January 21, 2016

Mr. Michael Byram, Quality Assurance Manager
Canberra Industries Inc.
800 Research Parkway
Meriden, CT 06450

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION OF CANBERRA INDUSTRIES INC. REPORT NO. 99901461/2015-201, AND NOTICE OF NONCONFORMANCE

Dear Mr. Byram:

On November 2 to November 6, 2015, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Canberra Industries Inc. (hereafter referred to as Canberra) facility in Meriden, Connecticut. The purpose of the limited-scope inspection was to assess Canberra'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 Canberra's implementation of quality activities associated with the fabrication, design, testing, and commercial-grade-dedication (CGD) activities for the radiation monitoring systems and safety-related systems supplied to U.S. operating 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.

Based on the results of this inspection, the NRC staff determined that the implementation of your QA program did not meet certain NRC requirements imposed on you by your customer or NRC licensees in the areas of design control and control of special processes. Specifically, (1) Canberra failed to adequately dedicate the use of commercial supplier TUV for services that support safety-related qualification activities; and (2) failed to ensure that several purchase orders (POs) were adequately dedicated and reviewed for appropriate qualification as required by the POs. Additionally, in the area of the control of special processes, Canberra failed to adequately measure the temperature of the solder pot in the Mann Corporation Model AE-400DS wave soldering machine (WSM), which affects solder quality being applied to circuit boards in safety-related radiation monitoring systems currently shipped to Canberra customers. Finally, the NRC staff identified that Canberra did not have a documented cyber security program in place that could meet applicable purchase order requirements on several purchase orders, however since the cyber rule 10 CFR 73.54 is not yet required to be fully implemented, there is no regulatory deficiency at this time. Due to the NRC's inspection being a limited sample and based on the prevalence and significance of dedication findings, it is expected that Canberra will perform and document a thorough extent of condition to evaluate for similar dedication deficiencies related to all shipped safety-related product.

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

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/

Greg Galletti, Acting Chief
Electrical Vendor Inspection Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99901461

Enclosures:
1. Notice of Nonconformance
2. Inspection Report 99901461/2015-201
   and Attachment

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

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DATE	01/14/16	01/21/16	01/14/16	01/21/16

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Letter to Michael Byram from Greg Galletti dated January 21, 2016

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION OF CANBERRA INDUSTRIES INC. REPORT NO. 99901461/2015-201, AND NOTICE OF NONCONFORMANCE

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NOTICE OF NONCONFORMANCE

Canberra Industries Inc.
800 Research Parkway
Meriden, CT 06450

Docket No.: 99901461
Report Number 2015-201

Based on the results of a Nuclear Regulatory Commission (NRC) inspection conducted at Canberra Industries Inc. (hereafter referred to as Canberra) facility in Meriden, CT, on November 2, 2015, through November 6, 2015, certain activities were not conducted in accordance with NRC requirements which were contractually imposed on Canberra by NRC licensees:

A. Criterion III, "Design Control," of Appendix B to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 states, in part, that "Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components."

   Canberra procedure, M07-0-2, "Commercial Grade Dedication Plan Process," Revision G, section 6.7.5, states, "Commercial grade items designated for installation or installed in seismically or environmentally qualified equipment or in locations which require such qualification shall include the selection of appropriate critical characteristics and possible dedication of the service required to maintain the qualification of the component or equipment."

   Contrary to the above, as of November 6, 2015, Canberra failed to establish adequate measures for the selection and review for suitability for purchase order (PO) 00185091, for a CAM skid manual flow control mod kit, PO 00185167, for a time delay relay, and PO 00191479, for an electrical AC motor pump. Specifically, POs 00185091, 00185167, and 00191479 are essential to the safety-related functions of the structures, systems and components and Canberra failed to identify and verify all the appropriate critical characteristics for these POs and failed to ensure that the components met/enveloped the applicable qualification reports as required by the POs. Examples of some of the critical characteristics that were not identified or verified in these POs included: material composition and material strength; weight of components; dielectric strength; current capacity; operating current; startup current; insulation resistance; and overall dimensions. Therefore, all three POs that had seismically, environmental, or electromagnetic interference (EMI)/electromagnetic compatibility (EMC) qualified related items were not appropriately verified or evaluated.

   This issue has been identified as Nonconformance 99901461/2015-201-01.

B. Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 states, in part, "The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. The verifying or checking process shall be performed by individuals or groups other than those who performed the original design, but who may be from the same organization. Where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking processes, it shall include suitable qualifications testing of a prototype unit under the most adverse design conditions."

Canberra procedure, M07-0-2, “Commercial Grade Dedication Plan Process,” Revision G, section 6.2.2, states in part that “Dedication shall be performed on commercial items or services as required. Services may also require dedication. Examples of “services” requiring dedication are: b. Test and Qualification testing.”

Contrary to the above, as of November 6, 2015, Canberra failed to verify the adequacy of design by a suitable testing program. Specifically, Canberra did not dedicate the commercial services offered by TUV for EMI and/or EMC testing that supported safety-related qualification activities.

This issue has been identified as Nonconformance 99901461/2015-201-02.

C. Criterion IX, “Control of Special Processes,” of Appendix B to 10 CFR Part 50 states, in part, “Measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.”

Canberra procedure, M09-0-1, “Control of Production Processes,” Revision H, section 6.3.1, states in part that the special process, “Wave Soldering,” shall be performed using qualified procedures in accordance with specified requirements. Section 6.3.2 states, in part that “Special processes shall be controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means,” and “Conditions necessary for accomplishment of the process shall be included. These conditions shall include proper equipment, controlled parameters of the process, specified environment, and calibration requirements.”

