August 18, 2009

Mr. Robert D. Barry, QA Manager
Flowserve Corporation
1900 S. Saunders Street
Raleigh, NC 27603

SUBJECT: NRC INSPECTION REPORT NO. 99901356/2009-201, NOTICE OF VIOLATION, AND NOTICE OF NONCONFORMANCE

Dear Mr. Barry:

On July 6–10, 2009, U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Flowserve Corporation (Flowserve) facility in Raleigh, NC. The enclosed report presents the results of this inspection. This was a limited scope inspection, which focused on assessing your compliance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." This NRC inspection report does not constitute NRC endorsement of your overall quality assurance or 10 CFR Part 21 programs.

Based on the results of this inspection, the NRC staff has identified a Severity Level IV violation of NRC requirements. The violation is cited in the enclosed Notice of Violation (NOV) and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited in the NOV because NRC inspectors identified that Flowserve failed to meet the requirements set forth in 10 CFR Part 21 for the timely evaluation of deviations or failures to comply, and for the timely submittal of interim reports to the NRC.

You are required to respond to this letter with respect to the above violation and should follow the instructions specified in the enclosed Notice of Violation when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

During this inspection, NRC inspectors also found that implementation of your quality assurance program failed to meet certain NRC requirements imposed on you by your customers. Specifically, the NRC inspectors noted that Flowserve failed to rework nonconforming items in accordance with documented procedures. The specific finding and reference to the pertinent requirements are identified in the enclosures to this letter.

Please provide a written statement or explanation with respect to the nonconformance within 30 days from the date of this letter in accordance with the instructions specified in the enclosed Notice of Nonconformance.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a copy of your response that identifies the information that should be protected in brackets and a redacted copy of your response that deletes such information. If you request that such material be withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., you should 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, "Protection of Safeguards Information: Performance Requirements."

Sincerely,
/RA/

Juan Peralta, Chief
Quality and Vendor Branch 1
Division of Construction Inspection
& Operational Programs
Office of New Reactors

Docket No. 99901356

Enclosures:
1. Notice of Violation
2. Notice of Nonconformance
3. Inspection Report No. 99901356/2009-201

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC 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. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information 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.

Sincerely,
/RA/

Juan Peralta, Chief
Quality and Vendor Branch 1
Division of Construction Inspection
& Operational Programs
Office of New Reactors

Docket No.: 99901356

Enclosures: 1. Notice of Violation
2. Notice of Nonconformance
3. Inspection Report No. 99901356/2009-201

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OFFICE	NRO/DE/CIB1	NRO/DCIP/CQVP	NRO/DCIP/CCIB/CAET
NAME	JStrnisha	KKavanagh	RPasacarelli
DATE	8/10/2009	8/18/2009	8/10/2009
OFFICE	NRO/DCIP/CQVP/BC		
NAME	JPeralta		
DATE	8/18/2009		

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NOTICE OF VIOLATION

Flowserve Corporation
Raleigh, NC

Docket No. 99901356
Inspection Report No. 99901356/2009-201

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at the Flowserve Corporation (Flowserve) Raleigh, NC, facility on July 6–10, 2009, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> Title 10 of the *Code of Federal Regulations* (10 CFR) 21.21(a) requires, in part, that each individual, corporation, partnership, or other entity subject to 10 CFR Part 21, "Reporting of Defects and Noncompliance," shall adopt appropriate procedures to evaluate deviations and failures to comply to identify defects and failures to comply associated with substantial safety hazards as soon as practicable, and, except as provided in 10 CFR 21.21(a)(2), in all cases within 60 days of discovery, in order to identify a reportable defect or failure to comply that could create a substantial safety hazard, were it to remain uncorrected, and ensure that if an evaluation of an identified deviation or failure to comply potentially associated with a substantial safety hazard cannot be completed within 60 days from discovery of the deviation or failure to comply, an interim report is prepared and submitted in writing to the Commission through a director or responsible officer or designated person within 60 days of discovery of the deviation or failure to comply.
>
> Contrary to the above, on July 10, 2009, Flowserve failed to complete an evaluation of a deviation or failure to comply within 60 days of discovery and failed to submit an interim report in writing to the NRC when the evaluation of an identified deviation or failure to comply could not be completed within 60 days.

This issue has been identified as Violation 99901356/2009-201-01.

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

Pursuant to the provisions of 10 CFR 2.201, "Notice of Violation," Flowserve is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Quality and Vendor Branch 1, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Violation. This reply should be clearly marked as a "Reply to a Notice of Violation" and should include (1) the reason for the violation or, if contested, the basis for disputing the violation; (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. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. Where good cause is shown, the NRC will consider extending the response time.

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

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

Dated this 18th day of August 2009

NOTICE OF NONCONFORMANCE

Flowserve Corporation
Raleigh, NC

Docket No. 99901356
Inspection Report No. 99901356/2009-201

Based on the results of a U.S. Nuclear Regulatory Commission (NRC) inspection conducted on July 6–10, 2009, the NRC inspectors found that certain activities were not conducted in accordance with NRC requirements which were contractually imposed upon Flowserve by NRC licensees.

> Criterion XV, "Nonconforming Materials, Parts, or Components," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," states, in part, that measures shall be established to ensure that nonconforming items be reviewed and accepted, rejected, or reworked in accordance with documented procedures.
>
> Section 15.1.4 of Flowserve's "Quality Assurance Manual ASME Section III, Division 1, Classes 1, 2, and 3," Revision 34, dated February 15, 2008, states, in part, that the applicable drawings and specifications pertinent to the nonconforming item shall be retrieved to review the condition and possible corrections.
>
> Contrary to the above, as of July 10, 2009, Flowserve failed to retrieve the applicable drawings and specifications pertinent to three nonconforming valve bodies, as required by Section 15.1.4 of the Flowserve Quality Assurance Manual. This failure resulted in the wrong weld procedure being documented on Reject Ticket No. 120445 and implemented during weld repairs of three nonconforming valve bodies.

This issue has been identified as Nonconformance 99901356/2009-201-02.

Please provide a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Chief, Quality and Vendor Branch 1, 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) the reason for the noncompliance or, if contested, the basis for disputing the noncompliance; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid noncompliances; and (4) the date when your corrective action will be completed. Where good cause is shown, the NRC will consider extending the response time.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC Agencywide Documents Access and Management System, which is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html, to the extent possible, it should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that

should be protected and a redacted copy of your response that deletes such information. If you request that such material be withheld, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., you should 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, "Protection of Safeguards Information Performance Requirements."

Dated this 18th day of August 2009

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

Docket No.:	99901356	
Report No.:	99901356/2009-201	
Vendor:	Flowserve Corporation 1900 S. Saunders Street Raleigh, NC 27603	
Vendor Contact:	Mr. Robert D. Barry Manager, Quality Assurance (919) 832-0525 E-mail: BBarry@flowserve.com	
Nuclear Industry:	Flowserve Corporation (Flowserve) is a major supplier of safety-related valves and flow control devices to the nuclear industry.	
Inspection Dates:	July 6–10, 2009	
Inspection Team Leader:	Kerri Kavanagh	NRO/DCIP/CQVP
Inspectors:	Samantha Crane	NRO/DCIP/CQVP
	Robert Prato	NRO/DCIP/CQVP
	Raju Patel	NRO/DCIP/CQVP
	James Strnisha	NRO/DE/CIB1
Approved by:	Juan Peralta, Chief Quality and Vendor Branch 1 Division of Construction Inspection & Operational Programs Office of New Reactors	

EXECUTIVE SUMMARY

Flowserve Corporation
99901356/2009-201

The purpose of this inspection was to verify that Flowserve Corporation (Flowserve) implemented an adequate quality assurance (QA) program that complied with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." The inspection also verified that Flowserve implemented a program under 10 CFR Part 21, "Reporting of Defects and Noncompliance," that met the regulatory requirements of the U.S. Nuclear Regulatory Commission (NRC). The inspection was conducted at Flowserve's facility in Raleigh, NC.

