

October 16, 2007

Donald L. Curtin, President
Conval, Inc.
265 Field Road
Somers, Connecticut 06071-1049

SUBJECT: NRC INSPECTION REPORT 99901367/2007-201, NOTICE OF VIOLATION
AND NOTICE OF NONCONFORMANCE

Dear Mr. Curtin:

On August 13-17, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Conval, Inc. (Conval) facility in Somers, Connecticut. The enclosed report presents the results of that inspection.

This was a limited scope inspection that focused on assessing your compliance with the provisions of Part 21, "Reporting of Defects and Noncompliance," of Title 10 of the Code of Federal Regulations (10 CFR Part 21) and selected portions of 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants." This NRC inspection report does not constitute NRC endorsement of your overall quality assurance or Part 21 programs.

During this inspection, it was found that the implementation of your 10 CFR Part 21 program failed to meet certain NRC requirements that are discussed in the enclosed Notice of Violation (NOV) and NRC Inspection Report. Specifically, a review of Conval's 10 CFR Part 21 implementation documents identified that Conval did not develop an appropriate procedure to evaluate deviations and failures to comply in order to determine whether they were associated with substantial safety hazards as required by 10 CFR 21.21(a)(1). Please note that you are required to respond to the NOV and you should follow the instructions in the enclosed NOV when preparing your response.

In addition, the NRC inspection team (Team) found that the implementation of your quality assurance program failed to meet certain NRC requirements imposed on you by your customers. Specifically, the Team determined that three Conval procedures related to commercial-grade dedication; control of nonconforming materials, parts, or components; and independent verification and validation of the valve coefficient values; and one procedure for receipt inspection were contrary to requirements of 10 CFR Part 50, Appendix B. These nonconformances are cited in the enclosed Notice of Nonconformance (NON) and discussed in detail in the enclosed report. You are requested to respond to the enclosed NON and should follow the instructions specified in the enclosed NON when preparing your response.

The NRC will use your responses to the NOV and NON, in part, to determine whether further inspection and/or enforcement action is necessary to ensure compliance with regulatory requirements.

D. L. Curtin

- 2 -

In accordance with 10 CFR 2.390, of the NRC's "Public inspections, exemptions, requests for withholding," of 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," of the NRC's regulations, a copy of this letter, its enclosures, and any associated correspondence will be placed in the NRC's Public Document Room (PDR) or the NRC's document system (ADAMS), accessible from the NRC's public web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

Sincerely,

/RA/

John A. Nakoski, Chief
Quality and Vendor Branch B
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99901367

Enclosures:

1. Notice of Violation
2. Notice of Nonconformance
3. Inspection Report No. 99901367/2007-201

cc w/encl: Mr. Frank Siver

In accordance with 10 CFR 2.390, of the NRC's "Public inspections, exemptions, requests for withholding," of 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," of the NRC's regulations, a copy of this letter, its enclosures, and any associated correspondence will be placed in the NRC's Public Document Room (PDR) or the NRC's document system (ADAMS), accessible from the NRC's public web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

Sincerely,

/RA/

John A. Nakoski, Chief
Quality and Vendor Branch B
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99901367

Enclosures:

- 1. Notice of Violation
- 2. Notice of Nonconformance
- 3. Inspection Report No. 99901367/2007-201

cc w/encl: Mr. Frank Siver

DISTRIBUTION:

- G. Tracy
- E. Imbro
- M. Lesser, RII
- J. Peralta
- D. Thatcher, NRR
- S. Magruder, OE
- M. Morgan
- F. Talbot
- K. Heck
- A. Issa, RII

ADAMS Accession# ML072770900 NRO-106

OFC	CQVB:DCIP:NRO	CQVB:DCIP:NRO
NAME	KNaidu	JNakoski
DATE	10 / 16 /07	10 / 16 /07

OFFICIAL RECORD COPY

NOTICE OF VIOLATION

Conval, Inc.
265 Field Road
Somers, Connecticut 06071-1049

Docket Number 99901367
Inspection Report Number 2007-201

Based on the results of a Nuclear Regulatory Commission (NRC) inspection conducted August 13-17, 2007, at Conval Incorporated (Conval), a violation of NRC requirements contained in Part 21, "Reporting Defects and Noncompliance," of Title 10 of the *Code of Federal Regulations* (10 CFR Part 21) was identified. Conval became subject to 10 CFR Part 21 requirements by supplying basic components, as defined in 10 CFR 21.3, to NRC-licensed or otherwise regulated facilities under the Energy Reorganization Act of 1974. In accordance with the NRC Enforcement Policy, the violation is listed below:

Section 21.21 of 10 CFR Part 21 requires, in part, that corporations or other entities subject to this part adopt appropriate procedures to evaluate deviations and failures to comply to determine whether they are associated with substantial safety hazards. Deviations, defects, failures to comply, and substantial safety hazards are defined in Section 21.3.

Contrary to the above, Conval's 10 CFR Part 21 implementing procedure, QCP-0240, "Implementation of 10 CFR 21," dated November 6, 2003, was not appropriate in that it failed to provide sufficient guidance to ensure that deviations and failures to comply would be evaluated to determine whether they were associated with substantial safety hazards. For example, paragraph 3.0 of QCP-0240 was inadequate in that it did not require Conval employees to identify for evaluation under 10 CFR Part 21 departures from technical requirements in procurement documents, test or inspection acceptance criteria not being met, or failure to comply with an NRC requirement. Similarly, paragraph 4.0 of QCP-240 was inadequate in that it did not require employees to identify and report to a Conval officer know or suspected deviations or failures to comply for evaluation as required by 10 CFR 21.21(a)(1).

Violation 99901367/2007-201-I.

This is a Severity Level IV Violation (Supplement VII).

Pursuant to the provisions of 10 CFR 2.201, "Notice of Violation," Conval is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with a copy to the Director, Division of Construction, Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of receipt 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; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Where good cause is shown, consideration will be given to 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 document system (ADAMS), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. Agency-wide Documents Access and

ENCLOSURE 1

Management System (ADAMS) are accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. 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 withholding of such material, 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 will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection, described in 10 CFR 73.21.

Dated at Rockville, Maryland this 16 day of October 2007.

NOTICE OF NONCONFORMANCE

Conval, Inc.
265 Field Road
Somers, Connecticut 06071-1049

Docket Number 99901367
Inspection Report Number 2007-201

Based on the results of a Nuclear Regulatory Commission (NRC) inspection conducted August 13-17, 2007, of activities performed at Conval, Inc. (Conval), it appears that certain activities were not conducted in accordance with NRC requirements that were contractually imposed upon Conval by NRC licensees.

1. Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50, states, in part, 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."

Conval's Quality Procedure QP-003, "Sampling Inspection," dated March 14, 2005, required the receipt inspector to verify the dimensions of 10% of the forgings or a minimum of five pieces to be inspected during receipt inspection.

Contrary to Criterion V of Appendix B to 10 CFR Part 50 and QP-003, one occasion was identified in which the receipt inspector failed to follow the procedure and verified the dimensions of only three T-body forgings, type F-316, Conval item 20016-DO3N, instead of five and only three yoke forgings, type F-316, Conval item 20037-DO3N, instead of five.

Nonconformance 99901367/2007-201-1

- 2a. Contrary to Criterion V, Conval's procedures governing commercial-grade dedication, an activity affecting quality, were not appropriate to the circumstances in that the Section II portion of the Dedication Procedure (part of PSP-201), for all the Dedication Reports, did not include the appropriate 10 CFR 21.3 definition for a commercial grade item as it applies to nuclear power plants licensed pursuant to 10 CFR Part 50. The definition included in the Conval Dedication Reports (as part of the Commercial Grade Determination) related to commercial grade items as applied to facilities and activities other than nuclear power plants in 10 CFR 21.3a.

Nonconformance 99901367/2007-201-2a.

- 2b. Criterion III, "Design Control," of Appendix B to 10 CFR Part 50, states in part, that "design control measures shall provide for verifying the adequacy of design by the use of alternate calculation methods. The verifying process shall be performed by individuals or groups other than those who performed the original design."

