

July 20, 2017

Mr. Ronald Nikander
Director, Engineering and Quality
Mirion Technologies Inc.
402 Sonwil Drive
Buffalo, NY 14225

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION OF MIRION
TECHNOLOGIES REPORT NO. 99901479/2017-201

Dear Mr. Nikander:

During the period from June 12-15, 2017, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Mirion Technologies Inc. (Mirion) facility in Buffalo, New York. This was a routine inspection which was performed to assess Mirion's compliance with provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." This inspection specifically evaluated Mirion's implementation of quality activities associated with the fabrication of containment penetrations for the AP1000 reactors currently under construction in the U.S., as well as containment penetrations, squib valves, and resistance temperature detectors (RTDs) being supplied to the U.S. nuclear operating fleet. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance or Part 21 programs.

Within the scope of this inspection, no violations or nonconformances were identified and as such, no response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if applicable) 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, (if applicable), 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). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Sincerely,

/RA/

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

Docket No.: 99901479

Enclosure:
Inspection Report No. 99901479/2017-201
and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION OF MIRION TECHNOLOGIES REPORT NO. 99901479/2017-201

Dated: July 20, 2017

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

Docket No.: 99901479

Report No.: 99901479/2017-201

Vendor: Mirion Technologies Inc.
402 Sonwil Drive
Buffalo, NY 14225

Vendor Contact: Ronald L. Nikander
Director, Engineering and Quality
716-681-1973 Ext. 207
RNikander@Mirion.com

Nuclear Industry Activity: Mirion Technologies is manufacturing containment penetrations for the U.S. AP1000 reactors. They also manufacture containment penetrations, squib valves, resistance temperature detectors, and replacement parts to the operating nuclear fleet.

Inspection Dates: June 12-15, 2017

Inspectors: Jeffrey Jacobson, NRO/DCIP/QVIB-1, Team Leader
Raju Patel, NRO/DCIP/QVIB-2
Phillip Natividad, NRO/DCIP/QVIB-1
Calvin Cheung, R-II/DCO/IB2

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

Enclosure

EXECUTIVE SUMMARY

Mirion Technologies
99901479/2017-201

During the period from June 12-15, 2017, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Mirion Technologies facility in Buffalo, New York. This was a routine inspection which was performed to assess Mirion's compliance with provisions of Title 10 of the Code of Federal Regulations (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." This inspection specifically evaluated Mirion's implementation of quality activities associated with the fabrication of containment penetrations for the AP1000 reactors currently under construction in the U.S., as well as containment penetrations, squib valves, and resistance temperature detectors (RTDs) being supplied to the U.S. nuclear operating fleet. There were no findings identified as a result of this inspection.

Material Traceability

The inspectors assessed Mirion's procedures and implementation governing the identification and control of materials, parts, and components to verify compliance with the regulatory requirements of Criterion VIII, "Identification and Control of Materials, Parts, and Components," of Appendix B to 10 CFR Part 50. Based on the limited samples of documents reviewed and activities observed, the inspectors also determined that Mirion is implementing its policies and procedures associated with identification and control of materials, parts, and component program. No findings of significance were identified.

Manufacturing Control

The inspectors concluded that Mirion is implementing its manufacturing control program, including control of special processes in accordance with the regulatory requirements of Criterion IX, "Control of Special Processes," of Appendix B to 10 CFR Part 50.

Design Control

The inspectors concluded that Mirion is implementing its design control program in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The inspectors concluded that Mirion was appropriately implementing design controls for the manufacture of electric penetrations. The inspectors verified that the controls implemented at Mirion were sufficient to ensure that the electric penetrations would be capable of performing their intended safety functions, by translating design inputs into specifications and supporting testing and analysis.

Control of Subvendors/Dedication of Commercial Grade Items

The inspectors concluded that Mirion was appropriately controlling the materials used in the manufacture of components through its commercial grade dedication program, including controls for RTDs, squib valve trigger assemblies and electrical penetration materials, as required by Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50.

Corrective Action/Part 21 Program

The NRC inspectors concluded that Mirion had established Corrective Action and 10 CFR Part 21 programs in accordance with regulatory requirements and was appropriately implementing its policies and procedures associated with Criterion XVI, "Corrective Action," of 10 CFR Part 50 Appendix B and 10 CFR Part 21.

Nonconforming Material

The NRC inspectors concluded that Mirion had established a nonconformance program in accordance with Criterion XV, "Nonconforming Materials, Parts, or Components" of Appendix B to 10 CFR Part 50, and was appropriately implementing its policies and procedures in accordance with regulatory requirements.

Test Control

The inspectors concluded that Mirion is implementing an appropriate test control program in accordance with Criterion XI, "Test Control", of Appendix B to 10 CFR Part 50. Based on the limited samples observed, the testing procedures and performance of tests were determined to be adequate.

REPORT DETAILS

1. Material Traceability/Control

a. Inspection Scope

The inspectors reviewed Mirion's policies and implementing procedures that govern material traceability to verify compliance with the regulatory requirements of Criterion VIII, "Identification and Control of Material, Parts, and Components," of Appendix B to 10 CFR Part 50.

The inspectors performed a walk-down of Mirion's receipt inspection, shipping, packing and storage areas, welding area, assembly and test area and verified that raw materials, parts, and components were either marked with a part number, material specification, heat number/heat code, or serial number and with a shop traveler identifying their fabrication process status. The inspectors assessed whether materials, components were identified with acceptable tags indicating a part number, material type and grade and were traceable to Mirion's purchase order, and the vendor's heat/lot number from which the materials were procured.

The inspectors also discussed the material traceability program with Mirion's management and technical staff. The attachment to this inspection report lists the documents reviewed by the inspectors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that Mirion is implementing its material traceability/control program in accordance with the regulatory requirements of Criterion VIII of Appendix B to 10 CFR Part 50.

2. Manufacturing Control

a. Inspection Scope

The inspectors reviewed Mirion's policies and implementing procedures that govern the control of special processes to verify compliance with the regulatory requirements of Criterion IX, "Control of Special Processes," in Appendix B to 10 CFR Part 50 and with the requirements in Subsection NCA, "General Requirements for Division 1 and Division 2," Subsection NB, "Class 1 Components," Subsection NC, "Class 2 Components," and Subsection ND, "Class 3 Components," of Section III, "Rules for Construction of Nuclear Facility Components," Section V, "Nondestructive Examination," and Section IX, "Welding and Brazing Qualification," of the ASME Boiler and Pressure Vessel (B&PV) Code.

