May 10, 2017

Mr. Victor Montalbano, Vice President
Quality and Performance
AREVA Inc.
155 Mill Ridge Rd.
Lynchburg, VA 24502

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION OF AREVA INC.
REPORT NO. 99901359/2017-201

Dear Mr. Montalbano:

From March 27 through March 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the AREVA Inc. facility in Lynchburg, VA. The purpose of this limited-scope inspection was to assess AREVA Inc.'s compliance with the provisions of selected portions 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," and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

This inspection focused on AREVA Inc.'s documentation and evaluation of potential carbon macrosegregation issues in forgings supplied by AREVA for U.S. operating nuclear power plants. Specifically, the NRC inspection reviewed documentation to verify that forgings meet the ASME code requirements for carbon content and mechanical properties. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance (QA) or 10 CFR Part 21 programs.

Within the scope of this inspection, no violations or nonconformances were identified.

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 at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response, (if applicable), 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 Paul Prescott Acting for/

Kerri A. Kavanagh, Chief
Quality Assurance Vendor Inspection Branch-3
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 99901359

Enclosure:
Inspection Report 99901359/2017-201
and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION OF AREVA INC. REPORT NO. 99901359/2017-201

Dated: May 10, 2017

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NAME	TKendzia	KKavanagh (PPrescott for)	
DATE	05/08/17	05/09/17	

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

Docket No.:	99901359
Report No.:	99901359/2017-201
Vendor:	AREVA Inc. 155 Mill Ridge Rd. Lynchburg, VA 24502
Vendor Contact:	Mr. Gary Peters Director Licensing and Regulatory Affairs Telephone: 434-832-3945 E-mail: Gary.Peters@areva.com
Background:	AREVA Inc. is functionally a separate company of AREVA serving North America. AREVA Inc. provides safety related products and services for the U.S. operating nuclear power plants, including replacements for reactor coolant pressure boundary components. AREVA NP provides safety related products and services for the operating nuclear power plants in France and internationally. AREVA NP provides reactor coolant pressure boundary components it assembles from forgings to ARVEA Inc. and other vendors, and it provides forgings to other vendors who assembly them and supply them to U.S. operating nuclear power plants. AREVA Creusot Forge is a subsidiary of AREVA NP that provides forgings to AREVA NP.
Inspection Dates:	March 27-31, 2017
Inspection Team Leader:	Thomas Kendzia, NRO/DCIP/QVIB-3
Inspectors:	Michelle Hayes, NRO/DCIP/QVIB-3 Christopher Hovanec, NRR/DE/EVIB
Approved by:	Kerri A. Kavanagh, Chief Quality Assurance Vendor Inspection Branch-3 Division of Construction Inspection and Operational Programs Office of New Reactors

Enclosure

EXECUTIVE SUMMARY

AREVA Inc.
99901359/2017-201

The U.S. Nuclear Regulatory Commission (NRC) conducted this vendor inspection to verify that AREVA Inc. has implemented an adequate quality assurance (QA) program that complies 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," and 10 CFR Part 21, "Reporting of Defects and Noncompliance." This was the first NRC vendor inspection of AREVA Inc., AREVA Inc.'s predecessor AREVA NP Inc. was last inspected in 2011.

This inspection specifically evaluated AREVA Inc.'s implementation of QA activities related to the manufacturing processes used by AREVA Creusot Forge (ACF) to fabricate in-service U.S. components and the resulting mechanical properties, the supporting documentation for the actual forgings used for U.S. operating nuclear power plants, the timeliness and effectiveness of corrective actions, and implementation 10 CFR Part 21.

The NRC inspection team also performed a facility walk down to verify, in part, that:

- Part 21 postings were in place

The following regulations served as the bases for this NRC inspection:

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

The NRC inspection team used Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance."

The information below summarizes the results of this inspection.

Part 21

The NRC inspection team determined that AREVA Inc.'s 10 CFR Part 21 program meets the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that AREVA Inc. is implementing its policies and procedures associated with the 10 CFR Part 21 program. No findings of significance were identified.