Contrary to Criterion III, Conval's Procedures EP-0012, "Analysis Verification & Validation," SEI-123-1, "CF Design 5.0 Validation," and SEI-123-3, "CF Design 8.0 Validation," were found to be inadequate. Specifically, these procedures did not require that Conval independently verify and validate the valve flow coefficient values, C_v ,

ENCLOSURE 2

computed using Blue Ridge Numerics Computational Fluid Dynamics software for valves provided for use in safety-related applications.

Nonconformance 99901367/2007-201-2b.

Criterion XV, "Non Conforming Material, Parts, or Components," of Appendix B to 10 CFR Part 50, states, in part, that "measures shall be established to control materials, parts or components which do not conform to requirements in order to prevent their inadvertent use or installation. These measures shall include procedures for identification, documentation, segregation, disposition and notification to affected organizations. Nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures."

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. The identification of significant conditions adverse to quality, the cause of the conditions, and corrective actions taken shall be documented and reported to the appropriate levels of management."

- 2c. Contrary to Criterion V, XV, and XVI, Conval's Procedure QP-0015, "Nonconforming Material Control," was inadequate in that it did not address "Parts and Components," did not require documentation of conditions adverse to quality, did not solicit corrective actions to correct the conditions adverse to quality, and did not require verification that the recommended corrective action was verified to be satisfactory and complete.

Nonconformance 99901367/2007-201-2c.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with a copy to the Director, 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: (1) a description of steps that have been or will be taken to correct this item; (2) a description of steps that have been or will be taken to prevent recurrence, and (3) the dates your corrective action and preventive measures were or will be completed. Where good cause is shown, consideration will be given to 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 document system (ADAMS), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. Agency-wide Documents Access and Management System (ADAMS) are accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. 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 withholding of such material, 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 will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection, described in 10 CFR 73.21.

Dated at Rockville, Maryland this 16 day of October 2007.

1.0 INSPECTION SUMMARY

The purpose of this inspection was to review selected portions of the quality assurance (QA) and 10 CFR Part 21 (Part 21) controls that Conval has established and implemented. The inspection was conducted at the Conval facility in Somers, Connecticut, from August 13 to 17, 2007. At this facility, Conval manufactures "Y"-pattern, angle and "T"-pattern globe-stop and stop-check valves, "T"-pattern lift-check valves, top-entry metal-seated ball valves of Pressure Classes through ASME 4500 psi, sized ¼ inch through 4 inches. At this facility, Conval also manufactures "Y"-pattern, angle and "T"-pattern bellows-seal globe valves; "Y"-pattern, angle and "T"-pattern lift-check valves, and angle-pattern throttling valves of Pressure Classes through ASME 2500 psi and also sized from 1/4 inch through 4 inches. Most of the valves are suitable for manual operation, or with motor, air or electro-hydraulic actuators. In the past, Conval has provided valves to a number of nuclear power plants, primarily for balance of plant, non-safety-related applications. However, Conval has recently received its "N" stamp certification from the American Society of Mechanical Engineers (ASME) and is likely to provide safety-related valves to existing and new reactors in the future. Conval has supplied its valves as basic components to NRC-licensed facilities, some through contractors to those facilities.

The NRC inspection bases were:

- Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Part 50 of Title 10 of the *Code of Federal Regulations*, and
- 10 CFR Part 21, "Reporting of Defects and Noncompliance."

1.1 Violations

Violation 99901367/2007-201-1 was identified and is discussed in Section 3.1 of this report.

1.2 Nonconformances

Nonconformance 99901367/2007-201-1 was identified and is discussed in Section 3.5 of this report.

Nonconformance 99901367/2007-201-2a was identified and is discussed in Section 3.2 of this report.

Nonconformance 99901367/2007-201-2b was identified and is discussed in Section 3.6 of this report.

Nonconformance 99901367/2007-201-2c was identified and is discussed in Section 3.7 of this report

2.0 STATUS OF PREVIOUS INSPECTION FINDINGS

There were no previous NRC inspections performed at Conval's facility in Somers, Connecticut.

3.0 INSPECTION FINDINGS AND OTHER COMMENTS

3.1 10 CFR Part 21 Program Review

a. Scope

The Team followed the guidance of inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and 50.55(e) Programs for Reporting Defects and Nonconformance," to implement the review of Conval's procedures and program for implementing the requirements of 10 CFR Part 21. Specifically, the Team reviewed Conval's Procedure QCP-240, "Implementation of 10 CFR Part 21," dated November 6, 2003. Implementation of QCP-240 was also conducted by reviewing one 10 CFR Part 21 report.

b. Observations and Findings

Conval uses Procedure QCP-240 to implement the requirements described in 10 CFR Part 21, "Reporting of Defects and Noncompliances."

b.1. 10 CFR Part 21 Procedure

The definitions for basic component, and defects in QCP-240 were incomplete and inconsistent with the definitions in 10 CFR 21.3. Furthermore, QCP-240 did not provide adequate guidance to employees for identifying deviations or failures to comply that they may become aware of in basic components delivered or to be delivered to NRC-licensed facilities. The procedure did not provide adequate guidance to document and report these conditions to the appropriate personnel, so that such deviations or failures to comply could be evaluated by qualified personnel to determine if the deviations could be defects or failures to comply that could cause substantial safety hazards if left uncorrected as required by 10 CFR 21.21(a)(1).

Paragraph 1.2 of QCP-240 states, "Excluded from the scope of these rules are items that are: (1) not subject to design specification requirements unique to facilities or activities licensed by NRC, (2) used in applications other than facilities or activities licensed by the NRC, and (3) able to be ordered from the manufacturer/distributor on the basis of the manufacturer's published specifications." By this statement, Conval excluded identifying deviations or failures to comply during dedication of commercial-grade items (CGIs). This implied that CGIs undergoing dedication to become basic components would not be subjected to 10 CFR Part 21 requirements, which they are.

The Team found that the definition of "basic component" in Paragraph 2.1 of QCP-240 was incomplete and the definition for "dedication" in Paragraph 2.2 was not consistent with the definition in 10 CFR 21.3. Also, the definition in 10 CFR 21.3 contains four different kinds of defects, but Paragraph 2.3 of QCP-240 mentioned only one of them.

In Paragraph 3.0, "Responsibilities," of QCP-240, the term "defect" appears to have been misused and confused with "deviation" and "failure to comply." For instance, Paragraph 3.1, of QCP-240, states "Federal Regulation 10 CFR 21 requires that any company individual having knowledge that an item, such as a component, sub-assembly, or assembly, containing a defect which could create a substantial safety hazard that has been or could be shipped to a nuclear

facility shall immediately notify a responsible manager or officers of Conval.” To be consistent with the requirements of 10 CFR Part 21, Conval’s procedure should require that employees identify potential deviations, i.e., departures from technical requirements in procurement documents, test or inspection acceptance criteria not being met, or a failure to comply (if the individual was aware of NRC requirements that apply) in components they may be working on. In many cases, Conval employees would not know the specific plant application, and would not likely be able to evaluate the deviation per 10 CFR 21.21(a)(1) to determine if the deviation could constitute a defect (i.e., could create a substantial safety hazard or a condition or circumstance that could lead to exceeding a [NRC license] technical specification safety limit) if left uncorrected or if the failure to comply could be associated with a substantial safety hazard if left uncorrected.

Paragraph 4, “Evaluation,” of QCP-240, stated that “Information regarding a known or suspected defect or deviation shall be submitted by any employee to the Quality Assurance Manager or Engineering Manager or President.” In addition to omitting failures to comply, this section also appears to presume that employees can identify a “known defect;” whereas, the procedure should require the employees to identify and report known or suspected deviations or failures to comply for evaluation as required by 10 CFR 21.21(a)(1).

The Team informed Conval representatives of the issues associated with CP-240 related to the definitions and requirements related to identifying, evaluating, and reporting deviations or failures to comply associated with substantial safety hazards. In summary, defects cannot be reported to the engineering manager because they cannot be identified as such until the issues can be evaluated per 10 CFR 21.21(a)(1), and defects, by definition, are reportable to affected licensees and purchasers under 21.21(b) within five working days of making that determination. However, Conval may report deviations or failures to comply to the NRC that it may suspect could be defects or failures to comply associated with substantial safety hazards, should Conval see fit to do so, as well as informing its customers as required by 10 CFR 21.21(b).