Contrary to the above, as of November 6, 2015, Canberra failed to assure that the wave soldering special process is controlled and accomplished using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements. Specifically, Canberra failed to correctly measure solder temperature in accordance with test equipment specifications, thus inducing potential latent failure modes.

This has been identified as Notice of Nonconformance 99901461-2015-201-03.

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 Inspection Branch, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a “Reply to a Notice of Nonconformance” and should include for each noncompliance: (1) the reason for the noncompliance, or if contested, the basis for disputing the noncompliance; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid noncompliance; and (4) the date when your corrective action will be completed. Where good cause is shown, the NRC will consider extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC’s Agencywide Documents Access and Management System, which is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html, 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 that such material be withheld, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this 21st day of January 2016.

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

Docket No.:	99901461
Report No.:	99901461/2015-201
Vendor:	Canberra Industries, Inc. 800 Research Parkway Meriden, CT 06450
Vendor Contact:	Mr. Michael Byram, Quality Assurance Manager Michael.Byram@canberra.com (203) 639-2209
Nuclear Industry Activity:	Canberra Industries designs, tests, and manufactures radiation monitoring equipment for the operating reactor fleet. Canberra Industries, a subsidiary of AREVA, is located in Meriden, CT.
Inspection Dates:	November 2, 2015 - November 6, 2015

Inspectors:		
	George Lipscomb	NRC/NRO/DCIP/EVIB
	Eugene Huang	NRC/NRO/DCIP/EVIB
	Nicholas Savwoir	NRC/NRO/DCIP/EVIB
	Frank Talbot	NRC/NRO/DCIP/QVIB
	Ron LaVera	NRC/NRO/DSEA/RPAC

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

EXECUTIVE SUMMARY

Canberra Industries Inc.
99901461/2015-201

The U.S. Nuclear Regulatory Commission (NRC) conducted a vendor inspection to verify Canberra Industries Inc. (hereafter referred to as Canberra) 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 Canberra's implementation of quality activities associated with the fabrication, design and commercial grade dedication (CGD) of safety-related radiation monitor systems (RMS) 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 internal audits, 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.

Commercial Grade Dedication and Design Control

The NRC inspection team concluded that Canberra has not adequately implemented its program to control commercial-grade-dedication (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. The NRC inspection team issued Nonconformance 99901461/2015-201-01 for Canberra's failure to adequately dedicate commercial components and services and ensure that purchase order (PO) requirements were met. Specifically, Canberra did not identify and verify all the appropriate critical characteristics for PO 00185091, for a CAM skid manual flow control mod kit, PO 00185167, for a time delay relay, and PO 00191479, for a motor pump, and did not ensure that the components met/enveloped the applicable qualification reports as required by the purchase orders. Additionally, Canberra did not dedicate the commercial services offered by TUV for electromagnetic interference (EMI) and/or electromagnetic compatibility (EMC) testing that supported safety-related qualification activities. The NRC inspection team identified this issue as Nonconformance 99901461/2015-201-02. The NRC inspection team identified that Canberra did not have a program in place to show cyber security requirements that were

imposed via purchase orders were met, however, since the cyber rule 10 CFR 73.54 is not yet required to be fully implemented, there is no regulatory deficiency at the time of this inspection.

Manufacturing Control / Control of Special Processes

The NRC inspection team reviewed and observed a number of Canberra controls for the special process for performing crimping and stripping of cables used to make connections to circuit boards and other components used in radiation monitor systems (RMS) components used in safety-related RMS. There were no findings, related to stripping and crimping special process, identified by the inspectors.

The NRC inspection team also reviewed and observed control of the special processes related to soldering in circuit boards. The inspectors identified Nonconformance 99901461/2015-201-03 for inadequate control of the special process for soldering with the Wave Solder Machine. Specifically, the technique used to maintain solder pot temperature did not meet test equipment manufacturer specifications. This directly affects the quality and uniformity of solder applied to circuit boards used to operate safety-related RMS components.

10 CFR Part 21 Program Implementation

The NRC inspection team concluded that Canberra has established a defect and noncompliance reporting program in accordance with the regulatory requirements of 10 CFR Part 21, “Reporting of Defects and Noncompliance.” Based on the limited sample of documents reviewed, the NRC inspection team also determined that Canberra is implementing its policies and procedures associated with its 10 CFR Part 21 reporting program. No findings of significance were identified.

Nonconformance Control and Corrective Action Program

The NRC inspection team concluded that Canberra has established nonconformance and corrective action programs (CAPs) 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 Canberra is implementing its policies and procedures associated with its nonconformance and CAP. No findings of significance were identified.

Inspections, Test Control and Control of Measuring and Test Equipment (M&TE)

The NRC inspection team determined that Canberra has established programs to implement inspections, test control and control of M&TE in accordance with the regulatory requirements of Criterion X, “Inspections,” Criterion XI, “Test Control,” and 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 Canberra is implementing its policies and procedures associated with inspections, testing and control of M&TE. No findings of significance were identified.

Audits

The NRC inspection team concluded that Canberra has established an internal audit program in accordance with the regulatory requirements of Criterion XVIII, “Audits,” of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Canberra is implementing its policies and procedures associated with its internal audit program. No findings of significance were identified.

