November 7, 2007

Ms. Emily Mayhew
Vice President, U.S. Region Quality
Areva NP, INC.
3315 Old Forest Road
Lynchburg, VA 24506

SUBJECT: NRC INSPECTION REPORT 99901359/2007-201

Dear Ms. Mayhew:

On October 9-12, 2007, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Areva NP Inc., facility in Lynchburg, Virginia. The purpose of this inspection was to verify that Areva NP Inc. (formerly Framatome NP) has implemented programs consistent with10 CFR Part 50, Appendix B, and 10 CFR Part 21 program requirements. Further, the inspection team (Team) reviewed the corrective actions taken to address the cause of the design deficiency reported in the 10 CFR Part 21 notification dated July 22, 2005, regarding the supply of pressurizer heaters with defective internals to several nuclear power plants. This was a limited scope inspection that also reviewed the process adopted to provide selected basic components to nuclear power plants.

During this inspection, the Team reviewed the actions taken by you and outlined in your response dated June 30, 2005, to correct two nonconformances identified in NRC inspection Report 99901355/2006-201. The Team found that the actions taken to correct the noncompliance identified as 99901355/2006-201-01 was only partially complete because of problems with the computer-based condition report system, WebCAP. On October 10, 2007, you requested that the NRC extend the date for completing the corrective action date until March 2008 and received the extension. This nonconformance remains open pending completion of the remaining corrective action. The Team considered the actions taken to correct noncompliance 99901355/2007-201-02 to be satisfactory, and this corrective action is considered closed.

No conditions adverse to quality were identified during this inspection. This NRC inspection report is not intended to endorse or approve your overall quality assurance or 10 CFR Part 21 programs.

In accordance with 2.390, “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 regulation, 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/adms.html.

Sincerely,

/RA/

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

Enclosures: As Stated

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U.S. NUCLEAR REGULATORY COMMISSIONDIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS OFFICE OF NEW REACTORS

VENDOR INSPECTION REPORT

Report No: 99901359/2006-201

Organization: Areva NP, INC.
3315 Old Forest Road
Lynchburg, Virginia 24506

Vendor Contact: Ms. Tara Werner
Quality Audits and Programs Manager
(434) 832-2836

Nuclear Industry: Areva NP, Inc. (Areva), supplies basic components such as pressurizer heaters for pressurized water-type reactors, solenoid-operated valves manufactured by Automatic Switch Company, motor-operated-valves manufactured by Flowserve (formerly Limitorque), and replacement components to U.S. nuclear utilities. Areva maintains a warehouse to store the components pending shipment and a hot workshop and a cold workshop where work related to American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME) activities are performed.

Inspection Dates: October 9 - 12, 2007

Inspectors: Kamalakar R. Naidu, Lead Inspector, CQVB/DCIP/NRO
Sabrina Cleavenger, Inspector-in training, CQVB/DCIP/NRO
Jonathan Ortega, Inspector-in training, CQVA/DCIP/NRO

Approved by: John A. Nakoski, Chief,
Quality & Vendor Branch B
Division of Construction Inspection
and Operational Programs (DCIP)
Office of New Reactors

ENCLOSURE

1.0 INSPECTION SUMMARY

The purpose of this inspection at Areva NP Inc. (Areva), Lynchburg, Virginia, was to review selected portions of the quality assurance program and 10 CFR Part 21 (Part 21) controls that Areva established and implemented to meet NRC requirements. Further, the NRC inspection team (Team) reviewed actions taken to correct conditions adverse to quality that led to the failure of a basic component, namely, pressurizer heaters (heaters). Areva supplied heaters to three nuclear power plants that subsequently failed in service. Areva notified the NRC in accordance with the requirements of Part 21 that, during 2005, the heaters supplied to various nuclear power plants failed because its subvendor did not manufacture the heater elements in accordance with Areva's design specifications. During this inspection, the Team also reviewed the actions taken to correct two nonconformances identified during a previous inspection and reviewed the methodology Areva adopted to supply basic components to nuclear power plants.

The inspection was conducted at Areva's facility in Lynchburg, Virginia. The inspection bases were:

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

No violations or nonconformances were identified during this inspection.

2.0 STATUS OF PREVIOUS INSPECTION FINDINGS

2.1. Status

Noncompliance 99901359/2006-201-01 remains open pending completion of corrective action that was estimated by Areva to be completed by March 31, 2008.