Finally, Conval was informed that the retention times stated in Section 6.0, “Records” -- although not required to be part of the procedures required by 10 CFR 21.21(a) -- were not consistent with the requirements of the current regulation.

Conval representatives stated that QCP-240 would be revised with the correct definitions and that all the Conval staff would be trained in implementing the revised procedure. The Team informed Conval’s representatives that the procedure, QCP-0240, “Implementation of 10CFR21,” dated November 6, 2003, was not adequate in that it failed to provide sufficient guidance to ensure that deviations and failures to comply would be identified and evaluated to determine if defects or failures to comply associated with substantial safety hazards exist and therefore constituted a violation of the requirements of 10 CFR 21.21.

b.2. Conval’s 10 CFR Part 21 Report

In a letter dated February 16, 2007, Conval notified the NRC and Conval customers that approximately 2000 forged-body globe valves, generally used in high-temperature and high-pressure applications, in sizes ranging from ½” to 4,” which Conval supplied to approximately 25 nuclear power plants from the 1980s to the present, may have potential “safety-related, noncompliance deviations which meet the definition of 10 CFR Part 21 (Part 21).” [sic]. The first noncompliance concerned Conval’s failure to procure the forged valve bodies through an

accredited supply source. This noncompliance is limited to the customers who issued purchase orders (PO) for Conval valves invoking ASME Section III Class 1, 2, or 3 without Conval having an ASME N stamp. The second deviation concerned Conval's failure to independently verify the validity of the Certified Material Test Reports (CMTRs) on the alloy components issued by the material supplier. Conval engineering personnel discovered a third error during the technical evaluation of the split ring materials from which the split rings were manufactured. The split ring strength is only a concern in "flow-over-the-seat" applications. Conval concluded that only valve codes commencing with "8J" and "8K" (out of 29 different configurations) were at risk given the maximum temperature and pressure combination of fluid systems in nuclear power plants. Conval believed that even in the valves with codes "8J" and "8K" elevated service conditions were still required to overstress the split rings – and that assumes minimum yield strengths were typically well below the actual strength values furnished in the CMTRs supplied by the mills. Conval concluded that it should notify the NRC of a potential Part 21 condition because it had not entirely fulfilled the requirements of ASME Section III, NCA 3800. Action taken by Conval to correct this problem was to classify the split ring as a safety-related item that requires independent verification of the CMTRs. Before Conval issued the Part 21 Report, the split rings in the stem assemblies were not identified in the dedication program. Dedication documents now identify split ring as a safety-related item, and require independent verification of the CMTRs.

The Team observed that implementation of QCP-240 would not be effective without Conval developing a system to document nonconformances in accordance with Criteria XV and XVI of 10 CFR Part 50, Appendix B, and to further screen the nonconformances for 10 CFR Part 21 applicability. This screening is "discovery" as defined in 21.3, i.e., determination of whether a nonconformance is a deviation or failure to comply in a component manufactured under Conval's Appendix B Quality Assurance (QA) program, and supplied as a basic component or a commercial-grade item dedicated by Conval under its Appendix B QA program and supplied as a basic component, with the potential to create a substantial safety hazard. This inadequacy is discussed in Paragraph 3.7 of this report as it relates to Conval procedure QP-0015, "Nonconforming Material Control." With a revised system to document conditions or significant conditions adverse to quality, and a revised QCP-240, it is expected that Conval would be able to comply with the provisions of 10 CFR Part 21.

c. Conclusion

The Team identified the lack of adequate procedural guidance for identifying and evaluating a deviation or failure to comply as required by 10 CFR Part 21 as Violation No. 99901367/2007-201-1.

3.2 Commercial-Grade Dedication

a. Scope

The Team reviewed Conval's Procedure QP-0006, "Dedication of Commercial Grade Items for Nuclear Safety Related Applications," dated October 9, 1991, and Form FQ-003, "Commercial Grade Dedication Record," to determine whether activities related to dedication could be effectively performed.

b. Inspection Findings and Observations

The Team reviewed QP-0006 and determined that the references provided in section 2.0 were inadequate in that NRC Generic Letters (GL) 89-02, "Actions to Improve the Dedication of Counterfeit and Fraudulently Marketed Products," and GL-91-05, "Licensee Commercial-Grade Procurement and Dedication Programs," were not included. In these GLs, the NRC provides guidance on commercial-grade dedication. Further, NRC endorsed industry guidance contained in Electric Power Research Institute (EPRI) NP- 5652, "Guideline for Utilization of Commercial-Grade Items in Nuclear Safety-Related Applications," was not included. The definitions of "Basic Component," "Commercial-Grade Items," and "Dedication" stated in Sections 3.1, 3.2, and 3.4 respectively were either incomplete or obsolete in that they did not reflect the definitions stated in the current version of 10 CFR Part 21. Criterion V of 10 CFR Part 50, Appendix B, requires activities affecting quality be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstance. The Team identified that QP-006 was an inadequate procedure and was contrary to Criterion V of 10 CFR Part 50, Appendix B. Conval's procedure governing commercial-grade dedication, an activity affecting quality, was not appropriate to the circumstances. QP-0006 did not include the appropriate 10 CFR 21.3 definition for a commercial grade item as it applies to nuclear power plants licensed pursuant to 10 CFR Part 50. The definition included in the Conval Dedication Reports (as part of the Commercial Grade Determination) related to commercial grade items for facilities and activities other than nuclear power plants in 10 CFR 21.3.

The components of Conval valves were either manufactured in-house or purchased. During receipt inspection of purchased material, the CMTRs for the forgings, raw material, and finished products were reviewed and verified by Conval employees. Conval engineers provided the dimensions for the components being manufactured in-house in the drawings and also provided the critical characteristics (CCs) for selected components. The production staff was required to verify the CCs on the components. The Team observed the CCs listed for the components were complete and adequate for determining that the associated valve would be capable of performing satisfactorily. The Team verified that the receipt inspector accepted raw material after verifying that the CMTRs accompanying the shipment mentioned the heat numbers traceable to the material supplied. The dimensions were verified, for components being manufactured in-house and determined acceptable.

The Team found that FQ-003 has a two step process for identifying critical characteristics (i.e., special inspections and tests to be verified and special inspections and test results) that verify that the critical characteristics are being met. The FQ-003 special inspections and test include raw material receipt inspection, critical dimensions, independent chemical verification, hydrostatic shell/seal tests, minimum wall thickness, weld braze inspection, material identification conformance and part number verification. The Team found that the methods used in FQ-003 were adequate to identify the critical characteristics used to dedicate CGIs as basic components. At the time of this inspection, the Team identified 11 CGIs in a Stop Valve being manufactured under drawing NB0004 and Specification Sheet (SS)-65790W. The stop valve items have not completed the dedication process since they were still being manufactured. For additional details, see Section 3.6 of this report.

c. Conclusions

The inspectors observed that engineers provided CCs in drawings for quality control inspectors such that the CCs could be verified. The CCs were found to be adequate and complete for the components. Verification methods were considered appropriate. The acceptance criteria were found to be acceptable. The Team concluded that lack of adequate guidance for commercial grade dedication of a basic component was contrary to Criterion V of Appendix B, to 10 CFR Part 50. Nonconformance 99901367/2007-201- 2a was identified.

3.3 Instructions, Procedures, and Drawings

a. Inspection Scope

The Team selectively reviewed the vendor's documentation to determine whether activities that affect quality were being conducted as prescribed by appropriately documented instructions, procedures, and drawings. During the inspection, the Team reviewed the following Conval procedures that control various activities.

Documents reviewed:

- Corporation Procedure; CP-0010, "Documentation Systems," dated May 11, 2006.
- Special Engineering Instruction; EP-0018, "Special Engineering Instructions," dated June 30, 2004.
- Engineering Production Drawings; EP-0017, "Production Drawings," dated February 4, 2004.
- Engineering Procedure; EP-0024, "Scanned Engineering Document Control," initial Issue dated October 20, 2006.
- Manufacturing Operations Sheets, OP-0010, "Operations Sheets," dated January 8, 2007.
- Special Process Procedures, QP-0009, "Special Process Control," dated May 22, 2006.
- Quality Assurance Procedure, QP-0036, "Visual Examination of Brazed Joints, E.B. Weld Joints, and Weld Deposited Seats by Remote Method," dated June 27, 2003.