Nonconformances and Corrective Actions

The NRC inspection team determined that AREVA Inc.'s Nonconformance and Corrective Action programs meet the regulatory requirements of Criterion XV, Nonconforming Materials, Parts, or Components, and Criterion XVI, Corrective Action, to Appendix B of 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that AREVA Inc. is implementing its policies and procedures associated with the Nonconformance and Corrective Action programs. No findings of significance were identified.

Material Processing and Properties

The NRC inspection team determined that the likelihood of the pressurizer shells or heads containing regions of carbon macrosegregation is low based on a combination of the: location of the components in the ingot; location of test specimen(s) taken from the forging; carbon composition profile of the hollow ingot; and combination of material removed from the top regions of the conventional ingot during the discard and machining processes.

The NRC inspection team determined that the likelihood of the reactor pressure vessel (RPV) components containing regions of carbon macrosegregation is low based on a combination of the: ingots being trepanned; location of test specimen(s) taken from the forging; and supplemental test results.

The NRC inspection team determined that the likelihood of the steam generator (SG) primary heads produced from Lingot à Solidification Dirigée (LSD) ingots and SG shells containing regions of carbon macrosegregation is low based on a combination of the: LSD mold design; chemistry results from representative material; location of test specimen(s) taken from the forging; and ingots being trepanned.

The information reviewed did not challenge the NRC's preliminary determination on the topic of carbon macrosegregation: that the safety significance to the U.S. fleet appears to be negligible. Based on the limited sample of documents reviewed, the NRC inspection team determined that AREVA Inc. is also effectively implementing its policies and procedures governing design control in regards to potential carbon macrosegregation issues. No findings of significance were identified.

REPORT DETAILS

1. Part 21

   a. Inspection Scope

   The NRC inspection team reviewed the policies and implementing procedures of AREVA Inc. that govern the facility's compliance with the requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance." The NRC inspection team also verified that AREVA Inc.'s nonconformance and corrective action procedures provide a link to the 10 CFR Part 21 program. In addition, the NRC inspection team evaluated AREVA Inc.'s implementation of the 10 CFR Part 21 screening and reporting process, including the technical basis for reporting or not reporting and meeting the regulatory time requirements for implementing the process. Specifically, the NRC inspection team reviewed twelve condition reports that were screened as not requiring reporting, and one condition report that required notification to the purchaser of a deviation that required the purchaser to determine if the deviation could cause a substantial safety hazard in accordance with 10 CFR 21.21(b). The NRC inspection team also reviewed the documentation associated with AREVA Inc.'s Interim Report to the NRC of an evaluation of a deviation in accordance with 10 CFR 21.21(a)(2), that AREVA Inc. made for AREVA NP on December 7, 2016. The NRC inspection team also verified two 10 CFR Part 21 postings for compliance with the requirements of 10 CFR 21.6. Furthermore, the NRC inspection team discussed the 10 CFR Part 21 program with AREVA Inc.'s management and technical staff to ensure their understanding of the 10 CFR Part 21 requirements.

   The attachment to this inspection report lists the individuals interviewed and documents reviewed by the NRC inspection team.

   b. Observations and Findings

   No findings of significance were identified.

   c. Conclusion

   The NRC inspection team determined that AREVA Inc.'s 10 CFR Part 21 program meets the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that AREVA Inc. is implementing its policies and procedures associated with the 10 CFR Part 21 program. No findings of significance were identified.

2. Nonconformances and Corrective Action

   a. Inspection Scope

   The NRC inspection team reviewed AREVA Inc.'s nonconformance and corrective actions policies and procedures to verify compliance with Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The NRC inspection team verified that AREVA Inc. had established and implemented procedures for correcting conditions adverse to quality and that nonconformances were promptly identified and corrected. With regard to significant conditions adverse to quality (SCAQ), the NRC inspection team confirmed that AREVA

Inc. had established and implemented procedures to ensure (1) proper identification of the causes, (2) documentation of the corrective actions to prevent recurrence, and (3) reporting of the SCAQs and actions taken to the appropriate levels of management. In addition, the NRC inspection team confirmed that the corrective action program (CAP) provides a connection to evaluate for 10 CFR Part 21 requirements.

