

March 30, 2017

Mr. James M. Rossignol  
Quality Assurance Manager  
Chicago Bridge & Iron  
366 Old Airport Road  
Laurens, SC 29360

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT OF  
CHICAGO BRIDGE & IRON NO. 99901432/2017-201, AND NOTICE OF  
VIOLATION AND NOTICE OF NONCONFORMANCE

Dear Mr. Rossignol:

On January 23-27, 2017, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Chicago Bridge & Iron (hereafter referred to as CB&I Laurens) facility in Laurens, SC. The purpose of this limited-scope reactive inspection was to assess CB&I Laurens' 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 CB&I Laurens' implementation of quality activities associated with the fabrication and testing of safety-related piping for the Westinghouse Electric Company AP1000 reactor design. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of CB&I Laurens' overall quality assurance (QA) program.

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements occurred. The NRC evaluated the violation in accordance with the agency's Enforcement Policy, which is available on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>.

The enclosed Notice of Violation (NOV) cites the violation, and the subject inspection report details the circumstances surrounding it. The NOV cites CB&I Laurens for failing to adequately evaluate a deviation potentially associated with a substantial safety hazard in accordance with the requirements of 10 CFR Part 21.

You are required to respond to this letter and to follow the instructions specified in the enclosed NOV when preparing your response. In your response to the enclosed NOV, CB&I Laurens should document the results of the extent of condition review for this finding and determine if there are any effects on other safety-related components. If you have additional information that you believe the NRC should consider, you may provide it in your response to the NOV. The NRC's review of your response to the NOV also will determine if further enforcement action is necessary to ensure compliance with regulatory requirements. In addition, the NRC inspection team found that the implementation of your QA program did not meet certain regulatory requirements imposed on you by your customers or NRC licensees. The specific findings and references to the pertinent requirements are identified in the enclosures to this letter.

The NRC is concerned with the number of findings based on this limited scope inspection. This was the third NRC inspection of CB&I Laurens over a period of four years and the NRC continues to identify examples of CB&I Laurens' inadequate implementation of its QA program. Specifically, the NRC inspection team determined that CB&I Laurens was not fully implementing its QA program in the areas organization, instructions, procedures, and drawings, control of special processes, inspection, handling, storage, and shipping, and corrective action. In addition, this inspection was performed after CB&I Laurens had lifted a stop-work order that was self-imposed in March 2015.

Please provide a written explanation or statement within 30 days of this letter in accordance with the instructions specified in the enclosed NON. The NRC is requesting that in the response to the NONs, CB&I Laurens documents the extent of condition on the implementation of your QA program and ensure all issues are identified and adequately addressed in your corrective action program. The NRC will consider extending the response time if you show good cause to do so.

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 (and if applicable), your response should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, 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/*

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

Docket No.: 99901432

Enclosures:

1. Notice of Violation
2. Notice of Nonconformance
3. Inspection Report No. 99901432/2017-201  
and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT OF CHICAGO BRIDGE & IRON NO. 99901432/2017-201, AND NOTICE OF VIOLATION AND NOTICE OF NONCONFORMANCE

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<b>NAME</b>	YDiaz-Castillo	JOrtega-Luciano	AKeim	JHoncharik*
<b>DATE</b>	03/15/17	03/15/17	03/15/17	03/16/17
<b>OFC</b>	RII/DCI	NRO/DCIP	NRO/DCIP	
<b>NAME</b>	JChristensen*	SSmith	JBurke	
<b>DATE</b>	03/15/17	03/27/17	03/29/17	

**OFFICIAL RECORD COPY**

## NOTICE OF VIOLATION

Chicago Bridge & Iron  
366 Old Airport Road  
Laurens, SC 29360

Docket No. 99901432  
Report No. 2017-201

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at the Chicago Bridge & Iron (hereafter referred to as CB&I Laurens) facility in Laurens, SC, from January 23, 2017, through January 27, 2017, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21.21, "Notification of failure to comply or existence of a defect and its evaluation," Section (a)(1) requires "Each individual, corporation, partnership, dedicating entity, or other entity subject to the regulations in this part shall adopt appropriate procedures to evaluate deviations and failures to comply to identify defects and failures to comply associated with substantial safety hazards as soon as practicable, and, except as provided in paragraph (a)(2) of this section, in all cases within 60 days of discovery, in order to identify a reportable defect or failure to comply that could create a substantial safety hazard, were it to remain uncorrected."

Section 3.2 of CB&I Laurens' procedure BFS-QC-10CFR21, "Procedure for Compliance with 10CFR21/10CFR50.55 (e)," Revision 5, dated April 2, 2015, states, in part, that "If the QA Manager is unable to confirm that the deviation or failure to comply had been previously reported, he shall initiate a 10 CFR Part 21/10 CFR 50.55 (e) Evaluation Form (Exhibit C). The QA Manager shall forward a copy of the 10 CFR Part 21/10 CFR 50.55 (e) Evaluation Form to the General Manager and Project Manager and advise them that an evaluation will be conducted by CB&I Laurens or if it is determined that CB&I Laurens is not able to perform the evaluation, initiate action to notify the Purchaser to perform an evaluation of the deviation or failure to comply. The QA Manager shall complete the evaluation or obtain the evaluation results from the Purchaser."

Contrary to the above, as of January 27, 2017, CB&I Laurens failed to adequately evaluate a deviation potentially associated with a substantial safety hazard in accordance with 10 CFR 21.21(a)(1). Specifically, corrective/preventive action report No. 584 states, in part, that "The Quality Control Manager made a determination that certain UT [ultrasonic testing] documents were completed outside of the expectations of the procedure. A senior CBIL [Chicago Bridge and Iron Laurens] QC [Quality Control] Specialist was suspended pending ERB [Employee Review Board] action for falsification of UT Test records." CB&I Laurens proceeded to perform an investigation and determined that a Senior Quality Control (QC) Specialist had falsified ultrasonic testing (UT) test records. Rather than performing a new Part 21 evaluation, CB&I Laurens took credit for a Part 21 evaluation that was previously performed as part of a root cause analysis to determine if there was widespread falsification of records at CB&I Laurens. However, the root cause analysis did not specifically evaluate whether the falsification of UT test records could create a substantial safety hazard on any piping spools that had been delivered.

This issue has been identified as Violation 99901432-2017-201-01.

This is a Severity Level IV violation (Section 6.9.d of the NRC Enforcement Policy).

Under the provisions of 10 CFR 2.201, "Notice of Violation," CB&I Laurens is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Quality Assurance Vendor Inspection Branch-2, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this notice of violation. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include (1) the reason for the violation or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence if the correspondence adequately addresses the required response. Where good cause is shown, the NRC will consider extending the response time.

If you contest this enforcement action, provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible it should not include any personal privacy, proprietary, or Safeguards Information (SGI) so that the agency can make it available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information 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 SGI 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"

In accordance with 10 CFR 19.11, "Posting of Notices to Workers," you may be required to post this notice within 2 working days of receipt.

Dated this the 30<sup>th</sup> day of March 2017.

## NOTICE OF NONCONFORMANCE

Chicago Bridge & Iron  
366 Old Airport Road  
Laurens, SC 29360

Docket No. 99901432  
Report No. 2017-201

Based on the results of a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at the Chicago Bridge & Iron (hereafter referred to as CB&I Laurens) facility in Laurens, SC, from January 23, 2017, through January 27, 2017, it appears that CB&I Laurens did not conduct certain activities in accordance with NRC requirements that were contractually imposed upon CB&I Laurens by its customers or NRC licensees:

- A. Criterion I, "Organization," of Appendix B, "Quality Assurance Program 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," states, in part, that "The quality assurance functions are those of (1) assuring that an appropriate quality assurance program is established and effectively executed; and (2) verifying, such as by checking, auditing, and inspecting, that activities affecting the safety-related functions have been correctly performed."

Section 4.2.1 of CBIL-QAM-001 states, in part, that "The Plant Manager of CBIL is responsible for the establishment of the facilities for and overall operation of CBIL including but not limited to buildings, workspace, utilities, process equipment, and transport services." In addition, Section 4.2.9 states, in part, that the "Quality Assurance Manager is responsible for the administration and implementation of the Quality functions as described in this Manual, and reporting regularly to the Plant Manager on the effectiveness of the QA Program."

Contrary to the above, as of January 27, 2017, CB&I Laurens failed to ensure that portions of the quality assurance program were effectively executed, and failed to verify that activities affecting safety-related functions have been correctly performed. Specifically, CB&I Laurens failed to take timely and effective corrective actions to address several conditions adverse to quality and failed to adequately perform fabrication activities identified during the inspection. This included the implementation of quality activities in accordance with approved procedures and the oversight of suppliers. CB&I Laurens implemented a stop work order in March 2015 pending an evaluation of programmatic deficiencies and 10 CFR Part 21, "Reporting Defects and Noncompliance," issues, however, the findings described below demonstrate that CB&I Laurens is still not implementing an adequate quality assurance program in accordance with the requirements of Appendix B to 10 CFR Part 50.

