilton	Lead Inspector	Cameron			X
Caesar Westerhout	Receipt Inspector	Cameron			X
Sharon Shepard	Welder	Cameron			X
Daniel Ibarra	Lead Technician	Cameron			X
Adam Mendoza	Assembly Technician	Cameron			X
Carl Christopherson	Inspection Technician	Cameron			X
Sandra Zuniga	Welder	Cameron			X
Francisco Hernandez	Welder	Cameron			X
Margarito Toldeo	Welder	Cameron			X
Irene Lara	String Gage Operator	Cameron			X
Sandra Chavez	Welder	Cameron			X

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
Elva Segura	QA Inspector	Cameron			X
Eugene Huang	Team Lead	NRC	X	X	
George Lipscomb	Inspector	NRC	X	X	
Jose Jimenez	Inspector	NRC	X	X	
Nicholas Savvoir	Inspector	NRC	X	X	

**2. INSPECTION PROCEDURES USED**

IP 43002, "Routine Inspections of Nuclear Vendors"

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

IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance"

**3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

<b><u>Item Number</u></b>	<b><u>STATUS</u></b>	<b><u>TYPE</u></b>	<b><u>ITAAC</u></b>	<b><u>DESCRIPTION</u></b>
99901370/2016-201-01	Open	URI	N/A	Unresolved Item



#### **4. LIST OF ACRONYMS USED**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Documents Access and Management System
CAP	corrective action program
CAR	corrective action request
COC	Certificate of Conformance
CGD	commercial-grade dedication
CGDP	Commercial Grade Dedication Plan
CGDS	Commercial Grade Dedication Survey
CPAR	Corrective / Preventive Action Request
DP	differential pressure
ECN	Engineering Change Notice
EO	Engineering Order
IP	inspection procedure
M&TE	measuring and test equipment
NIST	National Institute of Standards and Technology
NON	Notice of Nonconformance
NRC	Nuclear Regulatory Commission
PCB	printed circuit board
PN	part number
PO	purchase order
QA	quality assurance
QDC	Quick Disconnect Connector
QMS	Quality Management System
RG	NRC Regulatory Guide
SPDT	Sub Miniature Basic Switch
S/N	serial number
XMTR	transmitter

#### **5. DOCUMENTS REVIEWED**

##### Procedures and Work Instructions

NQPM-200, "Nuclear Quality Program Manual," Revision 6, dated April 11, 2013

NQSP-21, "Reporting of Defects and Noncompliance per 10 CFR Part 21," Revision 14, dated March 2, 2015

QSP-15, "Control of Nonconforming Items," Revision 8, dated March 2, 2015

QSP-16, "Corrective and Preventive Action," Revision 5, dated March 2, 2015

QSP-04 "Process Control" Revision 7, dated March 31, 2015

QSP-12 "Control of Measuring and Test Equipment" Revision 7, dated March 2, 2015

QSP-722 "Contract Review" Revision 3, dated March 2, 2015

QP-066023 Revision 4, dated July 18, 2009

MSD-001, "Design Control Authority," Revision 6, dated October 11, 2010  
MSD-002, "Engineering Design Planning," Revision 3, dated April 18, 2008  
MSD-003, "Product Realization Procedure," Revision 7, dated October 31, 2009  
MSD-004, "System Realization Procedure," Revision 9, dated November 10, 2011  
MSD-005, "Design Document Format," Revision 8, dated November 10, 2009  
MSD-006, "Design Document Control," Revision 4, dated July 11, 2008  
MSD-007, "Nameplate Design," Revision 1, dated July 13, 2006  
MSD-008, "Material Classification," Revision 4, dated November 6, 2009  
MSD-009, "Engineering Work Request," Revision 7, dated March 8, 2010  
NEN-03-01, "Configuration Control for Nuclear Qualified Product," Revision 3, dated January 27, 2016  
NQSP-07 "Commercial Grade Dedication," Revision 06, dated March 2, 2015  
9A-C9999-34105 "Commercial Grade Item Dedication Plan All Nuclear Models," Revision 12, dated March 26, 2012

Corrective Action Reports (CARs)