The Team reviewed procedures governing control and handling of Conval's quality assurance, engineering/special engineering practices, operations production drawings, manufacturing practices and special manufacturing/production processes. The procedures listed above were specifically identified as the vendor's major controlling procedures for engineering, manufacturing, and special process practices. They were identified in the vendor's corporate procedure, CP-0010, "Documentation Systems."

b. Observations and Findings

The Team verified that changes to these documents were reviewed and approved by the same engineering, quality assurance, and manufacturing groups that originally reviewed and approved the documents. The Team further noted that each of these controlling documents

was approved for use by managers responsible for each of the respective engineering, manufacturing, and quality assurance groups. The Team also verified that documents used by the vendor's engineering and manufacturing organizations were the most recently reviewed and approved specifications, procedures, and instructions. Each of the reviewed documents was also signed by the appropriate department manager. In the case of ISO and N-stamp related documents, the inspectors observed that the vendor also uses a "third-party" reviewer; i.e., Hartford Steam Boiler Corporation; to ensure thorough coverage/"third-party" review of the document.

The Team also verified, by sampling, that the most current drawings – both those kept in the vendor's computerized drawing file system and those used as working copies in production – were being used by both engineering and fabrication/production personnel. The Team observed that drawings are maintained current by use of the vendor's electronic/computerized database system. The Team verified that this system is controlled solely by the vendor's engineering administrator and that all changes to drawings, which are maintained in the system, required the approval of the engineering manager.

During the inspection, the vendor's quality assurance (QA) personnel performed QA inspections of four (4) "designated for safety application" valve stem electron beam welds. These inspections were performed in accordance with instructions contained in QA procedure, QP-0036, "Visual Examination of Brazed Joints, E.B. Weld Joints, and Weld Deposited Seats by Remote Method." The Team noted in its review that personnel followed the instructions covered in section six (6) of the prescribed procedure and that personnel performed a 100% visual examination of all designated welds. A currently controlled, June 27, 2003, working copy of the procedure was available for use by the QA personnel in the immediate inspection/working area.

c. Conclusions

While the Team determined that the implementation of Conval's instructions, procedures, and drawings control program did not always meet requirements as discussed in Sections 3.2, 3.6, and 3.7 of this report, the Team did determine that the program requirements were consistent with Criterion V of Appendix B to 10 CFR Part 50.

3.4 Control of Special Processes

a. Inspection Scope

The Team reviewed examples of the vendor's special processes to determine whether measures had been established by the vendor to assure that in-house processes, i.e., tungsten inert gas welding and electron beam welding and subcontractor processes, i.e., brazing, were controlled with the use of qualified procedures as required by Criterion IX of Appendix B to 10 CFR Part 50. The Team also reviewed the qualifications of personnel performing such processes and the qualifications of Conval's quality assurance group.

Documents reviewed:

- Special Engineering Instruction, EP-0018, "Special Engineering Instructions," dated June 30, 2004.

- Special Process Procedures, QP-0009, "Special Process Control," dated May 22, 2006.
- Quality Assurance Procedure, QP-0036, "Visual Examination of Brazed Joints, E.B. Weld Joints, and Weld Deposited Seats by Remote Method," dated June 27, 2003.
- Special Engineering Instruction, SEI-3, "Electron Beam Welding - General Requirements," dated April 15, 1991.
- Special Engineering Instruction, SEI-74, "General Requirement - Gas Tungsten Arc and Gas Metal Arc Welding," dated May 28, 1993.

b. Observations and Findings

The Team reviewed vendor procedures governing the control of in-house special processes, i.e., electron beam and tungsten inert gas welding (TIG) and subcontractor procedures for brazing. The procedures listed in the scope of this section, were specifically identified as the vendor's major controlling procedures for such weld and brazing activities. They were identified in the vendor's special engineering instructions, EP-0018, "Special Documentation Systems." The Team verified that changes to these documents were reviewed and approved by the same engineering and quality assurance groups that originally reviewed/approved the documents. The Team also verified that each of the documents was approved for use by the managers responsible for each of the respective engineering and QA groups.

During the inspection, Conval's TIG welding personnel performed two (2) valve body welds/passes on one of the vendor's commercial-grade valves. The Team observed that each of the weld passes was performed in accordance with the weld traveler package – i.e., proper speed and weld thickness. The Team also noted that the proper weld filler material, as called for by the package, was used by the welder. The Team further observed that the welder met the appropriate weld technique and cleanliness requirements, as prescribed in SEI-74, "General Requirement – Gas Tungsten Arc and Gas Metal Arc Welding."

During the inspection, the Team also witnessed one of the vendor's electron beam welding machine operators performing electron beam welds on some of the vendor's valve stems. The Team again noted that in the case of each weld, the weld pass was performed in accordance with the weld traveler package – i.e., proper stem roll speed and weld application was set into the machine and each valve stem part, once welded, was checked by the operator. The operator used a "go-no-go" gauge to perform all checks. The Team further noted that the weld machine operator met the appropriate electron welding machine operation and cleanliness requirements, as prescribed by SEI-3, "Electron Beam Welding – General Requirements."

The Team also reviewed qualifications of the vendor's welders, weld machine operators, and QA Team. Their qualifications were found to be adequate and a routine "in-house" review of personnel qualifications by vendor management was apparent.

c. Conclusions

The Team determined that Conval's special process activities adequately met the requirements described in their engineering, manufacturing, and quality assurance documents. The Team also determined that the vendor's current program for control of special processes, specifically

welding, are controlled and accomplished by qualified personnel using qualified procedures. The Team further determined that the vendor's special process measures/activities were consistent with the requirements for activities affecting quality as described in Criterion IX of Appendix B to 10 CFR Part 50.

3.5 Procurement Document Control

a. Inspection Scope

The Team reviewed the vendor's process for assuring that applicable regulatory, technical, administrative, and reporting requirements (such as specifications, codes, standards, tests, inspections, special processes, witness and hold points, and applicability of 10 CFR Part 21) are translated from the customer purchase orders into its procurement documents to Conval's vendors and subtier suppliers as required by Criterion IV, "Procurement Document Control," of Appendix B to 10 CFR Part 50. The review included the vendor's provisions for review to ensure that customer's technical, quality, and regulatory requirements have been translated into design and manufacturing documents and imposition of customer requirements on subtier suppliers.

b. Observations and Findings

The vendor received nuclear accreditation from the American Society of Mechanical Engineers (ASME) on July 31, 2006, authorizing Conval to manufacture components in accordance with the ASME Boiler and Pressure Vessel Nuclear Codes and Standards (the Code). The authorization includes an "N" stamp for design and manufacture of components in accordance with the Code and an "NPT" stamp for providing Code-compliant components to other N-certificate holders. At the time of the NRC inspection, only Purchase Order (PO) #224703, dated November 7, 2006, from Weir Valves and Controls (Weir), required valves with an N-stamp.

b.1 Policies and Procedures for Procurement Document Control

The Team reviewed Conval's procedural controls for assuring that applicable regulatory requirements, design bases, and other requirements that are necessary to assure adequate quality are suitably included or referenced in procurement documents.

Procedures reviewed included the following:

- CP-0250, "Code-stamped Contract Review," dated October 22, 2003.
- CP-0260, "Code-Stamped Order Entry," dated November 29, 1996.
- SP-0010A, "Specification Sheet Procedure," dated June 2, 2006.
- OP-0051, "N-Stamp Purchase and PO Document Control," dated May 5, 2006.
- QP-0006, "Dedication of Commercial Grade Items for Nuclear Safety Related Applications"

b.2 Quality Assurance Program

The QA program applicable to the PO # 224703 is titled, "Quality System Program Manual for ASME Section III, Class 1, 2, 3, and NPT Valves and Valve Parts in Accordance with NCA-4000 and as a Material Organization Supplying Materials in Accordance with NCA-3800" (ASME QA Manual) and dated June 7, 2006. As part of its certification process, the ASME survey team reviewed the ASME QA Manual and found it to be acceptable for implementing the applicable provisions of the Code. In accordance with the terms of the PO, Conval submitted the ASME QA Manual to the customer for review. The customer has neither approved the QA program nor conducted a qualification audit. The vendor stated that the PO provides for hold points at the hydrostatic testing stage and during pre-packaging, when it is expected that the customer will conduct a qualification audit.