This issue has been identified as Nonconformance 99901432/2017-201-02.

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

Section 2.3.5 of CB&I Laurens' Procedure BFS-NWC-1 AD, "Nuclear Welding Material Control AP1000 Addendum," Revision 2, dated April 14, 2016, states that "Welding materials with different heat numbers shall be kept separated." In addition, Section 2.3.3 states that "This [nuclear filler metal storage] area shall be controlled by the Tool Room Attendant." Furthermore, Section 2.3.12 states that "The Bay Foreman is responsible for the recording of the heat/lot number of the welding materials used for a specific weld joint in the applicable spaces on the shop traveler."

Contrary to the above, as of January 27, 2017, CB&I Laurens failed to assure that special processes were controlled and accomplished using qualified procedures in accordance with specifications and acceptance criteria. Specifically, while witnessing a welder preparing for a welding job, the NRC inspection team noted that the Tool Room Attendant allowed the welder to take out his own filler metal and did not verify the heat numbers and amount of filler metal removed from the storage area. In addition, both the filler metal storage area and the welder's filler metal holder had different heats of filler metal that were not separated as required by BFS-NWC-1 AD. When asked for the requirements for the issuance of the filler metal, the Tool Room Attendant was not aware of the specific requirements and did not have immediate access to BFS-NWC-1 AD. Filler metal control is required to assure that each heat of material is documented in the associated traveler and that the correct filler material is used.

This issue has been identified as Nonconformance 99901432/2017-201-03.

- C. Criterion X, "Inspection," of Appendix B to 10 CFR Part 50, states, in part, that "A program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. Examinations, measurements, or tests of material or products processed shall be performed for each work operation where necessary to assure quality. If inspection of processed material or products is impossible or disadvantageous, indirect control by monitoring processing methods, equipment, and personnel shall be provided."

Section 6.0 of CB&I Lauren's procedure SP-VT-1, "Examination (Inspection)," Revision 3, dated January 19, 2011, states that "Tools utilized for visual examination shall be, but not limited to tape measure, square, fillet gauges, high low gauges, depth gages, machinist rule, etc." In addition, Section 7.0, "Examination of Fit-up," states the following should be verified:

- 7.2 Proper root gap prior to welding. (Ref. Shaw WPS GEN)
- 7.3 Tolerable mismatch of adjoining parts to be welded. (Ref. Shaw WPS GEN)
- 7.4 Proper angular alignment of mating parts. (Ref. Shaw WPS GEN)."

CB&I Laurens Job Instruction BFS-J1-1, "General Fabrication Procedure," Revision 11, dated July 8, 2016, specifies a root gap of 5/32 inches for manual welding and 3/32 inches for mechanized welding. Westinghouse Electric Company's (WEC) design specification APP-GW-007, "AP1000 Specification for Shop Fabricated Piping," Revision 7, references drawing No. APP-GW-VFY-001, Revision 5, which states, in part, that "the maximum offset shall be 3/32 inches at one point on the weld joint."

Contrary to the above, as of January 27, 2016, CB&I Laurens failed to inspect the fit-up of weld No. 10 on piping spool SV4-RCS-PLW-03D for Vogtle Electric Generating Plant (VEGP) Unit 4 in accordance with the documented instructions to assure quality. Specifically, the QC inspector did not verify that the dimension of the root gap and inside diameter offset/misalignment were within the drawing specifications using the appropriate measuring device or gauge. Instead, the QC inspector relied on visual estimation based on experience only to determine if the required dimensions were met, and signed the fit-up inspections on the traveler as meeting the requirements of BFS-J1-1. By not properly inspecting the fit-up of the weld utilizing the required measuring devices or gauges, the weld is of indeterminate quality and may result in a welder and/or a weld procedure not being properly qualified for those specific fit-up dimensions.

This issue has been identified as Nonconformance 99901432/2017-201-04.

- D. Criterion XIII, "Handling, Storage and Shipping," of Appendix B to 10 CFR Part 50, states that "Measures shall be established to control the handling, storage, shipping, cleaning and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. When necessary for particular products, special protective environments, such as inert gas atmosphere, specific moisture content levels, and temperature levels, shall be specified and provided."

Section 2.1.4, "Protecting Final Surfaces," of WEC Technical Specification No. APP-GW-Z0-602, "Cleaning and Cleanliness Requirements for Equipment for Use in Nuclear Supply and Associated Systems," Revision 3, dated February 18, 2013, states, in part, that "Final surfaces shall be protected with foreign material exclusion (FME) barriers during all processing." In addition, Section 3.9.1, "Protection of Final Cleaned Surfaces/Installed Components," states that "Temporary plugs shall be installed in component openings."

Contrary to the above, as of January 27, 2016, CB&I Laurens failed to control the storage, cleaning and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. Specifically, CB&I Laurens did not maintain cleanliness of numerous piping spools, including valves that have inaccessible areas, by not installing end cap plugs after final cleaning. The final cleaned piping spools were in an area that had no personnel, the building doors were open with wind blowing dirt into the building, and was observed to be in this condition for at least two days. Loss of cleanliness can affect the components ability to resist degradation and affect the maintenance of the plant chemistry in the safety related systems.

This issue has been identified as Nonconformance 99901432/2017-201-05.

- E. Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50, states that "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished."



Section 2.3.12 of CB&I Lauren's Procedure BFS-NWC-1 AD, states that "The Bay Foreman is responsible for the recording of the heat/lot number of the welding materials used for a specific weld joint in the applicable spaces on the shop traveler."

In addition, Section 8.4.9.4 of CB&I Laurens Quality Assurance Manual CBIL-QAM-001, Revision 25, dated April 19, 2016, states that "The welder shall record their identification symbol, WPS [weld procedure specification] number and revision number, filler metal heat number, and date in the applicable spaces on the shop traveler."

Contrary to the above, as of January 27, 2016, CB&I Laurens failed to assure procedures had appropriate acceptance criteria to accomplish activities and had been implemented by trade personnel. Specifically, a welder did not document the required information in the shop traveler while welding on piping spool No. SV4-RCS-PLW-03B for VEGP Unit 4 on both current and previous work. The information the welder failed to record as required by procedure BFS-NWC-1 included the welder identification, filler metal heat number and weld procedure specification used. The welder and shop foreman noted that he was required to record this information on the traveler for current and past dates. Not recording the required information may lead to lack of traceability of the material used (i.e., different filler metal or heat numbers).

This issue has been identified as Nonconformance 99901432/2017-201-06.

- F. Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50, states, in part, that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected."

Section 16.2.8.1 of CBIL-QAM-001 states that "The implementation of corrective action for significant conditions adverse to quality shall be verified and shall be assessed to determine its effectiveness." In addition, Section 16.2.8.3 states that "After verification of completion of corrective action, follow-up reviews, surveillance, or auditing shall be performed to determine whether actions taken have been and continue to be effective. When corrective actions have not been effective, further analysis shall be performed to identify and correct the cause. In addition, the problem shall receive escalated management attention."

Contrary to the above, as of January 27, 2017, CB&I Laurens failed to correct conditions adverse to quality. Specifically, CB&I Laurens closed its corrective/preventive action requests (C/PARs) Nos. 533 and 534 without adequately implementing the corrective actions to address Notice of Nonconformance (NON) 99901432/2015-201-03 from the 2015 NRC Inspection Report No. 99901432/2015-201. In response to NON 99901432/2015-201-03, CB&I Laurens initiated C/PARs Nos. 533 and 534 to address their failure to establish adequate measures for source evaluation and selection of contractors and subcontractors as demonstrated through the following examples:

1. The corrective actions implemented by CB&I Laurens for the evaluation and selection of the commercial services provided by Wyman Gordon Pipe and Fittings (WGPF) for the procurement of piping included CB&I Laurens qualifying WGPF to work under CB&I Laurens' quality assurance program. The NRC inspection team noted that WGPF procured the calibration services of their measuring and test

equipment (M&TE) from a commercial sub-supplier. However, CB&I Laurens did not perform any additional oversight activities that would provide reasonable assurance that the M&TE was adequately controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits.

2. The corrective actions implemented by CB&I Laurens for the evaluation and selection of the commercial services provided Pinson Valley Heat Treating (PVHT) for the procurement of heat treating services included performing a commercial-grade survey as part of CB&I Laurens' commercial-grade dedication of PVHT, however, CB&I Laurens did not verify that certain critical characteristics identified in the technical evaluation for calibration services were adequately controlled. CB&I Laurens' commercial-grade survey of PVHT did not verify that they had imposed and verified the necessary controls on their commercial sub-suppliers for the calibration of PVHT's M&TE. CB&I Laurens did not perform any additional verification or acceptance activities to ensure that the identified critical characteristics were adequately controlled and the components would perform their intended safety function.