Specifically, the inspectors reviewed a sample of Mirion welding procedures and their associated procedure qualification record (PQR) to verify they were qualified in accordance with ASME Section IX Code requirements. The inspectors reviewed several

nuclear travelers for AP1000 domestic nuclear orders and verified the welder had stamped and dated the welding operation performed in accordance with the specified welding procedure and had documented the weld wire used.

The inspectors selected a sample of two welders' qualifications and their biennial performance continuity records to verify they were qualified to meet the requirements of the ASME Section IX Code. The welders' performance qualification records indicated the welding technique, material used, the weld position, and material thickness range they were qualified to.

The inspectors performed a walk-down of the weld storage area to verify weld materials were controlled to prevent degradation, inadvertent use, or loss of traceability in accordance with Mirion approved procedures. The inspectors reviewed weld issuance tickets that link the weld material issuance to a shop traveler and the welder. The inspectors noted that the weld area was kept clean and protected from wind, and moisture. Further, the inspectors assessed whether the weld machines and weld oven were calibrated within the range of use, using known traceable standards and their calibration frequency was maintained.

The inspectors reviewed certified material test reports for the weld filler metal and electrodes used to verify that the material specifications for physical and chemical properties meet the ASME Section II Code requirements.

The inspectors reviewed liquid penetrant test (PT) reports for ASME Section III, Electrical Penetration Assemblies (EPAs) for the Vogtle and V.C. Summer reactors currently under construction. The PT was performed by a visible dye penetrant method using non-aqueous developer, and the inspectors assessed whether the testing was being performed in accordance with Mirion's policies, procedures, applicable codes, and standards. The inspectors also interviewed QC inspection personnel. The inspectors noted that Mirion's NDE inspector was in the process of being qualified as a Level II inspector by a Level III inspector from a third-party supplier. The inspectors noted that all PT evaluations performed by the NDE Level III demonstrated that step-by-step instructions of the PT procedure were followed using calibrated equipment that was within the applicable inspection range. The inspectors verified that the PT operation was stamped with the inspector's stamp and date. Further, the inspectors reviewed a sample of NDE reports from three completed EPA data packages to verify the quality of records met the Mirion NDE procedures and that the records were in compliance with Section V of the ASME Code.

The inspectors reviewed the material test reports of the penetrant and developer and confirmed the material's halogen contents were less than 1% by weight as required by the ASME Code. The inspectors reviewed Mirion's, "Written Practice for Nondestructive Testing Personnel Qualification and Certification," procedure and confirmed the education, training hours, written, basic and practical examination requirements for Level I, II, & III NDE inspector qualification met the requirements of American Society for Nondestructive (ASN)-SNT-TC-1A, "American Society for Nondestructive Testing Recommended Practice," as referenced in ASME Section III, Subsection NCA. The inspectors reviewed Mirion's third-party NDE inspector Level III qualification and certification records to verify the Level III NDE inspector was trained, qualified and certified to a specific level, grade, method and for specific techniques, and that his

annual performance and eye examination were current meeting the requirements of Mirion written practice and in compliance with Sections III and V of the ASME Code.

The inspectors also discussed the manufacturing control program with Mirion's management and technical staff. The attachment to this inspection report lists the documents reviewed by the inspectors.

b. Observation and Findings

No findings of significance were identified.

c. Conclusion

The inspectors concluded that Mirion is implementing its manufacturing control program, including control of special processes in accordance with the regulatory requirements of Criterion IX of Appendix B to 10 CFR Part 50.

3. Design Control

a. Scope

The inspectors reviewed Mirion's policies and implementing procedures that govern the design control program to verify compliance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The inspectors reviewed purchase order (PO) 4500430408 for TAG No. SV3-IDS-B-EY-P31Y, Equipment No. P31 Vogtle Unit 3, dated March 27, 2012, from Westinghouse Electric Company (WEC) to Mirion, for the production of electric penetration P31 for Vogtle Unit 3. The team assessed whether the testing performed by Mirion of the penetration and the material procured for its manufacture met the Westinghouse design specification, APP-EY01-Z0-001 Rev 7, Electrical Penetration Assemblies Design Specification, dated November 7, 2016. The inspectors witnessed representative electrical and fiber optic factory acceptance testing and reviewed test data sheets applicable to P31. The inspectors also reviewed documentation for Mirion procured kapton insulated copper wiring utilized for manufacture of P31 to ensure the procured material met requirements and appropriate certifications were available. The environmental qualification for the Vogtle and V.C. Summer penetrations was not reviewed by the inspection team as it is being handled directly by WEC.

The inspectors reviewed environmental qualification reports generated by Mirion for penetrations supplied to the Sequoyah Nuclear Power Plant. The inspectors reviewed internal procedure specification (IPS) 1582, "Design Qualification Report for Instrumentation and Low Voltage Power Electric Penetration Assemblies Sequoyah Nuclear Power Plant Units 1&2," Revision N, dated May 26, 2017, and IPS-1525, "Design Qualification Test Report of a Low Voltage Power and Control (LVP/C) Service Classification Electric Penetration Assembly for Class 1E Service in BWR & PWR Containment Structures for Conax Buffalo Corporation," Revision B, dated August 3, 1988, to verify that the testing and analysis concluded that the penetration assembly design will perform its intended function under normal operating environmental and accident environmental conditions without loss of mechanical or electrical integrity over a 40 year full installed life. The qualification testing was performed through sequential type testing, in accordance with Institute of Electrical and Electronics Engineers

(IEEE) 317-1983, to demonstrate that aging and environmental influences do not degrade, compromise, or affect the function of the penetration assembly and that the materials as used in an electric penetration are not susceptible to any significant degradation due to thermal or radiation effects and that no age or service related common failure modes exist that would preclude a qualified life of 40 years. This analysis included a heat load analysis.

The inspectors also reviewed IPS-1510, "Design Qualification Material Test Report for Materials Used in Conax Nuclear Products for Service in Nuclear Power Generating Stations," Revision A, dated September 9, 1988, which provides input to Design Qualification Reports IPS-1525 and IPS-1582 discussed above. IPS-1510 calculates various parameters for materials used in Mirion products, including the combination of polysulfone and kapton for the feedthrough assembly, which in turn are used for radiation, thermal (activation energy), and fire design qualification analysis.

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

b. Findings and Observations

No findings of significance were identified.

c. Conclusions

The inspectors concluded that Mirion was appropriately implementing design control and design configuration controls for the manufacture of electric penetrations in accordance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. The inspectors verified that the controls implemented at Mirion were sufficient to ensure that the electric penetrations would be capable of performing their intended safety functions, by translating design inputs into specifications and supporting testing and analysis.

