April 17, 2018

To: Whom it may concern

Subject: Reply to Notice of Nonconformance – Audit 99900100/2018-201

Attached are the responses to the three (3) notices of nonconformance's written on audit 99900100/2018-201.

Jeffrey McConkey
Quality Manger – Automation
Flowserve

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

IE09
NRO

Reply to Notice of Nonconformance
NRC Inspection Report 99900100/2018-201; Flowserve

Nonconformance 99900100/2018-201-01

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

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 January 26, 2018, Flowserve failed to ensure the suitability of materials, parts, equipment, and processes that are essential to the safety-related functions of the safety-related electric actuators. Specifically, as part of its commercial grade dedication process:

1. Flowserve failed to verify the validity of the Certificates of Compliance provided by a commercial sub-supplier, by performing a commercial-grade survey, source surveillance, independent testing, or other acceptable methods, as necessary for ensuring the proper material composition (hardness and tensile strength) of motor shafts used in DC motors and supplied by Flowserve as either part of safety-related actuators or sold as replacement parts.

2. Flowserve failed to identify motor torque as a critical characteristic and failed to verify the motor output torque conformed to the associated speed-torque curves for DC motors procured from a commercial supplier and then supplied by Flowserve as a safety-related replacement part.

This issue has been identified as Nonconformance 99900100/2018-201-01.

Reasons for the Violation

Regarding item 1, Flowserve's existing commercial grade dedication plan for DC motors did not include verification of raw material certificates of compliance for certain metallic components the motor OEM receives from their sub-supplier.

Regarding item 2, Flowserve does not have a technical evaluation on file specifically documenting critical characteristics of motor output performance. The routine motor test (RMT) performed by the motor OEM on every production motor does not include specific tests that verify output torque capability to the maximum rated torque of the motor.

Corrective Actions Taken

Flowserve will impart new requirements on the motor OEM and their sub-suppliers to validate raw material certificates of compliance for critical components by laboratory analysis at an independent facility designated by Flowserve. Quality Engineering Standard K-12028 will be revised to document the requirement for independent material testing of raw materials used in components critical to the motor's function. Flowserve will revise internal inspection procedure IP-10.111 to add requirements for material properties verification of the motor shaft and other metallic components identified in the investigation. Quality Control Inspectors will be trained in the requirements of the revised inspection procedure.

Flowserve engineering will generate a technical evaluation to document critical characteristics of motor performance and establish the requirements for verification of those attributes. Flowserve will enhance the production test requirements for DC motors to include verification of motor performance at the maximum rated output torque required of the motor. The RMT review and approval section of Flowserve QAP 10.4 will be revised to include additional acceptance criteria. The commercial grade survey checklist contained in inspection procedure IP 10.111 will be revised to include verification of any additional production testing.

Actions to Avoid Future Violations

Commercial grade surveys of the motor OEM will verify that applicable controls are in place with their sub-suppliers to ensure compliance with the requirements for independent verification of material properties. Flowserve will ensure critical motor performance characteristics are adequately verified by review of RMT data and by commercial grade surveys of the motor OEM test facility.

Date of Full Compliance

Flowserve corrective actions regarding revision of internal procedures and documentation will be completed by 05/31/2018. Verification of full compliance with all corrective actions involving the motor OEM will be completed by 08/31/2018.

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Nonconformance 99900100/2018-201-02

The Nonconformance as stated in the referenced Notice of Nonconformance (NON) is as follows:

> Criterion XVII, "Quality Assurance Records," of Appendix B states, in part, that "Sufficient records shall be maintained to furnish evidence of activities affecting quality. Records shall be identifiable and retrievable." Flowserve Procedure QAP 16.1, "Handling and Storing Quality Records", Revision 24, required receipt inspection records to be maintained in hardcopy format for a period of three (3) years. Contrary to the above, as of January 26, 2018, Flowserve failed to maintain sufficient records to furnish evidence of activities affecting quality. Specifically, Flowserve was unable to provide documented evidence (inspection records) covering a period of more than two (2) years between January 2016 and January 2018 that showed that commercial-dedicated fasteners procured from Industrial Products Company were inspected, and critical characteristics for the items were verified, as required by Flowserve Inspection Plans 10.19, 10.14, 10.16, and 10.15.
>
> This issue has been identified as Nonconformance 99900100/2018-201-02.