This issue has been identified as Nonconformance 99901432/2017-201-08.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Quality Assurance Vendor Inspection Branch-2 Vendor Branch, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Nonconformance. This reply should be clearly marked as a "Reply to a Notice of Nonconformance" and should include for each noncompliance: (1) the reason for the noncompliance or, if contested, the basis for disputing the noncompliance; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further noncompliance; and (4) the date when the corrective action will be completed. Where good cause is shown, the NRC will consider extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or Safeguards Information (SGI) so that the NRC can make it available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information 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 SGI is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

Dated this the 30<sup>th</sup> day of March 2017.

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

Docket No.: 99901432

Report No.: 99901432/2017-201

Vendor: Chicago Bridge & Iron  
366 Old Airport Road  
Laurens, SC 29360

Vendor Contact: Mr. James M. Rossignol  
Quality Assurance Manager  
E-mail: James.Rossignol@cbi.com  
Phone: 864-6863-3986

Nuclear Industry Activity: Chicago Bridge & Iron (hereafter referred to as CB&I Laurens), located in Laurens, SC, has been providing pipe bending and piping fabrication services for over 25 years. CB&I Laurens' scope of supply includes fabrication and assembly of pressure piping, American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel (B&PV) Code Class 1, 2 & 3 fabrication of supports, and ASME B&PV Class 1, 2, and 3 shop assemblies. CB&I's services include pipe bending, piping fitting and assembly of safety-related piping, and piping modules for the Westinghouse Electric Company AP1000 new reactor construction.

Inspection Dates: January 23-27, 2017

Inspectors: Yamir Diaz-Castillo NRO/DCIP/QVIB-2  
Jonathan Ortega-Luciano NRO/DCIP/QVIB-2  
Andrea Keim NRO/DCIP/QVIB-3  
John Honcharik NRO/DEIA/MCB  
Jason Christensen RII/DCI/IB1

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

## **EXECUTIVE SUMMARY**

Chicago Bridge & Iron  
99901432/2017-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a vendor inspection at the Chicago Bridge & Iron (hereafter referred to as CB&I Laurens) 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 also verified that CB&I Laurens 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 January 23-27, 2017. This was the third inspection at the CB&I Laurens facility since 2013.

This technically-focused inspection specifically evaluated CB&I Lauren's implementation of quality activities associated with piping fabrication and testing for the Westinghouse Electric Company (WEC) AP1000 reactor design.

Some of the specific activities observed by the NRC inspection team included:

- mechanized Gas Tungsten Arc Welding (GTAW) using hot wire technique for weld No. 30 on shop traveler No. VS2-RCS-PLW-U30 for Virgil C. Summer Nuclear Station (VC Summer) Unit 2
- oval and ultrasonic thickness measurements for piping bend on piping spool No. VS2-PXS-PLW-934 for VC Summer Unit 2
- fit-up and inspection of the fit-up for weld No. 10 on piping spool No. SV4-RCS-PLW-03D for Vogtle Electric Generating Plant (VEGP) Unit 4
- manual Gas Tungsten Arc Welding (GTAW) for weld No. 30 on shop traveler No. SV4-RCS-PLW-03B for VEGP Unit 4

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 Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," July 15, 2015, IP 43003, "Reactive Inspections of Nuclear Vendors," dated December 14, 2015, IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated November 29, 2013, and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated February 13, 2012.

The last inspection of CB&I Laurens occurred in March 2015.

The results of this inspection are summarized below.

## 10 CFR Part 21 Program

The NRC inspection team issued Violation 99901432/2017-201-01 in association with CB&I Laurens' failure to implement the regulatory requirements of 10 CFR Part 21. Violation 99901432/2017-201-01 cites CB&I Laurens for failing to perform an adequate evaluation of a deviation potentially associated with a substantial safety hazard. Specifically, a Quality Control (QC) Manager identified that certain ultrasonic testing (UT) documents were potentially falsified. CB&I Laurens performed an investigation and determined that a Senior QC Specialist had falsified UT records. Rather than performing a new Part 21 evaluation, CB&I Laurens took credit for a Part 21 evaluation that was previously performed as part of a root cause analysis to determine if there was widespread falsification at CB&I Laurens. However, the root cause analysis did not specifically evaluate whether the Senior QC Specialist had performed any safety-related UT work on any piping spools that had been delivered.

## Organization

The NRC inspection team issued Nonconformances 99901432/2017-201-02 in association with CB&I Laurens failure to ensure that portions of the QA program were effectively executed, and failed to verify that activities affecting safety-related functions have been correctly performed. Specifically, CB&I Laurens failed to take timely and effective corrective actions to address several conditions adverse to quality and failed to adequately perform fabrication activities identified during the inspection. This included the implementation of quality activities in accordance with approved procedures and the oversight of suppliers.

## Manufacturing Control

The NRC inspection team issued Nonconformances 99901432/2017-201-03, 99901432/2017-201-04, 99901432/2017-201-05, and 99901432/2017-201-06 in association with CB&I Laurens' failure to implement the regulatory requirements of Criterion IX, "Control of Special Processes," Criterion X, "Inspection," Criterion XIII, "Handling, Storage, and Shipping," and Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50, respectively. Nonconformance 99901432/2017-201-03 cites CB&I Laurens for failing to assure that special processes were controlled and accomplished using qualified procedures in accordance with specifications and acceptance criteria. Nonconformance 99901432/2017-201-04 cites CB&I Laurens for failing to inspect the fit-up of weld No. 10 on piping spool SV4-RCS-PLW-03D for Vogtle Electric Generating Plant Unit 4 in accordance with the documented instructions to assure quality. Nonconformance 99901432/2017-201-05 cites CB&I Laurens for failing to control the storage, cleaning and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. Nonconformance 99901432/2017-201-06 cites CB&I Laurens for failing failed to assure procedures had appropriate acceptance criteria to accomplish activities and had been implemented by trade personnel.

## Corrective Action

The NRC inspection team issued Nonconformance 99901432/2017-201-08 in association with CB&I Laurens' failure to implement the regulatory requirements of Criterion XVI of Appendix B to 10 CFR Part 50. Nonconformance 99901432/2017-201-07 cites CB&I Laurens' for failing to correct conditions adverse to quality. Specifically, for Wyman Gordon Pipe Fittings, CB&I Laurens did not perform any additional activities that would provide reasonable assurance that the calibration services were adequately controlled and the components would perform their

intended safety function. In addition, for Pinson Valley Heat Treating, CB&I Laurens did not perform any additional verification or acceptance activities to ensure that the identified critical characteristics were adequately controlled and the components would perform their intended safety function.

The NRC inspection team also issued unresolved item (URI) 99901432/2017-201-07 pending CB&I Lauren's full evaluation of the corrective actions taken for corrective/preventive action report (C/PAR) No. 570, and whether adequate objective evidence supports the extent of condition specified in C/PAR No. 570 as a result of Notice of Nonconformance 99901432/2015-201-02 issued in the NRC inspection report dated May 22, 2015.

#### Other Inspection Areas

The NRC inspection team determined that CB&I Laurens is implementing its programs for design control, commercial-grade dedication, oversight of contracted activities, test control, control of measuring and test equipment, nonconforming materials, parts or components, and internal audits in accordance with the applicable regulatory requirements of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team also determined that CB&I Laurens is implementing its policies and procedures associated with these programs. No findings of significance were identified.

## REPORT DETAILS

### 1. 10 CFR Part 21 Program

#### a. Inspection Scope

The NRC inspection team reviewed Chicago Bridge & Iron's (hereafter referred to as CB&I Laurens') policies and implementing procedures that govern CB&I Laurens' 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 CB&I Laurens' 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 CB&I Laurens' nonconformance and corrective action procedures provide a link to the 10 CFR Part 21 program.

The NRC inspection team also discussed the 10 CFR Part 21 program with CB&I Laurens' 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 a sample of Part 21 evaluations, the NRC inspection team noted that a Quality Control (QC) Manager identified that certain ultrasonic testing (UT) documents were potentially falsified. CB&I Laurens performed an investigation and determined that a Senior QC Specialist had falsified UT records. Rather than performing a new Part 21 evaluation, CB&I Laurens took credit for a Part 21 evaluation that was previously performed as part of a root cause analysis to determine if there was widespread falsification at CB&I Laurens. However, the root cause analysis did not specifically evaluate whether the falsification of UT test records could create a substantial safety hazard on any piping spools that had been delivered. The NRC inspection team identified this issue as Violation 99901432-2017-201-01 for CB&I Laurens' failure to adequately evaluate a deviation potentially associated with a substantial safety hazard.

#### c. Conclusion

The NRC inspection team issued Violation 99901432/2017-201-01 in association with CB&I Laurens' failure to implement the regulatory requirements of 10 CFR Part 21. Violation 99901432/2017-201-01 cites CB&I Laurens for failing to perform an adequate evaluation of a deviation potentially associated with a substantial safety hazard. Specifically, a QC Manager identified that certain UT documents were potentially falsified. CB&I Laurens performed an investigation and determined that a Senior QC Specialist had falsified UT test records. Rather than performing a new Part 21 evaluation, CB&I Laurens took credit for a Part 21 evaluation that was previously performed as part of a root cause analysis to determine if there was widespread falsification at CB&I Laurens. However, the root cause analysis did not specifically evaluate whether the falsification of UT test records could create a substantial safety hazard on any piping spools that had been delivered.

