

July 21, 2015

U.S. Nuclear Regulatory Commission Attn: Document Control Desk Chief, Construction Mechanical Vendor Branch Division of Construction Inspection and Operational Programs Office of New Reactors Washington, DC 20555-0001

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SUBJECT: REPLY TO A NOTICE OF NONCONFORMANCE NRC INSPECTION REPORT NO. 99901432/2015-201

REFERENCES:LETTER FROM EDWARD H. ROACH (NRC) TO TAMMY WATSON (CB&I LAURENS), U.S.
NUCLEAR REGULATORY COMMISSION INSPECTION REPORT NO. 99901432/2015-201
AND NOTICE OF NONCONFORMANCE, DATED MAY 22, 2015. REFERENCE ALSO NRC
EXTENSION REQUEST ACCEPTANCE DATED JUNE 26, 2015.

Dear Mr. Roach,

In response to the referenced NRC Notice of Nonconformance (NON), CB&I Laurens herewith provides the enclosed reply (enclosure). The reply addresses: NONs A, B and C of the Notice as they relate to Section 16 (Corrective Action Report), Sections 8 (Production) and Section 9 (NDE, Inspections, Tests, and Inspection and Test Status), and Section 7 (Material Control). CB&I Laurens submitted extension request to the NON Reply on June 17, 2015. Acknowledgement of this request was received and approved within NRC letter dated June 26, 2015.

Pursuant to the NRCs corresponding instructions specified in the Notice, the enclosure addresses for each of the NONs A, B, and C: 1) the reason for the noncompliance; 2) the corrective steps that have been taken and the results achieved; 3) the corrective steps that will be taken to avoid future noncompliance; and 4) the date when the corrective actions will be completed.

CB&I Laurens understands the feedback received from the NRC during the inspection and in the published inspection report. The feedback received is taken seriously and it is recognized that attention to this is necessary. Corrective actions have either been completed or initiated to remedy the specific findings provided to avoid further noncompliance.

A self-imposed Stop Work Order (SWO) was initiated on March 17, 2015, as a result of systemic problems with the corrective action program, commercial grade dedication processes, qualification of vendors and the overall quality assurance program implementation. These deficiencies have been addressed within the nonconformance and corrective action programs and necessary extent of condition reviews will take place as required by corrective actions.

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Issues identified within the quality assurance program will be addressed to ensure corrective action implementation.

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Should you have any questions regarding this submittal, please contact Matt Rossignol, Quality Manager, at (864) 683-3986.

Sincerely,

Matt

Matt Rossignol Quality Manager CB&I Laurens

Enclosure: Reply to Notice of Nonconformance 99901432/2015-201



ENCLOSURE REPLY TO A NOTICE OF NONCONFORMANCE



STATEMENT OF NOTICE OF NONCONFORMANCE:

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 March 16, 2015 through March 19, 2015, 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:

NONCONFORMANCE - A

Criterion XVI, "Corrective Action," 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," states that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management."

Paragraph 16.2.5 of Section 16, "Corrective Action," of CB&I Laurens Quality Assurance Manual, Revision 21, dated November 15, 2014, states, in part, that "The Department Manager responsible for the corrective/preventive action shall evaluate the significance of the problem affecting quality..." Paragraph 16.2.8, states, in part, that "Preventive action shall be included as part of the corrective/preventive action to a degree appropriate to the magnitude of potential future problems." In addition, paragraph 16.2.9 states, in part, that "The Department Manager responsible for recommending the corrective/preventive action shall return the C/PAR, with their recommendations and a completion date to the Quality Manager promptly for further review and processing." Furthermore, paragraph 16.2.10 states, in part, that "The person(s) responsible for completing the corrective/preventive action shall return the C/PAR to the Quality Manager."