4. Control of Subvendors/Dedication of Commercial Grade Items

a. Scope

The inspectors reviewed Mirion's policies and implementing procedures that govern the subvendor oversight program and commercial grade dedication program to verify compliance with the regulatory requirements of Criterion III, "Design Control," Criterion IV, "Procurement Document Control," and Criterion VII, "Control of purchased material, equipment, and services," of Appendix B to 10 CFR Part 50. The inspectors reviewed Mirion Internal Procedure Specification (IPS) IPS-1761, "Procedure for Dedication of Commercial Grade Items and Services," Revision M, dated June 7, 2017, which provides instructions for controlling commercially procured components, materials and services. The procedure requires the completion of a Technical Evaluation Form (TEF) and a corresponding Quality Control Instruction (QCI) for all commercially procured items and services used by Mirion in the manufacture of safety-related components. The inspectors sampled Mirion's implementation of this procedure associated with their supply of the following nuclear safety-related components to U.S. nuclear utilities. The inspectors focused their review on the activities implemented by Mirion to ensure the supplied components met all safety-related customer imposed technical requirements. The attachment to this inspection report lists the documents reviewed by the inspectors.

Resistance Temperature Detectors

The inspectors reviewed PO #01568763, Revision 1, dated April 17, 2015, from Indiana Michigan Power Company (for the Donald C. Cook Nuclear Plant) to Mirion for a 100 Ohm resistance temperature detector (RTD). The purchase order required qualification to IEEE 323-1974 (radiation only) and to IEEE 344-1975 (seismic). The PO also required that the RTD be qualified per Conax Qualification Report IPS-1138, Revision A, and be calibrated at a minimum of three points.

The inspectors reviewed Mirion PO #P93-8809-3, Revision A, dated July 18, 2016 to ESSCO Calibration Lab, a commercial laboratory contracted by Mirion to perform calibration services associated with their supply of the RTD. The inspectors reviewed Mirion's commercial grade survey of ESSCO, #ES15-009, performed on May 13, 2015, which was used as a basis for dedicating their calibration services. The inspectors assessed whether the Mirion survey appropriately addressed the critical aspects of ESSCO's quality program as necessary to dedicate their service.

The inspectors reviewed commercial PO P93-8602-1, Revision A, dated September 15, 2015, from Mirion to Heraeus Sensor Tech for RTD elements used in manufacture of the RTDs. The inspectors reviewed QCI #7-243, Revision C, dated October 14, 2014, which was used by Mirion to dedicate the RTD elements.

Squib Valve Trigger Assembly

The inspectors reviewed the controls established at Mirion associated with their supply of trigger assemblies for safety-related explosive squib valves. Specifically, the inspectors assessed whether Mirion had implemented sufficient controls to ensure that the explosive charges being supplied would perform reliably if called upon to perform in terms of both ignition and performance output. Mirion is the OEM for the squib valves and has established a limited shelf life of five years for the explosives, thus utilities are required to periodically replace the explosive component portions of the valves. Since Mirion procures the explosive charges from a commercial supplier and then installs the charges in the trigger assemblies, the inspectors reviewed the methods utilized by Mirion to dedicate the material.

The inspectors reviewed PO 00612680, dated May 10, 2017, from Exelon to Mirion, for the purchase of four explosive valve trigger assemblies. The trigger assembly contains the explosive part of the squib valve, mating fixtures, and the moving ram that shears the sacrificial portion of the valve that allows for flow through the valve. The assemblies were procured as safety-related and the PO required certification of the explosives used to the tested explosive batch.

The inspectors reviewed commercial PO P93-S-1772, Revision A, dated February 9, 2017, from Mirion to AMTEC for the purchase of 205 explosive primer assemblies which are used by Mirion to manufacture the squib valve trigger assemblies. Data sheets and certificates of performance were also reviewed associated with this lot of primer assemblies.

- The inspectors reviewed Mirion specification N47002, "Primer," Revision H, dated May 16, 2017, for the explosive primer assemblies utilized in the manufacture of the trigger assemblies. Included within N47002 were instructions for what specific tests

need to be performed on the primer by the supplier, both to initially qualify the primer for use, and then for each batch of manufactured product. Included within the initial qualification testing was Bruceton testing which was performed to demonstrate reliable fire and no-fire performance of the primer assemblies at specified firing signal current values. The specification also required that dielectric testing, insulation resistance testing, bridgewire resistance testing, and x-ray testing be performed on each primer assembly. The inspectors also reviewed Mirion IPS 1465, "Operation of Conax Energy Monitor For Primers," Revision A, dated January 16, 1991, which provides a description for a test fixture and instructions for its implementation for testing primer output forces.

The inspectors reviewed TEF 241, Revision A, dated November 11, 2014, which provides the verification methods utilized at Mirion for ensuring the critical characteristics of the material were met. Since the majority of the testing of the explosives is performed by AMTEC, a commercial supplier, the inspectors reviewed the methods utilized by Mirion to dedicate this material.

Polysulfone and Ceramic Insulator Materials

Polysulfone is a sealant material used in Mirion containment cabling/electrical penetration assemblies. Mirion's material requirement NP300, Revision P, dated March 3, 2010, requires purchasing a specified grade of polysulfone from a specified manufacturer, additionally indicating that this material requirement takes precedence over drawing requirements. The inspectors verified that the material formulation was confirmed during receipt inspections via infrared spectroscopy testing. The NRC inspectors reviewed Mirion's purchase order to the supplier, PO P93-8400-23, dated August 31, 2015, and verified that the material was purchased from the original manufacturer, with batch and lot number for material traceability.

The inspectors reviewed Mirion's receipt Inspection Procedures QCI 7-122 and IPS-1944 for polysulfone which specified critical characteristics such as stress relief, infrared spectrum, and dimensions. Leak and electrical tests were also specified for the final penetration product. Following receipt, Mirion stores polysulfone material in bulk rod appropriately segregated by batch/lot number; as well as in the form of machined parts segregated by part number. The inspectors reviewed a sample of purchase orders for sub-supplier molding, machining, and annealing of polysulfone, and for confirming material formulation via infrared spectroscopy. Mirion indicated that annealing of the polysulfone is performed in either bulk rod form prior to machining (Specification NP300 5.1.1), or after machining if required by the particular drawing specification (QCI 7-122 2.C). The sub-suppliers for these machining, molding, and spectroscopy services were verified to be on Mirion's current Approved Supplier List, dated June 9, 2017.

In addition, the NRC inspectors also reviewed and found acceptable a sample of purchase orders, certificates of compliance, drawings, and commercial grade surveys for other electrically-insulating ceramic materials used by Mirion in electrical penetrations and found them acceptable.