Noncompliance 99901359/2006-201-02 is closed.

2.2 Review of actions taken to correct Nonconformances

The NRC Team reviewed the actions taken to by Areva to correct conditions adverse to quality identified in nonconformances 99901359/2006-201-01 and 99901359/2006-201-02 during an inspection dated July 18-21, 2006.

The Team reviewed the following documents:

- Administrative Procedure 1717-06 Rev. 2, "Corrective Action Program," dated July 15, 2007.
- Areva Memo to Inspection File, File Number TWW-07-035, "Corrective Actions associated with Overdue Condition Reports," dated September 26, 2007.
- Email from Tara Werner to employees in the Quality Assurance and Programs group, "Internal Audits and Corrective Action," dated August 1, 2007.
- Areva Operating Instruction OI-1602, Rev. 0, "Tracking Overdue Condition Reports," dated September 5, 2007.

Nonconformance 99901359/2006-201-01 identified that various Areva NP Inc. user groups failed to complete actions to correct adverse conditions identified in condition reports (CRs) by the assigned due date or complete the initial screening within 7 days. As of July 19, 2006, 34 CRs had exceeded their required due dates and 8 CRs had exceeded the initial 7-day screening time limit. Adequate management of CRs is necessary in order for Areva's corrective action program to satisfy Criterion XVI, "Corrective Action," of 10 CFR Part 50. Document No: 1717-06, "Corrective Action Program - WebCAP," dated July 15, 2007, establishes and satisfies the requirements of Areva's quality program for identifying investigating and correcting conditions adverse to quality. This document was revised to specify the "Issue Owner," in Section 3.3.5 as the person who has the ultimate responsibility for processing the entire CR. In Section 4.1.5, the procedure now requires quality control personnel to monitor CR trends at regular intervals and initiate a CR to the Issue Owner of a CR that is overdue by greater than 2 weeks. Quality control organization will also monitor overdue CR trends during internal audits and corrective action trending.

In addition to changing the procedure, Areva initiated five corrective actions to achieve timely tracking and completion of CRs. To date, Areva completed only four of the five corrective actions.

Corrective action 1 was to continue with current mechanisms in place to track and encourage prompt responses to CRs, such as alerting senior management to overdue CRs. This action was complete.

Corrective action 2 entailed establishing the CR owner as the individual responsible for timely CR processing as opposed to the approver. The person originating the CR in WebCAP was held responsible for on-time completion of the CR. Areva hired a Quality Specialist to track and reduce overdue condition reports; this specialist, per Areva OI-1602, took specific actions to hold the originator accountable for the CR process. These actions range in severity from sending emails to the issue owner (originator) and applicable management if a CR was found to be overdue by one day to writing a CR to the issue owner. This action was complete.

Corrective action 3 was an improvement to WebCAP identified by Areva to define incremental due dates for each signature in the CR chain. Revision 2 to Areva Administrative Procedure 1717-06, SECTION 4.1.1, "Due Dates," was modified to include a table that establishes due dates for each phase of CR resolution. The due dates were established "by signature" such that a due date for one phase would occur a set number of days after the previous phase was completed or "signed." This arrangement prevented a cascading effect on all due dates if one deadline was missed. These changes were incorporated into WebCAP and were verified by inspectors through an examination of a representative sample of WebCAP-generated due dates. This action was satisfactorily completed.

Corrective action 4 was to simplify the CR due date extension process but also to implement requirements for increasing levels of management approval after a set number of extensions. This action was not yet complete as Areva was still negotiating an acceptable solution with the vendor. During the inspection, the Areva Manager of Quality Audits and Programs requested the NRC management to extend the due date of completion and was granted the extension. Areva provided a preliminary copy of the

letter formally documenting the requested extension to the Team during the inspection; the letter cited a completion date of March 31, 2008. Areva could not complete this action because it was trying to coordinate with its vendor to complete WebCAP revisions for CR due date extension control. This portion of the nonconformance will remain open pending verification that the corrective action is complete.