Contrary to the above, as of March 19, 2015, CB&I Laurens failed to establish adequate measures to assure: (1) conditions adverse to quality are promptly identified and corrected; (2) the cause of the condition is determined and corrective action taken to preclude repetition for significant conditions adverse to quality; and (3) adequate documentation of the identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken. Specifically, for the sample of Corrective/Preventive Action Requests (C/PARs) reviewed by the NRC inspection team,



CB&I Laurens did not: (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/PAR were adequately implemented and completed. For example:

- 1. Corrective actions taken in response to NRC finding NON 99901432/2013-201-03 regarding the inadequate commercial-grade dedication of seamless pipes was not adequate. In its letter, CB&I committed to send samples of the materials to an approved testing laboratory as part of the commercial-grade dedication process. The NRC inspection team identified that CB&I Laurens chose to utilize a commercial supplier, Welding Testing Laboratory, 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, but did not adequately dedicate the testing services provided by Welding Testing Laboratory.
- 2. Corrective actions taken in response to NRC finding NON 99901432/2013-201-04 regarding the failure to conduct commercial-grade surveys or source surveillance have not been implemented. CB&I Laurens committed to (1) perform a documented annual and semiannual evaluation of commercial suppliers providing items for commercial-grade dedication and (2) perform a documented review of the suppliers' Non Conformance Report (NCR) log to identify any developing trends that could be adverse to quality and initiate corrective action and to complete the corrective actions by January 14, 2014. The NRC inspection team determined that CB&I Laurens has not performed the documented annual and semiannual evaluation of commercial suppliers or the documented review of the supplier's NCR log to identify any adverse trends.
- 3. CB&I Laurens failed to ensure that C/PAR No. 408, dated April 21, 2014 contained objective evidence of the corrective actions taken and that it was completed in a timely manner. C/PAR No. 408 was generated as a result of CB&I Laurens receiving pipes from Tioga Pipe that had an outside diameter above 3 percent of the acceptable tolerance. As part of the corrective actions, CB&I Laurens opened NCRs No. S2/V1219, S3/V1083, S3/V1103, and V41147. The NRC inspection team identified that these NCRs did not contain objective evidence of the engineering evaluation performed to disposition the use-as-is and close the C/PAR.
- 4. CB&I Laurens failed to ensure that C/PAR No. 419 dated May 27, 2014; C/PAR No. 499, dated January 9, 2015; C/PAR No. 508, dated January 29, 2015; and C/PAR No. 517, dated February 20, 2015; contained objective evidence of the corrective actions taken, and that they were completed in a timely manner. CB&I Laurens could not present any objective evidence of the corrective actions associated with these C/PARs and whether the actions were completed. The only documentation available for these C/PARs was the completed initial form that initiated the C/PAR.

This issue has been identified as Nonconformance 99901432/2015-201-01.



NONCONFORMANCE - 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."

Sections 8.6 and 8.7 of CB&I Procedure SP-VT-1, "Visual Examination Procedure," Revision 4, AP1000 Addendum 2, dated March 12, 2012, states, in part, that "The surface of welds shall be sufficiently free from coarse ripples, grooves, overlaps abrupt ridges and valleys...The surface smoothness shall be such that no depression of greater than 1/32-inch per inch exists." The above sections in SP-VT-1 are based on the same requirements in Westinghouse Electric Company (WEC) Specification APP-GW-P0-008, "AP1000 Specification for Field Fabricated Piping and Installation, ASME III, Code Classes 1,2, and 3 and ASME B31.1," Revision 6.

Welding Procedure Specification (WPS) N4/803, Revision 1, dated May 26, 2014, states, in part, that "Welds shall be made with the minimum preheat and maximum interpass temperatures stated in WPS N4/803." WPS N1/803, Revision 0, June 4, 2012, states, in part, that "Welds shall be made with the minimum preheat and maximum interpass temperatures stated in WPS N1/803." Both WPS N1/803 and N4/803 are currently used for welding name plates on safety-related piping spools.

Contrary to the above, as of March 19, 2015, CB&I Laurens failed 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. Specifically,

- 1. CB&I Laurens visually inspected and accepted welds (weld numbers 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 V.C. Summer Unit 2) which did not meet the visual inspection criteria of procedure SP-VT-1 and WEC Specification APP-GW-P0-008. The NRC inspection team found that the pipe spool had abrupt ridges and valleys, and depressions of greater than 1/32-inch that did not meet the pre-service and in-service inspection surface condition requirements of Sections 8.6 and 8.7 of CB&I Procedure SP-VT-1 and WEC Specification APP-GW-P0-008. If the surface area is not conducive to the pre-service and in-service inspection examinations (ultrasonic (UT) examination), the UT probe will not have direct contact with the material and induce lift-off which will not detect defects such as cracking.
- 2. When a WPS specifies preheat and interpass 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) interpass temperature of the two different materials. However, contrary to this, WPSs N1/803 and N4/803 specifies that when welding two different materials with different preheat and interpass



temperatures, the minimum preheat and maximum interpass 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°F, while the minimum preheat for P-8 material is 50°F, and therefore the WPS is requiring that the 50°F preheat be used, even though the limiting preheat temperature of 200°F should be specified in the WPS, as supported by the applicable PQRs. Welding of name plates using the incorrect preheat and interpass temperatures could lead to changes in the mechanical properties of the base material.