REPORT DETAILS

1. Commercial-Grade Dedication Program

a. Inspection Scope

The NRC inspection team reviewed Canberra's CGD policies and procedures to verify compliance with Criterion III, "Design Control," of Appendix B to10 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. The sample of completed documentation included drawings, 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

The NRC inspection team reviewed the dedication plan for PO 00185091 for a CAM skid manual flow control modification kit for Fort Calhoun. The NRC inspection noted that parts for the manual flow control modification kit were procured commercially and Canberra did not do a commercial-grade survey of any of the commercial vendors. The NRC inspection team identified that Canberra failed to specify and verify critical characteristics, nor have any engineering evaluation, to ensure that the commercial parts were equivalent to original environmental, EMI/RFI, and seismic qualified parts. Canberra did not provide adequate documentation to show how the missing critical characteristics were identified, tested and/or evaluated to ensure that the manual flow control modification kit, which consisted of a pump and controllers, could meet its intended safety-function as required by the PO requirements.

This issue has been identified as an example of Nonconformance 99901461/2015-201-01.

The NRC inspection team reviewed the dedication plan for PO 00185157 for a time delay relay for Fort Calhoun. The NRC inspection team noted that the evaluations establishing the suitability of existing qualification reports were marked as N/A. The inspectors identified that the CGD plan for the components and parts were missing critical characteristics, and that Canberra failed to verify and/or evaluate suitability by another method to ensure that the components and parts were equivalent to what was originally qualified. Examples include, but are not all inclusive of, material and material strength and weight. The NRC inspection team also identified that all the critical characteristics that Canberra had established were not verified, checked or tested for the PO. For example, in the area of electrical functional critical characteristics, they failed to test the dielectric strength. Canberra could not provide adequate documentation to ensure that the time delay relay could meet its intended safety-function as required by the PO.

This issue has been identified as an example of Nonconformance 99901461/2015-201-01.

The NRC inspection team reviewed the dedication plan for PO 00191479 for an electrical AC motor pump for Fort Calhoun. The NRC inspection team noted that there were multiple commercial vendors listed in the dedication plan for procurement of the electrical AC motor, and that again Canberra chose not to perform any commercial-grade surveys. The inspectors identified that Canberra only verified basic visual identification and basic functional tests on the commercial electrical AC motor as part of the dedication process. Canberra could not provide adequate documentation to show that all critical characteristics for the electrical AC motor pump were identified and verified, such as, but not all inclusive of, overall dimensions, current capacity, operating current, startup current, insulation resistance, and flange specifications, to ensure that the motor pump could perform its intended safety-function and meet the qualification requirements as listed in the PO. Additionally, the NRC inspection team identified that the completed data sheet used to support this dedication did not list tools and/or instruments used or the traceability for those items.

This issue has been identified example of Nonconformance 99901461/2015-201-01. Canberra created corrective as an action report (CAR) 1511-MB940948 to address the above issues.

The NRC inspection team noted that Canberra used commercial vendor TUV to provide EMI and EMC testing to support safety-related qualification activities. The NRC inspection team identified that Canberra did not dedicate these testing services. Canberra stated that since TUV was certified as a Nationally Recognized Testing Laboratory (NRTL) by the Occupational Safety and Health Administration (OSHA), that there was no need to dedicate the testing service. The NRC currently does not recognize the certification label of NRTL and additionally, the scope that OSHA used for this certification does not cover the nuclear industry standards used for EMI and EMC testing. The inspectors determined that Canberra utilized a commercial testing vendor to support safety-related qualification activities without adequately dedicating the service.

This issue has been identified as Nonconformance 99901461/2015-201-02. Canberra created CAR 1511-MB512155 to address this issue.

c. Conclusions

The NRC inspection team concluded that Canberra established, but did not implement its program to control 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. The NRC inspection team issued Nonconformance 99901461/2015-201-01 for Canberra’s failure to adequately dedicate commercial components and services and ensure that PO requirements were met. Specifically, Canberra did not identify and verify all the appropriate critical characteristics for PO 00185091, for a CAM skid manual flow control mod kit, PO 00185167, for a time delay relay, and PO00191479, for a motor pump, and did not ensure that the components met/enveloped the applicable qualification reports as required by the POs. Additionally, Canberra did not dedicate the commercial services offered by TUV for EMI and/or EMC testing that supported safety-related qualification activities.

2. 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 RMS to ensure proper implementation of requirements. The selection included a review of processes for hand tools, wave soldering on circuit boards, stripping and crimping of radiation monitor cable wires, in-process inspection of circuit boards, maintenance records, and training and qualification records.

The inspection team reviewed and observed assembly of various RMS components such as pre-amplifiers, rate-meters, detectors, single and multi-channel analyzers, nuclear instrumentation modules (NIMs), NIM pin connections to various RMS, power supplies, central processing units, assembly and current/voltage testing of circuit boards, cable wire connectors and panel displays. The inspection team specifically assessed Canberra's in-process inspection of circuit boards to verify no potential failures modes associated with proper circuit board solder application. In addition, the NRC inspection team reviewed Canberra's manufacturing processes for applying conformal coatings, material shelf life procedures, and the training and qualification records for an individual designated as qualified to apply conformal coatings.

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

b. Observations and Findings

The inspection team observed the Mann Corporation Model AE-400DS wave soldering machine (WSM) did not have an attached calibration sticker or an associated calibration procedure. The NRC inspectors reviewed the manufacture maintenance recommendations for the AE-400DS WSM. Several operational parameters were identified as critical to the proper operation of the WSM, including, but not limited to, solder pot temperature; temperature of the preheat stages 1, 2, and 3; circuit board belt transit speed; solder wave depth on the circuit board, and; solder chemical quality. The NRC inspectors reviewed the solder chemical analysis, maintenance and calibration records for the WSM. Results of the solder sample chemical analysis were within the WSM manufacturer's recommendations.

