

September 7, 2016

Mr. Robert Michiels
Project Quality Manager
Aecon Industrial
150 Sheldon Drive
Cambridge ON N1R 7K9
Canada

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT OF AECON
INDUSTRIAL NO. 99901444/2016-201

Dear Mr. Michiels:

From July 25-29, 2016, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Aecon's Industrial (here after referred to as Aecon) facility in Cambridge, Ontario, Canada. The purpose of this limited-scope routine inspection was to assess Aecon'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 Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

This technically-focused inspection specifically evaluated Aecon's implementation of the quality activities associated with the fabrication, assembly, and testing of the Q223: Direct Vessel Injection B mechanical module being supplied to the Westinghouse Electric Company (WEC) AP1000 reactor design. The inspection also evaluated activities related to Section III, "Rules for Construction of Nuclear Power Plant Components," of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) and the American Welding Society D1.1:2000, "Structural Welding Code – Steel". The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of Aecon's overall quality assurance (QA) or Part 21 programs.

During this inspection, the NRC staff reviewed qualification tests associated with inspections, tests, analyses, and acceptance criteria (ITAAC) from Revision 19 to the certified AP1000 Design Control Document (DCD) Tier 1. Specifically, these activities were associated with ITAAC 2.2.03.02a, ITAAC 2.2.03.02b, and ITAAC 2.2.03.03b for Vogtle Electric Generating Plant Unit 3.

Based on the results of this inspection, the NRC inspection team found that the implementation of your QA program met the regulatory requirements imposed on you by your customers or NRC licensees. No findings of significance were identified.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," the NRC will make available electronically for public inspection a copy of this letter, its enclosure, and your response through the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is

accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response (and 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, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information would create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Sincerely,

/RA/ (KKavanagh for)

Richard P. McIntyre, Acting Chief
Quality Assurance Vendor Inspection Branch-2
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99901444

Enclosure:
Inspection Report No. 99901444/2016-201
and Attachment

accessible at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response (and 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, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information would 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."

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DATE	08/17/16	08/17/16	08/17/16	08/17/16	09/07/16

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

Docket No.: 99901444

Report No.: 99901444/2016-201

Vendor: Aecon Industrial
150 Sheldon Drive
Cambridge ON N1R 7K9
Canada

Vendor Contact: Robert Michiels
Project Quality Manager
rmichiels@aecon.com
(519) 740-7477 x3873

Nuclear Industry Activity: Aecon Industrial is located in Cambridge, Ontario and it supplies mechanical modules to Vogtle Electric Generating Plant Units 3 and 4 and Virgil C. Summer Nuclear Station Units 2 and 3. Aecon has a NCA 4000 Quality Assurance Manual approved by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. Aecon also has an ASME NA and NPT Certificate of Authorization for Class 1, 2, and 3 fabrication without design responsibility and an NS Certificate.

Inspection Dates: July 25-29, 2016

Inspectors: Jonathan Ortega-Luciano NRO/DCIP/QVIB-2 Team Leader
Yamir Diaz-Castillo NRO/DCIP/QVIB-2
John Honcharik NRO/DEIA/MCB
Alain Artayet RII/DCI/CIB3

Approved by: Richard P. McIntyre, Acting Chief
Quality Assurance Vendor Inspection Branch-2
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Enclosure

EXECUTIVE SUMMARY

Aecon Industrial
99901444/2016-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a bagman trip at the Aecon Industrial (hereafter referred to as Aecon) facility in Cambridge, Ontario on May 18, 2016. Aecon is currently under contract with WECTEC, formally Chicago Bridge and Iron, to supply mechanical modules that meet the requirements of Section III to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code for the Vogtle Electric Generating Station (hereafter referred to as Vogtle) Units 3 and 4 and Virgil C. Summer Nuclear Station (hereafter referred to as V.C. Summer) Units 2 and 3 projects. Discussions with Aecon included the fabrication schedule and the manufacturing processes and procedures being utilized on the Westinghouse Electric Company (WEC) AP1000 projects for Vogtle and V.C. Summer. During the walkthrough of the fabrication shop, the NRC staff observed two 10-inch piping spools supplied by Chicago Bridge and Iron (CB&I) in Laurens, South Carolina that had abrupt weld contours that did not meet Section III, "Rules for Construction of Nuclear Power Plant Components," of the ASME B&PV Code, which requires offsets to have at least a 3:1 taper over the width of the finished weld or, if necessary, by adding additional weld metal beyond what would otherwise be the edge of the weld. The NRC staff noted that the outside diameter offset was visible for approximately half of the pipe weld circumference, and acts as a stress concentration and could affect the design stresses and piping integrity. As a result of this observation, Aecon issued Non-conformance report (NCR) –No. A00002-000-0206, dated June 30, 2016.

Subsequently, the NRC staff conducted a technically focused inspection at the Aecon's facility to verify that it had 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." In addition, the NRC inspection team also verified that Aecon implemented a program under 10 CFR Part 21, "Reporting of Defects and Noncompliance," that met the NRC's regulatory requirements. The NRC inspection team conducted the inspection from July 25-29, 2016. This was the initial NRC inspection at the Aecon facility.

A representative from the Canadian Nuclear Safety Commission (CNSC) participated as an observer of this inspection. These observations foster the sharing of international experiences with the construction of new reactors, oversight of vendors, and modular construction techniques consistent with the objectives of the Multinational Design Evaluation Program.

During the July 25- 29, 2016 inspection the NRC inspection team verified that Aecon adequately dispositioned NCR –No. A00002-000-0206, and that non-conforming material was repaired as dispositioned by the designer (WEC). The NRC inspection team observed that the welds had been repaired to meet the requirements of the ASME B&PV Code and the WEC design specification. After observing the repairs, the NRC inspection team inspected other welds and identified seven additional welds that did not meet the requirements of the ASME B&PV Code and the applicable design specification. Aecon issued NCR –No. A00002-000-0259 that will require WECTEC Source Inspectors to perform 100 percent inspection on all of the piping spool welds manufactured by CB&I Laurens that are currently being installed into the mechanical modules at Aecon. Since WEC has responsibility for the piping spools, WEC will take ownership of the corrective actions to be performed by Aecon. The NRC will evaluate WEC's

corrective actions for the piping spool welds that did not meet the ASME B&PV Code and the design specification requirements during the next scheduled inspection at WEC's headquarter offices.

Some activities observed by the NRC inspection team are associated with or directly affect closure of inspections, tests, analyses, and acceptance criteria (ITAAC) from Revision 19 of the certified AP1000 design. These ITAAC are included in the combined licenses of Vogtle Units 3 and 4, and V. C. Summer Units 2 and 3.

Specific activities observed by the NRC inspection team included:

- Manual Gas Tungsten Arc Welding (GTAW) for the root and hot passes on Class 1 (BTA) shop weld-No. W4 joining a short radius 90° elbow fitting to 8-inch NPS schedule 160 pipe spool S/N Q223-PXS-PLW-01-B
- Remote up/downhill machine GTAW for intermediate weld passes on shop weld-No. W1 to the inlet side of the tee fitting for an 8-inch NPS schedule 160 pipe spool shown on drawing No. SV3-Q223-PXS-PLW-02
- Receipt inspection of two gate valves, 8-inch, CL 1500 INT, stainless steel, motor operated, butt weld, Schedule 160S, active, Class 1, for the Reactor Coolant System for Vogtle Unit 3
- Borescope inspection of weld 17 on piping spool Serial Number VS2-RNS-PLW-014-1D, for Residual Heat Removal system for V.C. Summer, Unit 2.
- Corrective Action Screening Committee meeting to determine the level of significance for corrective actions requests (CARs) opened in response to issues identified by the NRC during the inspection
- Calibration of an A/C Yoke (40-063) and a 12-inch Vernier Caliper (10-022)

In addition to observing these activities, the NRC inspection team verified that measuring and test equipment (M&TE) was properly identified, marked, calibrated, and used within its calibrated range.