CAR 210026671, dated November 14, 2013  
CAR 210032474, dated January 22, 2014  
CAR 210044121, dated May 27, 2014  
CAR 210046707, dated June 24, 2014  
CAR 210049337, dated July 17, 2014  
CAR 210046954, dated June 26, 2014  
CAR 210107908, dated September 21, 2015  
CAR 210036595, dated March 5, 2014

CAR 210036966, dated March 20, 2014

CAR 210076543, dated February 4, 2015

CAR 210126043, dated February 3, 2016

CAR 210126154, dated February 4, 2016

CAR 210047538, dated July 3, 2014

CAR 210030935, dated January 7, 2014

CAR 210126041, dated February 3, 2016

Nonconformance Reports

NCR 210118371, dated December 1, 2015

NCR 21021170, dated December 21, 2015

NCR 210085750, dated April 9, 2015

NCR 210062986, dated October 22, 2014

NCR 210062983, dated October 22, 2014

NCR 210047538, dated July 3, 2014

NCR 210042989, dated May 15, 2014

NCR 210041017, dated April 23, 2014

NCR 210036577, dated March 5, 2014

NCR 210037308, dated March 13, 2014

NCR 210036371, dated March 3, 2014

NCR 210025586, dated November 4, 2013

NCR 210025762, dated November 5, 2013

NCR 210025632, dated November 4, 2013

NCR 210023750, dated October 16, 2013

## Engineering Reports and Change Notices

9A-CR1-224-123, "Engineering Report on DTE model 580A failure analysis," dated January 15, 2014

50277300-C-0012491, "Engineering Report DETA model 580A Failure Analysis," dated February 24, 2015

50277300-C-0012591, "Engineering Report Testing to demonstrate improvement in under range O-ring dislodgement issues for DTE," dated October 5, 2015

ECN-4653841, dated August 4, 2014

ECN 9A-CS961-0042C, dated February 18, 2014

ECN 2775226, "M752B Circuit Board Design," dated July 10, 2013

ECN 4566561, "M580A Switch Actuator Pivot Modification," dated October 15, 2013

ECN 4674206, "Add RG 1.180 capacitors filters," dated October 10, 2014

ECN 4693152, "Initial Release – RG 1.180- 763/764 Qual," dated December 19, 2014

EO 30610, "Material Change on Terminal Block and Connector Strip," dated March 4, 1997

EO 33422, "Resistor Change," dated January 8, 2002

9A-CR1-580A-22 "Radiation and Thermal Aging to Establish FTIR Baselines for the Model 580 Series Product Parts" Revision 01, dated May 20, 2011

## Purchase Orders

Dominion PO 4500224344 for (1) Barton 288A Switch for North Anna Plant, Change Order 1, dated June 10, 2015

Exelon PO 00478106 for (1) Indicating DP Switch for Braidwood plant, Revision 1, dated August 5, 2011

Exelon PO 00478106 for (1) Indicating DP Switch for Braidwood plant, Revision 0, dated August 4, 2011

First Energy PO 45344573 for (10) Cameron P/N 288A-28633 for Perry Plant, Change Order 4, dated December 16, 2011

Authorization for Certification of Qualification for Cameron Order 2891582 – Model 288A, dated June 9, 2015

Authorization for Certification of Qualification for Cameron Order 2096155 – Model 289A, dated October 17, 2011

Certification of Generic Qualification for Exelon PO 00478106, Revision 1, dated March 15, 2012

Environmental Qualification Certification for Dominion PO 4500224344, dated November 6, 2015

Certification of Generic Qualification for First Energy PO 45344573, Change Order 4, dated January 11, 2012

Quotation US18/CC01/1259094 for Dominion, dated May 22, 2015

Entergy PO 10286936 for (7) 289A Pressure Switches for Waterford 3 Plant, Revision 2, dated August 30, 2011

Cameron PO 4510338928, Vishay Sfernice: "Potentiometer manufacture", dated July 1, 2015

Cameron PO 4510856568, California Laser: "Laser welding of bellow", dated January 19, 2015

Cameron PO 4510404522, Element: "Alloy source calibration", dated July 14, 2014

Cameron PO 4510386016 Key Stone Compliance: "EMC testing", CGD performed on January 3, 2013