However, the inspectors determined that Canberra failed to perform temperature checks in accordance with manufacture recommendations and did not have any process or procedural guidance that required measuring the soldering pot temperature. Specifically, the technique used to maintain solder pot temperature within proper temperature limits for manufacturing soldered components did not utilize the specified thermocouple adapter and the measurement was performed without disconnecting the thermocouples from the WSM circuits as specified by the manufacturer. Circuit board damage could occur if the solder temperature is too high and inadequate circuit board solder coverage could occur if the solder temperature is too low. In-place post manufacturing testing methods are not capable of detecting latent solder failure modes, such as inadequate solder fill or board embrittlement that could occur under the design basis conditions.

This issue has been identified as Nonconformance 99901461/2015-201-03. Canberra created CAR 1511-MB613462, to address this issue. Since the WSM has been used to create solder for circuit boards since 2006, Canberra should address extent of condition issues associated with solder quality for safety-related circuit boards used in RMS.

c. Conclusions

The NRC inspection team concluded that Canberra has established a program for special processes, but did not appropriately implement the special process for wave soldering. Specifically, the controls for the WSM solder pot temperature control were inadequately implemented for manufacturing circuit boards used in safety-related components. The NRC inspectors identified this issue as Notice of Nonconformance 99901461-2015-201-03 for not meeting Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50 requirements. No findings related to stripping and crimping special process were identified by the inspectors.

3. Design Control

a. Inspection Scope

The NRC inspection team evaluated a sample of Canberra's implementation of design control to verify processes were executed in accordance with RMS components purchase order requirements and were in compliance with Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The RMS is a combination of alpha, beta, gamma, and neutron detectors. This sample included a review of COCs used to verify design, inspection and test requirements for the RMS components.

The NRC inspection team specifically reviewed Canberra's method for using Los Alamos National Laboratory (LANL) Monte-Carlo N-Particle (MCNP) software as part of the process for calibrating some radiation detectors. This process uses RMS detection system modeling and computational analysis, in lieu of multiple National Institute of Standards and Technology (NIST) traceable radiation sources, to perform the primary calibration of RMS detectors systems. The NRC inspectors reviewed Canberra's methods and processes to control variants, versions, and input data file parameters of the MCNP. NRC inspectors also reviewed uncertainty analysis associated with the MCNP based RMS detection system radiation calibration, detection system material properties and the Gaussian Energy Broadening (GEB) function.

The NRC inspection team reviewed a sample of purchase orders where licensees were imposing cyber security requirements. 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 reviewed and found specific examples in which licensees were imposing various cyber security requirements in the following POs.

- Exelon Nuclear – Peach Bottom 90075384-300044758, revision 1,
- Exelon Nuclear – Peach Bottom 90073430, revision 3,
- Southern Nuclear Company SNG10105831,
- Omaha Public Power District (OPPD) – Fort Calhoun 00206625.

Specific examples include:

Exelon POs:

Clause 1.5.1 requires;

- "The supplier's written quality assurance program shall include appropriate procedures for controlling the quality of equipment, parts, and/or material (hardware) supplied under this PO."
- "All hardware with addressable memory devices shall have controls placed on them that will preclude the introduction of any unapproved code and verification and certification that no unauthorized code is present on the devices." (1.5.1.4.)

Clause 1.5.2 requires;

- "The supplier's written quality assurance program shall include appropriate sections for software quality assurance and the supplier shall have software quality assurance implementing procedures."
- "All software associated with the purchased devices and/or special application software shall be developed in an environment secure from contamination by known malicious code." (1.5.2.1)
- "In the development phase when moving from the development environment to the production environment, vendor shall have appropriate procedures in place to ensure that no viruses, malicious code or unintended code is transported into the production environment or the operational environment." (1.5.2.3)
- "The procedures shall have, at a minimum, requirements that applications, binaries and supporting files transferred into the development environment should be scanned or otherwise assessed or inspected for viruses, worms, or other forms of malicious code prior to installation into the test environment utilizing a virus scanning workstation that has up-to-date signatures." (1.5.2.3)

Southern Nuclear Company POs:

Cyber Security requirements of no harmful code;

- "Licensor warrants that all deliverables (including the software) do not and will not contain, at the time delivered by licensor to licensee, any program routine, device or other undisclosed feature including, without limitation, a time bomb, virus, software lock, drop dead device, malicious logic, worm, trojan horse, or trap door that is designed to delete, disable, deactivate, interfere with, or otherwise harm the deliverables or licensee's hardware, data, or other programs or that is intended to provide access or produce modifications not authorized by licensee (collectively, "harmful code")."

OPPD POs:

For the OPPD purchase order, it required a cyber security certificate of conformance stating the same as the Southern purchase order above.

The NRC team inspection identified that Canberra did not have any procedures or a program in place to show the above requirements were being met for the above purchase orders. However, since the cyber rule 10 CFR 73.54 is not yet required to be fully implemented, there was no applicable regulation at the time of this inspection that was affected. Canberra created CAR 1512-MB8739324, to address this issue.

c. Conclusions

The NRC inspection team concluded that Canberra has established a program to meet the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team identified that Canberra did not have a program in place to show cyber security requirements that were imposed via purchase orders were met, however since the cyber rule 10 CFR 73.54 is not yet required to be fully implemented, there is no regulatory deficiency at the time of this inspection.