Section 3 of the ASME QA Manual describes the controls for contract review, order entry processing, design control of valves and valve parts, and for assuring that design documents and procurement specifications are correctly translated into Conval internal specifications, procedures, instructions, and drawings. Section 4 of the ASME QA Manual describes the controls exercised during the procurement of Code items and services. The provisions of Section 3 address assignment of a unique sales order number, a specification sheet, contract review, order entry processing, order change, design control, design origination and reporting, and design verification. Section 3 also provides for preparation of a Bill of Material in which processing engineering instructions and procedures and engineering changes are documented. Section 3 has provisions for a registered professional engineer to certify that documents conform to the applicable requirements of the Code. Section 4 provides controls for assuring that procurement technical and quality requirements are effectively translated into engineering and manufacturing documents and for processing changes to the PO.

b.3 Purchase Order (PO)

The Team reviewed the PO placed by Weir Valves on November 7, 2006, for 14 nuclear safety related valves to be installed at the Perry 1 nuclear generating station, operated by First Energy (FE). The PO incorporated by reference FE Specification PRS-1570, Revision 2, as the controlling technical document for the order. The N-stamp valves were to be fabricated in accordance with ASME Class 3 Code requirements. Required documentation included certified assembly drawings, a seismic design report, a code data report, a certificate of compliance, and certified material test reports.

The Weir PO required contracted activities to be controlled under a documented QA program that implements the requirements of Appendix B to 10 CFR Part 50, with provisions for extending QA requirements to all subcontractors or subtier suppliers. Further, the PO required rights of access to vendor's and associated subcontractor's facilities. Nonconformances dispositioned as "use-as-is" or "repair" were to be submitted to Weir for review. Defects and noncompliances were reportable under the requirements of 10 CFR Part 21. Testing to verify critical characteristics in support of commercial grade dedication were to be conducted in accordance with the approved QA program. The Team concluded that adequate controls were required in the Weir PO to meet the requirements of Appendix B to 10 CFR Part 50.

b.4 Specification Sheet

The Team reviewed the specification sheet for the Sales Order 65970W that was received by Conval on November 17, 2006. Conval procedure CP-0260 describes the process and departmental responsibilities for reviewing and entering of Code-Stamped POs into the Conval entry system. The process for entering and interpreting specification sheet entries is described in specification procedure SP-0010A.

The specification sheet for the subject valves was clearly stamped as a nuclear safety related order and indicated that customer-supplied prints had been sent with the order. The valves were to be fabricated as N Stamp Class, and there were hold points for ANI witnessing of the hydrostatic test. The bill of materials was to be prepared by Conval's Engineering, since the valves were nonstandard Conval products.

The specification was compared with the technical and quality requirements of the PO and was found to conform to the FE's PO PRS-1570, Revisions 1 and 2. 10 CFR Part 21 was applicable and the valves were to be seismically qualified. CMTRs were required for pressure retaining parts with traceability to the heat codes.

b.5 Contract Review and Order Entry

The Team reviewed the "contract review" and "order entry" documentation. CP-0250 provides a framework for reviewing contracts for Code-Stamped products and material to ensure consistency between the customer and all Conval departments relative to the contractual parameters and technical requirements.

The Team reviewed the Weir PO that was initiated on November 17, 2006, and completed on January 23, 2007, with a number of outstanding Conval comments. The Team reviewed the minutes of a project review meeting, conducted on January 26, 2007, during which Conval staff discussed open items that required resolution prior to release to production. Conval review of the contract was completed on March 15, 2007, with acceptance signatures of the Sales, Engineering, and QA organizations, and the Conval President. The order entry review, releasing the contract to production, was completed on March 26, 2007, with the additional acceptance signature of Manufacturing Engineering. The Team concluded that the contract review by Conval for the Weir PO met CP-0250 requirements.

b.6 Control of Procured Parts and Services

The Team reviewed the documentation translating the quality and technical requirements of the contract into production activities. Conval drawing, "Weir Valves & Controls/Perry Nuclear Station," (File No.: SP 13200, March 20, 2007), shows the configuration of the valves to be manufactured under the contract. The valve Code of Record is ASME Code Section III, Subsection ND, 1974 Edition - Addenda Winter 1975 and Code Case 1635-1, 1974.

The Team reviewed a printout of the bill of materials during the inspection and observed that the listing showed the manufacturing operation and physical location of the various valve subcomponents. The Team chose selected items to verify conformance with the terms and technical requirements of the contract. Verification included examination of travelers in the

shop, items received from subcontractors, items in receipt inspection, and items staged for final testing.

Subcontractors supplying items and services under the Weir contract were reviewed with respect to placement on Conval's approved vendor list as to scope of supply, qualification method, and the survey dates. In general, the Team determined that Conval QA staff reviewed and approved POs before being sent to the subcontractors. The Team selected the following items from the bill of materials for further evaluation.

1) Forgings

Forgings for the bellows body and yoke were provided by US Drop Forge Company, an approved supplier of N-Stamp forgings (NCA-3800) that was audited by Conval on May 22, 2006. The Team reviewed Conval PO #82015, issued on December 27, 2006, for conformance to the Weir contract. The Team noted that Conval's POs to subcontractors imposed the appropriate technical and quality requirements.

The ASME Code Material Requisition, issued with the PO, imposed the principal technical requirements for the forgings. The valves were to be manufactured to ASME Code Section III, 1995 edition, 1996 addenda with ASME material SA-182 F316/316L and specification PS-NQA-1. Special requirements imposed by the contract include intergranular testing per Supplement S10 of SA-182, Practice E of ASTM A 262. All finished forgings were to be examined by liquid penetrant examination in accordance with ASME Section III, NB-5350.

Quality specifications included general QA requirements, all applicable ASME requirements, and the QA specification attached to the PO. Conval procedures required that all sub-suppliers must be approved by Conval. Further, the QA requirements of Appendix B to 10 CFR Part 50 and reporting requirements of 10 CFR Part 21 were passed through to sub-suppliers. Specifically, material not in accordance with approved specifications, procedures, drawings, or PO requirements were to be classified as nonconformances; and items dispositioned as "repair to other than original specifications" or "use as is" were required to be submitted to Conval for approval.

Conval's procedures require that CMTRs shall attest that the materials have been manufactured in accordance with the subcontractor's approved QA program and meet the requirements of the specified ASME Section III, Division 1 edition and supplement and applicable material specifications. Further, all forgings were required to be marked per NCA-3800; forgings and materials were to be traceable to the CMTRs. The Team reviewed the certificates of conformance (COC) and CMTRs that were associated with the forgings for the valves being supplied to Perry and determined that they were acceptable.

The Team reviewed documentation for the following valve subcomponents, selected from the bill of materials, and verified the effectiveness of Conval's procurement controls to provide reasonable assurance that the procured items conformed to the quality and technical requirements imposed by the purchase order.

- Item #2015-L-MA181N, 3/4" 7F-T-SW Bellows Body; 316 N-Stamp
- Item #20154-A-D16N, 7F Bellows Bonnet Assy; N60 (N-Stamp)

2) Bar Stock

Some of the parts for the N-Stamp valve were manufactured from commercial grade material supplied by Trident Company, an approved source for D24 and D46 bar stock, certified to B.3.1.B and subject to receipt inspection. The material was processed in accordance with Conval ASME Certificate of Authorization N-3199. The file contained a COC, signed by the Conval QA Manager, certifying that the material was upgraded as unqualified source material in accordance with ASME NCA 3885.5. The CMTR provided supporting documentation such as mill order and heat treatment data, material chemistry and material attributes, and the results of tensile and Charpy V-notch impact tests. The NCA 3855.5 testing, as supported by these reports, confirms that the material was in accordance with the applicable ASME Section II, Part A 1995 edition with 1996 addenda. Dunkirk Specialty Steel provided CMTRs attesting compliance with Conval's PO. The validity of Dunkirk Specialty Steel's CMTRs were verified by Dirats Laboratory, a Conval approved 10 CFR Part 50, Appendix B and 10 CFR Part 21 supplier, last audited by Conval on October 19, 2006. Charpy impact test data was provided by Westmoreland Mechanical Testing and Research.