This issue has been identified as Nonconformance 99901432/2015-201-02.

NONCONFORMANCE - C

Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50, states, in part, that "Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor or subcontractor, inspection at the contractor or subcontractor source, and examination of products upon delivery."

Contrary to the above, as of March 19, 2015, CB&I Laurens failed to establish adequate measures for source evaluation and selection of contractors and subcontractors. Specifically, CB&I Laurens did not 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. CB&I Laurens used Palmetto Plating Company for the procurement of safety-related pickle and passivation of stainless steel bends, Wyman Gordon Pipe and Fittings for the procurement of safety-related piping, Pinson Valley Heat Treating for the procurement of heat treating services for safety-related piping, and Welding Testing Laboratory for destructive testing to determine the acceptability of procedure qualification records as required by Section III, "Rules for Construction of Nuclear Facility Components," and Section IX, "Welding and Brazing Qualifications of the American Society of Mechanical Engineers Boiler & Pressure Vessel Code.

This issue has been identified as Nonconformance 99901432/2015-201-03.



CB&I LAURENS REPLY TO NONCONFORMANCE'S A, B AND C

CB&I LAURENS REPLY TO NONCONFORMANCE A

1. The Reason For Nonconformance A

This issue has been documented in C/PAR 528 and has been further analyzed and supported with actions and causal factors determined within C/PAR 603. C/PAR 603 was initiated and causal analysis was performed to identify the common cause associated with all significant conditions and NON's identified within the CB&I Laurens Corrective Action Program. Root Cause Analysis (RCA) of the condition identified in C/PAR 528 was performed and has identified a Root Cause and three (3) contributing causes as detailed below:

- Root Cause: Organizational communication less than adequate.
- Contributing Cause #1: Understanding of nuclear industry requirements less than adequate.
- Contributing Cause #2: Suitably qualified and experienced personnel less than adequate.
- Contributing Cause #3: Procedural guidance less than adequate.

Analysis of C/PAR 603 identified on the following causal factors:

- Root Cause: CB&I Laurens management understand of nuclear QA requirements less than adequate.
- Contributing Cause: CB&I Laurens understanding of nuclear industry standard practices less than adequate.
- 2. Corrective Steps That Have Been Taken and Results Achieved

Immediate actions include the inclusion of two individuals to implement the corrective action program, including tracking, trending and overall management of the program. Also as an immediate action, nineteen (19) personnel attended an 8 hour cause analysis fundamentals course. This class was developed from a training program used at the Lake Charles facility and was conducted by a cause analysis SME from the Lake Charles facility. The training consisted of the following elements:

- Introduction to Cause Analysis Historical significance of Cause Analysis
- Investigation & Interviewing Best Practices
- Common Cause Analysis Tool Familiarization
- Development of Effective Corrective Actions
- Specific Site & CMS Procedural Requirements
- Practical Exercise(s) for Cause Analysis Tool Usage

Immediate actions associated with C/PAR 603 include the addition of experienced nuclear personnel including the following:



- Quality Manager with previous nuclear experience.
- Quality Assurance personnel with previous nuclear experience.
- Assistant Plant Manager with previous nuclear experience.
- Employee Concerns Program Manager with previous nuclear experience.
- Executing Management support with previous nuclear experience and Lake Charles stop work experience.
- A total of 2 operations mentors with previous nuclear and stop work experience.
- Document Review mentors with previous nuclear experience and documentation review experience.
- A total of 2 Quality Assurance Program mentors with previous nuclear experience and Lake Charles stop work experience.
- <u>Corrective Steps That Will Be Taken to Avoid Noncompliance</u> The Root Cause Analysis performed for C/PAR 528 identified a total of four (4) actions as described below:
 - Corrective Action # 1: Senior management shall use a cross functional team specifically to develop detailed implementation step and task level procedure(s) for the Corrective Action Program. This action will include the implementation of the newly created procedures, which will be developed with lessons learned incorporated from the CB&I Lake Charles facility.
 - Corrective Action # 2: Senior Management shall use an entity external to CB&I Laurens to
 provide detailed causal analysis education for the entire management team, and to the
 employees who will be responsible for performing causal analysis functions, and providing
 oversight of the Corrective Action Program (CAP). The intention of this action is to provide
 CB&I Laurens with a pool of employees suitably qualified and educated to implement an
 effective corrective action program.
 - Corrective Action # 3: Senior Management shall use an entity external to CB&I Laurens to provide an interactive communication and team building workshop for Management and Supervision in all CB&I Laurens functional groups.
 - Corrective Action # 4: Senior management shall organize and implement monthly All-Hands Meetings designed to disseminate information to the entire workforce, promote a healthy Nuclear Safety Culture, provide a sense of transparency between functional organizations, and encourage open communication at all levels. Content of the All-Hands can include any information the management team deems necessary. However, each meeting shall contain Nuclear Safety Culture discussion topics.



Causal Analysis performed for C/PAR 603 identified a total of two (2) actions as described below:

- Corrective Action # 1: As an action to prevent recurrence moving forward, CB&I Laurens management shall use a suitably qualified instructor to provide training for all CB&I Laurens management and supervision personnel regarding compliance to ASME NQA-1 QA Program requirements. The training shall include detailed instruction for managers and supervisors to provide guidance regarding:
 - o promoting a strong nuclear safety culture,
 - o instilling compliance based performance values in employees,
 - o handling compliance issues,
 - acceptable management and supervision practices to ensure compliance based performance.
- Corrective Action # 2: To address the contributing causal factor of less than adequate understanding for nuclear industry principles throughout the CB&I Laurens workforce, CB&I Laurens management shall use a suitably qualified instructor to provide all employees with Human Performance training. This training shall align with nuclear industry accepted Human Performance instruction promoted by the NRC, INPO, and/or IAEA.
- 4. Date When Corrective Actions Will Be Completed
 - Corrective Action #1 (C/PAR 528): 9-30-15
 - Corrective Action #2 (C/PAR 528): 9-30-15
 - Corrective Action #3 (C/PAR 528): 9-30-15
 - Corrective Action #4 (C/PAR 528): 9-30-15
 - Corrective Action #1 (C/PAR 603): 9-15-15
 - Corrective Action #2 (C/PAR 603): 9-15-15

CB&I LAURENS REPLY TO NONCONFORMANCE B

1. The Reason For Nonconformance B

The issues identified have been documented in C/PAR 570, NCR S2/1489 for ISI (Inservice Inspection) preparation and C/PAR 568 for interpass and preheat notes identified on WPS's.

C/PAR 570 was written to identify welds on pipe spool 8927-40-010-00031, serial number VS2-RNS-PLW-014-1A that did not meet preservice and inservice inspection requirements required by the VT procedure and purchaser supplied specification.

The cause of this condition is attributed to a lack of training for personnel performing and inspecting ISI preparations along with lack of procedural guidance for performing and inspecting ISI preparations. It should be noted that the analysis of this condition concluded that the welds



in question within the NRC NON had not yet received ISI inspections as indicated by the shop traveler, however UNSAT conditions, identified by purchaser Source Inspection were reviewed. This review determined that instances of ISI preparations being performed incorrectly and subsequently inspected and accepted were identified.

C/PAR 568 was written to identify a note on dissimilar material WPS's that was not clear as to the interpass and preheat requirements.

The reason for this non-conformance was unclear direction provided on the WPS.

2. Corrective Steps That Have Been Taken and Results Achieved

C/PAR 570: A review of the welds on the spools identified within the NRC NON was performed and it was confirmed that there were welds that were not in conformance with ISI preparations. Extent of condition review of this issue included review of identified unsatisfactory conditions associated piping still at the Laurens facility, as no ASME Section III work was being performed at that time, and it was concluded that deficiencies with the performance of and inspection of ISI preparations does exist.

C/PAR 568: Corrective actions taken include a review of all dissimilar material WPS's to identify if this note existed on other documents. Also, to determine the effect that this unclear note may have had on the material, QA and Weld Enginéering performed multiple interviews with welding personnel and foremen on the floor to determine how this WPS was implemented. It was identified that all personnel interviewed understood the proper implementation of the interpass and preheat requirements. Applicable personnel were provided a questionnaire with the WPS's in question and asked to identify the proper preheat and interpass temperature that would be used. All personnel surveyed provided acceptable answers in regards to proper preheat and interpass that would be implemented within the WPS's.