The NRC inspection team reviewed 12 condition reports (CRs) related to potential carbon macrosegregation for forgings manufactured by AREVA Creusot Forge (ACF). This detailed review focused on the adequacy of CR screening, cause identification, corrective action, extent of condition, and completion of corrective action, in accordance with AREVA Inc. procedures and regulatory requirements. The NRC inspection team verified the CRs were promptly initiated, the dispositions were technically based, the dispositions had reasonable conclusions, and that the CRs were processed and completed within the required time frames. The NRC inspection team interviewed various personnel on their knowledge of the CR process, and their ability to use the process.

The attachment to this inspection report lists the individuals interviewed and documents reviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team determined that AREVA Inc.'s Nonconformance and Corrective Action programs meet the regulatory requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," to Appendix B of 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that AREVA Inc. is implementing its policies and procedures associated with the Nonconformance and Corrective Action programs. No findings of significance were identified.

3. Material Processing and Properties

a. Inspection Scope

The NRC inspection team reviewed the manufacturing processes used by ACF to fabricate in-service U.S. components and the resulting mechanical properties. The U.S. components produced by ACF are provided in Attachment A of letter dated February 3, 2017 (Agencywide Documents Management System (ADAMS) Accession No. ML17040A100). The NRC inspection team activities primarily focused on the:

1) thermomechanical processing of the forged components to identify processing attributes capable of impacting carbon macrosegregation;
2) component-specific chemistry and mechanical property data to assess the level of conservatism in evaluating the impact of postulated carbon macrosegregation on U.S. in-service components; and
3) preliminary results generated from international test programs characterizing mechanical properties as a function of carbon content for similar alloys.

For its review, the NRC inspection team selected representative samples for each component type and processing route used by ACF. The reviews were conducted at the generic processing level and component-specific level. The NRC inspection team reviewed documentation associated with the focus areas outlined above, including the evaluation of: quality assurance data packages; manufacturing plans; internal travelers and manufacturing sheets, and certified material test reports (CMTRs). The NRC inspection team also interviewed experts from ACF and was provided with technical presentations. The presentations included an overview of the typical manufacturing processes used at ACF, a generic risk assessment for the likelihood of carbon macrosegregation, and a summary of the preliminary results from ongoing international test programs.

The NRC inspection team reviewed an engineering evaluation resulting from the ACF records review, to verify that it was consistent with the requirements of Criteria III, "Design Control," to Appendix B of 10 CFR Part 50. All documents the NRC inspection team reviewed were verified that they appeared to be retrievable, appropriately stamped, and contained no obvious erasures or unapproved corrections.

b. Observations and Finding

The NRC inspection team reviewed the results of the generic risk assessment performed by ACF to rank components based on their likelihood of containing regions of carbon macrosegregation. The generic risk assessment performed by ACF considered information including: component configuration, ingot type, ingot weight, ingot discard ratio, manufacturing sequence, and results obtained during the qualification of similar components (not limited to U.S. components). The ACF generic risk assessment results proposed that the reactor pressure vessel (RPV) components, pressurizer components, steam generator (SG) shells, SG secondary heads, and SG primary heads produced from Lingot à Solidification Dirigée (LSD) type ingots be ranked as nil, very low, or low likelihood of containing regions of carbon macrosegregation. The ACF generic risk assessment did not consider any component-specific information, such as measured chemistries or test specimen locations, which provides a level of conservatism in the ACF proposed ranking for U.S. components.

The NRC inspection team did review component-specific information for U.S. components and found it appropriate to rank the likelihood of these components containing regions of carbon macrosegregation as low. Components types that have been identified as being impacted by carbon macrosegregation in foreign plants were ranked "high" in the ACF generic risk assessment. The NRC inspection team did not discover any new processing or testing information pertinent to the likelihood of these component types in the U.S. containing regions of carbon macrosegregation. The generic ranking only provides information on the likelihood of a component type being impacted by carbon macrosegregation. The generic ranking does not consider component-specific information nor does it guarantee that a component has a region of carbon macrosegregation or imply any safety issue with the component. The information reviewed did not challenge the NRC's preliminary determination on the topic of carbon macrosegregation: that the safety significance to the U.S. fleet appears to be negligible.