The NRC inspection was based on the following:

- 10 CFR Part 21
- Appendix B to 10 CFR Part 50

During this inspection, the NRC inspectors implemented Inspection Procedure 43002, "Routine Inspections of Nuclear Vendors," and Inspection Procedure 36100, "Inspection of 10 CFR Part 21 and 50.55(e) Programs for Reporting Defects and Nonconformances."

The NRC conducted its last inspection at Flowserve's facility in Raleigh, NC, documented in Inspection Report 99901356/2006-201, from January 10–13, 2006. The report documented four nonconformances. The NRC's follow-up on Flowserve's implementation of these nonconformances is documented in this inspection report.

With the exception of the violation and nonconformance described below, the NRC inspectors concluded that Flowserve's QA policies and procedures comply with the applicable requirements of 10 CFR Part 21 and Appendix B to 10 CFR Part 50 and that Flowserve personnel are implementing these policies and procedures effectively.

10 CFR Part 21 Program

The NRC inspectors cited Violation 99901356/2009-201-01 related to Flowserve's failure to complete evaluations of deviations and failures to comply within 60 days of discovery and for not submitting an interim report to the NRC as required by 10 CFR 21.21(a). With the exception of this violation, the NRC inspectors concluded that Flowserve's 10 CFR Part 21 program implementation is consistent with the requirements of 10 CFR Part 21.

Training and Qualification of Personnel

The NRC inspectors concluded that Flowserve's program requirements for training and qualification of personnel are consistent with the regulatory requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. The NRC inspectors concluded that Flowserve's Quality Assurance Manual (QAM) and associated training and qualification procedures were effectively implemented. No findings of significance were identified.

Design Control

The NRC inspectors concluded that Flowserve's design control policies and procedures are consistent with Criterion III, "Design Control," of Appendix B to 10 CFR Part 50 and with the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), Section III, "Rules For Construction Of Nuclear Power Plant Components," Subsection NB, "Class 1 Components." The NRC inspectors concluded that Flowserve's implementation of these processes and practices provided appropriate design controls in accordance with applicable requirements. No findings of significance were identified.

Control of Purchased Material, Equipment, and Services and Audits

The NRC inspectors concluded that the external and internal audit programs are consistent with the regulatory requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. The NRC inspectors concluded that Flowserve's implementation of these procedures and policies provided appropriate oversight of its suppliers and control of purchased material, equipment, and services. No findings of significance were identified.

Control of Measuring and Test Equipment

The NRC inspectors concluded that Flowserve's measuring and test equipment program requirements are consistent with the regulatory requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. The NRC inspectors concluded that Flowserve had established appropriate and effective means to control measuring and test equipment. No findings of significance were identified.

Quality Assurance Records

The NRC inspectors concluded that Flowserve's requirements for the control of QA records are consistent with the regulatory requirements of Criterion XVIII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. The NRC inspectors concluded that Flowserve had established appropriate and effective means of controlling its QA records. No findings of significance were identified.

Nonconforming Materials, Parts, or Components

The NRC inspectors issued Notice of Nonconformance (NON) 99901356/2009-201-02 related to Flowserve's failure to rework nonconforming valve bodies in accordance with documented procedures. NON 99901356/2009-201-02 also addresses Flowserve's failure to retrieve the applicable drawings and specifications pertinent to the nonconforming valve bodies to review the condition and determine possible corrections, as required by Flowserve's QAM and associated implementing procedures. With the exception of this nonconformance, the NRC inspectors concluded that Flowserve's program for controlling nonconforming materials, parts, or components was consistent with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," of Appendix B to 10 CFR Part 50.

Corrective Action

The NRC inspectors concluded that Flowserve's corrective action system was implemented consistent with the requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The NRC inspectors concluded that Flowserve's corrective action system was adequately described in the Flowserve procedures. No findings of significance were identified.

REPORT DETAILS

1. 10 CFR Part 21 Program

a. Inspection Scope

The NRC inspectors reviewed Flowserve's policies and implementing procedures that govern the program to verify compliance with the requirements of 10 CFR Part 21. In addition, the NRC inspectors observed the 10 CFR Part 21 postings and reviewed a sample of Flowserve's purchase orders (POs) and Part 21 evaluations for compliance with the requirements of 10 CFR 21.6, "Posting Requirements," 10 CFR 21.31, "Procurement Documents," and 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation," respectively. The NRC inspectors also reviewed Flowserve's procedures that govern corrective action, the control and correction of nonconforming items, and customer complaints to verify an adequate link to the Part 21 process. Specifically, the NRC inspectors reviewed the following Flowserve procedures and documentation:

- Flowserve "Quality Assurance Manual ASME Section III, Division 1 Classes 1, 2, and 3" (QAM), Section 2.0, "Quality Assurance Program" (QAP), Revision 34, dated February 15, 2008
- Plant Internal Operating Procedure (PIOP) 36-40-03-08, "Methods for Reporting to NRC Defects Creating Substantial Safety Hazard," Revision 8, dated February 16, 2009
- PIOP 36-41-13-04, "Corrective Action Procedure," Revision 13, dated June 2, 2009
- PIOP 36-40-26-11, "Complaint Report Procedure," Revision 26, dated September 15, 2007
- Part 21 Evaluation Committee Summary 10CFR 21-21
- Part 21 Evaluation Committee Summary 10CFR 21-24
- Part 21 Evaluation Committee Summary 10CFR 21-32
- Part 21 Evaluation Committee Summary 10CFR 21-25
- Part 21 Evaluation Committee Summary 10CFR 21-26
- Part 21 Evaluation Committee Summary 10CFR 21-35

- Part 21 Evaluation Committee Summary 10CFR 21-44

b. Observations and Findings

b.1 10 CFR Part 21 Procedures

The NRC inspectors reviewed several Flowserve procedures to verify that 10 CFR Part 21 requirements were adequately addressed. PIOP 36-40-03-08 describes the method used by Flowserve to ensure compliance with 10 CFR Part 21 for reporting potential deviations involving delivered valves, actuator control systems, and/or parts. The procedure includes roles and responsibilities, posting requirements, the evaluation process, notification requirements and timelines, and the forms for the Part 21 Evaluation Committee Summary and Timeline.

The NRC inspectors found that Flowserve's procedures effectively incorporate the requirements of 10 CFR 21.21(a) for evaluating deviations and failures to comply and that Flowserve's procedures for corrective action, nonconformances, and complaint reports provide a direct connection to its Part 21 evaluation process.

b.2 Part 21 Evaluations

The NRC inspectors reviewed seven Part 21 evaluations performed since January 2006 that resulted in NRC notification of a defect or failure to comply, in customer notification that Flowserve could not perform the evaluation, or in the determination that a defect or failure to comply did not exist. With the exception of the example described below, the NRC inspectors found that Flowserve effectively implemented the requirements of 10 CFR 21.21(a) for evaluating deviations and failures to comply.

During their review, the NRC inspectors identified on September 27, 2007, Flowserve initiated QPCAP No. 294 and identified the need to perform a Part 21 evaluation based on a letter from a customer explaining that a manual valve supplied by Flowserve would not fully open because of interference between the valve hand lever and the valve flange. Flowserve did not complete the evaluation on Part 21 Evaluation Committee Summary 10 CFR 21-32 until January 28, 2008. Contrary to the requirements of 10 CFR 21.21(a), Flowserve did not complete the evaluation within 60 days of discovery and did not issue an interim report. This issue has been identified as Violation 99901356/2009-201-01.