These 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 the following Inspection Procedures (IP):

- IP 36100, “Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance”
- IP 43002, “Routine Vendor Inspections”
- IP 43004, “Inspection of Commercial-Grade Dedication Programs”
- IP 65001.03, “Inspection of ITAAC-Related Installation of Piping”
- IP 65001.B, “Inspection of the ITAAC-Related Welding Program”
- IP 65001.F, “Inspection of the ITAAC-Related Design and Fabrication Requirements”

The NRC inspection team concluded that Aecon’s QA policies and procedures comply with the applicable requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21, and that Aecon’s personnel are implementing these policies and procedures effectively. The results of this inspection are summarized below.

Inspection Areas

The NRC inspection team determined that Aecon is implementing its programs for design control, commercial-grade dedication, supplier oversight, internal audits, manufacturing control, inspection, control of special processes, control of M&TE, nonconforming material parts, and components, and corrective action in accordance with the applicable regulatory requirements of Appendix B to 10 CFR Part 50. Also, Aecon is implementing its 10 CFR Part 21 program in accordance with the regulatory requirements. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team also determined that Aecon is implementing its policies and procedures associated with these programs and no findings of significance were identified.

REPORT DETAILS

1. 10 CFR Part 21 Program

a. Inspection Scope

The NRC inspection team reviewed Aecon's policies and implementing procedures that govern Aecon's 10 CFR Part 21, "Reporting of Defects and Noncompliance," program to verify compliance with the regulatory requirements. In addition, the NRC inspection team evaluated the 10 CFR Part 21 postings and a sample of Aecon's purchase orders (PO) for compliance with the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation," and 10 CFR 21.31, "Procurement Documents." The NRC inspection team also verified that Aecon's nonconformance and corrective action procedures provide a link to the 10 CFR Part 21 program.

The NRC inspection team discussed the 10 CFR Part 21 program with Aecon's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Aecon is implementing its 10 CFR Part 21 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 Aecon is implementing its policies and procedures associated with the 10 CFR Part 21 program. No findings of significance were identified.

2. Design Control

a. Inspection Scope

The NRC inspection team reviewed Aecon'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, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," and the requirements of Section III, "Rules for Construction of Nuclear Facility Components," of the ASME B&PV Code. Although Aecon does not have responsibility for any design activities, the NRC inspection team reviewed Aecon's processes for preparing fabrication drawings and work travelers, including translation of technical and quality requirements into Aecon's procedures and process controls. The NRC inspection team examined Aecon's standard operating procedures (SOPs) and associated forms that control design changes, as well as a sample of engineering drawings, design reports and inspection plans.

The NRC inspection team reviewed a sample of three ASME B&PV Code Section III, Subsections NB, NC and ND piping modules that were in various stages of fabrication at Aecon for the domestic WEC AP1000 reactor design at Vogtle Units 3 and 4 and V.C. Summer Units 2 and 3. The NRC inspection team reviewed the shop travelers, ASME design reports and design specifications to ensure that the piping modules were designed and constructed in accordance with the ASME B&PV Code requirements. Also, the NRC inspection team verified that the design report summaries were adequately supported and consistent with the ASME B&PV Code design reports and specifications. The NRC inspection team ensured that the ASME B&PV Code design reports, specifications, and design report summaries were approved by licensed Registered Professional Engineers.

The NRC inspection team's inspection activities at Aecon included evaluating how the design specifications were met, how design changes were controlled and approved, and the interactions between Aecon and the designer (WEC) to resolve non-conformances. The NRC inspection team's primary focus was related to items in the design areas that could affect piping integrity and inspectability. The NRC inspection team verified that the materials of construction and components for the piping and mechanical modules conform to the appropriate material specification, design specification, and ASME B&PV Code requirements. The NRC inspection team also reviewed how the piping and components are designed for inspectability per the design specification and the ASME B&PV Code, and that Aecon has processes in place to ensure ASME B&PV Code design requirements are being met (ASME B&PV Code, i.e., weld joint offsets and inside diameter of pipe tolerances).

The NRC inspection team discussed the design control program with Aecon's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

NCR –No. A00002-000-0206, dated June 30, 2016, was issued by Aecon after a walkthrough of Aecon's facility during a bagman trip on May 18, 2016. During the walkthrough, the NRC staff observed piping spools (Serial Numbers VS2-RNS-PLW-014-1D, and SV3-RNS-PLW-014-1D, 10-inch piping for Normal Residual Heat Removal system) supplied by Chicago Bridge and Iron (CB&I) in Laurens, South Carolina, that had abrupt weld contours that did not meet the Paragraph NX-4232.1 of Section III of the ASME B&PV Code, which requires offsets to have at least a 3:1 taper over the width of the finished weld or, if necessary, by adding additional weld metal beyond what would otherwise be the edge of the weld. This outside diameter offset was visible for approximately half of the pipe weld circumference, and acts as a stress concentration and could affect the design stresses and piping integrity.

The NRC inspection team verified that appropriate disposition of NCR –No. A00002-000-0206 was obtained by Aecon, and non-conforming material was repaired as dispositioned by the designer (WEC). Weld 17 for piping spool Serial No. VS2-RNS-PLW-014-1D was still in process of being repaired. The NRC inspection team observed that the weld 14 on piping spool SV3-RNS-PLW-014-1D had been

repaired to meet the requirements of the ASME B&PV Code and the design specification (WEC Specification APP-GW-PO-008, "AP1000 Specification for Field Fabricated Piping and Installation, Section III of the ASME B&PV Code, Classes 1, 2, and 3 and ASME B31.1," Revision 6, dated June 12, 2014).

During the inspection, the NRC inspection team observed seven additional welds that did not meet the requirements of the ASME B&PV Code and the applicable design specification on mechanical modules Q223 for Vogtle Unit 3 and Q240 for V. C. Summer Unit 2. These welds did not meet Paragraph NX-4232.1 of Section III of the ASME B&PV Code, which requires offsets to have at least a 3:1 taper over the width of the finished weld or, if necessary, by adding additional weld metal beyond what would otherwise be the edge of the weld and Paragraph NX-3125, which requires accessibility to permit the examinations required by the Edition and Addenda of Section XI as specified in the Design Specification for the component shall be provided in the design of the component, and the WEC Design Specification (APP-GW-PO-008, Revision 6, dated June 12, 2014), which requires the welds be finished such that the welds do not have abrupt ridges and valleys, and depressions of greater than 1/32-inch. Based on this observation, Aecon opened NCR No A00002-000-0259 that will require WECTEC Source Inspectors to perform 100 percent inspection on all piping spool welds manufactured by CB&I Laurens that are currently being installed into the mechanical modules at Aecon. Since WEC has responsibility for the piping spools, WEC will take ownership of the corrective actions to be performed by Aecon. The NRC will evaluate WEC's corrective actions for these piping spool welds that did not meet ASME B&PV Code and the design specification requirements during the next scheduled inspection at WEC's headquarter offices.

The NRC inspection team also observed that weld 17 on piping spool Serial No. VS2-RNS-PLW-014-1D and weld 14 on piping spool Serial No. SV3-RNS-PLW-014-1D were mistakenly identified as weld W17 and weld W14 respectively. It should be noted that in accordance with Aecon's numbering system a unique identifier needs to be etched next to the weld. That unique identifier is achieved by adding the letter "W" next to the weld number assigned to that weld. The NRC inspection team noted that documentation such as inspection reports, travelers and NCRs had documented the incorrect weld numbers. The NRC inspection team pointed out that welds 17, 14, W17, and W14 are located in the same piping assembly, and therefore proper documentation of any repairs is necessary for traceability. Aecon issued corrective action report (CAR) No 2016-0144, dated July 28, 2016, to address this issue.

c. Conclusion

The NRC inspection team concluded that Aecon is implementing its design control program in accordance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. The resolution of CAR 2016-0144 will make the determination if the quality of the safety-related welds was not affected, which will be reviewed by the NRC staff during a future inspection. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Aecon is implementing its policies and procedures associated with the design control program. No findings of significance were identified.