4. 10 CFR Part 21 Program Implementation

a. Inspection Scope

The NRC inspection team reviewed Canberra policies and implementing procedures that govern compliance with the requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance." The inspectors evaluated Canberra'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 Canberra's 10 CFR Part 21 posting, and that a sample of Canberra deviation evaluations met the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation." 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 Canberra 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 Canberra is implementing its policies and procedures associated with its 10 CFR Part 21 reporting program. No findings of significance were identified.

5. Nonconformance Control and Corrective Action Program (CAP)

a. Inspection Scope

The NRC inspection team reviewed Canberra policies and implementing procedures that govern the nonconformance and CAPs 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 inspectors discussed the nonconformance and CAPs with Canberra staff and reviewed a sample of nonconformance and CARs for appropriate disposition. The nonconformance program uses multiple databases and reports: Material Reject Reports (MRRs), Test and Defects Reports (TDRs), Product Performance Reports (PPRs), and Software Performance Reports (SPRs). The nonconformance sample focused on reports associated with RMS subcomponents and included discrepancies associated material problems, in-process testing, and customer concerns. The RMS subcomponents included the CAM skid main electrical component enclosure, and the ADM606 circuit assemblies. The CAR sample included actions associated with supplier discrepancies, audit findings, M&TE calibration issues, and significant product performance concerns.

In addition, the NRC inspection team evaluated a sample of root cause analysis, trending analysis, and verified that the CAP provided a connection to the 10 CFR Part 21 program. The inspectors also observed a product performance meeting for open PPRs. 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 Canberra has established nonconformance and CAPs 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 Canberra is implementing its policies and procedures associated with its nonconformance and CAPs. No findings of significance were identified.

6. Inspections and Test Control

a. Inspection Scope

The NRC inspection team reviewed Canberra's Inspections and 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 inspectors observed a sample of Canberra's inspection activities ranging from visual electrical receipt inspections to dimensional mechanical receipt inspections. The NRC inspection team verified implementation of Canberra's test control by sampling final acceptance testing packages and by witnessing the Factory Acceptance Test (FAT) of the safety-related ventilation monitoring system for Exelon's Peach Bottom control room. Inspection samples included verification of checklists, qualified individuals, 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. 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 Canberra 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 Canberra is implementing its policies and procedures associated with inspections and test control. No findings of significance were identified.

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

a. Inspection Scope

The NRC inspection team reviewed M&TE policies and procedures to determine if Canberra's controls were in compliance with regulatory requirements of 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 Canberra activities and samples of M&TE. Specifically, the NRC inspection team evaluated M&TE associated with the calibration of the ADM606 ratemeter and calibration certificates from Foss Therapy Services Inc. and Connecticut Labs. The NRC inspection team reviewed radiation source calibration report traceability to NIST, the methods Canberra personnel used to handle the radiation sources, and conditions of the radiation sources. M&TE samples also included various instruments used during testing to ensure they were 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 Canberra 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 Canberra is implementing its policies and procedures associated with controlling M&TE. No findings of significance were identified.

8. Audits

a. Inspection Scope

The inspectors reviewed Canberra's policies and procedures governing the implementation of audits to verify compliance with Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspectors reviewed Canberra Quality Management System (QMS)-M01, Section 18, "Audits," and Canberra procedure M18-0-1, "Audits." The inspectors sampled one Exelon external audit and three Canberra internal audits to verify that Canberra adequately documented QA related findings from internal and external audit teams and entered these findings into Canberra's CAP. The NRC inspectors also reviewed Canberra procedure M02-0-4, "Qualification of QA Program Audit Personnel," and sampled three Canberra auditor training records.

b. Observations and Findings

No findings of significance were identified in this area.

c. Conclusions

The NRC inspection team concluded that Canberra has established an internal audit program in accordance with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. The NRC inspectors concluded for the sample of documents evaluated that Canberra is implementing its policies and procedures associated with internal audits. No findings of significance were identified.

9. Entrance and Exit Meetings

On November 2, 2015, the NRC inspection team discussed the scope of the inspection during an entrance meeting with Mr. Doug Bellfy, Vice President Operational Excellence, and other members of Canberra management and technical staff. On November 6, 2015, the NRC inspection team presented the inspection results and observations during an on-site exit meeting with Mr. Doug Bellfy, Vice President Operational Excellence, and other members of Canberra management and technical staff. On December 17, 2015, via telephone conference the NRC inspection team re-exited with Ms. Audrey Carmichael, Director Global Quality, and other member of Canberra 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

Name	Title	Affiliation	Entrance	Exit	Re-Exit	Interviewed
Michael Byram	Q.A. Manager	Canberra	X	X	X	X
Sheila Webb	VP Engineering	Canberra		X		
Vincent Gentile	Director Engineering	Canberra	X	X		X
Kara Morris	Product Manager	Canberra		X		
Audrey Carmichael	Director, Q.A.	Canberra	X	X	X	X
Dean Pomykala	Continuous Improvement	Canberra	X	X		
Brian Betts	Manager, Project Management	Canberra	X	X		
Toni Pontell	Quality Tech. IPC Specialist	Canberra	X	X		X
Ernie Ludwig	QA Trainer, Auditor	Canberra	X	X		X
Gloria Febles	QA Lead Auditor	Canberra	X	X		X
Steve Fisher Jones	RMS Technical Director	Canberra	X	X		X
Jennifer Debumbia	System, Mfg Supervisor	Canberra	X	X		
Arlene Middleton	Instrument, Mfg Supervisor	Canberra		X		X
William Rearden	EHS Manager	Canberra	X	X		
David Anteck	Director, Global Engineering Quality	Canberra	X	X	X	X
Jim Zickefoose	Lead RMS Physicist	Canberra		X		X
Anthony D'Ostillio	Industrial Engineering Manager	Canberra	X	X		X
Hitesh Patel	Product RMS Manager	Canberra		X		
Changkun Xie	Detectors Manager	Canberra	X	X		
Mike Krezinsk	Incoming Inspections	Canberra	X	X		X
Thomas Boshuyzen	Systems and Instrument Manager	Canberra	X	X		
William Roch	RAD Safety Officer	Canberra	X	X		X