In response to the NRC inspectors' identification of this violation, Flowserve initiated QPCAP No. 517, dated July 9, 2009, documenting Flowserve's failure to meet the requirements of 10 CFR 21.21(a)(1) for the 60-day evaluation period and 10 CFR 21.21(a)(2) for submitting an interim report.

b.3 Postings

The NRC inspectors confirmed Flowserve's compliance with the posting requirements of 10 CFR 21.6. The NRC inspectors observed that Flowserve had posted notices in three locations within the facility, two in the office area and one on the shop floor. Each location included a copy of Section 206 of the Energy

Reorganization Act of 1974, a current copy of 10 CFR Part 21, and a current revision of PIOP 36-40-03-08.

c. Conclusions

The NRC inspectors identified one violation of 10 CFR Part 21. The inspectors cited Violation 99901356/2009-201-01 for lack of timeliness in the completion of Part 21 evaluations and the lack of issuance of interim reports. With the exception of the violation noted above, the NRC inspectors concluded that Flowserve's Part 21 program implementation is consistent with the requirements of 10 CFR Part 21.

2. Training and Qualification of Personnel

a. Inspection Scope

The NRC inspectors reviewed Flowserve's implementing policies and procedures that govern personnel training and qualification. Specifically, the NRC inspectors reviewed the personnel training and qualification process with respect to conformance with the requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. In addition, the NRC inspectors discussed the personnel training and qualification process with Flowserve management and technical staff.

Documents reviewed for this area of inspection include the following:

- Flowserve QAM, Section 2.4, "Personnel Training and Qualification," Revision 34, dated February 15, 2008
- Standard Operating Instruction (SOI) 40-23-11, "Qualifications and Training of QA Auditors," Revision 11, dated May 13, 2009
- SOI 70-23-08, "Grading Authorization To Certify Design Reports and Design Specifications," Revision 08, dated September 7, 2006
- PIOP 36-40-05-12, "Qualification and Certification of Quality Assurance and Test Personnel," Revision 12, dated July 1, 2006
- PIOP 35-40-02-23, "Training, Qualification, and Certification of NDT Personnel," Revision 23, dated June 2, 2009
- PIOP 36-40-15-09, "Welding Qualifications per ASME Sections III and IX," Revision 09, dated July 31, 2006
- PIOP 36-41-07-12, "Welder Performance Qualification Status," Revision 12, dated July 30, 2006
- SOI 40-71-02, "Training of Heat-Treat Personnel," Revision 02, dated September 20, 2005

b. Observations and Findings

b.1 Qualification and Training of Auditors and Inspection and Test Personnel

Section 2.4 of Flowserve's QAM describes the responsibilities and authority for establishing training and qualification requirements for Flowserve personnel.

The NRC inspectors reviewed training and qualification records for two auditors and three lead auditors. The records reviewed included training, experience, qualification credits, audit participation, examination scores, and annual evaluations approved by the Manager, Quality Assurance. The NRC inspectors found that Flowserve had documented training on the appropriate training record forms in accordance with Flowserve's procedures.

The NRC inspectors also reviewed training and qualification records for three inspectors, two calibration personnel, and two Level I test personnel. The records reviewed included education, experience, classroom and on-the job training, initial capability demonstration results, and triennial evaluations reviewed and approved by their managers. The NRC inspectors reviewed eye examination records, which were found to be current and conformed to procedural requirements. The NRC inspectors confirmed that the qualification records of the inspectors, and calibration and testing personnel were complete and met the requirements of Flowserve's procedures.

b.2 Registered Professional Engineer Indoctrination and Training Activities

Section 3.1.9 of Flowserve's QAM describes the authority and responsibility and qualification requirements for a registered professional engineer (RPE) responsible for certifying activities in the field of valve design consistent with ASME Code requirements. The qualification records of the RPE must meet the requirements of ASME Code, Section III, Appendix XXIII.

The NRC inspectors reviewed qualification records for three RPEs. The records reviewed included documented evidence of education, training, and experience; copies of professional engineer licenses; records of continuous participation in design and ASME Code activities; and the review and approval of the Engineering Manager authorizing the RPE to certify design reports and design specifications on behalf of Flowserve.

b.3 Qualifications and Training of Nondestructive Test Personnel

Section 10.2 of Flowserve's QAM states that the training, qualification, and certification of nondestructive testing (NDT) personnel shall be accomplished in accordance with American Society for Nondestructive Testing SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing," consistent with ASME Code, Section III, and Flowserve's PIOP 35-40-02-23.

PIOP 35-40-02-23 describes the administration, training, examination, and certification of Flowserve's NDT personnel for ASME Code, Sections I, "Power Boilers," III, "Rules for Construction of Nuclear Power Plant Components," V, "Nondestructive Examination," and VIII, "Pressure Vessels – Division 1," and SNT-

TC-1A. PIOP 35-40-02-23 requires all NDT personnel to pass an annual eye examination. NDT Levels I and II personnel are requalified every 3 years, and Level III personnel are requalified every 5 years.

The NRC inspectors reviewed qualification records for six NDT personnel. The qualification records reviewed were accurate, current, and met the requirements of ASME Code, Section III, and ASNT-TC-1A. The eye examination records of NDT personnel were current and conformed with the requirements of PIOP 35-40-02-23.

b.4 Qualifications and Training of Welders and Brazing Operators

Section 9.4 of Flowserve's QAM describes the responsibilities, authority, and methods for qualifying welders and brazing operators. Performance qualification records for welder and brazing operators is evaluated and updated biannually.

PIOP 36-40-15-09 provides guidelines to ensure that each welder and brazing operator qualifies and maintains his or her qualifications as required by ASME Code, Section IX, "Welding and Brazing Qualifications."

The NRC inspectors reviewed qualification records for four welders and for one brazing operator. The records indicated that each welder and the brazing operator were qualified in accordance with the requirements of Flowserve's QAM and ASME Code, Sections III and IX. The NRC inspectors found that the performance qualification records of the welders and the brazing operator were current and that they were evaluated every 6 months in accordance with the requirements of ASME Code, Section IX.

b.5 Heat-Treat Operator Indoctrination and Training

Section 9.3 of Flowserve's QAM describes the responsibilities and authority and the indoctrination and training to qualify heat-treat operators.

SOI 40-71-02 describes the authority, responsibilities, and necessary procedural details and controls to qualify heat-treat operators. The procedure included the qualification requirements, certification of qualification, maintenance of qualification, and documentation to qualify heat-treat operators.

The NRC inspectors reviewed a sample of training records for heat-treat operators and noted that the necessary training was complete and that it was documented on appropriate forms reviewed and approved by the Supervisor, Metallurgical Process Control. The NRC inspectors determined that heat-treat operators met the indoctrination and training requirements of Flowserve's QAM and procedures.

c. Conclusions

The NRC inspectors concluded that Flowserve's program requirements for training and qualification of personnel are consistent with the requirements of Criterion II of Appendix B to 10 CFR Part 50. Based on the limited records reviewed, the NRC inspectors concluded that Flowserve's QAM and associated training and qualification procedures were adequate and effectively implemented.