3. Manufacturing Control and Control of Special Processes

a. Inspection Scope

The NRC inspection team reviewed Aecon's policies and implementing procedures that govern the implementation for the control of manufacturing and special processes programs to verify compliance with Criterion VIII, "Identification and Control of Materials, Parts and Components," Criterion IX, "Control of Special Processes," and Criterion X, "Inspection," of Appendix B to 10 CFR Part 50, and the 1998 Edition, 2000 Addenda, of Section III of the ASME B&PV Code Division 1, Subsections NCA for General Requirements, NB for Class 1 Components, ND for Class 3 Components, and NF for Supports.

The NRC inspection team reviewed a sample of documents for inspection, welding, weld repair, and nondestructive examination (NDE) reports associated with the fabrication of safety-related austenitic stainless steel piping spools, valves, and supports for the Vogtle Unit 3 Q223 Direct Vessel Injection B mechanical module of the AP1000 reactor design associated with ITAAC 2.2.03.02a, 2.2.03.02b, and 2.2.03.03b.

The NRC inspection team reviewed welding procedure specifications (WPSs) and certified supporting procedure qualification records (PQRs) to confirm that the WPSs used in production for the Q223 mechanical module were developed and qualified in accordance with the applicable requirements of Sections III and IX of the ASME B&PV Code for welding qualifications. The NRC inspection team reviewed traceable performance qualification records for welders and welding operators to verify that these individuals were qualified and certified in accordance with the requirements of Section IX of the ASME B&PV Code.

The NRC inspection team performed a walkthrough for two of the welding material storage and issue areas to verify that welding materials were adequately stored and issued on the shop floor to welders/operators. The NRC inspection team observed that Aecon clearly identified welding materials at all times, and retained identification and traceability of acceptable material throughout the storage, handling, and use until the material was completely consumed for each production weld. The NRC inspection team verified that the applicable welding data; such as weld material identification numbers, WPSs, inspection procedures, and the final inspection results and NDE reports were recorded on weld travelers and associated drawings with traceability to ASME B&PV Code Data Reports of pipe spools and valves.

The NRC inspection team reviewed documents of inspections to ensure that the quality control (QC) inspectors verified the applicable traceability requirements of the welding activities including part numbers, serial numbers, assembly drawings and its revisions, job orders, work packages, WPSs, welder/operator identifications, weld filler metal rod and wire spool heat numbers to certified material test reports (CMTRs), and calibration of welding machines.

The NRC inspection team reviewed Aecon's NDE procedures and reports for magnetic particle examination and radiographic examination to verify they were developed and documented in accordance with the requirements of Sections III and V of the ASME B&PV Code for NDE. The NRC inspection team verified that Aecon's written practice for NDE personnel qualifications were established by a Level III individual in accordance

with the 1992 Edition of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing." In addition, the NRC inspection team observed that Aecon maintains the qualifications of NDE personnel to the most conservative requirements to comply with all the versions of ASNT SNT-TC-1A along with the annual vision test for near distance acuity and color contrast.

The NRC inspection team also verified the identification markings used on quality materials provided clear and legible identifications and do not adversely affect its function or the service life of the items. The NRC inspection team verified that part numbers and/or trace code numbers were maintained on each item and in documents traceable to the items. The NRC inspection team reviewed a sample of CMTRs to verify compliance with the procurement document requirements for chemical composition, mechanical properties, and dimensions.

The NRC inspection team discussed the control of manufacturing and special processes program with Aecon's management, technical staff, and shop floor craft supervision and labor force. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

The NRC inspection team observed in-process manual Gas Tungsten Arc Welding (GTAW) for the root and hot passes on Class 1 (BTA) shop weld-No. W4 joining a short radius 90° elbow fitting to 8-inch NPS schedule 160 pipe spool S/N Q223-PXS-PLW-01-B, and reviewed welding related documents for a completed Class 3 (BBC) shop weld-No. W1 between check valve No. BL 281 and 8-inch NPS schedule 160 pipe spool S/N Q223-PXS-PLW-01-A shown on spool drawing No. SV3-Q223-PXS-PLW-01.

The NRC inspection team observed remote up/downhill machine GTAW for intermediate weld passes on shop weld-No. W1 to the inlet side of the tee fitting for an 8-inch NPS schedule 160 pipe spool shown on drawing No. SV3-Q223-PXS-PLW-02 to verify that welding was performed in accordance the essential and nonessential variables described in Section IX of the ASME B&PV Code qualified WPSs.

The NRC inspection team reviewed Flux-Cored Arc Welding (FCAW) WPS-No. AWS-20B with supporting PQRs, and four semi-automatic FCAW welder performance qualification records for ID-Nos. 549, 557, 560, and 569 to determine whether the welding of angle iron clips and base plates with fillet welds to the safety-related surfaces of the Q223 mechanical module frame was performed in accordance with the American Welding Society (AWS) D1.1:2000, Structural Welding Code – Steel.

The NRC inspection team reviewed Acuren Radiographic Examination Report No. RT-X23-003 to verify whether radiography was performed on an 8-inch NPS schedule 160 completed stainless steel shop weld-No. W3 shown on spool drawing No. SV3-Q223-PXS-PLW-03 using traveler-A0002X23-008, Operation 750 in accordance with the requirements of Section III and V of the ASME B&PV Code for NDE.

The NRC inspection team reviewed the following documents to verify that welding was performed in accordance with the requirements of Subsection NF, of Section III of the ASME B&PV Code, for the boundary supports to join carbon steel tube Item-Nos. 15 and 17 to the Q223 mechanical module frame using complete joint penetration single-bevel grooves with backing material for weld-Nos. W45, W46, W53, and W54 shown on drawing-No. SV3-Q223-PXS-PLW-01XX using traveler-A00002X23-006:

- CMTRs for GTAW solid rods for heat-Nos. 1269G and 14302163, and Shielded Metal Arc Welding (SMAW) electrodes for lot-Nos. 1217T and 1217V in accordance with Aecon Technical Specification ATS-076 and ATS-069, respectively;
- Welder performance qualification records (WPQR) for stamp-nos. 72 and 182; and
- Magnetic Particle Examination Report-No. MT-X23-043 signed for final acceptance by a Level II technician.

c. Conclusions

The NRC inspection team concluded that Aecon is implementing its manufacturing control and control of special processes programs in accordance with the regulatory requirements of Criterion VIII, IX, and X of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and operations observed, the NRC inspection team also determined that Aecon is effectively implementing its policies and procedures associated with the manufacturing control and control of special processes programs. No findings of significance were identified.

4. Inspection

a. Inspection Scope

The NRC inspection team reviewed Aecon's policies and implementing procedures that govern the inspection program to verify compliance with the regulatory requirements of Criterion X, "Inspection," of Appendix B to 10 CFR Part 50. The NRC inspection team verified that Aecon's procedures for inspection activities provided measures for the generation of inspection documents, such as shop travelers, instructions, or other appropriate means. For a sample of shop travelers and as-built drawings, the NRC inspection team verified that these documents included the appropriate information as required by Aecon's procedures such as the heat numbers, welding material, welding procedures, inspection date, results of examination, and the initials/signature of the QC inspector. The NRC inspection team also verified that mandatory hold points were indicated and that work did not proceed without appropriate approval.

The NRC inspection team verified that inspections are performed by qualified persons other than those who performed or directly supervise the work being inspected and that these documents included appropriate information as required by Aecon's procedures such as inspection date, observations, results of examinations and tests, and the appropriate signature and/or initials of the QC inspector. The NRC inspection team verified the inspections were performed by qualified personnel and followed approved policies and procedures, and specific part numbers and heat numbers were traceable to the raw material purchased or supplied from the suppliers and maintained throughout the production process.