DTE GAS CO. PO 2777404, dated September 30, 2015

Westinghouse PO 2891402 "763A Gauge Pressure Transmitter", dated May 4, 2015

Union Electric Co PO 2810978 "Model 764 Transmitter", dated November 20, 2014

Alabama Power Co (Southern Co.) PO 3304360 "Model 764 Transmitter", dated February 16, 2015

Material Number 9A-C752X352-00003, Revision 01

Sales Order 2777404 for 9A-C580A-000059A "580A-0 DP Indicating Switch Low Switch"

Sales Order 2096155 for 9A-C289A-000008A "289A DP Indicating Switch"

Sales Order 2891582 for 50277306-C-0011301 "288A DP Indicating Switch"

### Drawings

9A-C0224-09058, "Seat valve 1 5/8 O.D. bellows," Revision 29, dated April 10, 2013

9A-C0224-09058, "Seat valve 1 5/8 O.D. bellows," Revision 30, dated August 1, 2014

9A-CS961-0042C, "Mounting Plate, 200A, SST," Revision 3

9A-C0199-14768, "Bracket Shock & Seismic," Revision 5

9A-C0764-1304B, "EGS Quick Disconnect Connector (QDC)," Revision 3, dated February 14, 2008

9A-C0068-1096T, "Sub Miniature Basic Switch (SPDT) 11SM428," Revision 6, dated June 20, 1995

9A-C0068-1140T, "Switch, Snap-Acting SPDT," Revision 9, dated December 21, 1994

9A-C0068-1140T, "Switch, Snap-Acting SPDT," Revision 1, dated September 20, 1985

9A-C0764-11561, "Circuit Board Assy 764-763," Revision 29, dated November 19, 1998

9A-C0764-13192, "Procedure, Circuit Board Capacitor Filter Assembly 764/763," Revision 2, dated October 8, 2014

9A-C0764-1317B, "Assy, Fliter Capacitor Left '+'," Revision 2, dated October 7, 2014

9A-C0205-00161 "Bellows Assembly", Revision 6, January 21, 2002

C9999-10142, Revision 8, July 18, 2008

9A-C0251-0047C "Actuator plate (left)" Certificate of Alloy Verification: XL3t-39627, dated January 25, 2011

9A-C0764-12021 "Elec. XMTRSTD & Rev (M764 Lot 5 and Up) Revision 15

9A-C0764-1043C "Beam, Model 764 (Polished)" Revision 03, dated July 30, 1999

#### Manufacturing, Qualification and Test Documentation

Test Report R3-288A-13, "Qualification Verification for ITT Barton Models 288A and 289A Differential Pressure Indicating Series," Revision 0, dated September 25, 1986

Test Report 9A-CR3-764-91, "M763A & M764 RG 1.180 Qualification Test Report," Revision 1, dated November 11, 2014

Environmental Qualification Certification for Entergy PO 10286936, Revision 2, dated December 14, 2012

SPC 9A-C0752-11782 "Assembly, Calibration, & Component procedure, 752 & 753" Revision 18, dated June 28, 2008

SPC 9A-C9999-10112 "Eng. Instruction: Class II Cleaning, DPU," Revision 17 dated, February 1984

SPC 9A-C0350-10282 "Sensor and XMTR Torque Specifications" Revision 06

SPC-9A-C0351-10862 "Sensor Assemblies, Typical" Revision 05

SPC-9A-C9999-33292 "Eng. Instruction: Fill Procedure for Seal System" Revision 05

SPC-9A-C9999-33922 "Eng. Instruction, Cal Source Accuracy REQT" Revision 01

SPC-9A-C0764-12532 "Assembly, Test, & Calibration. Procedure, M764" Revision 21, dated February 21, 2008

SPC-9A-C0764-12772 "Model 764 DPU Stress Relief Cycling" Revision 02, dated May 21, 1997

SPC-9A-C0764-11412 "Eng. Instruction: 764 Basic XMTR Assembly" Revision 14, dated August 14, 1995

SPC-9A-C0764-11432 "Eng. Procedure: Filling Bellows Units Assembly" Revision 09, dated November 24, 1998

SPC-9A-C9999-30312 "Soft Soldering & Workmanship Standards" Revision 05, dated March 1972

SPC-9A-C9999-31722 "Procedure for Calculation of Bellows Spring Rates for Model 752 & 764 Electronic Transmitters" Revision 03, dated June 12, 1995