## 2. Organization

### a. Inspection Scope

The NRC inspection team evaluated the overall implementation of CB&I Laurens' Quality Assurance (QA) program to verify compliance with the requirements of Criterion I, "Organization," 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."

### b. Observations and Findings

This was the third NRC inspection of CB&I Laurens. The NRC had previously inspected CB&I Laurens in August 2013 and March 2015. On both of these inspections the NRC identified issues with the implementation of CB&I Laurens QA program and issued several Notices of Nonconformances (NONs). In addition, during the March 2015 inspection, CB&I Laurens self-imposed a stop work order on all safety-related components pending an evaluation of programmatic deficiencies and Part 21 issues. The stop work order was lifted a few months after.

This inspection was performed to verify the implementation and closure of CB&I Laurens' corrective actions opened in response to the findings from the previous NRC inspections and the corrective actions opened in response to the stop work. However, during this inspection the NRC continued to identify issues with the implementation of CB&I Laurens QA program. As such, due to the issues identified from past NRC inspections and in Sections 3 and 4 below, the NRC determined that CB&I Laurens: (1) failed to take timely and effective corrective actions to address several conditions adverse to quality and (2) failed to adequately perform fabrication activities identified during the inspection. This included the implementation of quality activities in accordance with approved procedures and the oversight of suppliers. The NRC inspection team identified this issue as an example of Nonconformance 99901432/2017-201-02 for CB&I Laurens' failure to ensure that portions of the quality assurance program were effectively executed, and failed to verify that activities affecting safety-related functions have been correctly performed.

### c. Conclusion

The NRC inspection team issued Nonconformances 99901432/2017-201-02 in association with CB&I Laurens failure to ensure that portions of the QA program were effectively executed, and failed to verify that activities affecting safety-related functions have been correctly performed. Specifically, CB&I Laurens failed to take timely and effective corrective actions to address several conditions adverse to quality and failed to adequately perform fabrication activities identified during the inspection. This included the implementation of quality activities in accordance with approved procedures and the oversight of suppliers.



### 3. Manufacturing Control

#### a. Inspection Scope

The NRC inspection team reviewed CB&I Laurens' 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," of 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 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, 1998 Edition, 2000 Addenda.

For the welding activities observed, the NRC inspection team reviewed shop travelers, weld procedure specifications (WPSs), supporting procedure qualification records (PQRs), ASME B&PV Code data reports, and the calibration certificates of the welding equipment. The NRC inspection team also reviewed the processes for controlling weld filler metal and cleanliness of the piping components were performed in accordance with the applicable requirements.

The NRC inspection team also discussed the control of special processes program with CB&I Laurens' management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

#### b. Observations and Findings

At the time of the inspection, CB&I Laurens was fabricating AP1000 piping spools for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, and Virgil C. Summer Nuclear Station (VC Summer) Units 2 and 3. The NRC inspection team witnessed mechanized Gas Tungsten Arc Welding (GTAW) using hot wire technique for weld No. 30 on shop traveler VS2-RCS-PLW-U30 for VC Summer Unit 2. The NRC inspection team verified that the WPS used (No. N803, Revision 4) was qualified in accordance with the applicable requirements of Sections III and IX of the ASME B&PV Code. The NRC inspection team also verified that the PQRs met the applicable requirements of Section IX of the ASME B&PV Code.

The NRC inspection team observed the weld material storage area and how weld material was controlled in accordance with the CB&I Laurens procedures. While witnessing a welder preparing for a welding job, the NRC inspection team noted that the Tool Room Attendant allowed the welder to take out his own filler metal and did not verify the heat numbers and amount of filler metal removed from the storage area. After the NRC inspection team asked the Tool Room Attendant to verify the filler metal, it was observed that for one heat of filler metal the welder had taken out less than specified, while for another heat of filler metal the welder exceeded the amount of filler metal to be taken. In addition, both the filler metal storage area and the welder's filler metal holder had different heats of filler metal that were not separated as required by BFS-NWC-1 AD, "Nuclear Welding Material Control AP1000 Addendum," Revision 2, dated April 14, 2016. When asked for the requirements for the issuance of the filler metal, the

Tool Room Attendant was not aware of the specific requirements and did not have immediate access to BFS-NWC-1 AD. Section 2.3.5 of CB&I Lauren's Procedure BFS-NWC-1 AD, "Nuclear Welding Material Control AP1000 Addendum," Revision 2, dated April 14, 2016, states that "Welding materials with different heat numbers shall be kept separated." In addition, Section 2.3.3 states "This [nuclear filler metal storage] area shall be controlled by the Tool Room Attendant."

The NRC inspection team identified this issue as an example of Nonconformance 99901432/2017-201-03 for CB&I Laurens' failure to assure that special processes were controlled and accomplished using qualified procedures in accordance with specifications and acceptance criteria. CB&I Laurens initiated Corrective Action Report (CAR) No. 2017-26 to address this issue.

The NRC inspection team also witnessed a fit-up and inspection of the fit-up for weld No. 10 on piping spool No. SV4-RCS-PLW-03D for VGEP Unit 4. The QC inspector performed the fit-up inspection with only a flashlight and relied on visual estimation based on experience only, and not on a measuring device or gauge to determine if the dimensions met the requirements. Section 6.0 of CB&I Lauren's procedure No. SP-VT-1, "Examination (Inspection)," Revision 3, dated January 19, 2011 states that "Tools utilized for visual examination shall be, but not limited to tape measure, square, fillet gauges, high low gauges, depth gages, machinist rule, etc." In addition, Section 7.0, "Examination of Fit-up," states the following should be verified:

- 7.2 Proper root gap prior to welding. (Ref. Shaw WPS GEN)
- 7.3 Tolerable mismatch of adjoining parts to be welded. (Ref. Shaw WPS GEN)
- 7.4 Proper angular alignment of mating parts. (Ref. Shaw WPS GEN)"

Furthermore, CB&I Laurens Job Instruction No. BFS-J1-1, "General Fabrication Procedure," Revision 11, dated July 8, 2016, specifies a requirements of a root gap of 5/32 inches for manual welding and 3/32 inches for mechanized welding. Westinghouse Electric Company's (WEC) design specification No. APP-GW-007, "AP1000 Specification for Shop Fabricated Piping," Revision 7, references 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, which states, in part, that "the maximum offset shall be 3/32 inches at one point on the weld joint."

The NRC inspection team identified this issue as an example of Nonconformance 99901432/2017-201-04 for CB&I Laurens' failure inspect the fit-up of weld No. 10 on piping spool SV4-RCS-PLW-03D in accordance with the documented instructions to assure quality. CB&I Laurens initiated CAR No. 2017-27 to address this issue.

The NRC inspection team performed a walk through of the paint shop to observe the cleanliness control of the piping spools though no active work was being performed at the time since the work shift had ended. However, the NRC inspection team observed that numerous piping spools that were final cleaned, including some piping spools that had valves with inaccessible areas, were lying unattended with no cleanliness barriers in the paint shop. The final cleaned piping spools were in an area that had no personnel, the building doors were open with wind blowing dirt into the building, and were observed to be in this condition for at least two days.

Section 2.1.4, "Protecting Final Surfaces," of WEC Technical Specification No. APP-GW-Z0-602, "Cleaning and Cleanliness Requirements for Equipment for Use in Nuclear Supply and Associated Systems," Revision 3, dated February 18, 2013, states, in part, that "Final surfaces shall be protected with foreign material exclusion (FME) barriers during all processing." In addition, Section 3.9.1, "Protection of Final Cleaned Surfaces/Installed Components," of the WEC Technical Specification APP-GW-Z0-602 states that "Temporary plugs shall be installed in component openings."

The NRC inspection team identified this issue as an example of Nonconformance 99901432/2017-201-05 for CB&I Laurens' failure to control the storage, cleaning and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. CB&I Laurens initiated CAR No. 2017-11 to address this issue.

While verifying that the applicable welding data were recorded in accordance with the applicable requirements, the NRC inspection team noted that the shop traveler for piping spool No. SV4-RCS-PLW-03B for VEGP Unit 4 had numerous line items/steps for weld No. 30. The NRC inspection team asked the welder what step in the shop traveler process was the welder working on. Neither the welder nor the foreman were able to identify which step the welder was working on. Subsequently, the General Foreman stated this was the third rework being performed to get the piping spool in alignment. However, the NRC inspection team noted that the welder did not record the appropriate information for which he was performing in the current step in the shop traveler process on both current and past dates.