The U.S. components produced by ACF are used in assembling RPVs, SGs, and pressurizers. The NRC inspection team reviewed the generic processing routes for each component type. The component types and processing routes reviewed are shown in Table 1. The locations of specimen(s) extracted from the forgings were also reviewed to determine if the test results provide information relevant to the likelihood of the component containing regions of carbon macrosegregation. All of the components reviewed were produced to the requirements of American Society of Mechanical Engineers (ASME) Code material specifications SA-508, "Specification for Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels," Grade 3 Class 1 or Grade 3 Class 2.

Table 1: Component types and processing routes reviewed by the NRC inspection team.

Assembly	Component Type	Ingot Type			Trepanned	Ingot Weight[2] (MT)	
		Conventional	LSD[1]	Hollow		< 150	≥ 150
Steam Generator	Secondary Head / Elliptical Head	X					X
	Upper Shell / Barrel			X			X
			X		Yes	X	
	Conical Shell			X			X
			X		Yes	X	
	Lower Shell / Barrel			X		X	
			X		Yes	X	
	Tubesheet	X				X	X
	Primary Head / Channel Head	X					X
			X			X	
Reactor Pressure Vessel	Monoblock Head	X					X
	Closure Head Flange	X			Yes	X	
	Vessel Shell	X			Yes	X	
Pressurizer[3]	Upper Head	X					X
	Lower Head						
	Upper Shell			X			X
	Lower Shell						

1. Lingot à Solidification Dirigée (LSD) is French meaning oriented solidification ingot.
2. Ingot weight can be related to ingot type and mold design. Ingot weight of 150 metric tons was selected to provide an indication of ingot size.
3. A set of two heads or a set of two shells produced from a single ingot.

The NRC inspection team reviewed the documentation associated with the manufacturing of the pressurizer shells and heads. The pressurizer upper and lower shells are both produced from a single hollow ingot. The pressurizer lower shells are extracted from a portion of the ingot, away from the positive segregation zone, that precludes the presence of carbon macrosegregation in the final component. The pressurizer upper shells had product testing performed in a location that would directly sample the carbon macrosegregation if present. The pressurizer upper and lower heads are both produced from a single conventional ingot. The pressurizer lower heads are extracted from a portion of the ingot, away from the positive segregation zone, that precludes the presence of carbon macrosegregation in the final component. The pressurizer upper heads had tensile specimen(s) removed from locations on the forging that correspond to regions close to the top of the ingot. Carbon macrosegregation is a localized phenomenon and the samples taken may not guarantee that carbon macrosegregation would be identified. The NRC inspection team noted that the amount of material removed from the upper head forgings during the machining was significant, relative to removing regions of carbon macrosegregation potentially remaining from the ingot. The NRC inspection team determined that the likelihood of the pressurizer shells or heads containing regions of carbon macrosegregation is low based on a combination of the: location of the components in the ingot; location of test specimen(s) taken from the forging; carbon composition profile of the hollow ingot; and combination of material removed from the top regions of the conventional ingot during the discard and machining processes.

The NRC inspection team reviewed the documentation associated with the manufacturing of the RPV core shells, monoblock heads, and closure head flanges. The RPV shells are produced from a conventional ingot that is trepanned (a method of drilling) to remove the center of the ingot after discarding a percentage of the ingot top. The top center of the ingot is the region containing the carbon macrosegregation. The RPV closure head flange is also produced from a conventional ingot that is trepanned to remove the center of the ingot after discarding a percentage of the ingot top. Additionally, the product chemistry measurements for the RPV closure head flange are taken in locations that are likely to directly sample carbon macrosegregation, if it were present. The RPV monoblock head is produced from a conventional ingot. The NRC inspection team reviewed supplementary chemistry and mechanical test data from specimens removed from the thickness of the RPV head near the center dome. The supplementary data complied with the applicable ASME Code requirements. Carbon macrosegregation is a localized phenomenon and the samples taken may not guarantee that carbon macrosegregation would be identified. The NRC inspection team determined that the likelihood of the RPV components containing regions of carbon macrosegregation is low based on a combination of the: ingots being trepanned; location of test specimen(s) taken from the forging; and supplemental test results.