Corrective action 5 was to hold personnel and management accountable for overdue CRs and to issue a CR for overdue CRs during trending analysis, internal audits, and as part of the Corrective Action Review Board. These actions were completed by issuing CRs for any CR that was overdue by more than 14 days or for negative trends discovered during self assessments, as reflected in an update to AP 1717-06. A higher level of accountability for these items was achieved through the hiring of an additional staff person to monitor and maintain staff awareness of CR status. Additionally, management sent an informational email to staff to ensure their understanding of the changes and to alert staff remembers to run a query in WebCAP during internal audits. The team was shown "Areva NP Inc. QA Internal Audit Checklist Summary Sheet," Revision 4, dated April 2, 2006, that required the auditor in section 1.B.1.e) to verify that nonconformances had been initiated to identify those CRs that had not been dispositioned and closed within the required timeframe. Areva uses Procedure 1719-21, "Quality Assurance Audits of Internal Activities," dated January 28, 2005, to perform audits. Areva Operating Instructions OI-1-602 dated September 5, 2007, requires the quality control organization to monitor and track overdue CRs. This action is considered complete.

Nonconformance 99901359/2006-201-01 remains open.

Nonconformance 99901359/2006-201-02 identified that there was inadequate documentation of the justification for determining CR reportability under 10 CFR Part 21. In order to address this issue, Areva added questions to WebCAP to ensure employees adequately examined the possibility of a condition's reportability under 10 CFR Part 21.

Additionally, the changes made to WebCAP were captured in Revision 2 to Areva's Corrective Action Procedure 1717-06. The Team reviewed a representative sample of training records and determined that employee training on the procedure revision was completed and was adequately documented. Nonconformance 99901359/2006-201-02 is considered closed.

2.3 Conclusions

The actions taken to correct adverse condition identified in Nonconformance 99901359/2006-201-02 have been completed and are adequate. This item is closed. Nonconformance 99901395/2006-201-01 will remain open pending verification of the completion of the remaining corrective action.

3.0 INSPECTION FINDINGS AND OTHER COMMENTS

The Areva NP quality manual, "Quality Management Manual," (QMM) 56-5015885-05, dated July 7, 2005, describes the overall quality program for the corporation in the three major regions of France, Germany, and the United States of America. The QMM is divided into two major sections: Plants Quality and Environmental Management Manual (QEM) and Services Quality Management Manual (SQM). Section 2.4.4 of the Plants QEM, states, in part, that the USA

Quality organization performs activities for both Plants and Services. As such, the Plants QEM and the Areva NP Inc. implementing procedures were the focus of the limited scope inspection.

3.1 Areva's 10 CFR Part 21 Notification on Pressurizer Heaters

a. Scope

The team reviewed the actions taken by Areva to correct a design deficiency in pressurizer heaters that failed in service during 2005 at Waterford 3, Songs 2 & 3, and Palo Verde Unit 3. Areva reported this matter in accordance with the requirements of 10 CFR Part 21.

b. Observations and findings

b.1. Principles of Pressurizer Heater Operation

Pressurized Water Reactors (PWRs) use the heaters inside the pressurizers to ensure that the reactor coolant system (RCS) pressure can be controlled. In Westinghouse or Combustion Engineering (CE) PWRs, the heaters are mounted at the bottom of the pressurizer, where as in Babcox and Wilcox (B&W) PWRs, the heaters are mounted on the side of the pressurizer. The heaters are powered and controlled in groups or banks and serve two purposes. Proportional heaters cycle to maintain pressure during steady state operation. Backup heaters are on full time to increase the pressure during plant start up and to restore pressure during plant transients.

Pressurizers and the heaters mounted within them are required to maintain the integrity of RCS pressure boundary. Technical specifications for PWRs specify a minimum available capacity of pressurizer heaters to ensure that the RCS pressure can be controlled to maintain subcooled conditions in the RCS. Plant operation with failed pressurizer heaters can affect a facility's ability to control reactor pressure. Following a reactor trip, unnecessary safety injections can occur due to the inability to maintain RCS system pressure above actuation set point.