Kapton insulated wire

The inspectors reviewed commercial PO P93-S-1230, dated November 15, 2011, from Mirion to Carlisle Interconnect Technology for the purchase of #10 Kapton insulated solid copper wire which is used by Mirion to manufacture electric penetration assemblies. Data sheets and certificates of conformance were also reviewed to verify the procured item met the requirements. This material was utilized in the production of penetrations for Vogtle Unit 3.

b. Findings and Observations

No findings of significance were identified.

The inspectors identified as an observation that critical characteristics, specifically tied to the safety function of the components/services being commercially procured were sometimes not specifically captured on the TEF; however, for the examples reviewed, in aggregate, the activities that were implemented (testing at Mirion, independent laboratory testing, commercial grade surveys of the suppliers, etc.) were sufficient to verify that the technical requirements associated with the components being supplied were met and that the supplied components would be capable of performing their intended safety functions.

The inspectors also identified that specific to the PO for Kapton wiring, that the receipt inspection criteria did not specify an allowable tolerance range for the wire diameter. The inspectors determined that industry standards allow for some wire diameter tolerance and therefore providing a tolerance value would reduce the amount of personal judgment required during the receipt inspection process. Notwithstanding the above, the inspectors determined that the material supplied was capable of performing its intended safety function.

c. Conclusions

The inspectors concluded that Mirion was appropriately controlling the materials used in the manufacture of the RTD through its commercial grade dedication program. The inspectors determined that Mirion had performed a commercial grade survey of the laboratory used to ensure proper calibration of the detector and that the survey encompassed key quality attributes important to ensuring the validity of the calibration certificates provided.

The inspectors verified that the controls implemented at Mirion were sufficient to ensure that the supplied squib valve trigger assemblies would be capable of performing their intended safety functions. The inspectors determined that the controls were sufficient to ensure reliable ignition and performance output of the trigger assemblies.

The inspectors concluded that Mirion is adequately controlling material and vendor services for polysulfone sealant, in addition to testing its critical characteristics as specified.

Therefore, the inspectors concluded that Mirion is appropriately implementing controls in accordance with Criterion III, Criterion IV, and Criterion VII of Appendix B to 10 CFR Part 50.

5. Corrective Action/Part 21 Program

a. Scope

The inspectors reviewed Mirion's policies and implementing procedures for the corrective action program to verify compliance with the requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The inspectors also reviewed Mirion's policies and procedures to verify compliance with the requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance." The inspectors discussed the corrective action, nonconformance, and Part 21 programs with the Mirion staff, and reviewed a sample of Corrective Action Requests (CARs) to view the adequacy of Mirion's implementation and control of the corrective action program. The inspectors determined that Mirion's procedure and checklists for CARs provided a link to the 10 CFR Part 21 process by linking to IPS-1071, "Defect Reporting Implementation Procedure", for evaluations for potential reportability under Part 21. The inspectors verified Part 21 postings were appropriate in both the administrative and shop areas. The NRC inspectors reviewed Mirion's corrective actions for its most recent Part 21 notification made in 2013, as well as a sample of more recent Defect Evaluations and assessed whether the evaluations provided appropriate technical justifications for issues that were determined not to be reportable defects. The attachment to this report lists the documents reviewed by the inspectors.

b. Findings and Observations

No findings of significance were identified.

c. Conclusions

The NRC inspectors concluded that Mirion established corrective action and 10 CFR Part 21 programs in accordance with regulatory requirements. Based on the limited sample of documents reviewed, the inspectors determined that Mirion is appropriately implementing its policies and procedures associated with Criterion XVI of 10 CFR Part 50 Appendix B and 10 CFR Part 21.

6. Nonconforming Material

a. Scope

The inspectors reviewed Mirion's policies and implementing procedures that govern the nonconformance program to verify compliance with the regulatory requirements of Criterion XV, "Nonconforming Materials, Parts, or Components", of Appendix B to 10 CFR Part 50. Similar to the corrective action program, each Nonconformance/Material Discrepancy Report (MDR) includes a checklist item for applicability to Mirion IPS-1071 for evaluation, which provides linkage to 10 CFR Part 21. NRC inspectors verified that Mirion's procedures provided for identification, review, and disposition of nonconforming items, and observed segregated areas in the warehouse area for nonconforming items. The NRC inspectors reviewed a sample of MDRs, including items dispositioned as rejected and technical justifications for items dispositioned acceptable for use as-is. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the inspectors.

b. Findings and Observations

No findings of significance were identified.

c. Conclusions

The NRC inspectors concluded that Mirion has established a nonconformance program in accordance with Criterion XV of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the inspectors determined that Mirion is appropriately implementing its policies and procedures in accordance with regulatory requirements.

7. Test Control

a. Scope

The inspectors reviewed Mirion's policies and implementing procedures that govern the test program to verify compliance with the regulatory requirements of Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. The NRC inspectors witnessed electrical testing of conductor wires as part of a feedthrough assembly for a containment penetration product, per Work Order M93-899501. The inspectors reviewed test Procedure IPS-411, "Standard Procedure for Production Test & Final Inspection of Electrical Conductor Seal Assemblies", Revision L, dated June 18, 2015, and determined that the acceptance criteria met the requirements of IEEE-317 (1983) standard, as required by the customer design specification for the penetration. In addition, the NRC inspectors observed a demonstration of fiber optic testing for a containment penetration feedthrough assembly, utilizing IPS-2406, "Production Test Procedure for Electrical Penetration Assemblies for Westinghouse," Revision Original, dated October 15, 2012. The inspectors reviewed IPS-2406 to verify that the procedure for fiber optic attenuation factory acceptance testing met the requirements of IEEE-317 (1983). The NRC inspectors also determined that Mirion assembly and inspection personnel appropriately performed a conductor continuity check as part of the testing, and that they appeared knowledgeable regarding the assembly/testing process, including an appropriate questioning attitude for any potential nonconforming conditions. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the inspectors.

b. Findings and Observations

No findings of significance were identified.

c. Conclusions

The inspectors concluded that Mirion is implementing an appropriate test control program in accordance with Criterion XI, "Test Control", of Appendix B to 10 CFR Part 50. Based on the limited samples observed, the testing procedures and performance of tests were determined to be adequate.

ATTACHMENT

1. ENTRANCE/EXIT MEETING ATTENDEES

On June 15, 2017, the NRC inspection team conducted an exit meeting with Mirion management and staff and discussed the results of the inspection.