The NRC inspection team discussed the inspection program with Aecon's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

During the review of QCP-310.2, "Visual Inspection, Revision 18, dated June 18, 2015, the NRC inspection team noted that the procedure was written to the 2013 Edition of the ASME B&PV Code lieu of the contractual requirement of the 1998 Edition with the 2000 Addenda to the ASME B&PV Code, and no reconciliation was performed as allowed by ASME Code. During the discussion with Aecon's management several other inconsistencies were identified with QCP-310.2, including referencing the incorrect figure and not identifying the requirements of NB-4250 of Section II of the ASME B&PV Code. Aecon issued CAR 2016-0142, dated July 27, 2016 to address this issue.

c. Conclusion

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

5. Control of Measuring and Test Equipment

a. Inspection Scope

The NRC inspection team reviewed Aecon's policies and implementing procedures that govern the measuring and test equipment (M&TE) program to verify compliance with the requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspection team also reviewed a sample of calibration records and observed the calibration of an A/C yoke and a Vernier caliper. The NRC inspection team also verified that when M&TE equipment is received from the calibration service supplier and the calibration certificate states that it was found to be out of calibration, Aecon generates an NCR to identify items that have been accepted using this equipment since the last valid calibration date and to perform an extent of condition review.

The NRC inspection team discussed the M&TE program with Aecon's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Aecon is implementing its M&TE program 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 Aecon is implementing its policies and procedures associated with the M&TE program. No findings of significance were identified.

6. Commercial-Grade Dedication and Supplier Oversight

a. Inspection Scope

The NRC inspection team reviewed Aecon's policies and implementing procedures that govern the implementation of its commercial-grade dedication and supplier oversight programs to verify compliance with the 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 NRC inspection team reviewed a sample of commercial-grade dedication plans, checklists, reports, associated POs, and commercial-grade surveys of several commercial vendors on Aecon's Approved Supplier's List (ASL). The NRC inspection team evaluated a sample of technical evaluations and concluded that the technical evaluations in the dedication plans appropriately identify the critical characteristics and technical attributes necessary to provide reasonable assurance that the services would perform their intended safety function. Also, the NRC inspection team verified a sample of CMTRs, Certificates of Conformance, and receipt inspection records to verify that these documents contained the appropriate technical requirements.

The NRC inspection team verified that the POs included, as appropriate: the scope of work, right of access to facilities, and extension of contractual requirements to subcontractors. In addition, the NRC inspection team confirmed that the reviewed safety related POs invoked the requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21.

The NRC inspection team reviewed a sample of external audits to verify the implementation of Aecon's supplier oversight program. The NRC inspection team verified that Aecon had prepared and approved plans that identify the audit scope and applicable checklist criteria before the initiation of the audit activity. The NRC inspection team confirmed that the audit reports contained objective evidence of the review of the relevant QA criteria of Appendix B to 10 CFR Part 50. For audits that resulted in findings, the NRC inspection team verified that the supplier had established a plan for corrective action and that Aecon had reviewed and approved the corrective action and verified its satisfactory completion and proper documentation.

The NRC inspection team also reviewed a sample of training and qualification records of lead auditors and QC inspection personnel and confirmed that auditing and inspection personnel had completed the required training and maintained qualification and certification in accordance with Aecon's policies and procedures.

The NRC inspection team observed the receipt inspection of two 8-inch gate valves for Vogtle Unit 3. The NRC inspection team observed the Aecon QC inspector review the necessary documentation, confirm the PO information, conduct a review for any obvious damage, verify the quantity received, and verify the applicable receipt inspection requirements.

The NRC inspection team also discussed the commercial-grade dedication and supplier oversight programs with Aecon's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Aecon is implementing its commercial-grade dedication and supplier oversight programs in accordance with the regulatory requirements of Criterion III, Criterion IV, and Criterion VII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Aecon is implementing its policies and procedures associated with the commercial-grade dedication and supplier oversight programs. No findings of significance were identified.

7. Nonconforming Materials, Parts, or Components and Corrective Action

a. Inspection Scope

The NRC inspection team reviewed Aecon's policies and implementing procedures that govern the control of nonconformances and corrective actions to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed Aecon's NCR and Corrective/Preventive Action Report (CARs) logs and selected a sample of NCRs and CARs to verify that Aecon had implemented an adequate program to ensure that nonconforming items and significant conditions adverse to quality (SCAQ) and conditions adverse to quality (CAQ) were promptly identified and corrected. The NRC inspection team verified that nonconforming items were properly identified, marked, and segregated when practical, to ensure they were not reintroduced into the manufacturing process. Aecon's nonconformances are dispositioned either use-as-is, repair, re-work, scrap, return and replace, or other. The NRC inspection team verified that when applicable, the NCRs had the appropriate technical justification for the selected disposition.

The NRC inspection team verified that the CARs provide: (1) adequate documentation and description of the SCAQ or CAQ as applicable; (2) an appropriate analysis of the cause of these conditions and the corrective actions taken to prevent recurrence; (3) direction for review and approval by the responsible authority; (4) a description of the current status of the corrective actions; and (5) the follow-up actions taken to verify timely and effective implementation of the corrective actions. The NRC inspection team also reviewed a sample of trend evaluations and root cause analyses.

The NRC inspection team observed a Corrective Action Screening Committee meeting to determine the level of significance for CARs opened in response to issues identified by the NRC during the inspection.

The NRC inspection team also discussed the nonconformance and corrective action programs with Aecon's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

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

8. Internal Audits

a. Inspection Scope

The NRC inspection team reviewed Aecon's policies and implementing procedures that govern the control of internal audits to verify compliance with the requirements of Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50.

The NRC inspection team verified that Aecon had prepared and approved plans that identify the audit scope and applicable checklist criteria before the initiation of the audit activity. The NRC inspection team confirmed that the audit reports contained objective evidence of the review of the relevant QA criteria of Appendix B to 10 CFR Part 50. For audits that resulted in findings, the NRC inspection team verified that the lead auditor generated a corrective action and that Aecon had reviewed and approved the corrective action and verified its satisfactory completion and proper documentation. In addition, the NRC inspection team reviewed a sample of training and qualification records of Aecon's lead auditors and auditors to confirm that auditing personnel had completed all the required training and had maintained qualification and certification in accordance with Aecon's policies and procedures.

The NRC inspection team discussed the internal audit program with Aecon's management. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Aecon is implementing its internal audit program in accordance with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC

inspection team also determined that Aecon is implementing its policies and procedures associated with internal audits. No findings of significance were identified.

9. Entrance and Exit Meetings

On July 25, 2016, the NRC inspection team discussed the scope of the inspection with Dennis Lattanzi, Director of Quality, Robert Michiels, Project Quality Manager, and other members of Aecon's management and technical staff. On July 29, 2016, the NRC inspection team presented the inspection results and observations during an exit meeting with Sam Bambino, Vice President of Aecon Nuclear, Dennis Lattanzi, Robert Michiels, and other members of Aecon's management and technical staff. The attachment to this report lists the attendees of 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	Interviewed
Jonathan Ortega-Luciano	Inspection Team Leader	NRC	X	X	
Yamir Diaz-Castillo	Inspector	NRC	X	X	
Alain Artayet	Inspector	NRC	X	X	
John Honcharik	Technical Specialist	NRC	X	X	
Gabriele Giobbe	Observer	Canadian Nuclear Safety Commission	X	X	
Antonio Giamarco	Project Coordinator	Aecon			X
Ben Sidaway	Shop Floor Supervisor	Aecon			X
Chas Williams	Manufacturing Specialist	Aecon	X	X	X
Chris Armstrong	Quality Control (QC) Inspector	Aecon			X
Coach Shih	Senior Quality Specialist	Aecon	X	X	
Dan Clemens	Project Manager	Aecon			X
David Oliver	Project Manager	Westinghouse Electric Company (WEC)		X	
Dennis Lattanzi	Director of Quality	Aecon	X	X	X
Dent McIntyre	QC Inspector Level III	Aecon			X
Dorel Muth	Welding Engineer	Aecon			X
Eric Dyke	Manager, Nuclear Fabrication	Aecon	X	X	X
Gerry Grummett	Purchasing	Aecon	X	X	
Jend Parkison	Modular Director	WEC		X	
John Hogarth	QC Inspector	Aecon	X	X	X
John Sinoway	Shop Floor Supervisor	Aecon			X
Kevin Cassells	Fabrication Quality Manager	Aecon	X	X	X
Laura Moir	Corrective Action Specialist	Aecon			X
Liam Archibald	QC Inspector	Aecon			X