3. Design Control

a. Inspection Scope

The NRC inspectors reviewed Flowserve's implementing policies and procedures that govern design control in accordance with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspectors reviewed PIOP 36-70-03-27, "Design Control," Revision 27, dated May 13, 2009, and interviewed the Design Engineering and Research and Development Managers and members of their staff

Flowserve has been awarded the contract for the manufacturing of the main steam isolation valves (MSIV) and main feedwater isolation valves (MFIV) for the AP1000 design. The NRC inspectors focused their inspection activities on the design and initial receipt control activities associated with the MSIV order. The NRC inspectors inspected Flowserve's design control process by reviewing various job "travelers," onsite inspection, testing, and finishing and packing activities. In addition, the NRC inspectors reviewed the following documents:

- PIOP 36-70-03-27, "Design Control," Revision 27, dated May 13, 2009
- PIOP 36-70-02-24, "Engineering Change Notices," Revision 24, dated May 13, 2009
- PIOP 36-70-07-10, "Emergency Drawing Change Procedure," Revision 10, dated February 17, 2009
- PIOP 36-70-12-09, "Development, Revision, and Distribution of Assembly (Sales) Drawings," Revision 09, dated December 22, 2004
- SOI 70-38-06, "Requirements for Purchased or Leased Computer Programs for Product Design and Analysis," Revision 06, dated June 22, 2009
- AP 1000 Design Specification No. APP-PV64-Z0-001, "Main Steam Isolation Valve, ASME Boiler and Pressure Valve Code, Section III, Class 2," Revision 1
- AP1000 Valve Data Sheet No. APP-PV64-Z0R-001, "Main Steam Isolation Valve, ASME, Section III, Class 2 Valve Data Sheet Report," Revision 2
- AP1000, MSIV Drawing No. APP-PV64-V2-001, Sheets 1–21
- Flowserve QAP No. 08-91056, "Quality Assurance Plan for Westinghouse Electric Co., LLC/China Nuclear Island, MSIVs with A-510 Actuators," Revision 7
- Flowserve Purchase Order (PO) 80965-1 for Retainer Gasket, Part No. 006780989105601
- Scot Forge Company Certification of Compliance for Flowserve PO 80965-1
- Flowserve PO 80444 for Ring Seat, Part No. 006780989105601

- Scot Forge Company Certification of Compliance for Flowserve PO 80444
- Edward Valves, Product Specification Objective for the American National Standards Institute (ANSI) Class 3, 300 Flite-Flow Product Line Extension
- Flowserve Flow Control Division, "Gate Valve Design Manual," PS/D 73-01, Project 2830, Fourth Edition, November 14, 1975
- Flowserve Nuclear Design Control Checklist for MSIV Orders: Sales Order No. 91056, Order Code N
- Wyle Laboratories report, "Evaluation Report for Time and Temperature Effect in Edwards Type A/Gas/Hydraulic Actuator Supplied by Flowserve Corporation for Use in Various Nuclear Power Plants"
- Flowserve RAL-3690, "Seismic Report," Revision 1
- Flowserve RAL-11561, "Actuator Sizing Report," Revision 0
- Flowserve RAL-20201, "Size 38x36x38 Figure B14311(WCE)BDDJMMDTY with Edward A-510 Actuator," Revision 0

b. Observations and Findings

The NRC inspectors reviewed the Westinghouse AP1000 MSIV design specification and valve data sheet and key Flowserve-developed design control documents to verify Flowserve's design control process. The NRC inspectors verified that the Westinghouse AP1000 MSIV design specification was translated into appropriate manufacturing design documents by Flowserve personnel. Specifically, the Flowserve design plan (checklist) for the AP1000 MSIV documented the required design control activities needed to implement the project, including, but not limited to, the customer-specified reviews, design input development, design report preparation, layout, drawings, and design verification requirements. The Flowserve product specification design document for the basic gate valve used for the AP1000 MSIV contained the basic design rules, design layout, and detail drawings for the product line. The Flowserve design report included technical details such as applicable codes, calculations, background information, results from information research, component drawings, machine drawing parts, and references to qualification and test reports. The Flowserve QAPs, all governing specifications for traceable components, included PO specifications, codes, and Authorized Nuclear Inspector (ANI) review requirements. In addition, the NRC inspectors reviewed qualification and test reports for a smaller but similar valve and operator assembly that will be used to qualify the AP1000 MSIVs. The NRC inspectors concluded that the Flowserve generated documents met the requirements of the Flowserve design control procedures and QAM.

The NRC inspectors reviewed the Westinghouse AP1000 MSIV valve procurement specification and valve data sheet to verify that Flowserve correctly translated these design inputs into specifications, drawings, and procedures for the manufacture of the MSIV valve and operator. All review activities of Flowserve's specification documents and drawings were verified to conform to code requirements and Westinghouse specifications and data sheets. The NRC inspectors also reviewed the Flowserve

procedures for the development, review, and revision of engineering drawings. All drawings reviewed conformed to Flowserve's procedures.

In general, the NRC inspectors concluded that the AP1000 MSIV design control process was consistent with the applicable regulatory requirements, and that Flowserve had correctly translated the design basis into the applicable specifications, drawings, procedures, and instructions. The NRC inspectors confirmed that the appropriate quality standards were specified and included in design documents; that sufficient coordination between Westinghouse and Flowserve for the AP1000 MSIV is taking place; that independent verifications/checks were integrated into the process and were being performed; that required qualification tests were being performed; and that design changes were being effectively controlled and approved.

c. Conclusions

The NRC inspectors concluded that Flowserve design control processes and practices were consistent with the requirements of Criterion III of Appendix B to 10 CFR Part 50 and of the ASME Code, Sections III and VIII. The NRC inspectors concluded that Flowserve's QAM processes and practices relative to the AP1000 MSIV design were being effectively implemented.

4. Control of Purchased Material, Equipment, and Services and Audits

a. Inspection Scope

The NRC inspectors reviewed Flowserve's policies and implementing procedures that govern the control of internal and external audits to verify compliance with the requirements of Criterion VII, "Control of Purchased Material, Equipment, and Services," and Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. The NRC inspectors reviewed a sample of internal and external audit reports to evaluate compliance with program requirements and adequate implementation of those requirements. In addition, the NRC inspectors reviewed corrective actions that address deficiencies identified by the audit findings for adequacy and timeliness.

Documents reviewed for this area of inspection include the following:

- Flowserve QAM, Section 7.0, "Control of Purchased Material, Items, and Services," Revision 34, dated February 15, 2008
- Flowserve QAM, Section 18.0, "Audits"
- PIOP 36-40-23, "Quality Assurance Internal Audits," Revision 15, dated May 13, 2009
- PIOP 36-41-01, "Procedure for Performance of Vendor Audits and Assessments," Revision 20, dated March 3, 2006
- Flowserve "2009 Internal Audit Schedule"
- Flowserve "Internal Quality Audit Plan" for the first quarter 2009

- Flowserve “Internal Quality Audit Report, First Quarter, 2009,” design control results
- Flowserve “2008 Internal Audit Schedule”
- Flowserve “Internal Quality Audit Plan” for the second quarter 2008
- Flowserve “Internal Quality Audit Report, Second Quarter, 2008,” results of corrective action items
- QPCAP Nos. 355, 359, 360, 365, and 366
- Ralph A. Hiller Company “Supplier Audit Report” for the Pittsburgh Valve & Fitting Company audit performed from February 25–27, 2009
- Audit Package, Wyle Laboratories, W-2008-042, Nuclear Industry Assessment Committee (NIAC) No. 14048, March 10–12, 2009
- Letter dated February 10, 2009, from Trentec to Flowserve Corporation, “NIAC Member Assessment of Flowserve Corporation Conducted from
- January 6–9, 2009”

b. Observations and Findings

Section 7.0 and Section 18.0 of Flowserve’s QAM establish requirements for external and internal audits, respectively.

The NRC inspectors reviewed of Section 7.0 of Flowserve’s QAM to identify the requirements for performing the initial survey of vendors’ facilities to verify that their QA programs comply with the applicable requirements of codes and other specifications before the vendors are added to the Flowserve Approved Vendor List. The QAM requires that additional audits of nuclear vendors be performed commensurate with the schedule of production or procurement and at least once triennially during intervals when the vendors control material, items, and services. Such audits will be supplemented with annual audits or performance assessments documenting the effectiveness of vendors’ quality programs to verify compliance with applicable requirements. Audits of vendors of non-code, critical valve parts and services, including calibration service providers, shall be performed at intervals not to exceed 3 years.