Name	Title	Affiliation	Entrance	Exit	Interviewed
Cara Sweeney	Sales Engineer	Mirion	X		
Courtney Taylor	Contracts Manager	Mirion	X		X
Dave Krzywicki	Inspector				X
Gregory Scofield	Production Supervisor	Mirion	X	X	
Jennifer Quarcini	Purchasing Manager	Mirion	X		
Jinsuk Lee	Project Engineer	Mirion	X		
John Francioli	Master Assembler/Helium Leak Tester	Mirion			X
John MacDonald	Director, Global Penetrations	Mirion	X	X	X
Joseph Di Mario	Quality Control Inspector	Mirion			X
Kenneth Janiszewski	Senior Production Planner	Mirion	X		
Linda Stephens	Quality Engineer	Mirion	X	X	X
Michael Francioli	Senior Project Engineer	Mirion	X	X	
Mitch Staskiewicz	Director of Operations	Mirion	X	X	
Neal Matter	Quality Control Inspector	Mirion		X	X
Ronald Nikander	Director, Engineering and Quality	Mirion	X	X	X
Russell Witkop	Assembler/Tester	Mirion			X
Steve Karnysiu	Sales Manager	Mirion	X	X	
William Gee	Quality Engineer	Mirion	X	X	X
Jeffrey Jacobson	Inspection Team Leader	NRC	X	X	
Philip Natividad	Inspector	NRC	X	X	
Raju Patel	Inspector	NRC	X	X	
Calvin Cheung	Inspector	NRC	X	X	

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

None

3. DOCUMENTS REVIEWED

Policies and Procedures

- Mirion Quality Program Manual (QPM), Revision AJ, July 29, 2016
- Quality Control Instruction (QCI) 2-20, "Qualification of Audit Personnel," Revision G, dated July 20, 2016
- QCI 2-21, "Qualification of Inspection and Test Personnel," Revision L, dated April 1, 2016
- QCI 2-100, "Approved Suppliers List Maintenance Procedure," Revision A, dated August 16, 2016
- QCI 7-122, "Inspection/Test of Purchased Polysulfone Rods/Bars and Sealants and Components (bushings, insulators, etc.)," Revision M, April 23, 2013
- QCI-172, Revision C, dated December 4, 2013
- QCI 7-159, "Inspection/Test of Purchased –Helical Spring Lock-washers," Revision G, dated November 13, 2014
- QCI 7-262, "Inspection/Test of Purchased Chemical for Material Identification Kit," Revision A, dated June 17, 2016
- QCI 7-263, "Inspection/Test of Purchased Fabricated Component Using Supplier Furnished Materials," Revision B, dated April 23, 2013
- QCI 7-262
- QCI 9-01, "Non-Destructive Examination - Written Practice," Revision N, dated July 21, 2016
- Engineering Order (E.O) N14803, "QCI-9-01 Revision N," dated July 21, 2016
- QCI-9-23, "Solvent Removable Visible Dye Penetrant Test," Revision U, dated July 28, 2016
- QCI-10-11, "Receiving Inspection General Procedure and Sampling Plan; Purchased Items, Raw Materials, and Special Processes," Revision T, dated June 7, 2017
- QCI-10-243, "Verification Aid for 300 Stainless Steel series (Copper Sulfate Test)," Revision 0, dated February 29, 2000
- Internal Procedure Specification (IPS)-1520, "Standard Purchase Specification for ASME Code Nuclear Pressure Retaining Materials and Services," Revision V, dated July 11, 2016
- IPS-1560, "Weld Set-up Inspection Test Record," Revision A, dated January 25, 2000
- IPS-1816, "Assembly Skills Training Procedure," Revision D, dated August 31, 2016
- IPS-1900, "Welding Procedure Specification (WPS) For ASME Boiler & Pressure Vessel Code Shielded Metal Arc Welding (SMAW) of Carbon Steel (P1) to Stainless Steel (P8) Materials," Revision D, dated September 10, 2010
- Procedure Qualification Record (PQR)-WPS-IPS-1900, dated August 25, 1994
- IPS-2279, "WPS For ASME B&PV Code Gas Tungsten-Arc Welding (GTAW) of Carbon Steel Attachments to Carbon Steel Pressure Retaining Material," Revision 2, dated July 16, 2010
- PQR WPS IPS-2279, Revision 1, dated November 21, 2008, for P1 to P1 materials using GTAW process

- IPS-2323, "WPS for B&PV Code GTAW and Flux Core Arc Welding (FCAW) of Carbon Steel (P1) to Stainless Steel (P8) materials," Revision 0, dated May 20, 2013
- PQR IPS-2323, Revision 0, dated May 20, 2013, for P1-P8 materials using combination of GTAW and FCAW processes
- IPS-2451, "Welding Material Storage Procedure," Revision A, dated May 4, 2015
- IPS 1465, "Operation of Conax Energy Monitor For Primers," Revision A, January 16, 1991
- Mirion Specification NP300, Revision P, April 3, 2010
- IPS-1944, "Basis for Selection of Properties and Processes for Acceptance of Polysulfone and Polyimide (Kapton) Material for Mirion Technologies (Conax Nuclear)," Revision C, December 4, 2009
- IPS-411, "Standard Procedure for Production Test & Final Inspection of Electrical Conductor Seal Assemblies", Revision L, July 18, 2015
- IPS-2406, "Production Test Procedure for Electrical Penetration Assemblies for Westinghouse," Revision Original, November 15, 2012
- IPS-1071, "Defect Reporting Implementation Procedure"

Design/Drawings

- Drawing 8644-40002, "Nut, Square, Extended," Revision 0, dated September 11, 2016
- Drawing 8200-10004, "Instrumentation Electric Penetration Assembly," Revision D dated March 3, 2016
- Drawing Wire Legend (WL) 8200-100004-04-P21, "Instrumentation Electric Penetration Assemblies for V.C. Summer Units 2 and 3," Revision B, dated August 19, 2016
- Drawing 72R1-20022, "Canister Sub-Assembly (Inside, Outside Header Plate)," Revision F, dated April 21, 2017
- Drawing N29489, "Fiber Optic Feed through Sub-Assembly for Full Length Penetration," Revision C, dated May 7, 2017
- Drawing #47002, "Primer," Revision H, May 16, 2017
- Drawing #N77002, "Conax Energy Monitor (CEM)," Revision A, January 8, 1991
- Drawing 8113-10003, "LVP/C Electric Penetration Assembly (AP1000) for Vogtle, Units 3&4," Revision E, January 19, 2017
- Westinghouse Specification APP-EY01-Z0-001, "Electrical Penetration Assemblies Design Specification," Revision 7, December 7, 2016

American Society of Mechanical Engineers (ASME) Code Data Reports, and Shop Travelers Welding Records