Reasons for the Violation

Flowserve's procedure QAP 16.1 allowed for a weakness in file storage for inspection records in receipt inspection. Cabinets in this area are unlocked allowing access to any individual who may need to get files out of the filing cabinet. Flowserve has been audited in this area numerous times and records have always been available and retrievable which provided a false sense of assurance that all of the required records were available.

Corrective Actions Taken

Flowserve's internal procedure QAP 16.1, will be revised to require all receipt inspection records to be electronically scanned. Inspectors will be trained in use of the scanning sheets and the process for scanning and verifying records have been properly scanned.

Additionally, Flowserve Quality Assurance will perform a process audit on receipt inspection files at a minimum every 3-months to verify inspection records are being scanned and are available as evidence inspections have been performed in accordance with applicable inspection plans.

All fasteners in the IPC cage were removed and have been inspected to the applicable inspection plans.

Flowserve contracted GQA to perform the internal 10 CFR 50 Appendix B, 10 CFR Part 21, NQA-1 (1994) audit for 2018. During that audit, Flowserve requested the internal auditor review current IPC inspections, inspection records and file retention in RII as well as all other areas. There were no audit findings regarding this process during the internal audit.

Actions to Avoid Future Violations

Flowserve procedure 16.1 will be revised to require receiving inspection records to be electronic instead of hardcopy.

All inspectors will be trained in the use of file scanning

Process audits will be performed on receipt inspection by Quality Assurance each quarter to verify the processes and record retention is being properly followed.

Additional focus will be given during internal audits to the receiving inspection area.

Date of Full Compliance

Corrective actions will be completed by 4/20/2018.

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Nonconformance 99900100/2018-201-03

The Nonconformance as stated in the referenced Notice of Nonconformance (NON) is as follows:

> 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.
>
> Contrary to the above, as of January 26, 2018, the NRC inspection team identified four examples where the receipt inspection records lacked evidence that Flowserve had performed material testing on commercially-dedicated hardware and fasteners as necessary to confirm the suitability of the parts. In the following examples, the required testing data was either not filled in on the data forms or was marked N/A without explanation:
>
> 1. For stock order with Part Number HB8-1/2-13x28, dated March 23, 2015, and Part Number HB8-3/4-10x28, dated March 17, 2015, the receipt inspection datasheet failed to indicate that the hardness testing for the lot of hex head cap screws had been performed as required by the inspection plan.
>
> 2. For stock order with Part Number HC8-3/8-16x28, dated May 21, 2015, and Part Number HC8-3/4-10x36, dated August 4, 2015, the receipt inspection datasheet failed to indicate that the hardness testing for the lot of hex head cap screws had been performed as required by the inspection plan.
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> 3. For Part Number CKI-49NE-164, dated August 5, 2015, receipt inspection records did not verify the manufacturer for these fasteners as required by procedure.
>
> 4. For stock order with Part Number 60-563-02691, dated August 3 2015, inspection records failed to show that hardness testing had been performed as required by procedure.
>
> This issue has been identified as Nonconformance 99900100/2018-201-03.

Reasons for the Violation

Flowserve QC inspectors were not fully following the applicable inspection plans as required by their training and procedures. Receipt inspection is audited both internally and externally each year and objective evidence that inspections were being completed to the applicable inspection plans was found. IPC was a supplier for hardware that had not been reviewed during these audits and the missing/incomplete records went undetected.

Corrective Actions Taken

All inspectors were re-trained on all applicable inspection plans used by receipt inspection for fasteners.

All fasteners used in safety-related applications were inspected to the applicable inspection plans.

All of these inspection records were reviewed and approved by the Quality Assurance Supervisor.

Actions to Avoid Future Violations

Process audits on the receipt inspection records will be scheduled to occur every 3-months to verify that the process is being followed and records are being properly maintained.

Date of Full Compliance

Corrective actions will be completed by 4/2/2018.