Section 2.3.12 of CB&I Lauren's Procedure BFS-NWC-1 AD, states that "The Bay Foreman is responsible for the recording of the heat/lot number of the welding materials used for a specific weld joint in the applicable spaces on the shop traveler." In addition, Section 8.4.9.4 of CB&I Laurens Quality Assurance Manual CBIL-QAM-001, Revision 25, dated April 19, 2016, states that "The welder shall record their identification symbol, [weld procedure specification] WPS number and revision number, filler metal heat number, and date in the applicable spaces on the shop traveler." The welder and the shop foreman both noted that he was required to record this information on the traveler for the current and past dates.

The NRC inspection team identified this issue as an example of Nonconformance 99901432/2017-201-06 for CB&I Laurens' failure to assure procedures had appropriate acceptance criteria to accomplish activities and had been implemented by trade personnel. CB&I Laurens initiated CAR No. 2017-25 to address this issue.

c. Conclusion

The NRC inspection team issued Nonconformances 99901432/2017-201-03, 99901432/2017-201-04, 99901432/2017-201-05, and 99901432/2017-201-06 in association with CB&I Laurens' failure to implement the regulatory requirements of Criterion IX, Criterion X, "Inspection," Criterion XIII, "Handling, Storage, and Shipping," and Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50, respectively. Nonconformance 99901432/2017-201-03 cites CB&I Laurens for failing to assure that special processes were controlled and accomplished using qualified procedures in accordance with specifications and

acceptance criteria. Nonconformance 99901432/2017-201-04 cites CB&I Laurens for failing to inspect the fit-up of weld No. 10 on piping spool SV4-RCS-PLW-03D for Vogtle Electric Generating Plant Unit 4 in accordance with the documented instructions to assure quality. Nonconformance 99901432/2017-201-05 cites CB&I Laurens for failing to control the storage, cleaning and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. Nonconformance 99901432/2017-201-06 cites CB&I Laurens for failing to assure procedures had appropriate acceptance criteria to accomplish activities and had been implemented by trade personnel.

#### 4. Nonconforming Materials, Parts, or Components and Corrective Action

##### a. Inspection Scope

The NRC inspection team reviewed CB&I Laurens' policies and implementing procedures that govern the control of nonconformances 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 CB&I Laurens' nonconformance report (NCR) log and reviewed a sample of NCRs to ensure that CB&I Laurens implemented an adequate program to assess and control of nonconforming items, including appropriate identification, documentation, segregation, evaluation and disposition. Additionally, the NRC inspection team interviewed CB&I Lauren's personnel and verified that there were designated areas to segregate and control nonconforming materials.

The NRC inspection team also reviewed CB&I Laurens' proposed corrective actions as stated in their July 21, 2015 (Agency Document and Management System (ADAMS) Accession No. ML15229A301), October 8, 2015 (ADAMS Accession No. ML15300A327), and November 20, 2015 (ADAMS Accession No. ML15338A072), letters in response to the NRC's findings documented in inspection report No. 99901432/2015-201, dated May 22, 2015 (ADAMS Accession No. ML15132A240), and to a request for additional information dated August 19, 2015 (ADAMS Accession No. ML15209A787).

In addition, the NRC inspection team sampled additional CARs to verify that conditions adverse to quality were being promptly identified and corrected and that for significant conditions adverse to quality, measures were being taken to preclude repetition.

The NRC inspection team also discussed the nonconforming materials, parts, or components and corrective action programs with CB&I Laurens' management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observations and Findings

b.1 Corrective Action Associated with Nonconformance 99901432/2013-201-03 and 99901432/2013-201-04

Following an August 2013 inspection, the NRC issued NON No. 9901432/2015-201-01 for CB&I Laurens' failure to (1) identify and correct significant conditions adverse to quality in a timely manner; and (2) provide objective evidence that the actions associated with the Corrective/Preventive Action Requests (C/PARs) were adequately implemented and completed. As part of the examples cited in NON 9901432/2015-201-01, the May 2015 report documents the inadequate corrective actions taken by CB&I Laurens with regard to two NONs documented in inspection report No. 99901432/2013-201, dated October 2, 2013 (ADAMS Accession No. ML13263A411).

NON 99901432/2013-201-03 was issued for CB&I Laurens' inadequate commercial-grade dedication of testing services provided by Welding Testing Laboratory (WTL). CB&I Laurens procured these services for the chemical and physical testing of the seamless pipes to verify the critical characteristics to ensure that the seamless pipes would perform their intended safety function. The NRC inspection team reviewed C/PARs Nos. 533, 534, 565, and 569 that CB&I Laurens initiated as part of their process to address the closure of NON 9901432/2015-201-01 and 99901432/2013-201-03. The NRC inspection team reviewed the documentation that provided objective evidence for the completion of the corrective actions. The NRC inspection team verified how CB&I Laurens contracted the services of Laboratory Testing Inc. (LTI), an independent testing and calibrating company. LTI was placed on the CB&I Laurens Approved Vendor List (AVL) on March 10, 2013, based on the results of an audit performed on February 21, 2013. The NRC inspection team reviewed the audit and verified that it was conducted in accordance with CB&I Laurens policies and procedures. As part of the corrective actions CB&I Laurens sent samples of material previously tested by WTL to LTI. The NRC inspection team reviewed CB&I Laurens' evaluation of the test results provided by LTI. Upon review of the results from both companies, CB&I Laurens found that there were no discrepancies between the analysis of the tested materials by WTL and the results of testing by LTI and the results were in accordance with American Society for Testing and Materials (ASTM) standards. The NRC inspection team determined that the corrective actions taken by CB&I Laurens to evaluate the testing results of WTL in comparison to LTI provides reasonable assurance that the material integrity is in compliance with the requirements ASTM. Based on its review, the NRC inspection team closed NON 99901432/2013-201-03.

NON 99901432/2013-201-04 was issued for CB&I Laurens failure to perform annual or semi-annual evaluations of commercial suppliers providing items for commercial-grade dedication. The NRC inspection team reviewed C/PAR 533 that CB&I Laurens initiated to address closure of NON 99901432/2013-201-04. The NRC inspection team reviewed CB&I Laurens' AVL and selected a sample of commercial suppliers. For those commercial suppliers selected the NRC inspection team verified that the annual evaluation performed by CB&I Laurens

were done in accordance with the revised procedures. The NRC inspection team determined that CB&I Laurens' corrective actions were adequate to address the identified finding.

The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions and confirmed that all the corrective actions were completed and adequately implemented as described in the response. Based on its review, the NRC inspection team closed NONs 99901432/2013-201-03 99901432/2013-201-04.

**b.2 Corrective Action Associated with Nonconformance 99901432/2015-201-01**

Following a March 2015 inspection, the NRC issued NON 99901432/2015-201-01 for CB&I Laurens' failure to (1) identify and correct significant conditions adverse to quality in a timely manner; and (2) provide objective evidence that the actions associated with the C/PARs were adequately implemented and completed. The NRC inspection team reviewed C/PAR Nos. 528 and 603 that CB&I Laurens initiated to address NON 9901432/2015-201-01. The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions. Specifically, the NRC inspection team verified that CB&I Laurens contracted an external entity to provide training, revised and or create new implementing procedures to provide a more detail guidance to personnel performing quality activities, and provide training to promote a healthy nuclear safety culture. C/PAR 528 documented the necessary objective evidence to demonstrate that CB&I Laurens contracted an external entity which developed and implemented training to CB&I Laurens' management and employees. The training included an emphasis on a safety conscious work environment, Nuclear Safety Culture, and leadership techniques for effective communication between functional groups. Furthermore, CB&I Laurens conducted an All-Hands meeting to improve the communication between management and employees and promote a healthy Nuclear Safety Culture. The NRC inspection team, also verified that the new procedures supported the requirements implemented by these training and that all employees went through a CAP awareness training which included training on these new procedures. As part of the corrective actions identified in C/PAR 603, the NRC inspection team verified that all employees went through a human performance training which emphasized the principles of a healthy culture in the nuclear industry. In addition a cause analysis fundamental and C/PAR processing was provided to those employees responsible of these functions. The NRC inspection team determined that the CB&I Laurens' corrective actions were adequate to address the identified finding.

The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions and confirmed that all the corrective actions were completed and adequately implemented as described in the response. Based on its review, the NRC inspection team closed NON 9901432/2015-201-01.

**b.3 Corrective Action Associated with Nonconformance 99901432/2015-201-02**

The NRC also issued NON 99901432/2015-201-02 for CB&I Laurens' failure to perform visual testing inspection in accordance with applicable codes,

specifications and criteria, and failed to use welding procedures in accordance with the applicable code requirements. For the first example of the NON, CB&I Laurens visually inspected and accepted welds (weld Nos. 2, 3, 5, 6, 25, 26 and 27) on pipe spool 8927-40-010-00031, serial number VS2-RNS-PLW-014-1A, (10-inch, Class 2 piping for the Normal Residual Heat Removal (RNS) system for VC Summer Unit 2) which did not meet the visual inspection criteria. The NRC inspection team found that the pipe spool had abrupt ridges and valleys, and depressions of greater than 1/32 inches that did not meet the pre-service and in-service inspection surface condition requirements.