QV-10-01 "QA Work Instruction" Revision 4, dated October 14, 2013

SPC-9A-C0331-10232 "Scribing, Glass" Revision 05, dated October 9, 1995

SPC-9A-C0331-10312 "Bonding, Glass to Beam" Revision 05, dated July 9, 1999

SPC-9A-C0331-10322 "Bonding, Gage to Glass" Revision 05, dated May 23, 1972

SPC-9A-C0331-10212 "Cleaning, Beam, Glass and Gage" Revision 05, dated May 23, 1972

SPC-9A-C0331-10272 "Acceptance Test Procedure, Strain Gage Beam Assemblies" Revision 12, dated June 10, 2002

SPC-9A-C0764-11262 "Beam Assembly Instruction, M764" Revision 03, dated September 1, 1995

9A-C9999-32092 "Hydrostatic Pressure Testing of Differential Pressure, Gauge Pressure, Absolute Pressure Instruments & Components" Revision 18, dated January 20, 2009

9A-C0580-11022 "Calibration Procedure: Models 580, 581 & 583, All Series" Revision 09, dated November 8, 2010

9A-C9999-34092 "Wire Resistance Test" Revision 03, dated February 1, 2012

9A-CDS-0044 "Barton Model 580A/581A DP Switches Calibration and Electrical & Pressure Testing" Revision 02, dated June 8, 2015

## Molecular Bonded Strain Gage Beam Assembly

- C0764-1020B beam 57081 dated March 19, 2015
- C0764-1020B beam 57212 dated October 15, 2015
- C0764-1020B beam 57200 dated October 15, 2015
- C0764-1020B beam 57199 dated October 15, 2015
- C0764-1020B beam 57208 dated October 15, 2015

## Commercial Grade Dedication Surveys (CGDS), Audits, Certificates

CGDS: Vishay Sfernice COI-VEN-070115-MO, dated July 1, 2015

CGDS: California Laser Inc. COI-VEN-011915-MO, dated January 19, 2015

CGDS: Electron Plating III Inc. COI-VEN-121715-MO, dated December 17, 2015

CGDS: eMT Electronic Manufacturing Tech. LLC COI-VEN-022414-MO, dated February 24, 2014

CGDS: Miyachi COI-VEN-040413-CG, dated April 4, 2013

CGDS: Sterigenics COI-CGS-10-4, dated January 22, 2010

CGDS: Key Stone Compliance COI-VEN-010313-AM, dated January 3, 2013

AUDIT: Scientech Nuclear Division Curtis Wright COI-VEN-011215-AM, dated January 12, 2015

AUDIT: Qual Tech, Curtis Wright COI-VEN-071514-AM, dated July 15, 2015

Cert: Nadcap Certificate- Aerospace Quality Systems Cert #7514163441 exp. October 31, 2018

Cert: Nadcap Certificate- Chemical Processing Cert #7514158482 exp. April 30, 2017

Cert: ASNT as NDT Level III- Liquid Penetrant and Magnetic Particle Testing Cert #101048 exp. March 2018

9A-C-0030-1024T – Fanning Strip, dated November 3, 2015

9A-C-0764-1204C – Plate, dated December 4, 2015

9A-C-0224-0245C – Torque tube shaft, dated September 25, 2015

9A-C-0273-0001C – Bracket, dated November 19, 2015

9A-CS408-0045Z – Spring Calibration, dated January 15, 2016



9A-C0251-0046C – Actuator Plate Right, dated January 23, 2016

9A-C0199-0268C – Stiffener Plate, dated January 21, 2016

9A-C0199-0263C – Stud Valve Stem, dated January 21, 2016

9A-C0012-3012T – Wire 18 AWG, dated August 29, 2013

9A-C0038-1175T – Terminal Lug, dated October 7, 2015

9A-C0707-1124H – Strip 316L SST, dated August 10, 2015

9A-C022A-0139C – Bellows Stem, dated April 7, 2014

Miscellaneous Documents

RMA 300042418, dated, November 12, 2013

Field Performance Report notification for Detroit Edison – Fermi, dated January 8, 2015

Inspection report for 9A-CS961-0042C, “Mounting Plate”, Revision 3, dated March 10, 2014

SAP Printout, “ECN 4566561,” dated February 1, 2016