In March 2003, Areva teamed with Thermacoax, Plainquivory Athis De L'Orne, France (Thermocoax) to develop pressurizer heaters for the U.S. Market. The initial batch of heaters with Thermocoax heater elements that were supplied to San Onofre 3, Palo Verde 3, and Waterford, failed to operate successfully. After Areva performed a root cause analysis of the failures and determined the cause of failures, the fabrication methods were changed. Since then, failures have not been reported on the new heaters manufactured with Thermocoax heater elements.

b.2. 10 CFR Part 21 Notification to Areva Customers and NRC

In July 2005, Areva notified the owners of Arkansas Nuclear One, Three Mile Island, San Onofre, St. Lucie, Millstone Unit 2, and Palo Verde that, as a result of the recent pressurizer heater failures, it had initiated a Root-Cause of Failure Analysis and Discovery process to determine if there was a defect that required reporting as defined in 10 CFR Part 21. In a letter dated July 28, 2005, Areva also notified the NRC of a reportable condition regarding the pressurizer heaters with internals manufactured by Thermocoax, in accordance with 10 CFR Part 21. The following Condition Reports (CRs) were written by Areva regarding the heater failures:

CR 2005-2307 identified that on May 24, 2005, several Areva pressurizer heaters with Thermocoax internals were installed at Waterford 3. These heaters failed a month later.

CR 2005-2653 identified that several heaters manufactured by Thermocoax, failed subsequent to installation at Palo Verde 3. Additional problems at Palo Verde 3 were identified in CRs 2005-2342 and 2005-2656. Palo Verde installed the heaters in October 2004 and the first failure occurred on December 24, 2004, followed by failures on January 5, February 16, and 24, 2005. Additional failures occurred on May 28, 2005. All heaters were removed from Palo Verde Pressurizers by June 11, 2005.

CR 2005-2657 identified that pressurizer heaters fabricated for St. Lucie plant did not meet the design drawings.

CR 2005-3843 identified that several pressurizer heaters failed after operating for a few months at San Onofre nuclear power plant. The heaters had been installed on October 20, 2004. The first failure occurred on May 25, 2005, and subsequent failures occurred on June 28, 2005, and August 29, 2005.

Heaters shipped during April/May 2005 and installed in the pressurizer at Waterford 3 failed.

These heaters were removed and some of them returned to Areva for root cause analysis. The heaters were shipped to BWXT Services, Inc., Lynchburg Technology Center for laboratory analysis to determine the possible causes of failures. The testing included visual inspections, real time x-ray radiography, dimensional measurements, electrical testing, metallography, scanning electron microscopy, and energy dispersive spectrography. Laboratory examination revealed that three of the four failed heaters from Palo Verde failed due to overheating in the "warm" region of the heater, which is located approximately 19-20 inches from the receptacle weld. The fourth Palo Verde heater contained a 25 K ohm resistance fault between a copper conductor and its sheath. In two cases, the Waterford 3 heaters failed due to overheating in the receptacle. The epoxy resin was ejected from the receptacle end. In the Waterford 3 heater, there was a ground fault in the receptacle.

The investigation identified that Thermocoax did not fabricate the heater elements in accordance with design drawings. The heater assembly can be divided into four sections: the "Heated Section" that houses the Nickel Chromium (NiCr) heater element; the "Warm Section" in which NiCr transits into copper conductors; the "Cold Section" in which copper conductors extend from the warm section into the fourth section, the receptacle, where the copper is terminated on terminals to facilitate field terminations. Special sealants are applied in the receptacle to seal the heater assembly. In the failed heaters, the "heat zone" in the heater element extended several inches into the "Cold Section" thereby improperly located the transition region in the heater assembly. The NiCr wire extended into the cold region where the copper wire should have been located and caused excessive heating.

b. 3. Revised Method for Fabrication of Heaters

Areva is an American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME) "N-Stamp" holder. To enhance the fabrication method, Areva implemented the following process for pressurizer heater fabrication. It purchased the raw metals and welding materials, performed the welding operations, and performed nondestructive testing in its facility. A typical

heater consists of the heating element encapsulated in a SA-213 Type 316 stainless steel sheath that is welded with filler material type SFA-5.9 ER308L with a specified maximum Cobalt content to a SA-479 Type 316L end cap. Areva purchased the sheath, and sent it to Thermocoax where the heater elements fabricated to Areva's design requirements were inserted. The partially assembled heater assembly was then shipped to Areva, Lynchburg. Upon its arrival, Areva receipt inspectors verified that Areva's design engineer-specified attributes were met. The sheath with the heater assembly was then transferred to Areva's weld shop where it underwent nondestructive liquid penetrant examinations (PT), and the end plug welding was completed. This weld was subjected to PT and visual examinations and shipped to Thermocoax. This closure weld was required to meet the applicable sections of the ASME Code requirements because the weld has to maintain the integrity of the RCS pressure boundary. Thermocoax completed the fabrication, including heat treatment, and shipped the final assembly to Areva, where it underwent final PT and visual examinations, hydrostatic, insulation resistance, and similar tests. Before shipping the assembly, Areva completed all the tests prescribed by its engineers. Areva performed extensive tests on the heaters manufactured under the revised method at its facility in Areva NP GmbH Technical Center in Karlstein, Germany, and found them to work satisfactorily.