The Team reviewed documentation for the following valve subcomponents, selected from the bill of materials, and verified the effectiveness of Conval's procurement controls to provide reasonable assurance that the procured items conformed to the quality and technical requirements imposed by the PO.

- Item #1424-D24, 6, 7, 8 Split Ring, (Bellows, Stem; N50)
- Item #14214-D214, 7F Bellows (.562 Stroke); N50
- Item #20151-L-MA81N, 3/4" 7F-T-SW Bellows Body; 316 N-Stamp
- Item #20155-D24N, 7F Bellows Bonnet; N50 (N-stamp)

b.7 Liquid Penetrant Inspection

The Weir PO specifies that all fluid retaining surfaces be subject to liquid penetrant inspection (LPI) testing prior to assembly. Although Conval suppliers perform similar inspections as part of an order, commercial suppliers are typically not qualified to perform inspections that conform to ASME Code requirements. However, all LPI testing for the Weir contract was conducted by PTI Industries that is qualified for the contractual inspections, including N-stamp services. Conval had audited PTI on May 31, 2006. The contractual requirements for the items identified in this section were consistent with the applicable technical specifications of the Weir PO for LPI testing and imposition of the requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21.

b.8 Control of Production Process

The Team inspected shop travelers and manufacturing lots in the shop to verify control of the work-in-progress tracking system and successive operational steps were adequately documented in the shop. Travelers for the split ring (Item #1424-D24) and bellows bonnet assembly (item #20154-A-D16N) showed that shop operations had been completed for machining, ring splitting, deburring, vibroscribing of the material and heat code, and inspection. The bellows bonnet assemblies were awaiting shipment to PTI industries for LPI testing. The bellows body (item #20151-L-MA81N) had been returned to the shop. The lots were awaiting

verification of material and Code requirements. The bellows bonnet assembly (Item #20154-A-D16N) lot was awaiting shipment to PTI Industries following the necessary shop operations. The traveler for the bellows stem (Item #14214-D214) showed that all operations were completed on June 15, 2007.

b.9 Receipt Inspection

The body forging (item #20016-D03N) and bellows body (item #3051-L-MA81N) were selected to evaluate the effectiveness of the Conval receipt inspection process. The bellow bodies were located in the shop, had not been shipped for LPI examination, and were found to be awaiting a brazing operation. The bodies were located at Work Control Center 51502 (Operation #150, Brazing). Two of the forgings had been sent to PTI for LPI examination. The PTI COC 3521-A for the two pieces had been signed by a PTI Level II inspector, Certification Stamp PTI #388. The COC stated that all accessible surfaces had been inspected per Conval engineering procedure SEI 14, Revision 14 and that the inspection had been performed in accordance with the PTI Quality System Manual, which conforms to 10CFR50, Appendix B. The traveler indicated that one of the pieces had been rejected during receipt inspection. The rejection card was pulled and it showed that the reason for rejection was due to linear indications machined in the part, Defect Code #6. The part was dispositioned to be ground and polished to remove the linear indications to confirm that they were only surface imperfections and not defects.

The Team reviewed the receipt inspection file for the body forging and determined that the forgings were received from US Drop Forge, under PO #82013. The material (D03N K1) and heat treat code (K1) were stamped on the valve. The file contained a drawing of the forging (Dwg. No. 20016, "Body Forging, 90 Globe" Size Code 7), approved November 5, 2002, which was marked up to show 15 dimensions (with tolerances) to be verified by the inspector. In addition to the dimensional verifications, eight inspection attributes were identified. The verification record prepared by the receipt inspector was examined and found to contain measured values that were within the tolerances specified on the drawing.

The record showed that a sample of three valves had been selected for verification. Although a range of measurements had been recorded for some dimensions, some measurements were recorded only once. When questioned, the Conval inspector said that the dimensions must have been the same for all three forgings.

Conval Procedure QP-003, "Sampling Inspection Plan," established the size of the sample to be selected for receipt inspection. From the lot size of 26 forgings received from US Drop Forgings, three valves had been sampled. However, for a lot size smaller than 50, QP-003 required a minimum of five pieces to be examined, in order to maintain a prescribed level of certainty in the inspection conclusions. When shown the required sample size specified by the procedure, the inspector that had performed the verification stated that the value (3) shown in the procedure for large sample size was the one generally chosen. Another receipt inspection file was examined to determine the extent of this deficiency. The Team observed that only three F-316 type Yoke Forgings, identified as 20037-DO3N, were receipt inspected instead of a minimum of five. The confusion may be attributable to the layout of the procedure, where the minimum sample size is not readily apparent to the receipt inspector. The Team informed Conval representatives that failure to follow established QP-003, was a nonconformance, contrary to Criterion V of Appendix B to 10 CFR Part 50.

c. Conclusion

The Team identified that Conval personnel's failure to inspect the minimum number of body forgings and yoke forgings prescribed in Procedure QP-003 was a nonconformance, per Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50. Nonconformance 99901367/2007-201-1 was identified.

3.6 Design Control

a. Scope

The Team reviewed Conval Procedure EP-0012, "Analysis Verification & Validation" dated July 3, 2003, Special Engineering Instruction (SEI) -123, "Valve sizing equations and Techniques," dated November 10, 2006, SEI-123-1, "CF Design 5.0 Validation," dated November 10, 2006, and SEI-123-3, "CF Design 8.0 Validation," dated November 10, 2006, to examine the implementation of the procedures to calculate valve flow coefficients.

The Team reviewed the policies and procedures governing the implementation of the Conval's QA design control program. The documents reviewed include:

- ASME Section III, ND-3500, "Valve Design"
- ASME Section III, NCA-3800, "Accreditation or Qualification of Material Organizations"
- ASME Section III, NCA-4000, "Quality Assurance"
- ASME Code Case N-62-7, "Internal and External Valve Items, Division I, Classes 1, 2, and 3," approval dated, May 11, 1994
- NRC Regulatory Guide (RG) 1.84, "Design, Fabrication and Material Code Case Acceptability."
- Conval Engineering Procedure (EP)-0031, "NJN Processing and Design and Code Items 7," dated May 8, 2006.
- Conval Quality Procedure (QP)-0023, "Unqualified Source Material Processing," dated March 21, 2006.
- Conval QB-482, "Brazing Procedure Specification," dated August 3, 2007
- Conval Form FQ-003, "Commercial Grade Dedication Record"

The Team reviewed the following documents to verify the design and classification of basic components, dedicated items as basic components, and commercial grade items (CGIs) in a stop valve being manufactured for the Perry Nuclear Power Station:

- First Energy Nuclear Operating Company (FENOC) Customer Specification, PRS-1570, "ASME Class 3 Valves," Revision 2
- Conval Valve Drawing NB0004, "N-Stamp Class 3, 3/4" 1500# Bellows Assembly, Designed to 1974/1975 Winter Addenda," Rev A, dated March 26, 2007.
- Conval Engineering Change Notice (ECN) Form FE-011, ECN Number 5094.
- Conval Certified Material Test Report (CMTR) P5-3077-4-03
- Conval Purchase Order (PO) specification sheet (SS) Reconciliation Form (RF) 65970W, dated January 16, 2007.

b.1 Findings and Observation related to EP-0012

Conval's Procedure EP-0012, establishes the scope of analyses requiring verification and systematic actions to assure quality of engineering analyses. The Team verified the implementation of EP-0012 for the computation of Cv, the valve flow coefficient, which is defined as the flow of water through a valve at 60 degrees F in gpm at a pressure drop of 1 psi and is commonly used by licensees in the design of the piping system. Cv affects, among other things, flow, flow resistance, and how fast a valve will actuate. Conval, like all other valve vendors, provides the Cv value to the licensee either on the valve drawing or in the maintenance manual.

To compute Cv for its valves, Conval used the Blue Ridge Numerics Computational Fluid Dynamics (CFD) Software Verification and Validation Manual. CFD analysis is considered a modern numerical method for performing very complex fluid dynamics calculations using computer software and has been used in a wide variety of applications. Based on the Team's review of Conval's procedures, Conval should have performed verification and validation (V&V) of the method used to calculate Cv to confirm that the CFD analysis could be performed accurately. Conval did not adequately independently verify and validate the CFD analysis method.