Name	Title	Affiliation	Entrance	Exit	Re-Exit	Interviewed
David Gelpkz	HSE Director	Canberra	X	X		
Harry Brooks	Senior QA Engineer, Lead Auditor	Canberra	X	X		
Joe Muraca	Purchasing Manager	Canberra	X			
Keith Phillips	Engineering Director	Canberra	X			
Doug Belk	VP Operational Excellence	Canberra	X			
James Wrobel	General Manager	Canberra	X			
Hector Charneco	Manufacturing Technician	Canberra				X
Evelyn Quadrino	Product Team Technician	Canberra				X
Mike Spencer	Lead RMS System Technician	Canberra				X
Art Randomski	Senior Mechanical Engineer	Canberra				X
Scott Linsenbigler	Quality Assurance Project Engineer	Canberra				X
Dante Nakazawa	Senior Scientist	Canberra				X
Dr. Brian M. Young	Systems and Safeguards Technology	Canberra				X
Anthony Santiago	Compliance Engineer	Canberra				X
Dr. Amol Patil	Research Scientist	Canberra				X
Dr. Henrick Jaderstrom,	Research Scientist	Canberra				X
Ruthverry Charneco	Production Team Technician	Canberra				X
Steve Polek	Manufacturing Engineer	Canberra				X
Frank Boyko	Manufacturing Engineer	Canberra				X
Mat Kastner	Principle Engineer	Canberra				X
Tony Dinicola	IT/IS Manager	Canberra			X	
George Lipscomb	Team Lead	NRC	X		X	
Ronald LaVera	Health Physicist	NRC	X	X		
Francis Talbot	Inspector	NRC	X	X	X	

Name	Title	Affiliation	Entrance	Exit	Re-Exit	Interviewed
Eugene Huang	Inspector	NRC	X	X	X	
Nicholas Savwoir	Inspector	NRC	X	X	X	
Richard Rasmussen	Branch Chief	NRC			X	
Stacy Smith	Inspector	NRC			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

Item Number	STATUS	TYPE	ITAAC	DESCRIPTION
99901461/2015-201-01	Open	NON	N/A	App. B, Criterion III
99901461/2015-201-02	Open	NON	N/A	App. B, Criterion III
99901461/2015-201-03	Open	NON	N/A	App. B, Criterion IX

4. LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
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
FAT	Factory Acceptance Test
GEB	Gaussian Energy Broadening
IP	inspection procedure
LANL	Los Alamos National Laboratory
MCNP	Monte-Carlo N-Particle
MRB	Material Review Board
MRR	Material Reject Reports
M&TE	measuring and test equipment
NIM	nuclear instrumentation modules
NIST	National Institute of Standards and Technology
NON	Notice of Nonconformance
NRC	Nuclear Regulatory Commission
NRTL	Nationally Recognized Testing Laboratory
OPPD	Omaha Public Power District
OSHA	Occupational Safety and Health Administration
PN	part number
PO	purchase order
PPR	Product Performance Report
QA	quality assurance
QMS	Quality Management System
S/N	serial number
SPR	Software Performance Report
TDR	Test and Defects Report
WSM	Wave Solder Machine

5. DOCUMENTS REVIEWED

Procedures and Work Instructions

Canberra QMS-M01-1, Procedure Matrix, Revision A, dated January 1, 2013

Canberra QMS-M01, "Quality Policy Manual," Revision J, dated August 11, 2014

Canberra M02-0-3, Qualification of Inspection and Test Personnel, Revision I, dated January 2, 2013

Canberra M02-0-4, Qualification of QA Program Audi Personnel, Revision F, dated September 22, 2015

Canberra M03-1, Hardware Quality Assurance Plan, Revision E, dated August 27, 2014

Canberra Work Instruction M03-1-1, Creating an HDP (Hardware Development Plan), Revision 0, October 19, 2015

Canberra M03-1-2-5, Special Engineering (SERF), Revision 0, dated November 20, 2014

Canberra M03-2-1, Software Verification and Validation Plan, Revision A, Dated January 2, 2013

Canberra M03-2-2, Software Configuration Management Plan, Revision A, dated January 2, 2013

Canberra M03-2-3-7, Writing and Reviewing a Test Case, Revision 0, dated March 7, 2003

Canberra M03-2-7, Lifecycle Verification and Validation and Audits, Revision I, dated December 6, 2013

Canberra M03-2-8, Test Plan Execution, Revision M, dated September 21, 2015

Canberra M03-2-9, Safety Class Software Design, Revision A, dated January 2, 2013

Canberra M03-2-10, Safety Class Software Maintenance, Revision A, dated January 2, 2013

Canberra M04-0-1, Procurement Document Control, Revision H, dated January 2, 2013