The NRC inspectors reviewed of Section 18.0 of Flowserve’s QAM to identify the requirements for a system of planned and periodic internal audits and to determine the effectiveness of the program. The internal audits are being performed in accordance with written procedures and check lists. The QAM requires that appropriately trained personnel who do not have direct responsibilities in the areas being audited perform these audits and that management responsible for the audited areas document and review the results of the audit. The QAM also requires that all findings be documented and responded to within 30 days. PIOP 36-40-23 implements these QAM requirements. The NRC inspectors reviewed the following internal and external audits.

(1) Internal Quality Audit, Design Control Process

The NRC inspectors reviewed Flowserve's "Internal Quality Audit Plan" for the first quarter 2009; the "Internal Quality Audit Report, First Quarter, 2009;" the 16-page design control process audit check list; and other audit-related documentation. The audit report did not identify any findings and determined that Flowserve was implementing its design control process consistent with the QAM without any exception.

(2) Internal Quality Audit, Corrective Action Program

The NRC inspectors reviewed Flowserve's "Internal Quality Audit Plan" for the second quarter 2008; the "Internal Quality Audit Report, Second Quarter, 2008;" the two-page corrective action program audit check list; QPCAP Nos. 355 (open), 359 (closed), 360 (closed), 365 (being developed), and 366 (being developed); and other audit-related documentation. The audit report did not identify any findings, however, corrective actions were being written when appropriate and are being followed through to closure.

(3) External Quality Audit, Pittsburgh Valve & Fitting Company

The NRC inspectors reviewed the "Supplier Audit Report" for the Pittsburgh Valve & Fitting Company audit that Ralph A. Hiller Company, a Nuclear Industry Assessment Committee (NIAC) member company, performed from February 25–27, 2009. This audit was conducted as an NIAC assessment that various NIAC member organizations, including Flowserve, would share.

The scope of this audit included order entry, procurement, auditing, traceability, handling and storage, and other QA-related activities as applicable to regulatory and customer-specific requirements. Four findings were identified. On the basis of this NIAC audit, Flowserve determined that the Pittsburgh Valve & Fitting Company does not meet the requirements of its QAM and therefore removed the company from its Approved Vendor List.

(4) External Quality Audit, Wyle Laboratories

The NRC inspectors reviewed the assessment report for the Wyle Laboratories, LLC, audit that Westinghouse Nuclear Services, a NIAC member company, performed from March 10–12, 2009.

The scope of this audit included Wyle Laboratories' compliance to the applicable quality program requirements and implementation of its QA Program in accordance with the requirements of Appendix B to 10 CFR Part 50; 10 CFR Part 21; NQA-1-1994; SNT-TC-1992 (non-code supplier); ANSI N45.2-1977; Institute of Electrical and Electronics Engineers (IEEE) 323-1974; IEEE 344-1975; Wyle Laboratories' QAM, Revision 2; and Wyle Laboratories' applicable technical and quality and administrative procedures. The audit identified two findings.

At the time of this NRC inspection, Westinghouse Nuclear Services had not documented a final conclusion on the Wyle Laboratories audit. However,

Flowserve issued its own QPCAP to track the two audit open items. Flowserve continues to maintain Wyle Laboratories on its Approved Vendor List pending final resolution of the open items.

c. Conclusions

The NRC inspectors concluded that Flowserve is implementing its control of purchased materials, equipment, and services and its audit requirements consistent with the regulatory requirements of Criterion VII and Criterion XVIII of Appendix B to 10 CFR Part 50, respectively. Based on the sample of audits reviewed, the NRC inspectors determined that Flowserve was implementing its policies and associated procedures effectively.

5. Control of Measuring and Test Equipment

a. Inspection Scope

The NRC inspectors reviewed the Flowserve policies and procedures that govern the control of measuring and test equipment (M&TE) to verify conformance to the requirements of Criterion XII, "Control of Measuring and Test Equipment," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspectors reviewed the following Flowserve policies and procedures:

- Flowserve QAM, Section 12, "Control of Measuring and Test Equipment," Revision 34, dated February 15, 2009
- PIOP 36-40-06-19, "Gage Control," Revision 19, dated August 7, 2007
- SOI 40-59-21, "Gage Calibration, Calibration Intervals, and Instructions," Revision 21, dated August 8, 2007
- SOI 40-10-08, "Inspection, Calibration, and Control of Pressure Gages," Revision 08, dated January 25, 2005
- SOI 40-21-09, "Monitoring Welding Electrode Baking Ovens," Revision 09, dated June 17, 2004
- SOI 40-22-06, "Calibration of Testing Equipment in Metallurgical Process Control," Revision 06, dated June 14, 2004
- Flowserve Heat-Treat Manual, Section 7.0, "Calibration and Monitoring of Heat-Treat Recorders and Furnaces," Revision 10, dated June 10, 2000

The NRC inspectors reviewed a sample of calibration records for various M&TE, calibration recall schedules, and the disposition methods for out-of-tolerance instrumentation to verify compliance with the requirements for control of M&TE.

b. Observations and Findings

Section 12 of Flowserve's QAM establishes requirements and assigns responsibilities for the control of M&TE. The program ensures that tools, gauges, instruments, and other M&TE and devices used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements. Subcontracting of calibration activities is performed in accordance with Section 7.0 of Flowserve's QAM.

PIOP 36-40-06-19 describes the process for controlling and evaluating an out-of-tolerance instrumentation.

PIOP 36-40-18-12 establishes the methodology and responsibilities for calibrating voltmeters and ammeters installed on welding machines. Ammeters and voltmeters are calibrated on a quarterly basis using calibrated instruments traceable to nationally recognized standards and records of calibration maintained in gage laboratory files.

The NRC inspectors selected a sample of pressure test gauges; weld electrode ovens, weld machines, metallurgical test equipment, and heat-treat ovens and reviewed their calibration records for consistency and completeness. The NRC inspectors found that the calibration records for micrometers and vernier calipers used by quality control (QC) inspectors were complete. The NRC inspectors verified that the M&TE sampled at the inspection bench, test facility, welding facility, and heat-treat facility had appropriate calibration stickers and current calibration dates, including the calibration due date. The NRC inspectors selected a sample of the M&TE used by QC inspectors for final inspection identified on in-process job orders and reviewed the calibration records for consistency and compliance to procedures.

The NRC inspectors reviewed a sample of records for out of-tolerance equipment that was documented on reject tickets. The out-of-tolerance equipment was reviewed and evaluated for validity of previous inspection or test results and for the acceptability of those items previously inspected or tested.

The NRC inspectors observed activities at Flowserve's gage calibration laboratory. The NRC inspectors verified that the gage laboratory M&TE was calibrated using procedures and standards traceable to known industry standards. The NRC inspectors verified that Flowserve maintained appropriate environmental controls. In addition, through interviews with several calibration personnel and reviews of their qualification records, the NRC inspectors concluded that the calibration personnel were knowledgeable and qualified.

c. Conclusions

The NRC inspectors concluded that Flowserve's program requirements for control of M&TE were consistent with the regulatory requirements of Criterion XII of Appendix B to 10 CFR Part 50. Based on the limited sample of calibration records reviewed, evaluation of the controls established within Flowserve's gage calibration laboratory, and observation of a sample of calibration activities performed by Flowserve, the NRC inspectors concluded that Flowserve was implementing its QAM and associated M&TE procedures effectively.