- Document package for Electric Penetration Assemblies part number (P/N) 8113-10002-03, Serial No. 8445, sales order No. 811300, with ASME N2 Code data report signed and approved by quality assurance (QA) and Authorized Nuclear Inspector (ANI) on January 29, 2014 for Vogtle Unit 3 to Westinghouse Electric Corporation (WEC) purchase order (PO) 4500430408
- Document package for Low Voltage Instrumentation Penetration Sub-Assembly serial No. (S/N) 8433, with ASME N2 Code data report dated February 5, 2014, for V.C. Summer Unit 2 to WEC PO 4500430413
- Certificate of Conformance dated February 23, 2017, certifying Low Voltage Instrumentation S/N 8463, P/N 8113-10004-05, met all contractual requirements of WEC Purchase 4500430408

- Traveler for work order (WO) No. M93-820000149 issued for Instrumentation Electrical Penetration P/N P21-8200-20004-04, S/N 8433, operation No. 50 Helium leak tested on February 10, 2017, in accordance with IPS 2406
- Traveler for WO No. M93-8200013 released by QA and ANI on October 21, 2012, for Canister Tube Sub assembly P/N P30-8200-10004-06 S/N 8435 for V.C. Summer Unit 2, with operations material verification, assembly, inspection of weld area, assembly welding, inspection, outside vendor machining, PT inspection and Authorized Nuclear Inspector hold points
- Traveler for WO No. M93-8200014 released by QA and ANI on November 1, 2012, for Canister Tube sub assembly P/N P11-8200-10004-02 S/N 8431 for V.C. Summer Unit 2, with operations material verification, assembly, Code pressure test, inspection, Authorized Nuclear Inspector hold points and final inspection
- Traveler for WO No. M93-8200013 released by QA and ANI on November 1, 2012, for Canister tube subassembly P/N P11-8200-10004-02 S/N 8431 for V.C. Summer Unit 2, included operations of material verification, assembly, PT inspection, assembly weld area fit-up, welding, ANI review, final inspection.

Non-Destructive Examination, Weld, Inspection and Test Records, Calibration, Audit Reports, and Commercial-Grade Dedication Surveys

- Mirion Penetrant Testing (PT) (Visible Dye) report dated May 9, 2017, for two pieces of pre-weld of header plate P/N 8562-30000-01 accepted by Level III
- PT report dated December 12, 2016, for 10 pieces of primer chamber body P/N N38138-01, on WO No. M93-S-358 performed and accepted by Level III
- PT report dated December 12, 2016 for 10 pieces of trigger body P/N N38137-01, on WO No. M93-S-357 performed and accepted by Level III
- PT report dated February 5, 2014, for two LVI Canister P/N 8200-10004-04 for V.C. Summer Unit 2
- PT report dated February 24, 2013, for one weldment P/N 7ZR-300012-01 for V.C. Summer Unit 2
- PT report dated December 18, 2013, for Post-weldment of EPA Canister subassembly/weldment P/N 7ZR1-20022-03 for EPA S/N 8433, for V.C. Summer Unit 2
- PT report dated July 20, 2015, for one LVP Canister P/N 8113-10002-03 acceptable in accordance with QCI 9-23 procedure for Vogtle Unit 3
- PT report dated May 5, 2013 of one weldment P/N 7ZR1-30012-01 accepted in accordance with QCI 9-23 procedure
- Daily paint inspection report dated July 14, 2014, for Alliance 14-inch canister P/N 7ZR1-20002-01 coated with Carboline Zinc
- Daily paint inspection report dated January 22, 2014 for Alliance 14-inch canister P/N CN29975, WO No. BP0198, coated with Carboguard 890N
- Weldment report for EPA Canister assembly P/N 8200-10004-04 for EPA S/N 8433 for V.C. Summer Unit 2, accepted through PT and pneumatic test
- Weldment report on WO No. M93-82000316 for Canister tube subassembly S/N 9108, P/N 7ZR1-2022-03W2 for V.C. Summer Unit 3, performed and accepted on May 26, 2017
- Weld operation No. 30 on WO No. M93-895804 for fiber optic feeder through tube assembly P/N N29489-03, dated June 14, 2017, on sales order No. 895800 for North Anna
- Initial weld set-up inspection and test record dated June 12, 2017, for orbital welds of feeder through tubes qualified through visual and macro-etch inspection

- Receiving inspection report dated September 12, 2013 acceptance of 29 pieces of seamless carbon steel pipes 14-inch diameter x 8.6 feet SCH80 ASME SA 333 Grade 6 traceable to Tioga Pipe Supply Company Inc., heat No. in accordance with PO P93-8200-3N
- Receiving inspection report dated February 8, 2017, accepting 25 X 10 pound spools of Flux core 0.045-inch electrodes E309/309LT1-4 traceable to Lincoln lot No. 1310Z from Weldstar on PO P93-S-1784N
- Carboline Company CofC dated October 29, 2012 for 62 gallons of paint Carboguard 890N white batch No. N890S8090902D reviewed by Mirion to PO P93-8200-24
- Carboline Company CofC dated March 26, 2014 for 1.5 gallons of paint Carbozinc 11 SG base Grey 0700, P/N N59022-50, traceable to batch No. 02310700AA10, 2 gallons of Zinc Filler Type II, P/N N59022-51 traceable batch No. 14BD81816Z, and 1 gallon of Thinner 26, P/N N59022-04 traceable to Batch No. 13JD1476S
- Northeast Metrology Calibration Certificate No. 1193607 for Mirion Gage Id No. B-096-2, Go/No Go 1-8 UNC-2B thread plug gage calibrated on December 2, 2016, put in service March 10, 2016 due March 10, 2018
- Northeast Metrology Calibration Certificate No. 1184183 for 87 piece master gage block set gage Id No. J-001-13 calibrated on April 12, 2016, due April 12, 2018, to Mirion PO P93-G-3349 using standards traceable to National Institute of Standards and Technology (NIST)
- Northeast Technology Calibration Certificate dated April 6, 2017, calibrated to Mirion QCI 29-2-4-4 and PO P93-G-3609, using gages traceable to NIST
- Mirion Calibration record for 8-inch Vernier caliper gage Id No. U-003-20, calibrated on March 10, 2017, due March 10, 2018 using master standard gage block set gage Id No. J-001-13 traceable to NIST
- Mirion Calibration record for pin gages gage Id No. J-002-12, calibrated on June 23, 2016, due June 23, 2017 using master gage set gage Id No. J-001-12, traceable to NIST
- Certificate of Calibration for pressure gage Id No. 00315 calibrated on May 19, 2017 due November 19, 2017, per QCI 29-4-3 procedure using master dead weight tester gage ID No. 00050 serial No. 155-12 traceable to NIST
- Vacuum Instrument Corporation Calibration Certificate dated February 3, 2015, for helium lead standard gage Id No. 00048, serial No. 20977 to Mirion PO P93-G-3050, accepted on February 3, 2015 and placed in use on December 12, 2016
- Textronics Calibration Certificate No. 11497901 dated August 2, 2016 for Mansfield & Green dead weight tester gage ID No. 00050, serial No. 155-12, to Mirion PO P93-G-3443
- Mirion receipt inspection dated October 13, 2014, of calibration records for Miller Detlaweld machine gage Id No. 00340 calibrated by Strate Welding Supply to Mirion PO P93-G-3500 and QCI 29-6-9 procedure
- Receipt inspection dated October 14, 2015, of calibration record for Lincoln Weld machine gage Id No. 00168 performed by Strate Welding Supply in accordance with Mirion PO P93-G-3229 QCI 29-6-9
- Swagelok M200 Orbital autogenous welding machine gage Id No. 00342 calibrated on November 15, 2015, due November 10, 2017
- Receipt Inspection report dated June 13, 2017, for 744 pieces of square nuts P/N 8644-4002-01, to ASME Section II SA194 Grade 8A material specification traceable to Trust Manufacturing heat# 269922, trace code 19AM to Mirion PO P93-G-8644-4N Revision B
- Receipt Inspection report dated June 12, 2017, for 15 pieces of lock washers P/N N48186 receipt from Trust Manufacturing