The NRC inspection team reviewed the documentation associated with the manufacturing of the SG heads and shells. The SG primary heads (also termed SG channel heads) were produced using two separate processing routes. SG primary heads were produced using conventional ingots. SG primary heads were also produced using a processing route that utilized an ingot mold design specifically developed to minimize carbon macrosegregation. The ingot mold design affects the solidification of the molten steel and produces what is termed an LSD ingot. The NRC inspection team reviewed chemical analysis results from testing performed on representative LSD material that were compliant with the applicable material specification requirements.

The chemistry measurements for the representative LSD material were taken in locations that would directly sample carbon macrosegregation if it were present. The chemistry results were in a range comparable to the ladle and product analysis. The SG secondary heads (also termed SG elliptical heads) and tube sheets are produced using conventional ingots. The SG shells are produced using both hollow and LSD ingots. The LSD ingots and their likelihood of containing carbon macrosegregation is similar to that of the LSD ingot used for the SG primary heads. Additionally, the SG shells produced using the LSD ingots are trepanned. The SG shells produced from a hollow ingot had product testing performed in a location that would directly sample the carbon macrosegregation, if present. The NRC inspection team determined that the likelihood of the SG primary heads produced from LSD ingots and SG shells containing regions of carbon macrosegregation is low based on a combination of the: LSD mold design; chemistry results from representative material; location of test specimen(s) taken from the forging; and ingots being trepanned.

In addition to reviewing the material processing information for the U.S. components, the NRC inspection team also reviewed component-specific chemistry, tensile test, drop weight test, and Charpy impact test results. The component-specific test results most relevant to the topic of carbon macrosegregation that were reviewed are provided in Table 2. The chemistry requirements for alloy SA508 Grade 3 sets a maximum weight percent carbon (%C) of 0.25. The maximum carbon level of 0.25 percent applies to both the ladle chemistry (measured in the melt) and the product chemistry (measured on the forging). Reference temperature of nil ductility transition (RT_{NDT}) is the variable impacted by carbon macrosegregation that is most likely to affect the operational safety of pressure boundary components. The level of carbon in a segregated region will affect the magnitude of a shift in RT_{NDT}. Large shifts in RT_{NDT} could leave the material susceptible to brittle fracture. The range of carbon content and RT_{NDT} values observed during the inspection provided information to the NRC inspection team on the level of conservatism in evaluating the impact of postulated carbon macrosegregation on U.S. in-service components. All of the aforementioned test results reviewed by the NRC inspection team complied with the applicable ASME Code material requirements.

Table 2: Range in carbon content, reference temperature of nil ductility transition, and ingot discard for the component types and processing routes outlined in Table 1.

Range	Ladle Chemistry[1] (%C)	Product Chemistry (%C)	RT_{NDT} (°F)	Top Ingot Discard[2] (%)
Maximum	0.21	0.23	-4	21.5
Minimum	0.17	0.15	-30	16.4

1. Carbon content in the melt is the weighted average of two ladle pours used to produce a single ingot.
2. The top ingot discard range is only for conventional ingots of 150 metric tons or greater used to produce in-service components.