For the second example of the NON, when a WPS specifies preheat and inter-pass temperatures for welding two different materials, the limiting temperatures (as supported by the procedure qualification reports) should be used, which would be the maximum (higher) preheat temperature and the minimum (lower) inter-pass temperature of the two different materials. However, contrary to this, WPSs N1/803 and N4/803 specified that when welding two different materials with different preheat and inter-pass temperatures, the minimum preheat and maximum inter-pass temperature of the applicable procedure shall be used. For example, WPS N1/803 specifies that for a 1-inch thick weld, the minimum preheat for P-1 material is 200 degrees Fahrenheit, while the minimum preheat for P-8 material is 50 degrees Fahrenheit, and therefore the WPS is requiring that the 50 degrees Fahrenheit preheat be used, even though the limiting preheat temperature of 200 degrees Fahrenheit should be specified in the WPS, as supported by the applicable PQRs.

The NRC inspection team reviewed C/PAR No. 568 that CB&I Laurens initiated to address the issue with the inter-pass and preheat temperatures in NON 99901432/2015-201-02. The NRC inspection team verified that that the WPS was revised to provide clear requirements for preheat and inter-pass temperatures. The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions associated with the second example of the NON and confirmed that all the corrective actions were completed and adequately implemented as described in the response. Based on its review, the NRC inspection team closed NON 99901432/2015-202-02.

However, for the first example of the NON, CB&I Laurens initiated C/PAR No. 570 to address this issue. In its follow-up response dated October 8, 2015, CB&I Laurens stated the following:

“The issues pertaining to In-Service Inspection (ISI) preparation were identified by the NRC on a spool that had not yet reached a point of completion. There were additional steps remaining for this spool that were opportunities to identify any nonconformity in the ISI preparation. These steps included CB&I Laurens’ QC inspection, CB&I Power Source Inspection, and document reviews performed by both organizations. The documentation for the fabrication of this specific spool also shows that the ISI preparation inspection had not yet been performed. Therefore, the available barriers were still in place to identify this situation and it is currently judged that conditions of incorrect ISI preparation are being identified and corrected prior to delivery. Therefore, the extent of condition for this circumstance does not include material that was previously shipped.”

During the review of the corrective actions taken for C/PAR 570, the NRC inspection team could not verify the adequacy of the extent of condition based on the current information provided by CB&I Laurens. CB&I Laurens is still reviewing the documentation in order to provide adequate objective evidence that supports the adequacy of the extent of condition specified in C/PAR 570 as a result of NON 99901432/2015-201-02. The NRC inspection team will need to review CB&I Laurens' completed documentation to determine if a nonconformance has occurred. The NRC inspection team issued unresolved item (URI) 99901432/2017-201-07 pending Laurens' full evaluation of the corrective actions taken for C/PAR 570, and whether adequate objective evidence supports the extent of condition specified in C/PAR 570 as a result of Notice of Nonconformance 99901432/2015-201-02.

b.4 Corrective Action Associated with Nonconformance 99901432/2015-201-03

The NRC also issued NON 99901432/2015-201-03 for CB&I Laurens' failure to adequately qualify several suppliers by the conduct of an audit. CB&I Laurens used its Audit Checklist for Nuclear Material Organizations as the basis for qualifying Palmetto Plating Company, Wyman Gordon Pipe and Fittings, Pinson Valley Heat Treating, and Welding Testing Laboratory even though these are commercial suppliers without an Appendix B to 10 CFR Part 50 and 10 CFR Part 21 programs.

The NRC inspection team reviewed C/PAR Nos. 533 and 534 that CB&I Laurens initiated to address NON 9901432/2015-201-03. The NRC inspection team verified that CB&I Laurens contracted an external entity to provide training, revised the QA manual and implementing procedures to provide more detailed guidance to personnel performing commercial-grade dedication and the approval of Appendix B to 10 CFR Part 50 and 10 CFR Part 21 suppliers. C/PAR 533 and 534 documented the objective evidence to demonstrate that CB&I Laurens contracted an external entity which developed and implemented training to CB&I Laurens' management and employees. The training included an emphasis on commercial-grade dedication requirements, nuclear auditing requirements, implementation processes and generally accepted best practices. The NRC inspection team, also verified that the revised procedures supported the requirements and best practices addressed in the training.

In addition, the NRC inspection team reviewed the objective documented evidence to ensure that the services provided by the four vendors addressed in NON 99901432/2015-201-03 were adequate and provide reasonable assurance that the components would meet their intended safety function. The NRC inspection team reviewed the reports documenting additional oversight activities by CB&I Laurens, test reports, receiving reports and C/PARs to verify that the justification provided by CB&I Laurens that the components and services supplied by the four vendors would perform their intended safety function.

The NRC inspection team reviewed the documentation that provided the objective evidence for the completion of the corrective actions and confirmed that all the corrective actions were completed and adequately implemented as described in the response. Based on its review, the NRC inspection team closed NON 99901432/2015-202-03.



The NRC inspection team's decision to close NON 99901432/2015-202-03 is based on the fact that CB&I Laurens implemented all the corrective actions it opened in response to the NON. However, during the review of the implementation of the corrective actions associated with the evaluation and selection of commercial suppliers, the NRC inspection team noted a few inconsistencies. For example, for the procurement of piping from Wyman Gordon Pipe and Fittings (WGPF), CB&I Laurens qualified them to work under their Appendix B to 10 CFR part 50 QA program. The NRC inspection team noted that WGPF procured the calibration of their measuring and test equipment (M&TE) from a commercial sub-supplier. Upon further discussion, CB&I Laurens stated that they had not performed any additional activities that would provide reasonable assurance that the calibration services were adequately controlled and the components would perform their intended safety function.

In the case of Pinson Valley Heat Treating (PVHT), CB&I Laurens performed a commercial-grade survey for the procurement of heat treating services. During the review of the commercial-grade survey, the NRC inspection team noted that CB&I Laurens did not verify that certain critical characteristics identified in the technical evaluation for calibration services were adequately controlled. The commercial-grade survey did not verify that they had imposed and verified the necessary controls on their commercial sub-suppliers for the calibration of PVHT's M&TE. Upon further discussion, CB&I Laurens stated that they had not perform any additional verification or acceptance activities to ensure that the identified critical characteristics were adequately controlled and the components would perform their intended safety function.

As such, because these are two specific examples of inadequately implementing corrective actions that had been closed by CB&I Laurens, the NRC inspection team decided to issue a new NON to document this. The NRC inspection team identified these issues as examples of Nonconformance 99901432/2017-201-08 for CB&I Laurens' failure to correct conditions adverse to quality. CB&I Laurens initiated CAR No. 2017-31 to address this issue.

c. Conclusion

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

The NRC inspection team issued URI 99901432/2017-201-07 pending Laurens' full evaluation of the corrective actions taken for C/PAR 570, and whether adequate objective evidence supports the extent of condition specified in C/PAR 570 as a result of Notice of Nonconformance 99901432/2015-201-02 issued in the NRC inspection report dated May 22, 2015.

The NRC inspection team issued Nonconformance 99901432/2017-201-08 in association with CB&I Laurens' failure to implement the regulatory requirements of Criterion XVI of Appendix B to 10 CFR Part 50. Nonconformance 99901432/2017-201-08 cites CB&I Laurens' for failing to correct conditions adverse to quality. Specifically, for Wyman Gordon Pipe Fittings, CB&I Laurens did not perform any additional activities that would provide reasonable assurance that the calibration services were adequately controlled and the components would perform their intended safety function. In addition, for Pinson Valley Heat Treating, CB&I Laurens did not perform any additional verification or acceptance activities to ensure that the identified critical characteristics were adequately controlled and the components would perform their intended safety function.

## 5. Design Control and Commercial-Grade Dedication

### a. Inspection Scope

The NRC inspection team reviewed CB&I Laurens' policies and implementing procedures that govern the design control and commercial-grade dedication programs to verify their compliance with the regulatory requirements of Criterion III, "Design Control," in Appendix B to 10 CFR Part 50.

The NRC inspection team verified that the WEC design specifications were adequately translated into the applicable specifications, drawings, job instructions, and travelers by CB&I Laurens personnel. For a sample of design documents reviewed, the NRC inspection team confirmed that (1) the appropriate quality standards were specified and included in design documents, (2) sufficient coordination between WEC and CB&I Laurens was taking place for the design and fabrication of the pipe spools, (3) independent verifications and checks were integrated into the process and were being performed, (4) required qualification tests were being performed, and (5) design changes were being effectively controlled and approved.

For a sample of suppliers, the NRC inspection team evaluated a sample of technical evaluations and verified that the technical evaluations in the commercial-grade dedication plans appropriately identified the critical characteristics and technical attributes necessary to provide reasonable assurance that the components being dedicated would perform their intended safety function. The NRC inspection team also evaluated the criteria for the selection of critical characteristics, the basis for the selection of the sampling plan, and the selection and implementation of verification methods to verify effective implementation of CB&I Laurens' commercial-grade dedication process.