- Receipt inspection report dated April 11, 2017, for six tube extensions from Alliance Innovative on PO P93-8200-436
- Material Analysis Report No. 11589, dated June 13, 2017, for 15 pieces of helical lock washers P/N N48186-17, copper sulfate tested to verify material meets 300 stainless steel in accordance with QCI 7-159, Revision G procedure
- Material Analysis Report No. 11574 dated June 12, 2017, for 600 feet of 0.046-inch diameter cable P/N N49066-01, Heat Lot No. 4966-4 verifying material, dimensions and physical attributes per QCI 7-263 procedure
- Mirion acceptance of Nuclear Industry Assessment Committee (NIAC) audit report No. 20006 of Carboline Company dated April 16, 2015, approved for supplying safety-related coatings/paintings
- Audit Report No. EA16-011 dated September 27, 2016 of Niagara Testing qualifying for NDE services
- Annual Evaluation Report dated March 23, 2017, of Carboline Company
- Commercial grade survey Report No. ES14-013, dated September 10, 2014, of Secondary Service Company approving for coating services using Mirion supplied coatings/paint
- Annual Evaluation Report dated September 11, 2015, and September 22, 2016, of Secondary Services Inc.,
- Commercial-grade survey report No. ES15-016, dated April 28, 2015 of Textronix Inc., qualifying for calibration services
- Annual Supplier Evaluation report dated April 6, 2016 and March 23, 2017 of Tektronix Service Solutions
- Commercial Grade Survey Report No. ES15-005 dated May 13, 2015, of Northeast Metrology qualified for calibration services
- Commercial Grade Survey Report No. ES14-005 dated December 29, 2014, of Alliance Innovative Manufacturing, approved for machining services to Mirion supplied materials and drawings
- Commercial grade survey ES14-009, dated September 16, 2014.
- Commercial grade survey ES14-003, dated April 22, 2014.
- Supplier Evaluation for Alliance Innovative Manufacturing performed on June 23, 2015, and June 13, 2016

Purchase Orders

- PO P93-8644-4N Revision B, dated September 9, 2016, to Trust Manufacturing for procurement of 1-inch 8 UNC-2B Square Nuts to ASME Section III requirements
- PO P93-G-3520 dated November 17, 2014, to Northeast Metrology for calibration services of Go/No go thread plug gage Id No. B-096-2 per QCI 29-01, Revision L
- PO P93-G-3605 dated March 1, 2017, to Quality Equipment for procurement of Magnaflux cleaner SKC-S P/N 01-5750-78, penetrant SKL-SP2, P/N 01-5155-20 and developer SKD-S2, P/N 01-5352-78 with certificate of analysis to meet the requirements of ASME Section V Article 6, paragraph T-640
- PO P93-8200-436, dated February 19, 2014, to Alliance Innovative for procurement of machining services of 29 tube extensions P/N 7ZR1-30011—02, N49288-01, control numbers 30974 through 30982 for Heat No. 10353 and control numbers 30893 through 31002 for heat No. 21529 in accordance with supplied drawings
- PO P93-G-3443, dated July 18, 2016, to Textronix Service Solution for procurement of calibration services of Mansfield & Green dead weight tester Mirion gage ID No. 159-02 in accordance with QCI-29-01 that invokes technical and quality assurance requirements

- PO P93-8383-18, dated March 25, 2014, to Carboline Inc., for procurement of ¾ gallon of Base Carbo Zinc No. 11 grey P/N N59022-50, 1 gallon of filler Carbo Zinc No. 11 grey P/N N59022-51 and 1 gallon of paint Carboline thinner No. 26 P/N 59022-04 in accordance with IPS 1765, Revision G and IPS 838 Revision E
- PO 93-S-1784N dated November 8, 2016, to Weldstar Company for procurement of 433 pounds of weld rod P/N N49304-02-01X02 0.045-inch diameter of ASME SA E309LT1-4 in accordance with IPS-1520
- PO P93-G-3500 dated October 4, 2016, issued to Strate Welding Supply for procurement of calibration services of Miller Deltaweld machine Id Nos. 00335, and 00340
- PO P93-G-3654 dated May 9, 2017 issued to Niagara Testing to perform PT service of two header plates P/N 8562-30000-01 in accordance with QCI 9-23 procedure and IPS-1520 P93-8400-23 dated August 21, 2015
- PO 4500430408 "Purchase Order for TAG No. SV3-IDSB-EY-P31Y, Equipment No. P31 Vogtle Unit 3," dated March 21, 2012
- PO P93-8188-139 dated June 30, 2016
- PO P93-8003-9 dated July 1, 2011