6. Control of Nonconforming Materials, Parts, or Components

a. Inspection Scope

The NRC inspectors reviewed Flowserve's QA policies and implementing procedures that govern the control of nonconformances and a sample of reject tickets and complaint reports to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspectors reviewed the following policies, procedures, and documents:

- Flowserve QAM, Section 15.1, "Nonconforming Incoming Materials," Revision 34, dated February 15, 2008
- Flowserve QAM, Section 15.2, "Nonconforming in Process Materials," Revision 34, dated February 15, 2008
- PIOP 36-40-10-14, "Nonconforming Material Control—Rejection Procedure, Materials Review Board Involvement," Revision 14, dated June 2, 2009
- PIOP 36-40-26-11, "Complaint Report Procedure," Revision 11, dated September 15, 2007
- PIOP 36-40-28-05, "Deviation Disposition Request," Revision 5, dated October 26, 2005
- Reject Ticket No. 120222, dated February 4, 2009
- Reject Ticket No. 121053, dated January 28, 2009
- Reject Ticket No. 122287, dated February 27, 2009
- Reject Ticket No. 122306, dated February 26, 2009
- Reject Ticket No. 122791, dated January 9, 2009
- Reject Ticket No. 120445, dated October 30, 2008
- Reject Ticket No. 123341, dated July 7, 2009
- Complaint Report No. 5447
- Complaint Report No. 5070
- Complaint Report No. 5248

b. Observations and Findings

Sections 15.1 and 15.2 of Flowserve's QAM describe, in part, the general requirements for the implementation of a nonconforming material control system as it relates to incoming and in-process materials, respectively. Section 15.1.4 states, in part, that the

applicable drawings and specifications pertinent to the nonconforming item shall be retrieved to review the condition and determine possible corrections.

PIOP 36-40-10-14 outlines the control of nonconforming material or software (paperwork), both purchased and manufactured, by a reject ticket, its routing card, subsequent retention, and the use of the reject ticket as an analytical tool for establishing trends and determining root causes. Section 3.1.2 states in part that if the decision is to rework, the inspector will consult with Manufacturing Engineering and/or Metallurgical Process Control to determine necessary operations, sequences, and departments involved for rework of the nonconforming material.

PIOP 36-40-26-11 defines areas of responsibility and describes specific actions to be taken when a complaint report is received at the Flowserve facility in Raleigh, NC. If it is required, a QPCAP is opened. In addition, the complaint report is reviewed for possible Part 21 evaluations.

PIOP 36-40-28-05 provides a system for preparation, approval, and submittal of deviation disposition requests. When the product complies with applicable code and industry standards but is not in full compliance with customer specifications, Flowserve may analyze the product and the specification on a case-by-case basis to determine if the product is suitable for its intended application. If Flowserve deems that the product is acceptable for its intended application, it may request the customer acceptance of the product through a design deviation request.

The NRC inspectors toured the shop floor and verified that nonconforming materials, parts, and components were appropriately segregated. The NRC inspectors reviewed seven reject tickets and three complaint reports. With the exception of the example described below, the NRC inspectors found that nonconforming items were reviewed and dispositioned in accordance with documented procedures as scrapped, repair/rework, or use-as-is. The dispositions contained technical justifications documenting the nonconforming items as repair or use-as-is. In addition, with the exception of the example described below, the NRC inspectors found that nonconformances to design requirements dispositioned as repair or use-as-is were subject to design control measures commensurate with those applied to the original design.

While walking the shop floor, the NRC inspectors observed the post-repair inspection of three weld repaired valve bodies that had been identified as nonconforming on Reject Ticket No 120445. The NRC inspectors requested a copy of the QAP listed on the reject ticket, QAP No. 99912, from the QC inspector to verify the use of correct procedures against those listed on the reject ticket. Upon review of the QAP No. 99912, the NRC inspectors identified that the incorrect weld repair procedure was documented on the reject ticket and used in the rework instructions on Reject Ticket No. 120445 for the three nonconforming valve bodies. The valve bodies were to be manufactured in accordance with QAP No. 99912, which stated that weld procedure P1-323N shall be used for weld repairs of this type. However, the repair was performed using weld procedure P1-321N. Based on discussions with Flowserve management, the NRC inspectors determined that Flowserve failed to retrieve the applicable drawings and specifications pertinent to the three nonconforming valve bodies, as required by Section 15.1.4 of the Flowserve QAM. This failure resulted in the wrong weld procedure being documented on Reject Ticket No. 120445 and implemented during weld repair of three

nonconforming valve bodies. This issue has been identified as Nonconformance 99901356/2009-201-02. In addition, the NRC inspectors noted that PIOP 36-40-10-14 does not provide adequate instructions to implement the requirements of Section 15.1.4 of the QAM.

In response to the NRC inspectors' identification of this nonconformance, Flowserve issued Reject Ticket No. 123341 to address the use of the incorrect weld repair procedure. Flowserve evaluated the nonconformance and determined that weld procedure P1-321N is more stringent than weld procedure P1-323N because it has additional requirements for impact testing. In addition, both repair processes use the same welding procedure qualification report; therefore, Flowserve dispositioned the items as use-as-is. In addition, Flowserve opened QPCAP No. 516, dated July 7, 2009, documenting the use of the incorrect weld repair procedure. Flowserve performed a root cause evaluation and determined that rework instructions were not adequately verified against the QAP. Flowserve reviewed QPCAP No. 516 with all personnel responsible for developing welding instructions. In addition, Flowserve reviewed all 2009 reject tickets associated with weld repairs against their respective QAP requirements and found that the correct weld repair procedure was used in all other cases. Flowserve provided the NRC inspectors with documented evidence of training and the reject ticket review.

c. Conclusions

The NRC inspectors issued Notice of Nonconformance 99901356/2009-201-02 to document Flowserve's failure to rework nonconforming components in accordance with documented procedures and its failure to retrieve the applicable drawings and specifications pertinent to the nonconforming components, as required by the Flowserve's QAM and associated implementing procedures. With the exception of Nonconformance 99901356/2009-201-02, the NRC inspectors concluded that Flowserve's QA policies and implementing procedures that govern the control of nonconformances are consistent with the requirements of Criterion XV of Appendix B to 10 CFR Part 50.

7. Corrective Actions

a. Inspection Scope

The NRC inspectors reviewed the current status of corrective actions in response to the previous NRC's 2006 inspection. The NRC inspectors also reviewed Flowserve's policies and procedures that govern the corrective action process to ensure that those guidelines provide an adequate description of the process and implementation requirements consistent with the requirements of Criterion XVI, "Corrective Actions," of Appendix B to 10 CFR Part 50. Lastly, the NRC inspectors reviewed several corrective action reports (CARs) to determine if they provide for the documentation and description of conditions adverse to quality, the cause of these conditions and the corrective actions taken to prevent the recurrence. Specifically, the NRC inspectors reviewed the following Flowserve procedures and documentation:

- Flowserve QAM, Section 16.0, "Corrective Action System," Revision 34, dated February 15, 2008

- PIOP 36-41-13-04, "Corrective Action Procedure," Revision 13, dated June 2, 2009
- PIOP 36-40-26-11, "Complaint Report Procedure," Revision 26, dated September 15, 2007
- PIOP 36-40-10-14, "Nonconforming Material Control—Rejection Procedure, Materials Review Board Involvement," Revision 14, dated June 2, 2009
- QPCAP No. 225, dated August 10, 2006
- QPCAP No. 226, dated August 10, 2006
- QPCAP No. 227, dated August 10, 2006
- QPCAP No. 228, dated August 10, 2006
- QPCAP No. 236, dated September 6, 2006
- QPCAP No. 361, dated May 16, 2008
- QPCAP No. 462, dated February 25, 2009
- QPCAP No. 499, dated April 16, 2009
- QPCAP No. 505, dated May 11, 2009
- QPCAP No. 512, dated June 9, 2009
- QPCAP No. 516, dated July 7, 2009
- QPCAP No. 517, dated July 9, 2009

b. Observations and Findings

b.1 Corrective Action Associated with Nonconformance 99901356/2006-201-01

Nonconformance 99901356/2006-201-01 was issued for Flowserve's failure to identify a date for completion of the proposed corrective action on any of the QPCAPs for corrective action associated with a nonconformance caused by internal actions. As a result, there was no objective evidence that the QA manager or his designee completed their verification of the corrective action within 15 days of proposed completion date of the corrective action, in accordance with Flowserve's procedures, since the proposed completion date was not provided on the QPCAP.