Name	Title	Affiliation	Entrance	Exit	Interviewed
Richard Su	Inspector	Authorized Nuclear Inspector			X
Robert Michiels	Project Quality Manager	Aecon	X	X	X
Ronald Blais	QC Inspector	Aecon			X
Russell Bastyr	Director, SQO	WEC	X	X	
Sam Bambino	VP Aecon nuclear	Aecon		X	
Samuel Anselm	Project Director	Aecon	X	X	
Shailesh Kamble	Project Manager	Aecon	X	X	
Shaun O'souza	Junior Project Coordinator	Aecon	X		
Shelaney Lloyd	Project Coordinator	Aecon	X		
Tom Michaels	QC Lead	Aecon			X
Vikram Bassan	QC Inspector	Aecon			X
Wilfrid Bagley	Auditing Supervisor	Aecon	X	X	X

2. INSPECTION PROCEDURES USED

- Inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012
- IP 43002, "Routine Vendor Inspections," dated July 15, 2013
- IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated November 29, 2013
- IP 65001.03, "Inspection of ITAAC-Related Installation of Piping," dated August 19, 2008
- IP 65001.B, "Inspection of the ITAAC-Related Welding Program," dated September 25, 2013
- IP 65001.F, "Inspection of the ITAAC-Related Design and Fabrication Requirements," dated September 20, 2013

3. INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA

The U.S. Nuclear Regulatory Commission (NRC) inspection team identified the following inspections, tests, analyses, and acceptance criteria (ITAAC) related to mechanical piping component modules being assembled at Aecon. Aecon was nearing assembly completion of safety-related valves, piping spools, and supports for a VOG-3 Q223 Direct Vessel Injection B mechanical module. For the ITAAC listed below, the NRC inspection team reviewed Aecon's quality assurance controls in the areas of design control, commercial-grade dedication, test control, oversight of contracted activities, control of

measuring and test equipment, nonconforming materials, parts and components, corrective actions, American Society of Mechanical Engineers Boiler and Pressure Vessel Code nameplates and Data Reports, and the following for special processes:

- In-process manual and machine Gas Tungsten Arc Welding;
- Welding procedures with supporting qualification records;
- Welder/operator qualification records;
- Nondestructive examination procedures (NDE); and
- NDE written practice and personnel certifications.

The ITAAC design commitments and components referenced below are for future use by the NRC staff during the ITAAC closure process; the listing of these ITAAC design commitments does not constitute that they have been met and/or closed. The NRC inspection team did not identify any finding associated with the ITAAC identified below.

ITAAC	Design Commitment	Component
VOG 3 2.2.03.02a	2.a) The components identified in Table 2.2.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.	PV03 valve PXS-PL-V124B [IRWST Injection B Check Valve, S/N BL 281 for Q223]
VOG 3 2.2.03.02b	2.b) The piping identified in Table 2.2.3-2 as ASME Code Section III is designed and constructed in accordance with ASME Code Section III requirements.	PL02 PXS-L124B and -L118B [IRWST Injection Line B to DVI Line B: S/N SV3-PXS-PLW-01-A and -B; S/N SV3-PXS-PLW-02; and S/N SV3-PXS-PLW-03 for Q223]
VOG 3 2.2.03.03b	3.b) Pressure boundary welds in piping identified in Table 2.2.3-2 as ASME Code Section III meet ASME Code Section III requirements.	PL02 PXS-L124B and -L118B [IRWST Injection Line B to DVI Line B: S/N SV3-PXS-PLW-01- A: W1; S/N SV3-PXS-PLW-01- B: W4; S/N SV3-Q223-PXS- PLW-02: W1; and S/N SV3- PXS-PLW-03: W3 for Q223]

4. DOCUMENTS REVIEWED

Policies and Procedures

- Quality Assurance Manual for Nuclear Class Items, Revision 19 dated December 10, 2015
- Quality Control Procedure (QCP)-302.1, "Qualification of Audit Personnel," Revision 10 dated October 3, 2013
- QCP-302.3, "Certification of QC Inspectors," Revision 7, dated January 19, 2012
- QCP-302.4, "Quality Assurance Auditing," Revision 13 dated April 14, 2015
- QCP-302.5, "Certification of Testing Personnel," Revision 4 dated October 24, 2011
- QCP-306.3, "Certificate of Compliance," Revision 3, dated June 15, 2010
- QCP-306.5, "Control of Suppliers," Revision 12, dated February 22, 2016
- QCP-309.35, "Monitoring of Welding," Revision 7, dated March 21, 2011

- QCP-309.44, "Fabrication Shop Nonconformance," Revision 9 dated May 10, 2015
- QCP-309.54, "Production Engineering Drawing Work Flow (Nuclear)," Revision 1, dated May 10, 2011
- QCP-309.57, "Preparation of Quality Control Procedures, Work Instructions, Technical Specifications and Forms," Revision 6, dated July 9, 2014
- QCP-309.59, "Control of Welding," Revision 9, dated February 3, 2016
- QCP-309.61, "Root Cause Analysis," Revision 1, dated April 10, 2015
- QCP-309.66, "Trend Analysis," Revision 0, dated April 13, 2015
- QCP-309.74, "Nuclear Corrective Action," Revision 2 dated July 30, 2015
- QCP-310.17, "Piping Cleanliness Verification Procedure," Revision 3, dated November 24, 2010
- QCP-310.21, "Written Practice," Revision 12, dated May 23, 2014
- QCP-310.42, "Statistical Sampling Procedure," Revision 2, dated January 16, 2012
- QCP-311.0, "Calibration General," Revision 17 dated August 5, 2015
- QCP-311.1, "Calibration Master," Revision 6 dated October 29, 2014
- QCP-310.2, "Visual Inspection," Revision 18, dated October 21, 2015
- QCP-311.3, "Calibration of Verniers & Micrometers," Revision 9 dated October 29, 2014
- QCP-311.4, "Calibration of Pressure Gauges Using Dead Weights Tester," Revision 10 dated October 31, 2014
- QCP-311.6, "Verification of Welding Machines," Revision 4 dated September 26, 2013
- QCP-311.7, "Calibration of Weld Rod Ovens," Revision 9 dated February 23, 2015
- QCP-311.10, "Calibration of Equotip Hardness Tester," Revision 3 dated October 29, 2014
- QCP-311.13, "Calibration of Magnetic Particle Yoke," Revision 5 October 31, 2014
- QCP-311.14, "Verification of Noncontact Thermometer," Revision 4 dated July 20, 2011
- QCP-311.16, "Calibration of Dry Film Thickness Gauges," Revision 3 dated October 29, 2014
- QCP-311.18, "Calibration of Pressure Gauges Using the Beta Gauge 330," Revision 3 dated October 31, 2014
- QCP-405.7, "Receiving, Receiving Inspection, and Source Inspection of Nuclear Items," Revision 10, dated April 4, 2016
- QCP-405.8, "Certification of Source Material," Revision 6 dated May 30, 2011
- QCP-405.9, "10CFR21 and 10CFR 50.55(e) Reporting of Defects and Noncompliance," Revision 8 Dated August 24, 2015
- QCP-405.10, "Control of Nuclear Welding Material," Revision 10, dated May 26, 2015
- QCP-405.12, "Nuclear Purchasing," Revision 14, dated May 1, 2015
- QCP-405.15, "Repair of Base Material For Nuclear Pressure-Retaining Components," Revision 2, dated October 21, 2014
- QCP-405.16, "Repair of Weld Metal Defects in Nuclear Items," Revision 2, dated October 21, 2014
- QCP-405.17, "Certificate of Conformance," Revision 2, dated September 28, 2011
- QCP-409.3, "Control Notice," Revision 7, dated October 17, 2011
- QCP-409.4, "Training for Nuclear Personnel," Revision 7 dated March 27, 2012
- QCP-409.8, "Marking and Identification of Nuclear Material," Revision 5, dated October 28, 2011
- QCP-409.11, "Supply of Nuclear Material," Revision 4, dated September 20, 2011
- QCP-409.19, "Commercial-Grade Dedication," Revision 1, dated January 10, 2014
- QCP-409.20, "Commercial-Grade Surveys," Revision 0, dated September 25, 2013