Conval's SEI-123-1 and SEI-123-3, required Blue Ridge Numerics Computational Fluid Dynamics (CFD) software to be validated. However, instead of independently validating the software, Conval personnel compared the Cv values with those established by a competitor without ascertaining how the competitor established the values, with or without the benefit of a recognized quality assurance program.

b.2 Findings and Observations Related to Conval Stop Valve for Perry RWCU System

The inspectors found that Conval used EP-0031 to apply Code items to ASME Section III, Class 1, 2, and 3 valves. In accordance with PO 65970W, Conval was manufacturing a ¾" N-stamp T-Pattern bellows stop valve for Weir Valves & Controls. Weir Valves & Controls was supplying this valve to Perry Nuclear Power Station.

Conval designed the stop valve in accordance with FENOC Customer Specification PRS-1570. In accordance with ASME Section III, ND-3500, PO-65970W, and EP-0031, for ASME Class III valves, Conval created Valve Drawing No: NB0004, ECN-5094, and SS-RF-65970W. The Team reviewed these Conval documents to verify that QA design control attributes were being properly completed on this ASME Section III pressure boundary stop valve.

In SS-RF-65970W, Conval documented compliance with ASME ND-3511-1, Section III, ND and Table 4, ASME 16.34-2004 Edition, minimum wall thickness requirements for this valve. The ND-3511-1 valve body requirement minimum wall thickness is 0.214" and hub wall thickness is 0.24". The Conval actual valve design minimum neck wall thickness was 0.526" and valve port wall minimum wall thickness was 0.671." Conval accepted this valve design thickness as meeting ASME ND-3511-1. The Team found that Conval acceptance of the stop valve design met ND-3511-1 Class 3 valve requirements.

SS-RF-65970W also includes valve weld design requirements for welding the valve body and valve seats. The approved gas-tungsten-arc-welding (GTAW) procedure was Weld Procedure

Specification (WPS) 817, Rev 1, dated August 3, 2007. WPS 817 provides limits and material composition for weld thickness, filler metals, joint design, pre-heat temperature, post weld heat treatment, and weld techniques to be used. The weld between the bonnet and the back seat was required to meet ASME ND-4433, 1996 edition requirements. A bearing cap was also tack welded to the yoke that provides the pressure boundary. The tack weld will be considered a minor permanent attachment weld under ASME ND-4435. These welds have not been performed on the valve body but were in the process of being performed as part of manufacturing the valve.

Conval did use unqualified source material in manufacturing this valve for Perry. Conval QP-0023, provided two methods to upgrade unqualified source material for use in N-Stamp components. Conval upgraded the valve bonnet as unqualified source material consistent with PO-65790W from material code D24-SG to material code D24N-SG. The Team found that CMTR P5-3077-4-03 confirmed that the upgraded material satisfied ASME Code Section II, Part A Edition and NCA-3855.5, "Utilization of Unqualified Source Material." The upgraded material also met the NQA-1 quality requirements referenced in ASME NCA-3800/NCA-4000.

At the time of the inspection, Conval Drawing No: NB0004 was being updated with a new brazing procedure specification and a change to a weld angle. ECN 5094 documented weld angle changes from 60 to 30 degrees. The Conval registered professional engineer (PE) indicated that SS-RF-65970W and drawing NB0004 will updated to reflect these changes. Conval indicated that a contracted registered PE will independently review and approve SS-RF-65970W, drawing NB0004, and ECN 5094 before shipment of the valve. These documents will then be reviewed and approved by the acting QA manager to meet the requirements in 10 CFR Part 50, Appendix B, Criterion III, Design Control, before shipment of the valve.

b.3 Observations and Findings Related to SS-RF-65970W Classification of Safety Related and Pressure Boundary Items

In SS-RF-65790W, Conval classified the stop valve as a safety-related and an N-stamp component. The inspectors found that Conval procured the following pressure boundary components as basic components (as defined by 10 CFR Part 21) for the Perry stop valve: body assembly, body forging, and stem & bonnet assembly.

Conval also needed to dedicate CGIs with safety-related and pressure boundary functions in this Class 3 stop valve to meet the requirements and guidance in 10 CFR Part 50, Appendix B, Criterion III; ASME Section III; ND-3500; NCA-4000; Code interpretations in ASME Code Case N-62-7; and RG 1.84. RG 1.84 states, in part, that "Class 3 valve manufacturers must also meet the provisions of NCA-4000 because all Code Class valve items are subject to the licensee's 10 CFR 50, Appendix B approved QA programs."

Several CGIs were being dedicated in the stop valve by identifying the critical characteristics and verifying the critical characteristics were acceptable before the items could be dedicated as basic components for safety related use (e.g., stem assembly, stem, retainer, split ring, back seat, etc). See Section 3.2 of this report for additional details on this issue.

Other valve items that did not serve a pressure boundary or safety-related function (e.g., grease fitting, painted hand wheel, washers, etc) were not dedicated as basic components. The inspectors questioned Conval on some of these valve items to verify if any other items (e.g.,

weld rings, packing, end rings, etc) have a pressure boundary or safety related function. Conval staff stated that these CGIs were not Code Class valve items and do not have safety-related functions, therefore, Conval staff did not dedicate these items. The inspectors verified that these CGIs were not Code Class valve items and did not have safety-related or pressure boundary functions; therefore, Conval met the requirements of 10 CFR Part 50, Appendix B, Criterion III; ASME Section III; ND-3500; NCA-4000; guidance in ASME Code Case N-62-7; and RG 1.84.

c. Conclusions

The Team identified Conval's failure to have an adequate procedure to independently perform validation and verification of the software used to derive the valve flow coefficient Cv was a nonconformance contrary to Criterion III, "Design Control," and Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50. Nonconformance 99901367-2007-201-2b was identified in this area.

3.7 Conval's Procedures Affecting Quality

a. Scope

The Team reviewed the following Conval's procedures affecting quality to verify that they met the requirements of criterion V of Appendix B to 10 CFR Part 50.

- QP-0012, "Nonconforming material Control," dated March 21, 2006.
- QP-0001, "Receiving Inspection," dated April 28, 2006
- QP-0003, "Sampling Inspection," dated March 14, 2005.
- QP-0008, "Material Identification and Marking," dated September 9, 2003.
- QP-0009, "Special Process Control," dated May 22, 2006.
- QP-0010, "Nonconforming Statistics," dated 7/21/2003.
- QP-0014, "Inspection, Test, and Operating Status," dated April 28, 2006.
- QP-0015, "Nonconforming Material Control," dated April 21, 2006.
- QP-0016, "Corrective Action" dated February 6, 2007.
- QP-0018, "Audits," dated February 6, 2007.
- Conval QP-0020, "Vendor Qualification Program," dated November 1, 2006.

b. Findings and Observations

Conval Procedure QP-0015, "Nonconforming Material Control," dated April 6, 2006, addresses the control of nonconforming material pending evaluation and disposition. Criterion XV, "Nonconforming Materials, Parts, or Components," of 10 CFR Part 50, Appendix B, requires, in part, measures to be established to control materials, parts, or components that do not conform to requirements in order to prevent their inadvertent use or installation. These measures shall include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations. In its title, QP-0015 limits the adverse conditions to material and does not mention "Parts or Components," as required in Criterion XV of 10 CFR Part 50, Appendix B. Furthermore, it does not require nonconforming conditions to be documented in a document, such as a nonconformance report, to identify the condition adverse to quality. The procedure requires only Quality control inspectors to identify nonconforming material with a Material Rejection Tag. Section 3.1.5, states, "significant or repetitive

discrepancies shall be reported, analyzed, and corrected as described in QCP-16.” If discrepancies are only reported and not documented, there are no means for them to be analyzed, trended, and corrected. Furthermore, QP-0015, Section 3.1.1 permits the QA manager to disposition “minor” dimensional nonconforming conditions without generating a rejection tag. The procedure, however, does not provide a definition of what is “minor.”

QP-0015, Section 3.2.2, permits the QA manager to authorize use-as-is dispositions where previous Management Review Board (MRB) activities have established a disposition precedent. This section does not impose any limitations on the QA manager. The concern with this practice is that the MRB could have taken details related to a previous specific application into account that may not necessarily apply to the current application. Another concern with this practice is that it could potentially mask a recurring condition or possibly prevent the timely detection of fraudulent material. Conval representatives informed the NRC staff that QCP-0015 will be revised to include “Parts and Components” and, in accordance with Criterion XVI of Appendix B to 10 CFR Part 50, require conditions adverse to quality to be documented when ever they are identified.