The NRC inspection team also discussed the design control and commercial-grade dedication programs with CB&I Laurens' 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 CB&I Laurens is implementing its design control and commercial-grade dedication programs in accordance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that CB&I Laurens' is implementing its policies and procedures associated with the design control and commercial-grade dedication programs. No findings of significance were identified.

6. Oversight of Contracted Activities and Internal Audits

a. Inspection Scope

The NRC inspection team reviewed CB&I Laurens' policies and implementing procedures that govern the implementation of its oversight of contracted activities and internal audits program to verify compliance with the requirements of Criterion IV, "Procurement Document Control," Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50.

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 all of the safety-related POs reviewed included clauses invoking the provisions of 10 CFR Part 21. The NRC inspection team reviewed a sample of external and internal audits to evaluate compliance with CB&I Laurens' program and technical requirements. The NRC inspection team confirmed that the audit reports contained objective evidence of the review of the relevant quality assurance (QA) criteria of Appendix B to 10 CFR Part 50. In addition, the NRC inspection team reviewed the resolution of audit findings for adequacy and timeliness. The NRC inspection team also reviewed a sample of training and qualification records of CB&I Laurens' lead auditors and auditors and confirmed that auditing personnel had completed all the required training and had maintained qualification and certification in accordance with CB&I Laurens' policies and procedures. Furthermore, the NRC inspection team verified that external audits were performed by qualified lead auditors and auditors.

The NRC inspection team also discussed the oversight of contracted activities and internal audits programs with CB&I Laurens' 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 CB&I Laurens is implementing its oversight of contracted activities in accordance with the regulatory requirements of Criterion IV, Criterion VII, and 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 CB&I Laurens is implementing its policies and procedures associated with the oversight of contracted activities. No findings of significance were identified.

## 7. Test Control

### a. Inspection Scope

The NRC inspection team reviewed CB&I Laurens' policies and implementing procedures that govern the test control program to verify compliance with the requirements of Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50.

During the week of NRC inspection, there was no hydrostatic testing being conducted, however, the NRC inspection team selected a sample of four completed hydrostatic test reports for review. The NRC inspection team verified that the hydrostatic test reports were performed in accordance with the applicable requirements of Section III of the ASME B&PV Code, 1998 Edition, 2000 Addenda and the applicable WEC design specifications.

The NRC inspection team also discussed the test control program with CB&I Laurens' 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 CB&I Laurens' is implementing its test control program in accordance with the regulatory requirements of Criterion XI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that CB&I Laurens is implementing its policies and procedures associated with the test control program. No findings of significance were identified.

## 8. Control of Measuring and Test Equipment

### a. Inspection Scope

The NRC inspection team reviewed CB&I Laurens' policies and implementing procedures that govern the 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.

For a sample of M&TE, the NRC inspection team determined that the M&TE had the appropriate calibration stickers and current calibration dates, including the calibration due date. The NRC inspection team also verified that the M&TE had been calibrated, adjusted, and maintained at prescribed intervals prior to use. In addition, the calibration records reviewed by the NRC inspection team indicated the as-found or as-left conditions, accuracy required, calibration results, calibration dates, and the due date for

recalibration. The NRC inspection team also verified that the selected M&TE was calibrated using procedures traceable to known industry standards.

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, CB&I Laurens generates a nonconformance report 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 also discussed the M&TE program with CB&I Laurens' 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 CB&I Laurens 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 CB&I Laurens is implementing its policies and procedures associated with the M&TE program. No findings of significance were identified.

9. Entrance and Exit Meetings

On January 23, 2017, the NRC inspection team discussed the scope of the inspection with Eddie Gasbarri, Production Manager, and other members of CB&I Laurens' management and technical staff. On January 27, 2017, the NRC inspection team presented the inspection results and observations during an exit meeting with Brian Gibson, CB&I Director of Quality, Fabrication and Manufacturing, Juan Villareal, CB&I Laurens' Plant Manager, other members of CB&I Laurens' management and technical staff. On March 2, 2017, the NRC inspection team conducted a re-exit meeting to present an additional observations and a finding to Mr. Villareal and other members of CB&I Laurens 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

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
Brian Gibson	Director of Quality, Fabrication & Manufacturing	Chicago Bridge & Iron (CB&I)		X	X
Juan Villareal	Plant Manager	CB&I		X	
Edgar Gabsarri	Production Manager	CB&I	X		
Shawn T. Spivak	Site Superintendent	CB&I	X		
Matt Rosignol	Quality Assurance Manager	CB&I	X	X	X
Clyde Livingston	Quality Control (QC) Manager	CB&I	X	X	X
Ann Saia	Quality Management	CB&I		X	X
Bruce Simmons	General Foreman	CB&I			X
B. J. Cobble	Assistant Foreman	CB&I			X
Eric Hawn	Foreman	CB&I			X
Reggie Martin	Welding Engineer	CB&I	X		X
Keith Tollison	Welder	CB&I			X
Anthony Urban	Welder	CB&I			X
B. J. Wilson	Welder	CB&I			X
Glen Starek	QC Inspector	CB&I			X
Adam Hughes	QC Inspector	CB&I			X
Yamir Diaz-Castillo	Inspection Team Leader	NRC	X	X	
Jonathan Ortega-Luciano	Inspector	NRC	X	X	
Andrea Keim	Inspector	NRC	X	X	
John Honcharik	Inspector	NRC	X	X	
Jason Christensen	Inspector	NRC	X	X	
Richard P. McIntyre	Inspector	NRC		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 Inspections of Nuclear Vendors," dated April 25, 2011.

IP 43003, "Reactive Inspection of Nuclear Vendors," dated December 14, 2015.

IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated April 25, 2011.

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<b>Item Number</b>	<b>Status</b>	<b>Type</b>	<b>Description</b>
99901432/2013-201-03	Closed	NON	Criterion III
99901432/2013-201-04	Closed	NON	Criterion VII
99901432/2015-201-01	Closed	NON	Criterion XVI
99901432/2015-201-02	Discussed	NON	Criterion IX
99901432/2015-201-03	Closed	NON	Criterion VII
99901432/2017-201-01	Opened	NOV	10 CFR Part 21
99901432/2017-201-02	Opened	NON	Criterion I
99901432/2017-201-03	Opened	NON	Criterion IX
99901432/2017-201-04	Opened	NON	Criterion X
99901432/2017-201-05	Opened	NON	Criterion XIII
99901432/2017-201-06	Opened	NON	Criterion V
99901432/2017-201-07	Opened	URI	Criterion XVI
99901432/2017-201-08	Opened	NON	Criterion XVI

#### 4. DOCUMENTS REVIEWED

##### Policies and Procedures

- CB&I Laurens Quality Assurance Manual, Revision 25, dated April 19, 2016
- BFS-AP1000-CL/SS-1, "Cleaning Procedure", Revision 4, dated August 19, 2011
- BFS-J1-1, "General Fabrication Procedure, Revision 11, dated July 8, 2016
- BFS-NWC-1 AD, "Nuclear Welding Material Control AP1000 Addendum," Revision 2, dated April 14, 2016
- BFS-QC-10CFR21, "Procedure for Compliance with 10CFR21/10CFR50.55(e)," Revision 5, dated April 22, 2015
- Commercial Grade Dedication (CGD) Overview (Process Development and Basic Principals) presented by Sequoia Consulting Group, dated August 20, 2015
- PR-CBIL-06-001, "QA Records Receiving, Control, Management, and Retention," Revision 0, dated January 28, 2016
- PR-CBIL-06-002, "Document Management," Revision 2, dated September 23, 2016
- PR-CBIL-06-003, "Shop Traveler Control," Revision 0 (no date available)
- PR-CBIL-08-008, "Hydrostatic Testing Procedure," Revision 2, dated October 15, 2012
- PR-CBIL-08-027, "Cold Bending of Pipe Addendum AP1000 Addendum", Revision 0, dated May 24, 2016
- PR-CBIL-09-016, "Ultrasonic Thickness Testing", Revision 0, dated October 20, 2015
- PR-CBIL-10-001, "Cleaning Procedure Stainless Steel," Revision 4, dated August 19, 2011
- PR-CBIL-15-005, "Procedure for Compliance with 10CFR21/10CFR50.55(e)," Revision 0, dated February 17, 2016
- PR-CBIL-16-001, "Corrective Action Program," Revision 1, dated November 19, 2015
- PR-CBIL-16-002, "Corrective Action Reporting," Revision 1, dated November 19, 2015
- PR-CBIL-16-003, "Corrective Action Report Processing," Revision 2 dated May 2, 2016
- PR-CBIL-07-004, "Commercial Grade Dedication Procedure - AP1000," Revision 0, dated April 28, 2016
- PR-CBIL-17-004, "Quality Assurance Audits," Revision 1, November 18, 2015