Training/Qualification Records

- Welder Procedure Qualification (WPQ) Record dated September 8, 2000, for Ken Wierzbowski qualified to WPS IPS-1900 in SMAW process for P1-P8 materials in 2G position
- WPQ Record dated March 18, 2013, for Justin Christ qualified to WPS IPS-1900, in SMAW process for P1-P8 materials in 2G position
- WPQ Record dated September 23, 2011, for Ken Wierzbowski qualified to IPS-2279 procedure in GTAW process for P1-P1 materials in 2F position
- WPQ Record dated September 7, 2012 for Justin Christ qualified to IPS 2279 procedure in GTAW process for P1-P1 materials in 2F position
- WPQ Record dated May 20, 2013, for Ken Wierzbowski and Ray Sullivan qualified to IPS-2323 procedure in GTAW/FCAW processes for P1-P8 materials in 1G position
- Personnel Qualification Record QCI 2-01, for Linda Stephens as Quality Engineer certified on December 1, 2015
- Annual welder performance records for Ken Wierzbowski to IPS-1900 to SMAW process dated March 15, 2017 and Justin Christ to IPS -1900 on March 16, 2017
- Annual welder performance record for Ken Wierzbowski to IPS-2279 to GTAW process dated March 15, 2017, and Justin Christ on March 16, 2017
- Annual welder performance record for Ken Wierzbowski and R. Sullivan to IPS-2323 in GTAW/FCAW processes dated March 15, 2017
- Lead Auditor Qualification Certification for Linda Stephens dated April 1, 2016, with annual evaluation dated April 31, 2017
- Lead Auditor Qualification Certification for William Gee dated February 1, 2016, and annual evaluation dated February 1, 2017
- Quality Personnel Qualification Record for Neal D Matter dated December 8, 2015, and visual exam dated December 15, 2016, qualified to perform receipt, assembly, witness testing (pressure, helium and electrical), dimensional, calibration/test
- Mirion letter dated July 29, 2016, acceptance of qualification of Mark Haynes Level III of Niagara Testing valid until July 31, 2017

- Qualification/Training record dated May 31, 2016, for John Finncioli qualified master assembler in accordance with IPS-1356 Revision G
- Niagara Testing Qualification and Certification of Mark Haynes as Level III in Liquid Penetrant to American Society for Nondestructive Testing Inc., certificate No. 107780 certified on May 2015 due May 2020

Corrective Action Requests and Material Discrepancy Reports

- CAR 16-007
- CAR 16-015
- CAR 17-003
- CAR 16-002
- CAR 15-001
- CAR 15-005
- CAR 15-011
- MDR N-001709
- MDR N-001782
- MDR N-001544
- MDR N-001762
- MDR N-001723
- MDR N-001586
- MDR N-001652
- MDR N-001825
- MDR N-001833
- MDR N-001834
- MDR N-001767
- MDR N-001358

Qualification Reports

- IPS 1582 Rev N, Design Qualification Report for Instrumentation and Low Voltage Power Electric Penetration Assemblies Sequoyah Nuclear Power Plant Units 1 & 2," Revision N, May 26, 2017
- IPS-1510, "Design Qualification Material Test Report for Materials Used in Conax Nuclear Products for Service in Nuclear Power Generating Stations," Revision A, September 9, 1988
- IPS-1525, "Design Qualification Test Report of a Low Voltage Power and Control (LVP/C) Service Classification Electric Penetration Assembly for Class 1E Service in BWR & PWR Containment Structures for Conax Buffalo Corporation," Revision B, August 3, 1988

Miscellaneous

- Mirion Quality Plan (QP) No. 8200-02A "Electrical Penetration Assemblies," Revision 3, dated December 1, 2016, for V.C. Summer Unit No. 3, to Westinghouse Electric Corporation (WEC) PO No. 4500430413
- QP No. 8200-01D4, "Electric Penetration Assemblies 8200-10004-04," Revision 5, dated December 1, 2016 for V.C. Summer Unit 2, WEC PO 4500430413

- QP 8113-01D3 “Electrical Penetration Assembly, P/N 8200-10003-02 and 003,” Revision 6, dated December 7, 2017, for Vogtle Unit 3 WEC PO No. 4500430413
- Mirion Report for Procedure Demonstration of QCI 9-23, “Solvent Removable Visible Dye Penetrant Test,” Revision U, dated July 18, 2015, performed on 4-inch butt-joint weld using Flawtech samples performed by Level III and witnessed by ANI on July 18, 2016
- Niagara Testing Mark Haynes Level III annual visual acuity examination dated April 22, 2017
- ASME Welding Stamp Control Issuance dated September 22, 2016
- Mirion Memorandum “Welding Material Control,” dated April 15, 2016, assigns quality inspectors the authority as representative of Quality Engineer to issue weld materials from weld ovens and filler storage area
- Magnaflux Certificate of Conformance for Penetrant P/N SKC-S Batch No. 15G14K, in accordance with ASME Section V Article 6, and Mirion PO P93-G-3235
- Magnaflux Certificate of Conformance for Developer P/N SKD-S2, batch No. 15F13K, in accordance with ASME Section V, Article 6
- Mirion 2017 Audit Schedule dated June 14, 2017
- Alliance Innovative Certificate of Compliance dated March 28, 2014, for 19 pieces of Tube Extensions P/N 7ZR1-30011-02, heat No. 21529 and to Mirion PO P93-8200-3N
- Mirion Certified Material Test Report (CMTR) for Canister 14-inch diameter x 2.56-inch thick pipe Heat No. SC18517, certifying material meets ASME SA 240/304L material requirements
- Mirion material certification dated January 31, 2013, for acceptance of 1/8-inch diameter ASME SFA 5.4 E309-16, Heat No. 42503 weld wire traceable to Teledyne McKay and PO N69832
- Weldstar Certificate of Compliance (CofC) dated April 12, 2013, for 25 x10 pounds of electrodes 5/32-inch diameter, ASME E309/309L-16 traceable to ARCOS lot No. 12H07E, Control No. AM, reviewed and accepted by Mirion on April 30, 2013
- Material Analysis Report TR 10713 dated 9/21/2015
- Certificate of Conformance PO P93-8188-139 dated June 30, 2016
- Certificate of Compliance for PO P93-8003-9 dated November 22, 2011
- Deficiency Evaluation Checklist dated February 10, 2016
Technical Evaluation Form TEF 172, Revision B, November 20, 2013

4. LIST OF ABBREVIATIONS USED IN REPORT

A	Ampere
ac	alternating current
CAR	corrective action request
CAP	corrective action program
CFR	<i>Code of Federal Regulations</i>
CMTR	certified material test report
COC	certificate of compliance
dc	direct current
EPA	electrical penetration assembly
IEEE	Institute of Electrical and Electronics Engineers
IPS	internal procedure specification
MDR	material discrepancy report
NCR	nonconformance report
NON	Notice of Nonconformance
PQR	procedure qualification record
PT	penetrant test
QA	quality assurance
QCI	quality control instruction
QP	quality plan
RG	regulatory guide
RTD	resistance temperature detector
TEF	technical evaluation form
V	Volt
VAC	Volts AC
WEC	Westinghouse Electric Company
WPQ	weld procedure qualification