Canberra M06-2-1-11, Engineering Document Control, Revision G, dated November 18, 2013

Canberra M07-0-1, Control of Purchased Items and Services Revision E, dated January 2, 2013

Canberra M07-0-2, Commercial Grade Dedication Plan Process, Revision G, dated August 11, 2014

Canberra M07-0-2-3, Commercial Grade Dedication Plan Template, Revision B, February 23, 2015

Canberra M07-1-1-2, Approved Supplier Procedure, Revision 1, dated March 10, 2014

Canberra M07-1-1-3, Purchase Order Procedure, Revision 0, dated September 21, 2015

Canberra M09-0-1, Production Process Quality Plan, Revision H, dated January 2, 2013

Canberra M09-01, Canberra Production Process Quality Plan, Revision A, dated January 2, 2013

Canberra Work Instruction M09-1-12, Hand Soldering

Canberra Work Instruction M09-1-28, Wire Crimping

Canberra Work Instruction M10-1-1-2, Product Wrap-Up, Revision 0, dated June 3, 2011

Canberra Work Instruction M09-1-1-23, Manufacturing Program Control Procedure, dated February 8, 2013

Canberra M15-0-1, “Control of Nonconforming Items,” Revision K, dated January 2, 2013

Canberra M15-01-1-1, “Control of MRB Products/Materials,” dated October 1, 2014

Canberra M15-0-1-2, “Nonconforming Material Products & Defective Components,” dated September 30, 2014

Canberra M15-0-1-6, “Warranty Repairs,” dated June 2, 2015

Canberra M16-0-1, “Corrective Actions,” Revision K, dated October 31, 2013

Canberra M16-0-3, “Stop Work,” Revision G, dated January 2, 2013

Canberra M16-0-4, Software Performance Reports, Revision L, dated August 4, 2015

Canberra M16-0-5, “Reporting of Defects under 10 CFR Part 21,” Revision R, dated October 1, 2015

Canberra M16-0-5-1, “The 10CFR21 Reporting Process for Employees,” Revision G, dated August 13 2014

Canberra M16-0-6, “Root Cause Analysis,” Revision A, dated April 10, 2012

Canberra M16-0-1-4, “PPR Process Work Instruction,” dated December 1, 2010

Canberra Operating Procedure, ATE Operating Procedure, dated April 27, 2005

Canberra MSA-27011, Procedure for Application of Conformal Coatings, Revision F, dated April 30, 2012

Canberra MFG STD 13 APP A, Manufacturing Engineering, dated November 18, 2014

Canberra 13 Cable Assemblies, Manufacturing Engineering, dated September 9, 2015

Canberra MFG STD 13, App B, 13B Cable Single Terminations, dated August 20, 2015

Canberra MFG STD App C, 13C Cable Ribbon, dated November 5, 2012

Canberra MFG STD 13 App D, 13D Cable Hardware, dated June 25, 2013

PTFM-009, "Test Defect Reporting," dated August 29, 2014

Document 10000006323, "Test Defect Report Procedure," Revision D, dated August 11, 2014

"Guidelines for Processing a PPR/CCM Entry," Revision 1, January 26, 2015

Canberra Engineering Change Order (OCO) Process, Topic: ECR/ECO Entry and Processing, dated November 2014

Canberra Procedure Engineering Document Control, Revision G, dated November 18, 2013

Corrective Action Reports (CARs)

CAR 133 – SP797853 dated March 12, 2013

CAR 1410 – JN814751 dated October 14, 2014

CAR 143 – SP893251 dated March 19, 2014

CAR 152 – GF847696 dated February 25, 2015

CAR 156 – MB058054 dated June 30, 2015

CAR 1511-MB377721, dated November 5, 2015

CAR 1511-MB512155, dated November 5, 2015 (TUV item)

CAR 1511-MB940948, dated November 5, 2015 (CDG Item)

CAR 1511-MB613462, dated November 9, 2015 (WAVE SOLDER MACHINE)

Material Reject Reports (MRRs), Test and Defects Report (TDRs), Product Performance Report (PPRs), and Software Performance Report (SPRs)

MRR 8017116 dated September 15, 2015

MRR 8016792 dated July 21, 2015

MRR 8016520 dated May 27, 2015

TDR 1109472 dated July 17, 2014

TDR 1105065 dated May 14, 2014

TDR 1100477 dated February 7, 2014

TDR 1053685 dated August 20, 2011

PPR 1852 dated October 25, 2012

PPR 2278 dated January 9, 2014

PPR 2282 dated January 16, 2014

Purchase Orders and Drawings

PO 00185091, OPPD-fort Calhoun, dated February 7, 2013

PO 00185157, OPPD-fort Calhoun, dated February 8, 2013

PO 90075384, Exelon-peach bottom, dated March 17, 2015

PO SNG10105831, Georgia power-Southern nuclear company, dated July 6, 2015

PO 90073430, Exelon-peach bottom, dated March 6, 2015

PO 00206625, OPPD-fort Calhoun for ratemeter, digital alarm and readout, dated August 5, 2014

PO 00191479, OPPD-fort Calhoun, dated June 28, 2013

DWG 800940-001, “Assembly, detector, MD-55,” Revision B

DWG 703504-001, “Outline drawing ADM-600 area monitor control room ratemeter panel display,” Revision B

DWG 703504-002, “Outline drawing ADM-600 area monitor control room ratemeter panel display,” Revision A