In Flowserve's response letter to the NRC, dated March 3, 2006, Flowserve stated that it would increase the number of days required to complete the root cause evaluation and propose an increase in the corrective action schedule from 15 to 30 days. In addition Flowserve stated that it would revise the QPCAP form to indicate the number of days and due date for providing the root cause and proposed

corrective action, and to include a proposed date for completion of the corrective action. Lastly, Flowserve stated that it would perform training on the corrective action procedure and process.

The NRC inspectors reviewed QPCAP No. 225, which Flowserve opened to address Nonconformance 99901356/2006-201-01. QPCAP No. 225 described the corrective actions detailed above, provided objective evidence of the completion of corrective actions, and was closed on April 11, 2007.

The NRC inspectors confirmed that QAM Section 16 and PIOP 36-41-13-04 were revised to allow 30 days to verify completion of corrective actions. The NRC inspectors also confirmed that the QPCAP form provided in PIOP 36-41-13-04 was revised to clearly indicate the number of days and due date for providing the root cause and proposed corrective action, and to include a space to enter the proposed date for completion of the corrective action. The NRC inspectors determined that Flowserve's corrective actions were adequate to address the identified finding. Based on their review, the NRC inspectors closed Nonconformance 99901356/2006-201-01.

b.2 Corrective Action Associated with Nonconformance 99901356/2006-201-02

Nonconformance 99901356/2006-201-02 was issued for Flowserve's inability to produce any documented, objective evidence that over 3,000 dedication packages were reviewed for completeness and were verified for signatures on the dedication forms for completeness of dedication activities as part of their corrective actions in response to a utility surveillance finding.

In their response to the NRC, Flowserve stated that the corrective actions were as follows: 1) conduct a new review to provide further confirmation that dedication operations were not missed; 2) perform a review of the problems identified in enclosure 2 of the NRC inspection report and determine whether the problems listed would affect the hardware or result in the shipment of defective product; and 3) conduct training on the corrective action procedure and process.

The NRC inspectors reviewed QPCAP No. 226, which included QPCAP 57A dated January 11, 2006 to document objective evidence of 3000 packages reviewed. QPCAP No. 226 described the corrective actions detailed above, provided objective evidence of the completion of corrective actions, and was closed on April 11, 2007.

The NRC inspectors reviewed the documentation which provided objective evidence that the 3000 dedication packages were reviewed for completeness to address nonconformance 99901356/2006-201-02. In addition, the NRC inspectors reviewed the objective evidence that supports the corrective actions. The NRC inspectors determined that Flowserve's corrective actions were adequate to address the identified finding. Based on their review, the NRC inspectors closed Nonconformance 99901356/2006-201-02.

b.3 Corrective Action Associated with Nonconformance 99901356/2006-201-03

Nonconformance 99901356/2006-201-03 was issued for Flowserve's lack of procedural link between the corrective action program and the 10 CFR Part 21 process.

In their response to the NRC, Flowserve stated that procedure PIOP 36-40-03-06, Methods for Reporting to NRC Defects Creating Substantial Safety Hazards, would be revised to specifically require 10CFR Part 21 consideration. In addition, the QPCAP form would be revised and training on the new procedure would be conducted.

The NRC inspectors reviewed QPCAP No. 227, which Flowserve opened to address Nonconformance 99901356/2006-201-03. QPCAP No. 227 described the corrective actions detailed above, provided objective evidence of the completion of corrective actions, and was closed on April 11, 2007. The NRC inspectors reviewed the documentation which provided objective evidence for the completion of the corrective actions. The NRC inspectors confirmed that Flowserve revised the relevant procedures to establish a link between QPCAPs and the Part 21 program as discussed in section b.5 below to address nonconformance 99901356/2006-201-03. The NRC inspectors determined that Flowserve's corrective actions were adequate to address the identified finding. Based on their review, the NRC inspectors closed Nonconformance 99901356/2006-201-03.

b.4 Corrective Action Associated with Nonconformance 99901356/2006-201-04

Nonconformance 99901356/2006-201-04 was issued for Flowserve's failure to implement appropriate procedures as required by the QAM as evidenced by the following examples:

1. Flowserve's Manufacturing Operations and Inside Sales and Applications personnel did not have a documented procedure to describe training requirements for those personnel performing activities affecting quality.

2. No procedural guidance existed for the conduct of commercial grade surveys

In their response to the NRC, Flowserve stated that the Manufacturing Operations and Inside Sales, and Application departments would generate training procedures to define their training programs. In addition, the vendor audit procedure would be revised to address commercial grade surveys specifically and to clearly list the added considerations associated with this activity. The internal audit checklists would be revised to require consideration on whether adequate procedural guidance is given for the activities being audited.

The NRC inspectors reviewed QPCAP No. 228, which Flowserve opened to address Nonconformance 99901356/2006-201-04. QPCAP No. 228 described the corrective actions detailed above, provided objective evidence of the completion of corrective actions, and was closed on August 24, 2006. The NRC inspection team reviewed Standard Operating Instruction (SOI) 25-01-01, Sales and Marketing Training Program dated February 23, 2006; SOI 80-30-01, Operations / Manufacturing Training Program dated March 16, 2006; PIOP 36-41-01-20,

Procedure for Performance of Vendor Audits and Assessments, dated March 3, 2006, and the associated audit checklists for final documentation and shipping process, record storage process, nonconformance and corrective action process, manufacturing/material handling process, procurement process, and design control process. The NRC inspectors confirmed that Flowserve revised the procedures to adequately reflect the requirements of the QAM as identified in nonconformance 99901356/2006-201-04. The NRC inspectors determined that Flowserve's corrective actions were adequate to address the identified finding. Based on their review, the NRC inspectors closed Nonconformance 99901356/2006-201-04.

b.5 Corrective Action Program

Section 16.0 of Flowserve's QAM describes, in part, the general requirements for the implementation of a corrective action system. The established procedures and practices provide assurance that conditions adverse to quality are promptly identified, documented, and corrected or otherwise handled in accordance with the procedures and practices. Section 16.1.3 of Flowserve's QAM requires that reject tickets and customer complaints be reviewed to determine the need for further corrective action.

PIOP 36-41-13-04 defines a process and assigns responsibilities to ensure that prompt action is taken throughout all phases of order processing to identify conditions adverse to quality and to correct such conditions as soon as practical to prevent recurrence. The procedure outlines the corrective action processes for conditions adverse to quality identified at both Flowserve and Flowserve's vendors. The procedure states that conditions adverse to quality may be identified through various means, including, but not limited to, the results of nonconformance identified on reject tickets, internal and external quality audit results, monitoring reports, field service reports, customer or outside agency audits, or source surveillance. Section 3.0 of the procedure states, in part, that QA engineers shall evaluate the Flowserve subcontractors' proposed corrective actions before the subcontractor completes the corrective actions. Section 4.0 of the procedure provides the connection between the corrective action process and the 10 CFR Part 21 process.

The NRC inspectors found that Flowserve has established adequate procedures for identifying and correcting conditions adverse to quality. Flowserve's corrective action process provides a connection to the 10 CFR Part 21 procedures; Flowserve's subcontractors must submit nonconforming reports and proposed corrective actions for approval before implementing corrective actions; and Flowserve adequately assesses deficiencies identified or reported by its customers and enters them into the nonconformance or corrective action programs.