The NRC inspection team reviewed preliminary results generated by ongoing international test programs characterizing mechanical properties as a function of carbon content for alloys similar to those in U.S. components. A plot representing the shift in RT_{NDT} as a function of carbon content showed that an increase of carbon from 0.18 to 0.29 percent is bounded by a RT_{NDT} shift of 126°F (70°C). The NRC inspection team was informed that additional test results indicated that a further increase in carbon content from 0.29 to 0.40 percent does not result in an equivalent further shift in RT_{NDT} and that the magnitude of the additional shift is significantly reduced. The information provided during this overview of preliminary test results does not challenge the NRC's preliminary safety determination on the topic of carbon macrosegregation.

c. Conclusions

The NRC inspection team determined that the likelihood of the pressurizer shells or heads containing regions of carbon macrosegregation is low based on a combination of the: location of the components in the ingot; location of test specimen(s) taken from the forging; carbon composition profile of the hollow ingot; and combination of material removed from the top regions of the conventional ingot during the discard and machining processes.

The NRC inspection team determined that the likelihood of the RPV components containing regions of carbon macrosegregation is low based on a combination of the: ingots being trepanned; location of test specimen(s) taken from the forging; and supplemental test results.

The NRC inspection team determined that the likelihood of the SG primary heads produced from LSD ingots and SG shells containing regions of carbon macrosegregation is low based on a combination of the: LSD mold design; chemistry results from representative material; location of test specimen(s) taken from the forging; and ingots being trepanned.

The information reviewed did not challenge the NRC's preliminary determination on the topic of carbon macrosegregation: that the safety significance to the U.S. fleet appears to be negligible. Based on the limited sample of documents reviewed, the NRC inspection team determined that AREVA Inc. is also effectively implementing its policies and procedures governing design control in regards to potential carbon macrosegregation issues. No findings of significance were identified.

4. Entrance and Exit Meeting

On Monday, March 27, 2017, the NRC inspection team discussed the inspection scope during an entrance meeting with Victor Montalbano, Vice President Quality & Performance, and other members of AREVA Inc.'s and AREVA NP's management and technical staff. On Friday, March 31, 2017, the NRC inspection team presented the inspection results during an exit meeting with Gary Mignogna, Chief Executive Officer, and other members of AREVA Inc.'s management and technical staff. The attachment to this report lists the attendees of the entrance and exit meetings, as well as those individuals whom the NRC inspection team interviewed.

ATTACHMENT

1. ENTRANCE/EXIT MEETING ATTENDEES

Name	Title	Affiliation	Entrance	Exit	Interviewed
Gary Mignogna	Chief Executive Officer	AREVA Inc.		X	
Victor Montalbano	Vice President, Quality and Performance	AREVA Inc.	X	X	X
Denise Woernle	Vice President, Communication	AREVA Inc.		X	
Gary Peters	Director, Licensing and Regulatory Affairs	AREVA Inc.	X	X	X
Jeff Fleck	Director, NSSS Engineering	AREVA Inc.	X	X	X
Gayle Elliott	Deputy Director, Licensing and Regulatory Affairs	AREVA Inc.	X	X	X
David Royer	General Counsel	AREVA Inc.		X	
Gary Szabatura	Manager, Quality Programs	AREVA Inc.	X	X	X
Craig Chiodo	Manager, Corrective Action Program	AREVA Inc.	X	X	X
David Cofflin	Manager, Component Analysis & Fracture Mechanics Section	AREVA Inc.	X	X	X
Brian Haibach	Manager, NSSS Materials	AREVA Inc.	X	X	X
Pavan Thallaprauada	Manager, Materials & Structural Analysis Unit	AREVA Inc.	X	X	
Nick Smile	Manager, Quality Assurance	AREVA Inc.	X	X	
Lawrence French	Manager, Quality Assurance	AREVA Inc.	X		
Mike Street	Manager Component Manufacturing USA	AREVA Inc.	X		X
Thierry Berger	BM CU Technical Quality Safety Department Manager	AREVA NP	X		X
Mathrew DeVan	Advisory Engineer, NSSS	AREVA Inc.	X	X	X
M. Craig Scott	Advisor Engineer, Component Engineering	AREVA Inc.	X	X	X
Fran Starr	Quality Specialist	AREVA Inc.	X	X	
Susan Andrews	Quality Specialist	AREVA Inc.	X	X	
Jamey Laughlin	Quality Specialist	AREVA Inc.	X	X	
Thomas Kendzia	Team Lead	NRC	X	X	
Michelle Hayes	Reactor Operations Engineer	NRC	X	X	
Christopher Hovanec	Materials Engineer	NRC	X		
Dave Rudland	Branch Chief	NRC		X*	
Kerri Kavanagh	Branch Chief	NRC		X*	