Manufacturing, Qualification and Test Documentation

Canberra (COC) Exelon Nuclear Peach Bottom Atomic Power Station, August 2010, Customer PO 90-069274, Revision 1, Canberra PO 50934

Canberra (COC) OPPD Fort Calhoun Station, Customer Order #: 00185091, Canberra PO 40342, Part Number 7068253, Description, WSERF CN8556671 RS-052 CAM SKID MANUAL FLOW CONTROL MODIFICATION KIT (Includes Teledyne-Hastings Model HFC-203 Flow Controller with SWAG Canberra Drawing 602308-003)

Canberra (COC), Dominion Energy Kewaunee, Customer Order #: 4500045547, Canberra PO: 40398, Material Part Number: 7070608

Canberra (COC) OPPD, Customer Oder #: 00191479, Canberra Order: 43245 Part Number: 7078756 February 11, 2015

Canberra (COC), Exelon Nuclear, Peach Bottom Atomic Power Station, Customer Order #: 90-064822, Rev 2, Canberra PO: 47388, Part Number: 801285-005, February 25, 2014

Canberra (COC), Exelon Nuclear Peach Bottom Atomic Power Station, Customer Order #: 90-066443, Canberra PO: 49634, Part Number 801285-005 (7081052), May 30, 2014.

Canberra COC, Customer: Omaha Public Power District (OPPD) – Ft Calhoun, Customer Order Number: 00212519, Canberra PO Number: 53968, Item 1030, Material Number: 002417-001, Description: Mass Flow Controller Repair, Serial Number: A718164227, dated March 4, 2015.

Canberra (CGDP) – 10000005776, Relay, Time Delay 602958-001, Revision A, dated April 29, 2013

Canberra (CGDP), MD455 Series Detectors, CGDP - 0000006271, dated December 16, 2013

Canberra (CGDP), Customer: Exelon Nuclear Peach Bottom Atomic Power Station, Rate meter ADM600A, CGDP–10000006350, dated February 21, 2014

Canberra (CGDP), 703162-002, PA-300 (V7), CGDP-10000006277 dated December 16, 2013

Canberra (CGDP) -10000002456, “Commercial grade dedication plan for WSERF CN8556671 RM-052 CAM SKID Manual flow control modification kit,” dated February 2, 2011

Canberra (CGDP) -601540-004, “Commercial grade dedication plan (component level) for relay, electrical box Canberra part #601540-004,” dated March 21, 2003

Canberra (CGDP) -10000006961, “Commercial grade dedication plan for 602627-XXX Motor, Pump, dated December 5, 2014

Canberra (CGDP): for WSERF CN8556671, RM-052 CAM SKID MANUAL FLOW CONTROL MODIFICATION KIT, dated January 11, 2011

Canberra (CGDP) for Fan, GAST P/N AC326B, CDGP -10000002450, Revision B, dated January 19, 2011,

Canberra (CGDP) for 606627-XXX, Motor, Pump, dated December 2, 2014

Canberra (CGDP) # -1000006350, Inspection Data Sheet, Exelon Nuclear Peach Bottom, Part Number: 7081052, May 30, 2014,

Canberra (CGDP) – 10000001577, Revision A, CGDP got Repair, Tylan/Celerity MFC, P/N 602417-001, Canberra M07-0-2-3, Commercial Grade Dedication Plan Template, Revision B, February 23, 2015

Canberra Engineering Change Notices 50000000 (7624, 7660, 7854, 7930, 7984) - Light Pipe Correction for Radiation Monitors

Canberra PO COR ENG GEN 002, Engineering Change Request, Revision A, dated May 1, 2015

Canberra Customer Safety Orders, November 2015 (Customer Service Repair Orders: 40197, 46164, 47388, 49364, 50767, 50934, and 54276)

Canberra Test Procedure (TP)-2000997, Revision D, Standard Test Procedure for Rate-Meter Accuracy, Rate-Meter Test Results, dated May 28, 2014

Canberra TP-200997, Standard Test Procedure Rate-Meter Accuracy, ADM-600A and ADM610A Series, Revision D, dated January 14, 1993

APTEC-Nuclear Research Corporation Standard “Burn-In” Procedure for New Electrical Assemblies and Components, TP-400107, Rev 0, dated September 24, 1998

IPC-610F, Acceptability of Electronic Assemblies, Revision F, July 2014, Section 10, Printed Circuit Boards and Assemblies

IPC/WHMA-A-620B, Requirements and Acceptance for Cable and Wire Harness Assemblies, October 2012

Audit and Survey Documents

Canberra M18-0-1, Audits, Revision J, dated August 27, 2014

Exelon Audit Report of Canberra SR-2015-18, dated April 20-24, 2015

Canberra Internal Audit Report 0215035, dated May 22, 2015

Canberra Internal Audit Report 0615152, dated August 24, 2015

Canberra Internal Audit Report 0915258, dated October 7, 2015

Lead Auditor Training Records (Two Canberra Auditors)

Miscellaneous Documents

PIFM-004, “Supplier Disposition Form,” for supplier TUV America, Inc., dated May 31, 2005

Spec sheet KP-S-601540, Revision 9

Spec sheet KP-S-601752, Revision 1

Canberra ATE Fixtures Database (e.g., Elect-Test Fixtures, World Test Fixtures, H+W Test Products, Keltech Associates, E/T technologies, Fairchild, World Test Systems, Southwest Test Inc.) (29 Test Fixtures)

Canberra Qualification Personnel Database

A2LA accredited calibration certificate 2010.01 Connecticut Calibration Labs PO: 4075775