The Team informed Conval that QCP-0015 is another example of an inadequate procedure, contrary to Criterion V, XV and XVI of Appendix B to CFR 50, and identified it as Nonconformance 99901367-2007-201-2c.

Conval Procedure QP-0016, “Corrective Action,” defines the process used by Conval to ensure that conditions adverse to quality and customer satisfaction are promptly identified and corrected and that the cause of such conditions are identified, rectified, and corrective actions are implemented to prevent recurrence of those conditions.

In section 1.0, “Purpose,” of QP-0016, the procedure defines the process Conval uses to promptly identify conditions adverse to quality, and customer satisfaction, and correct them, and then to identify the cause of such conditions and to rectify them. This statement by itself is incorrect. Adverse conditions should be first documented in a document such as a non-conformance report (NCR) or a Corrective Action Report (CAR).

In section 1.1.1 of QP-0016, the procedure lists the conditions adverse to quality. However, the list did not include conditions adverse to quality in the areas of design or receipt inspections. Anyone who identifies an adverse finding must be able to write an NCR, in accordance with the requirement in Paragraph 2.0, “Responsibilities,” that specifies that the Quality Assurance Manager is responsible to generate all corrective action requests (CARs) using Form FQ044.

The Team informed Conval representatives that if QCP-0015 is revised, then QCP-0016 will have to be revised to complement QCP-0016. Therefore, QCP is not being identified as an inadequate procedure.

c. Conclusion

Procedure QCP-0015 is considered inadequate because it does not list all conditions adverse to quality, and is therefore contrary to Criterion V, XV and XVI of 10 CFR 50, Appendix B. This condition, another example of an inadequate procedure, is being identified as nonconformance 99901367/2007-201-2c.

3.8 Quality Assurance Records

a. Scope

Review of quality assurance records provided by Conval for the following POs:

- South Texas Project Nuclear Operating Company (STP NOC)'s PO 8424
- Progress Energy Carolinas, Inc. (PEC's) PO 66 251Q.

b. Findings and Observations

STP NOC placed Purchase Order (PO) 8424 with Conval, Inc. (Conval) for one globe stop valve, ¾ inch, 1529 lb. LTD, 2485 psi at 680° degrees, Fahrenheit, T-pattern, cobalt free seat and disc, clamp and seal design, Material A/SA 182F316 Model ¾ IN-12 H2J-S316, and meet specification GQA. The PO required Conval to meet the following requirements:

The technical and administrative requirements of ASME B 16-34 wetted parts, including seat and disc to be manufactured with cobalt free material rated for service at 2485 psi at 680° F.

The PO requires Conval to provide the following supporting documents:

- hydrostatic and seat leakage test reports
- nondestructive test reports
- certified drawings, showing bill of material with part #, material, minimum wall thickness center of gravity location
- installation, operation, and maintenance manual

Conval supplied the following documents with the valve to STP NOC:

- Final inspection check list; quality control checklist
- Certified drawing
- Certificate of compliance, certifying that the valve met ANSI B 16-11 and B16:34 manufacturing standards
- Certified Material Reports (CMTRs) for the metals used
- Hydrostatic test results and seat leakage reports

Progress Energy Carolinas, Inc. (PEC), Raleigh, NC placed PO 66 251Q dated 07/01/22/07 for the supply of 4 pieces of stainless steel ¾ integral bonnet/chamber made of SA 479-XM19H with SA 479-UNS S 21800 (5E Bonnet assembly)/N60 Backseat, N50 Bonnet and required a certificate of conformance (COC), CMTR, and NDE test reports. The PO stated that Conval was required to implement its written quality assurance program as items were subject to 10 CFR Part 21.

Records indicate that Conval supplied PEC with all the required documents including the Weld Procedure Qualification Record (WPQR) 508-2A for electron beam welding which identified the Weld Procedure Specification used, base metals welded, ASME SA 479 - XM194 P No., Group P-8-GR 3 (N50), thickness 113 - 137.

WPQR 508-2A was not used because the ASME code does not recognize electron beam welding. Conval used Gas Tungsten Arc Welding (GTAW), WP No. 817 instead of Electron Beam Welding. The PQR was available to indicate that WP5 817 was qualified. SFA-S9ER 316 Type weld wire was used and was certified to meet ASME Section II, Part A, 1995 Edition, with 1996 Addenda. Commercial-grade dedication records showing that the critical characteristics for various components were verified.

Conval supplied the following documents with the 3/4" stainless steel integral bonnet/chamber:

- Hydrostatic Test Report
- Code Reconciliation Report for using ASME Section III Code 2004 edition instead of 1986
- Certificate of compliance stating that the weld was examined using a liquid penetrate examination
- CMTR for NIT 50 material

c. Conclusion

Conval supplied the documents required by the PO. No adverse finding was identified in this area.

3.9 Training And Qualification Of Personnel Control

a. Inspection Scope

The Team reviewed the vendor's QA program to verify that programs are implemented for the indoctrination and training of personnel performing activities affecting quality. Qualification records and certifications were reviewed for inspection/test personnel, auditors, calibration, repair personnel, and similar specialists performing activities affecting quality. Qualification records of personnel were reviewed to verify that they are certified in accordance with industry and/or vendor's program requirements.

b. Observations

The Conval Quality Assurance Program, dated August 4, 1996, Section 19.0, establishes general requirements for personnel training. Measures shall be established to identify training needs and to provide necessary training for all personnel performing activities. Personnel performing certain tasks may require qualification on the basis of education, experience or training. Corporate Procedure (CP) -0290, "Indoctrination & Training," dated October 18, 2006, defines the minimum requirements for the indoctrination and training of personnel performing or managing activities affecting quality.

Quality Procedure QP-0007, "Qualification of Personnel," establishes qualification and certification requirements for: 1) Quality assurance and quality control personnel, 2) Assembly and test department test personnel, and 3) Lead auditors and auditors.

Quality Procedure QP-009, "Special Process Control," establishes qualification requirements for welding personnel. Nondestructive examination (NDE) personnel are qualified and certified in

accordance with American Society for Nondestructive Testing standard ASTN-TC-1A, 1992 edition or later.

Special Engineering Instruction-3, "Electron Beam Welding - General Requirements," identifies the applicable industry standards for each weld type. Section 7 of SEI-3 specifies welder qualification.

Indoctrination and training records, documented on Conval form HR-519, "Training and Indoctrination Record," were reviewed for inspection/test personnel and auditors, and welders, calibration, repair personnel, and similar specialists performing activities affecting quality. Training records, documented on Conval form FQ-072, which documents general employee training in corporate processes, including quality programs and product knowledge orientation, were also reviewed. Welder qualifications for each welder were reviewed. All welders are qualified for 1) visual, 2) liquid penetration inspection, and 3) macro (2) inspections. Each welder record was examined with respect to the specific qualifications for which a welder was qualified (e.g. hardfacing overlay) and component specific welds (body, bonnet, stem, and yoke assembly), and the certifications were determined to conform to applicable industry standards. Records for annual eye examinations were reviewed and found to be in conformance with the requirement of SEI-3, step 7.4.

c. Conclusions

The NRC inspection Team concluded that training process requirements and personnel records reviewed were in conformance with 10 CFR 50, Appendix B, Conval implementing procedures, and applicable industry standards.

4.0 MANAGEMENT MEETINGS AND PERSONNEL CONTACTED

4.1 Entrance and Exit Meetings

In the entrance meeting on August 13, 2007, the inspectors discussed the scope of the inspection, outlined the areas to be inspected, and established interfaces with Conval's president and several staff personnel. During the exit meeting on August 16, 2006, the inspectors discussed the inspection findings and observations with Conval's president and staff.

4.2 Personnel Contacted

Conval, Inc.

F. Siver	Chairman
D. L. Curtin	President
M. Hendrick	Vice President, Marketing
I. Makuch	Nuclear Sales Representative
J. J. O'Callaghan	Product Engineer
C. Sumner	Engineering Manager
S. M. Wargo	Human Relations Manager
A. C. Wilkie	Inside Sales & Marketing Manager