- PR-CBIL-17-006, "Qualification of Auditors," Revision 0, November 9, 2015
- PR-CBIL-17-007, "Supplier Qualification and Evaluation," Revision 1, dated May 11, 2016
- PR-CBIL-17-008, " Commercial Grade Survey," Revision 1, dated November 18, 2015
- PR-CBIL-17-009, "Internal Audits," Revision 0, dated November 9, 2015
- SP-MTE-1, "Measuring and Test Equipment Calibration with General Addendum", Revision 0 (no date available)
- SP-UT-5, "Ultrasonic Testing," Revision 0, dated October 20, 2015
- SP-VT-1, "Visual Examination Procedure," Revision 5, dated July 28, 2011
- SP-VT-1, "Visual Examination Procedure Addendum," AP1000 Addendum, Revision 4, dated March 12, 2012
- WI-CBIL-007-PP-003, "Supplemental QA Requirements Palmetto Plating Acid Cleaning," Revision 0, dated January 28, 2016
- WI-CBIL-007-PVHT-002, " Supplemental QA Requirements Pinson Valley Heat Treating Solution Annealing," Revision 2, dated February 5, 2016

Design Documents

- Westinghouse Electric Company's (WEC) Design Specification No. APP-GW-007, "AP1000 Specification for Shop Fabricated Piping," Revision 7 (no date available)
- WEC Design Specification No. APP-GW-P0-008, "AP1000 Specification for Field Fabricated Piping and Installation, ASME Class 1, 2, and 3 and B31.1," Revision 6, dated June 12, 2014
- WEC Design Specification No. APP-GW-Z0-602, "AP1000 Cleaning and Cleanliness Requirements of Equipment for use in Nuclear Supply and Associated Systems," Revision 3 (no date available)
- 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

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

- Shop Travelers Nos. VS2-RCS-PLW-U30, SV4-RCS-PLW-03D, SV4-RCS-PLW-03B, VS2-RNS-PLW-192-1, SV3-RCS-PLW-03B-1, SV4-RCS-PLW-03B, VS2-PXS-PLW-934, and SV3-RCS-PLW-03B301-1
- Weld Procedure Specification (WPS) N803, "Mechanized and Manual GTAW Welding," Revision 4 (no date available)
- ASME Code Data Report No. VS2-RNS-PLW-014-1A, "Fabricated Piping," dated March 31, 2016
- ASME Code Data Report No. VS3-RNS-PLW-014-1D, "Fabricated Piping," dated September 30, 2016
- ASME Code Data Report No. SV3-RNS-PLW-014-1D, "Fabricated Piping," dated September 29, 2014
- ASME Code Data Report No. VS2-RNS-PLW-014-1D, "Fabricated Piping," dated October 22, 2014
- ASME Code Data Report No. VS3RNS-PLW-019-1, "Fabricated Piping," dated September 30, 2016

Calibration, Heat Treatment, Non-Destructive Examination, Inspection and Test Records

- Certificate of Calibration No. BFS001-15-04-16024-2 for a dead weight tester, dated May 4, 2017
- Certificate of Calibration No. BFS001-15-04-16024-3 for gage block, dated May 6, 2015
- Certificate of Calibration No. BFS001-15-04-16024-4 for gage block, dated May 6, 2015
- Certificate of Calibration No. BFS001-16-04-13282-1 for a radiometer display with 2 sensors, dated April 19, 2016
- Certificate of Calibration No. J1604191-1 for a light meter, dated April 19, 2016
- Certificate of Calibration No. J1604191-2 for a light meter, dated April 19, 2016
- Calibration Records for Ultrasonic Thickness Meters Nos. 42385, 41407, 43015, and 42386
- Calibration Records for Pyrometer No. 120931
- Calibration Records for Hydrostatic Test Gage Serial No. 600058473 (two week calibration period) dated November 1, 2016, November 4, 2016, November 16, 2016, and November 30, 2016

- Calibration Records for Hydrostatic Test Gage Serial No. 600058474 (two week calibration period) dated November 1, 2016, November 4, 2016, November 16, 2016, and November 30, 2016
- Calibration logs for relief valves with serial numbers BFS-PR1, BFS-PR3, BFS-PR5, BFS-PR10, and BFS-PR12
- Certified Test Report No. BFS001-16-08-31775-1 for a water sample from the wash bay, dated September 6, 2016
- Certified Test Report No. BFS001-16-11-41219-1 for a marker chemical analysis, dated November 11, 2016
- Hydrostatic test reports: No. VS2-PCS-PLW-833-1, November 16, 2016; No. SV4-12463-ML-P19, dated November 16, 2016; No. 230081-00-00001 Item A, dated November 18, 2016, and No. SV4-SFS-PLW-352-4, dated November 4, 2016
- Blotter Test Result Logs for the Wash Bay

Purchase Orders, Audit Reports, and Commercial-Grade Dedication

- Purchase Order (PO) No. 982454 to Laboratory Testing Inc. for tensile testing, dated July 21, 2016
- PO No. 1114754 to Laboratory Testing Inc. for impact testing, Revision 0, dated June 22, 2016
- PO No. 958269 to Exelon Powerlabs, LLC for calibration of pyrometers, dated September 16, 2015
- PO No. 949957 to Exelon Powerlabs, LLC, for calibration of electrometer, dated June 16, 2015
- PO No. 935005-001 to Dubose National Energy for pipe and flanges, dated February 4, 2015
- PO No. 975090 to Dubose National Energy for seamless pipe, dated March 3, 2016
- PO No. 976913 to Conrad Kacsik Instrument Systems for furnace and recorder calibrations, dated April 8, 2016
- PO No. 935594-001 to Lincoln Electric Company for welding materials, dated February 2, 2015
- PO No. 978909 OI-001, to Wyman-Gordon Forgings, Inc., grinding of 38-inch pipe, dated May 13, 2016
- PO No. 978904-001 to Wyman-Gordon Forgings, Inc. for grinding of 38-inch pipe, dated May 13, 2016

- External Audit of DuBose Nuclear Energy Services Inc., Audit No. SA-16-007 and Checklist, dated November 29, 2016, Audit Plan, dated August 29, 2016 and Audit Plan Supplement dated October 26, 2016.
- External Audit of Exelon PowerLabs, Audit No. SA-15-32 and Audit Checklist, dated May 15, 2015, Audit Plan, dated April 23, 2015, Annual Evaluation dated June 13, 2016.
- External Audit of Lincoln Electric Company, Audit No. S-16-002 and Audit Checklist, dated March 16, 2016, Audit Plan, dated January 11, 2016, Audit Plan Supplement, dated January 25, 2016, QA Manual Review dated January 20, 2017, Supplier Annual Evaluation, dated February 16, 2015.
- External Audit of Laboratory Testing Inc., Audit No. SA-16-01 and Audit Checklist, dated March 9, 2016, Audit Plan, dated January 25, 2016, Supplier Annual Evaluation, dated January 18, 2017.
- External Audit of Wyman-Gordon Forgings, Inc., Audit No. SA-15-33 and Checklist, dated March 10, 2016.
- Internal Audit, Audit Number IA-15-001 and Checklist, dated April 26, 2016, Audit Plan dated November 11, 2015.
- Internal Audit, Audit Number IA-03-16 and Checklist, dated July 7, 2016, Audit Plan dated June 15, 2016.
- Inspection Attributes List for CB&I Laurens at Wyman-Gordon, dated March 8, 2016.
- Approved Suppliers List - Safety Related, ASME Section III, Commercial Grade, RTN55, Revision 32, dated January 20, 2017.
- CGD Plan No. CBIL-5, "Commercial Grade Dedication Plan for Pickling & Passivation Services Palmetto Plating, Co. Inc.," Revision 5, dated August 3, 2016.
- CGD Plan No. CBIL-6, "Commercial Grade Dedication Plan for Solution Annealing Services," Revision 3, dated January 6, 2016.
- Commercial Grade Survey CGS-15-001 for Palmetto Plating, Co. Inc., dated May 1, 2015.
- Quality Assurance Surveillance Report No. 2016-017 for Palmetto Plating, Co. Inc., dated February 22, 2016.

#### Nonconformance Reports

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#### Corrective Action Reports

408, 414, 528, 533, 534, 535, 536, 539, 540, 542, 565, 567 Revision 1, 5569, 84, 603 Revision 2, 642, 762, and 763

### Corrective Action Reports Opened During the NRC Inspection

2017-11, 2017-25, 2017-26, 2017-27, 2017-30, and 2017-31

### Training Records

- S. Mullenburg, Lead Auditor, dated January 18, 2016
- P. Utle, Lead Auditor, dated May 20, 2013, last review dated November 12, 2015
- P. Hunsucker, Auditor, dated October 24, 2016
- N. Huff, Nondestructive Testing Level III Certificate No. 278594, issued January 2016
- N. Huff, CB&I Annual Technical Evaluation for magnetic particle, liquid penetrant, and visual examination testing Level II, dated February 2, 2014
- N. Huff, Eye Exam Record, dated February 21, 2014