b. 4. Supply of Heaters Manufactured Under Revised Process

In 2006, Doosan, South Korea, manufactured a pressurizer with Areva's redesigned heaters and delivered it to ANO 2 nuclear power plant. Also, in 2006, Areva manufactured a pressurizer with its redesigned heaters and delivered to Millstone Unit 2. To date, no problems have been reported with Areva's redesigned heaters. Additionally, Areva was in the process of supplying heaters to several other power plants.

c. Conclusion

The root cause analysis performed by Areva to determine the cause of heater failures was considered adequate. Problems have not been identified in the heaters manufactured under the revised fabrication process that have been installed in several operating nuclear power plants.

3.2 Review of a Typical Purchase Order (PO) for Pressurizer Heaters

a. Scope

The Team reviewed the PO 50027 4481, dated June, 17, 2004, issued by Arizona Public Service Company (APS). The PO required Framatome (currently Areva) to supply 75 pressurizer heater assemblies manufactured to specification No. 14273-PE-130, Revision 05, March 3, 1986, and attached a detailed Specification, 13-N001-0604-003-12, dated April 23, 2004, that listed the critical characteristics for the heaters.

b. Observations and Findings

The Team reviewed the specification and determined that it specified the design and fabrication requirements as follows:

Code of Federal Regulations

10 CFR Part 21, "Reporting of Defects and Noncompliance "

10 CFR Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants

American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, 1988 Edition through 2000 Addenda unless otherwise specified.

Section II - Material Specifications
Section III – Nuclear Power Plant Components
Section V – Nondestructive Examination
Section IX – Welding and Brazing Qualifications (latest Edition/Addenda)
Section XI – Rules for In-Service Inspection of Nuclear Power Plant Components, 1992 Addenda
ASME, Code Case N-405-1 dated July 24, 1989

American National Standards Institute (ANSI)

Specification 00000-PE-130, Revision 6, "General Specification for a Pressurizer Assembly"
Specification 14273-PE-130, Revision 5, "Project Specification for a Pressurizer Assembly"
Drawing E 78 373-684-001, Revision 2

Watlow Electric MFG. Co Documentation

Drawing WDC-3580

c. Conclusions

The team observed that the PO contained adequate technical and quality requirements for the fabrication of the heaters.

3.3 Quality Assurance Records

a. Scope

The Team selected the quality assurance record for a typical heater supplied to Entergy and reviewed it for adequacy.

b. Observations and Findings

Typical quality assurance records for a heater assembly consisted of:

Certificate of conformance (COC) certifying that the pressurizer heater assemblies that were furnished to Entergy, Waterford, were manufactured in accordance within the applicable codes, specifications, and tested to the PO requirements.

Thermocoax-initiated Contract Variation Approval Request (CVAR) 87-5063945-00, dated April 22, 2005, to document that the power of heat assembly identified as SN 15148/18 was measured to be 55.1 Kilowatts (KW), exceeding the specification

maximum limit of 55 kW. Proposed action was to accept "as-is" because the tolerance of the supply voltage was 480 ± 10% and therefore the actual delivered power can be 20% higher that the specified 55 KW.

c. Conclusions

The Team identified no adverse conditions.

3.4 Approved Suppliers List

a. Scope

The Team reviewed the methodology used by Areva to qualify its vendors to place them on its "Approved Suppliers List," (ASL) and verified that Thermocoax was on its ASL.

b. Observations and Findings

The Team determined that Areva uses Procedure No. 1719-22 dated July 7, 2006, to qualify its vendors before placing them on the ASL. Procedure No. 1719-22 establishes the methods to be used in preparing for and conducting quality assurance (QA) audits of Areva NP suppliers of ASME Code items, safety-related products and services, and commercial-grade items and services that will ultimately end as safety related. The procedure outlines the considerations for evaluating a supplier before awarding a contract, depending on whether the supplier was already on the ASL, or the supplier was not on the ASL. The procedure required an annual evaluation of each supplier listed on the ASL that takes into account the problems encountered in the past, the results of audits conducted by other sources, and significant changes in the QA program. Based on the results of the review, Areva will retain the supplier on the ASL, or schedule an audit of the facility. The procedure discussed the audit frequency and schedule, the review of supplier's QA manuals, selection of an Audit Team, conduct of the audit, documenting the results of the audit in an audit report, and pursuing the actions taken to correct conditions adverse to quality during the audit.