- Aecon Technical Specification (ATS)-059, "Supply of Structural Steel for AP1000 Mechanical Modules," Revision 14, dated June 14, 2016
- QCP-410.4, "Magnetic Particle Examination-Nuclear Power Plant Components," Revision 11, dated September 4, 2015
- QCP-410.5, "Liquid Penetrant Examination-Nuclear Power Plant Components," Revision 11, dated September 10, 2013
- QCP-410.8, "ITPS and Travelers for Nuclear Items," Revision 8, dated February 25, 2016
- ATS-061, "Nuclear Weld Consumable Ordering Specification," Revision 0, dated April 20, 2014
- ATS-062, "Nuclear Weld Consumable Ordering Specification for ER316L Rod or Spools," Revision 0, dated April 29, 2015
- ATS-066, "Nuclear Safety Related Weld Consumable Ordering Specification," Revision 2, dated December 16, 2014
- ATS-068, "Nuclear Safety Related Weld Consumable Ordering Specification," Revision 4, dated December 16, 2014
- ATS-069, "Nuclear Safety Related Weld Consumable Ordering Specification (SMAW) for E7018-1 MR," Revision 1, dated December 16, 2014
- ATS-076, "Nuclear Weld Consumable Ordering Specification," Revision 0, dated April 29, 2015
- ATS-085, "CMTL CGD Survey Critical Characteristics," Revision 0, dated July 16, 2014
- ATS-104, "Commercial Grade Dedication CMTL Mississauga Chemical Testing," Revision 0, dated September 19, 2014
- ATS-109, "Supply of Coating Material for Carbon Steel Surfaces AP1000 Mechanical Modules," Revision 2, dated April 5, 2016
- ATS-111, "DI Water Chemical Analysis Requirements," Revision 2, dated July 3, 2015
- ATS-114, "Commercial Grade Dedication: LP Custom Machining Ltd. Project A00002," Revision 0, dated June 4, 2015
- ATS-146, "Nuclear Weld Consumable Ordering Specification," Revision 0, dated November 18, 2015
- ATS-147, "Commercial Grade Dedication: Acuren Group, Inc. Project A00002," Revision 1, dated December 22, 2015
- Work Instruction (WI)-018, "Receiving of Free Issue Material Job 2210 (Stone and Webster)," Revision 1, dated June 11, 2014
- WI No. 038, "CFM/PFM Preventative Work Maintenance Work Instruction Job A00002," Revision 0, dated June 15, 2005
- WI-057, "General Fabrication Requirements for Module Assembly Job A00002," Revision 1, Dated April 4, 2016

Design Documents

- Westinghouse Electric Company (WEC) Design Specification APP-GW-P0-007, "AP1000 Specification for Shop Fabricated Piping," Revision 7, dated June 12, 2014
- WEC Design Specification APP-GW-P0-008, "AP1000 Specification for Field Fabricated Piping and Installation, ASME III, Code Classes 1, 2, and 3 and ASME B31.1," Revision 6, dated June 12, 2014

Drawings

- Aecon Drawing DI-Q240-SV3 (APP-Q240-V0-001), "Normal Residual Heat Removal for Vogtle EPC –Unit 3,: Revision 6, dated June 16, 2016
- Aecon Drawing A00002-001-SK-03, "ISI Weld Layout and Mapping Record," dated March 15, 2016
- Aecon Drawing DI-Q240-SV3 (Spool SV3-Q240-RNS-PLW-03), "Normal Residual Heat Removal," Revision 6, dated June 16, 2016
- Aecon Drawing DI-Q240-VS2 (Spool VS2-Q240-RNS-PLW-01), "Normal Residual Heat Removal," Revision 3, dated July 18, 2016
- Aecon Drawing DI-Q223-SV3 (Spool SV3-Q223-PXS-PLW-01), "Passive Core Cooling System," Revision 4, dated May 12, 2016
- WEC Drawing APP-RNS-PLW-016, "Normal Residual Heat Removal System Containment Building Room 11208 from IRWST to Cont. Penetration," Revision 6, dated March 27, 2013
- WEC Drawing APP-RNS-PLW-014, "Normal Residual Heat Removal System Containment Building Room 11208 from Hot Leg to Cont. Penetration," Revision 7, dated April 9, 2013
- WEC Drawing APP-PXS-PLW-02U, "Passive Core Cooling System Containment Building Room 11207 IRWST & Cont. Recirc. To DVI-B," Revision 3, dated August 8, 2012
- WEC Drawing APP-GW-VFY-001, "AP1000 Weld End Configuration for Stainless Steel, Carbon Steel and Alloy Steel Auxiliary Piping Components," Revision 2, dated February 11, 2015
- Westinghouse Drawing SVO-PV01-V2-120004, "AP1000 Motor Operated Gate Valve, 10" Class 1500, Assembly Drawing," Revision 1, dated September 18, 2014
- WEC Drawing APP-RNS-M6X-004, "RNS Pipe Line Designation Table," Revision 1
- As Built Drawings SV3-Q223-PXS-PLW-01, Revision 9, dated May 12, 2016
- As Built Drawings SV3-Q240-RNS-PLW-01, Revision 7 dated May 27, 2016
- As Built Drawings VS2-Q240-RNS-PLW-01, Revision 2, dated July 5, 2016

Audit Reports and Commercial-Grade Surveys

- Survey Report No. AI-SA-14-041 of Cambridge Material Testing Ltd., Cambridge Division, Revision 1, dated July 11, 2014
- Commercial-Grade Dedication Plan No. CGD-001 for mechanical testing services by Cambridge Material Testing Ltd., Cambridge Division, Revision 1, dated July 2, 2014
- Survey Report No. AI-SA-15-072 of Acuren Group Inc., Revision 0, dated October 2, 2015
- Commercial-Grade Dedication Plan No. CGD-007 for non-destructive examination services performed by Acuren Group Inc., Revision 0, dated July 27, 2015
- Survey Report No. AI-SA-14-046 of LP Custom Machining Ltd., Revision 1, dated October 24, 2014
- Commercial-Grade Dedication Plan No. CGD-004 for machining services performed by LP Custom Machining Ltd., Revision 1, dated February 18, 2015
- Survey Report No. AI-SA-14-043 of International Light Technologies, Inc. Revision 0, dated July 14, 2014
- Commercial-Grade Dedication Plan No. CGD-004 for calibration services performed by International Light Technologies, Inc., Revision 0, dated May 6, 2014

- Survey Report No. AI-SA-14-049 of Hexagon Metrology, Inc. Revision 1, dated January 19, 2015
- Commercial-Grade Dedication Plan No. CGD-005, for calibration services performed by Hexagon Metrology, Inc., Revision 1, dated November 28, 2014
- Survey Report No. AI-SA-14-042 of Cambridge Material Testing – Mississauga Division, Inc. Revision 0, dated July 11, 2014
- Commercial-Grade Dedication Plan No. CGD-002, for chemical analysis testing services performed by Cambridge Material Testing - Mississauga Division, Inc., Revision 1, dated May 21, 2014
- Audit Report No. AI-SA-14-040 of Weldstar Company, Revision 0, dated June 13, 2014
- Audit Report No. AI-SA-13-044 of TW Metals, Nuclear Material Solutions, Revision 0, dated September 4, 2013
- Audit Report No. AI-SA-14-047 of PPG Protective and Marine Coatings, Revision 0, dated January 8, 2015
- Audit Report No. AI-SA-13-051 of Lincoln Electric Company, Revision 0, dated January 10, 2014
- Audit Report No. AI-SA-16-055 of DuBose National Energy Services, Revision 0, dated April 29, 2016
- Audit Report No. AI-SA-15-071 of Laboratory Testing Inc., Revision 0, dated October 5, 2015