Corrective Steps That Will Be Taken to Avoid Noncompliance

Three (3) actions have been initiated to address this condition and to mitigate recurrence: <u>C/PAR 570</u>:

- Corrective Action #1 Develop and perform training for production personnel performing ISI preparation. This training will be conducted with all personnel that may perform ISI preparations.
- Corrective Action #2 Develop and provide clear instructions for the inspection of ISI
 preparations. Training shall be performed with all inspection personnel to the requirements
 and inspection methods used to verify ISI preparations.

C/PAR 568:

 Corrective Action #1 – Revise WPS to provide clear direction in regards to the preheat and interpass requirements and obtain CB&I Power approval as required.



- 3. <u>Date When Corrective Action Will Be Completed</u> C/PAR 570:
 - Corrective Action #1 8-15-15
 - Corrective Action #2 8-15-15
 - C/PAR 568:
 - Corrective Action # 1 6-30-15 (Action Complete)

CB&I LAURENS REPLY TO NONCONFORMANCE C

1. The Reason For Nonconformance C

This issue has been documented in C/PAR's 533 and 534. C/PAR 533 identifies issues within the CGD program, while C/PAR 534 identified issues within vendor qualifications. Root Cause Analysis (RCA) of this condition was performed and has identified a Root Cause and two (2) contributing causes as detailed below:

- Root Cause: Lack of Suitably Qualified and Experienced Personnel.
- Contributing Cause #1: Procedural guidance less than adequate.
- Contributing Cause #2: Corrective Action Program in effective. (See reply to Nonconformance A)

2. Corrective Steps That Have Been Taken and Results Achieved

Extent of Condition reviews began immediately upon identification of the issues associated with C/PAR's 533 and 534. This included a review of Lead Auditor Qualifications, Vendor Qualifications, Commercial Grade Dedication Plans and the Qualifications of service providers such as M&TE Calibrations, pickling/passivating and heat treatment/solution annealing. This review also included a review of the Quality Assurance Manual and associated procedures that directed these processes.

3. <u>Corrective Steps That Will Be Taken to Avoid Noncompliance</u>

The Root Cause Analysis performed identified a total of five (5) actions, two (2) for C/PAR 533 and three (3) for C/PAR 534, as described below:

- Corrective Action # 1: Senior Management shall use a qualified entity external to CB&I Laurens to provide detailed training for Commercial Grade Dedication requirements, implementation processes, and generally acceptable best practices. (C/PAR 533)
- Corrective Action # 2: Revise CGD procedure to ensure that step and task level implementation exists. This is intended to provide an easy to follow format of instructions by which the user can perform the CGD functions efficiently yielding high quality results. (C/PAR 533)



- Corrective Action # 1: Senior Management shall use a qualified entity external to CB&I Laurens to provide detailed training for Nuclear Auditing requirements, implementation processes, and generally acceptable best practices. (C/PAR 534)
- Corrective Action # 2: To address the programmatic gaps identified between Audit program requirements and the procedural guidance available at CB&I Laurens, the Quality Manager shall revise the CB&I Laurens QA Manual to clarify the instructions regarding 10CFR50.55(e), NQA-1 Supplemental 18S-1, and 10CFR50(B)/10CFR21 requirement implementation and oversight. (C/PAR 534)
- Corrective Action # 3: To add further emphasis to the Procedural Guidance Contributing Causal factor specific to this condition, management shall utilize a team or individual with sufficient experience and qualification to develop implementation step and task level procedures governing the Quality Assurance Program functions surrounding auditing, auditor qualification, and vendor/supplier qualification. The procedural guidance will provide a detailed format of instruction by which the user can effectively meet the requirements of 10CFR50 Appendix B and ASME NQA-1. (C/PAR 534)
- 4. Date When Corrective Action Will Be Completed
- Corrective Action #1 (533): 8-31-15
- Corrective Action #2 (533): 8-31-15
- Corrective Action #1 (534): 9-1-15
- Corrective Action #2 (534): 9-1-15
- Corrective Action #3 (534): 9-1-15