The team reviewed Areva's ASL and determined that Thermocoax was on its ASL.

c. Conclusions

The Team determined that Areva had established a system to qualify its vendors before placing them on its ASL. The Team observed that Thermocoax was on its ASL. No conditions adverse to quality were identified in this area.

3.4 Areva's Supply of Flowserve Motors as Basic Components

a. Inspection Scope

The Team reviewed the Areva purchase order (PO) 1007001927 to Flowserve for the supply of four nuclear safety related Limitorque actuators intended for installation at the Robinson nuclear generating station, operated by Progress Energy Carolinas Inc. (PEC). The PO incorporated by reference PEC specification PO 00304439, Revision 8, as the controlling technical document for the order. The Team also reviewed the following documents:

- Progress Energy Inc. PO 00304439, “Areva blanket PO 81583,” dated May 28, 1999, through change order 07 dated November 2006
- Flowserve Technical Update 06-01, “Reliance Motors Magnesium Rotors,” dated December 26, 2006
- Limitorque, “Reliance 3Ø L.C. Actuators Motors (Starting Torque at Elevated Temperatures),” dated May 13, 1993
- Reliance Electric, “Rotor material for Limitorque Nuclear Motors 180 Frames and Larger,” dated April 24, 1991
- Limitorque Maintenance Update 92-02, “Motor Pinion Keys”
- Areva “Operating Instruction (OI) -1216,” Revision 12, dated May 14, 2007

b. Observations and Findings

Areva’s PO 1007001927 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 and associated subcontractor facilities. Nonconformances dispositioned as “use-as-is” or “repair” were to be submitted to Areva for review. Defects and noncompliances identified during the procurement and manufacture were reportable under the requirements of 10 CFR Part 21.

The Team examined the POs from PEC to Areva, and Areva to Flowserve (formerly known as Limitorque) and associated documents for Limitorque actuators.

The Team reviewed PEC’s PO 00304439 issued to Areva for the purchase of two Type SMB-1-40-1700 and two Type SMB-1-15-1700 (total four) safety-related Limitorque actuators and verified that PEC’s requirements imposed on Areva were translated into Areva’s PO1007001927 to Flowserve for the supply of the actuators.

During the review, the Team determined that Areva supplied two motors to Robinson from its inventory. From the purchase date of the motors, the Team verified and confirmed that the motors supplied by Areva from its inventory conformed to Flowserve’s most recent technical reports, and therefore required no design changes.

The Team also reviewed the QA data package that Flowserve submitted with the Limitorque actuators to Areva. Flowserve provided a CoC for the Limitorque actuators that documented the actuators were manufactured and processed in accordance with Areva-specified Qualification Reports. The team determined that Flowserve’s CoC was acceptable.

Because the Team had focused on Limitorque actuators that had already been shipped to the Robinson plant, the Team went to the Areva warehouse to determine the storage condition in the warehouse where the actuators were stored. The Team determined that the information supplied by Flowserve met the requirements specified in the PO for a similar item. The Team selected an actuator motor at random and determined that proper documentation was attached to the motor. The Team also observed that the motor was properly packaged and labeled. The Team, from the observation at the warehouse, confirmed that Flowserve provided all the information required by Areva‘s PO. The Team also determined that Areva provided quality attributes for its receipt inspectors to verify those attributes upon receipt of the motor and documented the results in the Receipt Inspection Record.

c. Conclusion

The Team determined that Areva translated the product specifications and quality requirements imposed by PEC into its PO to Flowserve, and that Areva's inspectors verified the quality attributes of the motors specified in the PO during receipt inspections. The Team determined that the required storage conditions in the warehouse were clean with no evidence of rodents. The Team noted that Areva conducts periodic audits of Flowserve to ensure that it implements its established quality assurance program during the manufacture of the valve operators.