Calibration, Inspection and Test Reports

- Certificate of Calibration No. AIC006-16-01-01256-6 for Light Meter 81-016
- Certificate of Calibration No. AIC006-06-23760-4 for Torque Wrench 90-001
- Certificate of Calibration No. AIC006-16-07-24971-3 for Pressure Gage
- Certificate of Calibration No. AIC006-04-14132-7 for Non-Contact Thermometer
- Certificate of Calibration No. 61041 for Hardness Tester
- Certificate of Calibration DFT Gauge 14-013
- Certificate of Calibration for Welding Machine 50-547
- Certificate of Calibration No. QF 750-01 Welding Machine 152503
- Certificate of Calibration for AC Yoke 40-064
- Certificate of Calibration No. AIC006-15-09-36853-1 for an Ultrasonic Testing calibration block, Revision 0, dated October 1, 2015
- Certificate of Calibration No. 2016100365816 for the Leica TDRA6000 machine, dated February 5, 2016
- Certified Material Test Report (CMTR) for chemical and physical testing of various ASTM A500-13 tubes, dated April 22, 2016
- CMTR No. 7892232 for electrodes, dated June 24, 2016
- CB&I Stone & Webster Certificate of Conformance (COC) No. 00005 for supports, dated March 31, 2016
- CB&I Stone & Webster COC No. 00005 for supports, dated March 31, 2016
- COC for box beams Nos. SA2006-3, SA-2006-4, SA2242-03, and SA2242-04, dated April 26, 2016
- COCs for ASTM A500-13 Gr B Tubes, dated April 27, 2016
- Inspection Report (IR) No. MRR-2210N for electrodes, dated July 6, 2016
- IR No. MRR-201-2 for two box beams, SA2012-4 and SB2012-4, dated July 27, 2016
- IR No. A00002-083 for two 8" gate valves, Nos. BR391 and BR404, dated July 26, 2016

- Nuclear Material Report (NMR) for Job No. CS-2210N-001/A00002-201 for two box beams, SA2012-4 and SB2012-4, received from LP Custom Machining, dated July 27, 2016
- NMR for Job No. 2210N-001/A00002-112 for piping spool SV3-RNS-PLW-014-1A, dated March 14, 2011
- NMR for Job No. CS-2210N-001/A00002-222 for electrodes received from Lincoln Electric Company, dated July 6, 2016
- NMR for Job No. 2210N-001/A00002-150 for piping spool VS2-RNS-PLW-423-1, dated May 17, 2016
- NMR for Job No. CS-2210N-001/A00002-161 for four box beams, SA2006-003, SA2006-03, SA2242-03, and SA2242-04, received from LP Custom Machining, dated May 4, 2016
- NMR for Job No. 2210N-001/A00002-083 for two 8" gate valves, Nos. BR391 and BR404 received from Flowserve Corporation, dated July 26, 2016
- NMR for Job No. 2210N-001/A00002-125 for supports received from Aecon, dated March 30, 2016
- NMR for Job No. CS-2210N-001/A00002-159 for ASTM A500-13 Gr B Tubes received from TW Metals, dated April 28, 2016
- Material Receiving Report (MRR) for Job No. 2210N-001/A00002-105 for calibration and certification performed by Hexagon Metrology of a Leica TDRA6000 machine used for dimensional inspections, dated February 11, 2016
- MRR for Job No. 2210N-001/A00002-214 for chemical testing services performed by Cambridge Material Testing , dated June 23, 2016
- Test Report No. 730797-16 for fluoride and chloride chemical testing of 12 wipe cloths, dated June 22 2016
- Hawkes Electro-Arc LTD. calibration letter for Miller Load Bank Serial #KD509609 dated March 16, 2016
- Certificate of Compliance from Liburdi Automation Inc. for Welding Machine Serial #152503 dated August 19, 2015

Purchase Orders

- Purchase Order (PO) No. 4500021803 to Cambridge Material Testing Limited for the supply of testing services, dated June 26, 2015
- PO No. 4500121273 to Weldstar Company for the supply of weld consumables, dated June 16, 2016
- PO No. 4500001979 to TW Metals for the supply of ferrous and nonferrous materials, dated December 8, 2014
- PO No. 4500025696 to PPG Protective & Marine Coatings for the supply of protective coating products, dated July 17, 2015
- PO No. 4500016427 to Lincoln Electric Company for the supply of filler rod wire, dated June 1, 2015
- PO No. 4500036414 to Laboratory Testing Inc. for the supply of calibration services, dated September 21, 2015
- PO No. 4500000398 to Acuren Group Inc. for the supply of non-destructive examination services, dated September 25, 2014
- PO No. 4500003498 to Cambridge Material Testing for the supply of mechanical testing services, dated February 2, 2015

- PO No. 4500017660 to LP Custom Machining for the supply of machining services, dated June 6, 2015
- PO No. 4500100365 to Dubose National Energy for the supply of material, Revision 2, dated April 5, 2016
- PO No. 4500036414 to Laboratory Testing Inc. for the supply of calibration services, Revision 0, dated September 21, 2015
- PO No. 4500075058 to Hexagon Metrology for the supply of calibration services, Revision 0, dated January 13, 2016

Q223 Pressure Boundary Welds:

- WEC APP-Q223-Z3-001, Appendix 3: Technical and Quality Requirements for Module Q223, Revision 1
- CB&I Addendum for Supplemental QA Requirements for ASME III Mechanical Modules KB36, Q223, Q233, Q240, Q305 and Q601, Revision 2, dated August 27, 2015
- Aecon Work Instruction, Material Traceability Job A00002, WI 0331, (VOG3=SV3=Q223=X23), Revision 1, dated May 25, 2015
- B.F. Shaw, ASME Form N-5 Data Report S/N SV3-PXS-PLW-02U-2 for check valve S/N BL 281 and piping subassembly S/N SV3-PXS-PLW-02U-2A, dated September 20, 2014
- B.F. Shaw, ASME Form NPP-1 Data Report S/N SV3-PXS-PLW-02U-2A, dated September 20, 2014
- Flowserve, ASME Form NPV-1 Data Report S/N BL 281, dated April 24, 2012
- B.F. Shaw, ASME Form NPP-1 Data Report S/N SV3-PXS-PLW-02X-1B, dated October 9, 2014
- CB&I Sketch 3 of 3, No. 890700-42-01-00027 for SV3-PXS-PLW-02X-1B
- Lincoln Electric CMTR for Heat-No. 1254K of SFA-5.9, ER316L for 3/32" diameter, dated August 12, 2015
- Lincoln Electric CMTR for Heat-No. 1254L of SFA-5.9, ER316L for 1/8" diameter, dated August 5, 2015
- Lincoln Electric CMTR for Heat-No. 1268S of SFA-5.9, ER316L for 0.035" diameter, dated November 23, 2015
- Aecon Spool No. SV3-Q223-PXS-PLW-01 drawing, Revision 4
- Aecon Spool No. SV3-Q223-PXS-PLW-02 drawing, Revision 3
- Aecon Spool No. SV3-Q223-PXS-PLW-03 drawing, Revision 3
- Aecon ASME Section IX WPS 88-200-N28, Revision 2, dated April 15, 2016, with supporting PQRs 88-200-712 and 88-200-712 for P8-P8 manual GTAW
- Aecon ASME Section IX WPS 88-200-N50, Revision 2, dated April 15, 2016, with supporting PQRs 88-200-715 for P8-P8 manual and machine GTAW
- Acuren Radiographic Examination Report, RT-X23-003, dated July 23, 2016