The NRC inspectors reviewed a sample of eight QPCAPs of the 379 QPCAPs issued since January 2006. The reviewed reports relate to both internal and vendor conditions adverse to quality. The NRC inspectors noted that Flowserve manufactures approximately 2,500 to 3,000 components per month and that the number of QPCAPs issued was relatively low in comparison to the number of components manufactured in a year by Flowserve. The NRC inspectors found that Flowserve's QPCAPs provide for the documentation and description of conditions adverse to quality, the cause of these conditions and the corrective actions taken to

prevent the recurrence of them, the reviews and approvals by the responsible authority, the status of the corrective actions reviewed, and the follow-up actions taken to verify the timely and effective implementation of the corrective actions.

c. Conclusions

The NRC inspectors concluded that Flowserve's program requirements for corrective actions are consistent with the requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. Based on the limited sample of QPCAPs reviewed, the NRC inspectors determined that the Flowserve QAM and associated corrective action procedures were adequate and effectively implemented.

8. Quality Assurance Records

a. Inspection Scope

The NRC inspectors reviewed Flowserve's implementing policies and procedures that govern the control of documents to verify compliance with the requirements of Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. Specifically, the NRC inspectors reviewed the following documents:

- Flowserve QAM, Section 17.0, "Quality Assurance Records," Revision 34, dated February 15, 2008
- PIOP 36-40-16-11, "Requirements for Storage of QA Documents at Flowserve Raleigh," Revision 11, dated April 16, 2009
- SOI 40-19-10, "Gathering and Processing of Documents for Traceable and 'N' Stamp Valves and 'U' Stamp Actuators," Revision 10, dated June 14, 2006
- SOI 40-45-09, "Transferring Inactive QA Plans, and QA Documentation Files into Raleigh Plant Archives," Revision 09, dated July 22, 2005
- SOI 70-38-06, "Requirements for Purchased or Leased Computer Programs for Product Design and Analysis," Revision 06, dated June 22, 2009

b. Observations and Findings

b.1 Policies and Procedures

Section 17.0 of Flowserve's QAM describes the responsibilities and requirements for the collection, storage, retrieval, and maintenance of records applicable to those records acquired and developed as a result of or in support of Flowserve's design and fabrication activities for specific customers. The NRC inspectors verified that changes made to controlled documents were both appropriately reviewed and approved by the same organization that had reviewed and approved the original documents.

SOI 40-19-10 describes the methodology that QA documentation personnel use to gather and process various documents with a view to produce satisfactory

customer submittals, to ensure that all ASME Code documentation requirements are met, and to maintain all relevant documents for future reference.

PIOP 36-40-16-11 describes authority and responsibilities and the methodology for document identification, filing requirements, the filing system, and the retention period and protection for nuclear QA documents associated with the design and fabrication of components. It states that QA documentation related to nuclear sales orders shall be temporarily stored in the plant vault. The retention period for nuclear QA documents shall comply with ASME Code, Section III. The procedure also describes the methodology used to transfer and store completed nuclear sales orders into electronic media.

SOI 40-45-09 provides the methodology used to inactivate and transfer completed sales orders to Flowserve's Raleigh, NC, plant archives.

b.2 Implementation of Quality Assurance Record Control Process

The NRC inspectors reviewed a sample of records, such as design reports, design specification as-built drawings, engineering change orders, assembly design change notices, and bill of materials stored in the engineering department. The NRC inspectors reviewed a sample of completed nuclear sales orders maintained as copies in metal file cabinets in the QA department.

The NRC inspectors reviewed active complete quality records associated with nuclear sales order numbers 50924, 53035, and 90891 and verified them against customer PO requirements. The records reviewed included those required by ASME Code, Section III, and by customer specifications. Based on their review of sample QA records, the NRC inspectors confirmed that Flowserve's QA personnel implemented the appropriate controls for creating and storing records and thus meeting customer POs. The records reviewed were identifiable, traceable, and easily retrievable.

The NRC inspectors discussed the QA records storage and filing process with the plant records administrator responsible for categorizing nuclear QA documents as permanent and nonpermanent documents, for transmitting records, and for controlling the distribution of documents and records into Flowserve's computer server. The plant records administrator discussed Flowserve's process for filing and storing QA records with the NRC inspectors and retrieved documents that the NRC inspectors requested. The administrator explained the process for transferring inactive QAPs and QA documentation files into Flowserve's Raleigh, NC, plant archives.

The NRC inspectors reviewed Flowserve's method for storing transferred documents in electronic media. The NRC inspectors noted that the records were easily retrievable, identifiable, accurate, and complete. The NRC inspectors determined that Flowserve's QA records control process, as documented by the referenced procedures, is consistent with the requirements of Criterion XVII of Appendix B to 10 CFR Part 50.

c. Conclusions

The NRC inspectors concluded that Flowserve's control of QA records are consistent with the regulatory requirements of Criterion XVII of Appendix B to 10 CFR Part 50. Based on the sample of quality records reviewed, the NRC inspectors concluded that Flowserve was implementing its QAM and associated procedures effectively.

9. Entrance and Exit Meetings

On July 6, 2009, the NRC inspectors discussed the scope of the inspection with Mr. John Chappell, Flowserve General Manager, and Flowserve's management and engineering staff. On July 10, 2009, the NRC inspectors presented the inspection results and observations during an exit meeting with John Chappell; Robert Barry, Flowserve's QA Manager; and other Flowserve management staff.

ATTACHMENT 1

1. ENTRANCE/EXIT MEETING ATTENDEES

Name	Title	Affiliation	Entrance	Exit	Interviewed
John Chappell	General Manager	Flowserve	X	X	X
Robert Barry	QA Manager	Flowserve	X	X	X
Jim Tucker	Engineering Manager	Flowserve	X	X	X
Todd McKinney	QC Supervisor	Flowserve	X	X	X
Bernie Carothers	Supv. Metallurgical Process Control	Flowserve	X	X	X
W. Glenn Raines	Supv. QA Engineering	Flowserve	X	X	X
Benjamin Whysall	QA Engineer	Flowserve	X	X	X
Paris Wills	Admin. Asst.	Flowserve	X	X	
Daniel Mann	Welding Engineer	Flowserve	X	X	
Robert Sherman	Manager, Inside Sales	Flowserve	X	X	X
Samuel Encarnacion	NDT Level II Inspector	Flowserve			X
Ronald Farrell	Registered Professional Engineer	Flowserve			X
Richard Gradle	Research & Development Manager	Flowserve			X
Karen Hay	Supv. Calibration Laboratory	Flowserve			X
Patricia Miller	QC Inspector Level II	Flowserve			X
Chad Pettis	Welder	Flowserve			X
Robert Sizemore	Design Engineering Supv.	Flowserve			X

2. INSPECTION PROCEDURES USED

Inspection Procedure 43002, “Routine Inspections of Nuclear Vendors”

Inspection Procedure 36100, “Inspection of 10 CFR Part 21 and 50.55(e) Programs for Reporting Defects and Nonconformance”

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

The U.S. Nuclear Regulatory Commission previously conducted an inspection at Flowserve’s facility in Raleigh, NC, from January 10–13, 2006, and documented it in Inspection Report 99901356/2006-201. All open items from that inspection have been closed.

Item Number	Status	Type	Description
99901356/2006-201-01	Closed	NON	Criterion XVI

99901356/2006-201-02	Closed	NON	Criterion XVI
99901356/2006-201-03	Closed	NON	Criterion V
99901356/2006-201-04	Closed	NON	Criterion V
99901356/2009-201-01	Opened	NOV	10 CFR Part 21
99901356/2009-201-02	Opened	NON	Criterion XVI