3.5 Areva's Supply of Solenoid-operated Valves as Basic Components

a. Scope

The Team reviewed Dominion Generation's (Dominion) purchase order (PO) to Areva (formerly Framatome ANP, Inc.,) and Areva's PO to Automatic Switch Company (ASCO) for three 3-Way Solenoid Operated Valves (SOVs) to verify the adequacy of procurement documentation for a basic component. The inspection included verification that ASCO was listed on Areva's approved vendors list, a review of the methods Areva established to satisfy the requirements in Dominion's PO for the SOV, and a review of the following documents:

- Dominion (PO) 45525927 to Areva, dated July 12, 2007
- Areva Purchase Authorization (PA) 58001808, dated July 19, 2007, for three "3-Way" Solenoid Valves, 120/60VAC, Screw Terminal, ½" Conduit Connection 02112790"
- Areva Purchase Order 181154, dated October 26, 2006, for three "3-Way" Solenoid Valve, 120/60VAC Screw Terminal, ½" Conduit Connection 02112790" (This PO was a release against Blanket PO 3482, as revised by Change Orders 1-8.)
- Areva Receipt Inspection Record No: RIR-07-0242, dated March 6, 2007
- Areva NPC QA Documentation Approval Form for PO 181154, dated March 6, 2007
- ASCO Certificate of Compliance for Customer Blanket PO No. 3482/Customer Initial Release Order No. 181154, dated January 31, 2007

b. Observations and Findings

b.1. Purchase Orders

The Team examined the purchase orders from Dominion to Areva and Areva to ASCO and associated documents for the supply of three "3-way" SOVs. Areva had issued blanket PO 3482 to ASCO for the supply of SOVs with the understanding that whenever Areva received an order for specific SOVs, it placed the order on ASCO to supply the specific SOVs. The SOVs for Dominion had been purchased as safety-related items (basic components) from ASCO in accordance with Areva Product Specification No. 06-4000644-08 that sets forth the general and specific requirements for the procurement of SOVs under Blanket Purchase Order 3482.

Dominion issued PO No. 45525927 to Areva for the supply of three "3-way" SOVs, classified them as nuclear safety-related, and invoked compliance with the provisions of 10 CFR Part 21, and 10 CFR Part 50, Appendix B. Additionally, the PO required ASCO to certify that the SOVs met the requirements of ASCO Qualification Specification No. AQS-21678/TR, Rev. A (AQS-21678, Rev. B) and/or AQR-67368, Rev.1 (Qualification Specification AQS-21680, Rev. C). The Areva PO to ASCO, in which Areva Product Specification 06-4000644-08 was referenced, contained these requirements.

The qualification testing of the SOVs by ASCO was conducted on an SOV manufactured in accordance with ASCO's QA program and subjected to environmental and seismic qualifications tests in accordance with IEEE 323-1974, IEEE 382-1972, IEEE344-1975, IEEE 382-1980, IEEE 627-1980, AQS 21678/TR Rev. A, AQR 67368, Revision1, AQR 67484, Revision 0, and/or ASCO Engineering Report 351, Revision 2. The qualification testing and certification was completed without deleterious effects on the SOV. The principle behind the certification that an ASCO SOV meets the seismic and environmental qualification was that all SOVs subsequently manufactured will be identical in quality, and will meet or exceed the quality of the original SOV tested because ASCO will implement its QA program that meets 10 CFR Part 50, Appendix B, during the manufacturing process. The Product Specification required safety-related ACSO SOVs to be supplied such that the applicable Qualification Report may be applied and certified by ASCO.

Areva's Product Specification also required that for those components in the SOV that have limited shelf life, ASCO should identify the remaining valid shelf life for those components. Components such as "O-rings" and diaphragms in an SOV have limited shelf lives. The Team verified that ASCO documented the remaining shelf lives on the Nuclear Parts Center (NPC) QA Documentation Approval Forms and also provided them on the shipping containers, as described in the following section.

b. 2. Observations at Areva's Warehouse

The Team inspected the ASCO warehouse and verified that the information supplied by ASCO met the requirements stated in the Dominion PO for a like item stored in the warehouse because the SOVs listed in the PO that the Team reviewed had already been shipped to Dominion. The Team selected an SOV at random and verified that the shelf life expiration date, required storage conditions, and installation and maintenance instructions were present with the valve. The team also observed that the SOV was properly packaged and labeled. As a result of the observation at the warehouse, the Team concluded that all the information required to be provided by ASCO to Areva in the PO existed and that sufficient information was available to those performing receipt inspections to satisfy all of the requisite verifications on the Receipt Inspection Record.