Q223 NF Boundary Support Documents:

- Aecon Spool No. SV3-Q223-PXS-PLW-01XX drawing, Revision 3
- Lincoln Electric CMTR for Heat-No. 1269G of SFA-5.18, ER70S-2 for 3/32" diameter, dated December 8, 2015
- Lincoln Electric CMTR for Heat-No. 14302163 of SFA-5.18, ER70S-2 for 1/8" diameter, dated September 15, 2015

- Lincoln Electric CMTR for Lot-No. 1217T of SFA-5.1, E7018-1 H4R for 3/32" diameter, dated February 2, 2015
- Lincoln Electric CMTR for Lot-No. 1217V of SFA-5.1, E7018-1 H4R for 1/8" diameter, dated February 2, 2015
- Aecon Technical Specification for Nuclear Weld Consumable Ordering Specification, Procedure No. ATS-076, Revision 0, dated April 29, 2015
- Aecon Magnetic Particle Examination Report, MT-X23-043, dated July 18, 2016

Q223 Frame AWS Welding Documents:

- Aecon American Welding Society (AWS) D1.1 WPS AWS-20B, Revision 1 for CJP, dated August 20, 2015, with supporting PQRs AWS-20 and AWS-21 for FCAW carbon steel

Internal Audits

- Audit No. AI-IA-14-002, dated May 12, 2014
- Audit No. AI-IA-14-004, dated March 11, 2014
- Audit No. AI-IA-14-008, dated August 8, 2014
- Audit No. AI-IA-14-021, dated July 31, 2014
- Audit No. AI-IA-14-025, dated September 26, 2014
- Audit No. AI-IA-QF-14-027, dated November 11, 2014
- Audit No. AI-IA-15-002, dated August 11, 2015
- Audit No. AI-IA-15-004, dated March 2, 2015
- Audit No. AI-IA-15-008, dated May 5, 2015
- Audit No. AI-IA-15-021, dated January 4, 2015
- Audit No. AI-IA-15-025, dated December 15, 2015
- Audit No. AI-IA-15-00002, dated August 17, 2015

Nonconformance Reports

A00002-000-0002, A00002-000-0016, A00002-000-0019, A00002-000-0020, A00002-000-0021, A00002-000-0086, A00002-000-0091, A00002-000-0132, A00002-000-0162, A00002-000-0164, A00002-000-0167, A00002-000-0167-01, A00002-000-0206, A00002-000-0210, A00002-000-0238, and A00002-000-0245

Opened during the inspection:

A00002-000-0238, A00002-000-0259, and A00002-000-0260

Corrective Action Request

2015-013, 2015-019, 2015-020, 2015-023, 2015-028, 2015-29, 2015-038, 2015-50, 2015-59, 2015-60, 2015-61, 2015-063, 2015-064, 2015-102, 2016-010, 2016-035, and 2016-038

Opened during the inspection:

2016-0140, 2016-0141, 2016-0142, 2016-0143, 2016-0144, and 2016-0145

Qualification and Training Records

- Quality Control (QC) Qualification for Inspector Dent McIntyre,
- QC Qualification for Ronald Blais
- Inspection and Test Personnel Qualification for Liam Archibald
- Inspection and Test Personnel Qualification for Chris Armstrong
- Inspection and Test Personnel Qualification for John Hogarth
- Lead Auditor Qualifications for William Young
- Lead Auditor Qualifications for Wilfrid Bagley
- Lead Auditor Qualifications for Liviu Lecuta
- Auditor Qualification for Dennis Lattanzi
- Welder performance qualification records for ID-Nos. 549, 557, 560, and 569
- Aecon/TSSA ASME IX Welder/Welding Operator Certification No. 330176 for manual GTAW Stamp-No. 139
- Aecon/TSSA ASME IX Welder/Welding Operator Certification No. 328911 for manual/direct machine GTAW Stamp-No. 72, dated June 10, 2016
- Aecon/TSSA ASME IX Welder/Welding Operator Certification No. 328912 for manual/remote machine GTAW Stamp-No. 72, dated June 10, 2016
- Aecon/TSSA ASME IX Welder Certification No. 328923 for manual GTAW Stamp-No. 72 on 2.75" dia. monster coupon, dated June 17, 2016
- Aecon/TSSA ASME IX Welder/Welding Operator Certification No. 330168 for manual/direct machine GTAW Stamp-No. 135, dated April 13, 2016
- Aecon/TSSA ASME IX Welder/Welding Operator Certification No. 330189 for manual/remote machine GTAW Stamp-No. 135, dated June 10, 2016
- Aecon/TSSA ASME IX Welder Certification No. 330174 for manual GTAW Stamp-No. 135 on 2.75" dia. monster coupon, dated June 17, 2016
- Aecon/TSSA ASME IX Welder/Welding Operator Certification No. 330281 for manual GTAW/SMAW, Stamp-No. 182
- Aecon/TSSA ASME IX Welder/Welding Operator Certification No. 328923 for carbon steel manual GTAW/SMAW, Stamp-No. 72
- Aecon AWS Welder Qualification No. 43 for semi-automatic FCAW on carbon steel, ID-No. 549, dated August 26, 2015
- Aecon AWS Welder Qualification No. 149 for semi-automatic FCAW on carbon steel, ID-No. 557, dated March 22, 2016
- Aecon AWS Welder Qualification No. 105 for semi-automatic FCAW on carbon steel, ID-No. 560, dated December 10, 2015
- Aecon AWS Welder Qualification No. 147 for semi-automatic FCAW on carbon steel, ID-No. 569, dated March 22, 2016

Miscellaneous

- Acuren Procedure CEN-UT-16P001, "Ultrasonic Examination of Structural Steel Welds (AWS D1.1)," Revision 2, dated December 8, 2015
- CB&I Project Causal Analysis No. 2015-001 Final Report, dated July 27, 2015
- CB&I Project Causal Analysis No. 2015-004 Final Report, dated August 21, 2015
- Trend Evaluation and Management Assessment Report for 2015, Revision 0, dated December 20, 2013
- Trend Evaluation and Management Assessment Report for 2014, Revision 0, dated March 2, 2015

- Trend Evaluation and Management Assessment Report for 2013, Revision 0, dated December 23, 2015
- Aecon Monthly CAR Trending Charts for the months of January, February, March, April, May, and June
- Management Review Board (MRB) Meeting Minutes No. MRB-MOM-2015-001, dated August 19, 2015
- MRB Meeting Minutes No. 2015-005, dated January 5, 2016
- MRB Meeting Minutes No. 2015-009, dated March 11, 2016
- MRB Meeting Minutes No. 2015-011, dated May 20, 2016
- MRB Meeting Minutes No. 2016-12, dated June 8, 2016
- Traveler Document Master List Pipe Shop A00002-AP1000, "Mechanical Modules"
- Traveler A00002-A40-005, "Module Q240 Piping Assembly Summer Unit 2," Revision 0, dated May 27, 2016
- Traveler A00002-X40-005, "Module Q240 Piping Assembly Vogtle Unit 3," Revision 0, dated March 15, 2016
- Traveler A00002-X23-006, "Module Q223 Piping Assembly Vogtle Unit 3," Revision 0, dated May 12, 2016
- Traveler Addendum A00002-X40-005, "Module Q240 Piping Assembly Vogtle Unit 3," Revision A28, dated July 22, 2016
- Traveler Addendum A00002-A40-005, "Module Q240 Piping Assembly Summer Unit 2," Revision A14, dated June 30, 2016
- Liquid Penetrant Examination Report PT-X40-035, dated July 10, 2016
- Liquid Penetrant Examination Report PT-X40-110, dated July 13, 2016
- Ultrasonic Examination Report U-X40 W14 Initial Thickness, dated June 28, 2016
- Ultrasonic Examination Report A40/1, dated June 29, 2016