The Team also observed that, as required by the Areva PO to ASCO, ASCO identified each SOV by its Part Number (NPKX8320A172E 10688 [catalog number]), and the operating voltage as 120/60 VAC. Additionally, Areva required ASCO to energize each SOV and checked it for proper operation prior to shipment. From the test log provided by ASCO, the Team verified that these tests had been performed on the SOVs.

Section 6 of the Areva Product Specification prescribed the documents that ASCO should supply with the PO. These included:

- A COC certifying that the SOV met the PO requirements for each line item.
- Required storage conditions
- Installation and maintenance instructions
- Manufacturing Test Log
- Shelf life limitations

ASCO provided a COC for each SOV. The COC stated that the SOV was manufactured and processed in accordance with the latest ASCO QA Manual and that it met Areva-specified Qualification Reports.

The Team reviewed a Nuclear Valve Test Log, and determined that ASCO, using Test Procedure TP-NP8320, conducted various tests, such as, a coil test, seat leakage (both energized and de-energized), operational test, external leakage test, test procedure 1-035, a noise test, and a verification that each SOV operated at the minimum (degraded voltage) of 102/60VAC.

The Team observed that ASCO provided the following information that was either affixed to or contained inside the shipping container:

- The shelf life limitations and required storage conditions were maintained on a label on the outside of the box.
- The installation and maintenance instructions were included on a brochure that was packaged with the SOV.
- Areva's inspector documented that these documents were received during the receipt inspection.
- A label on the shipping container identified the required storage conditions and shelf life limitations.
- The installation and maintenance instructions were sent to the customer (Dominion) with the SOV.

Receipt Inspection Record, RIR-07-0242, which was competed upon receipt of the SOVs, indicated that Areva inspectors verified the following attributes for each SOV:

- The SOV was not damaged during shipment
- The identification and markings on the SOV met the PO requirements, and
- ASCO had supplied documentation and test results.

Areva staff stated that after receipt inspection, the valves were repackaged in accordance with Areva OI-1216. The valve and all the included instructions were sealed in plastic along with a desiccant and placed in the original shipping container with bubble wrap. These actions are consistent with Criteria XIII of 10 CFR Part 50, Appendix B, in that the control, the handling, storage, shipping, cleaning, and preservation of material and equipment were in accordance with work and inspection instructions to prevent damage or deterioration.

Areva completed an NPC QA Documentation Approval Form, to be maintained in its records, as evidence that each SOV met the criteria required by the PO and Product Specification. This form identified the serial numbers for the SOVs and the shelf life expiration dates.

c. Conclusion

The Team identified no adverse conditions to quality related to Areva's procurement of three "3-way" SOVs manufactured by ASCO that were subsequently furnished to Dominion as basic components. Areva translated all the quality and technical requirements from Dominion's PO into its PO to ASCO, and furnished to Dominion all the required quality documents for the three "3-way" SOVs. The warehouse where Areva stored its inventory items was clean and free from rodents. The Team verified that ASCO was on Areva's ASL. Areva conducts audits on ASCO

to verify that it implemented its established QA program during the manufacture of the SOVs, and therefore accepted the COCs provided by ASCO.

4.0 Management Meetings and Personnel Contacted

4.1 Entrance and Exit Meetings

In the entrance meeting on October 9, 2007, the inspectors discussed the scope of their inspection, outlined the documents to be inspected, and established interfaces with the relevant Areva staff and personnel. During the exit meeting on October 12, 2007, the inspectors discussed the inspection findings and observations with Areva's staff and the Vice President, U.S. Region Quality.

4.2 Persons Contacted

Areva NP, Inc.

J. Bartleman	Manager, Corrective Action Program
R. Gardner	Manager, Site Operations & Regulatory Affairs
E. Mayhew	Vice President, U.S. Region Quality
H. Prasse	Manager Operations Support
V. Montalbano	Manager, Quality Operations
F. Starr	Quality Specialist
T. Warner	Manager, Quality Audits Programs
H. Wiger	Supervisory Engineer