*Participated by phone

2. INSPECTION PROCEDURES USED

IP 43002 “Routine Inspections of Nuclear Vendors,” dated July 15, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No.ML13148A361)

IP 36100, Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance,” dated February 13, 2012 (ADAMS Accession No. ML113190538)

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

None.

4. DOCUMENTS REVIEWED

AREVA Inc. Procedures

Quality Assurance Program (Rev. 4), 56-9141754-004, dated July 25, 2016

ASME Section III, Div.1 & Section XI/NBIC Quality Assurance Manual (Rev. 34), 56-1151178-34, dated July 26, 2016

Corrective Action Program, 1717-06 Rev. 13, dated June 24, 2016

Implementation of 10 CFR 21, 1707-01 Rev. 46, dated January 13, 2017

Quality Assurance Data Packages and Certificates of Conformance, 1705-03, Rev. 35, dated November 2, 2016

Contract Variation Approval Request, 0405-05 Rev. 28, dated November 30, 2016

Developing and Revising Specifications and Systems Descriptions, 0412-55 Rev. 33, dated December 16, 2016

Engineering Technical Documents, 0412-59 Rev. 27, dated October 19, 2016

Control of Nonconforming Items and Corrective Action Program – Condition Reports

Condition Reports (CRs) 2015-3456, 2015-4434, 2015-4623, 2015-5688, 2015-7333, 2015-7771, 2015-10461, 2016-458, 2016-1570, 2016-3426, 2016-8171, and 2017-1726

Data packages for parts sold by AREVA Inc.

Quality Assurance Data Package for Dominion North Anna 1, Reactor Vessel Closure Head Flange, 23-5024456-00, dated October 2, 2003

Quality Assurance Data Package for Dominion Surry 1, Reactor Vessel Closure Head Flange, 23-5026279-01, dated April 17, 2003

Quality Assurance Data Package for Dominion Millstone 2, Replacement Pressurizer, 23-9030023-001, dated September 7, 2006

Quality Assurance Data Package for Florida Power & Light, St Lucie Unit 1, Replacement Pressurizer Vessel, 23-9003280-003, Revision 3, dated March 11, 2005

Quality Assurance Data Package for Dominion North Anna 2, Replacement Reactor Vessel Closure Head, 25-5022997-1, dated October 18, 2002

Data packages for components mfg. by ACF, but NOT sold by AREVA Inc. Data was made available by ACF technical expert at NRC request

Beaver Valley, Steam Generator Tube Plate Forging: Quality Assurance Data Package for ENSA, Beaver Valley, Customer OMB2/001; CFI Order: 820010.02, Heat E3981, CMTR #1518 for Beaver Valley Unit 1, Rev.4, dated September 25, 2003

Comanche Peak, Steam Generator Tube Plate Forging: Quality Assurance Data Package for ENSA, Comanche Peak, Customer OCH2/003 Rev. 1; CFI Order: 83531.01, Heat S4683/S4684, CMTR #1604 for Comanche Peak, dated April 15, 2004

Watts Bar Unit 1, Steam Generator Secondary Head Item 1: Doosan TVA Watts Bar Unit 1 RSG, Customer Order 110051354 Rev. 6, CFI Order 821210.01 Heats S0681/S0682, Secondary Head Item 1, CMTR #1541 for TVA Watts Bar Unit 1 RSG (Secondary Head Item 1), Contract #16346, dated November 17, 2003

Watts Bar Unit 1, Steam Generator Secondary Head Item 2: Doosan TVA Watts Bar Unit 1 RSG, Customer Order 110051354 Rev. 7, CFI Order 821210.01 Heats S0681/S0682, Secondary Heat Item 2, CMTR #1542 for TVA Watts Bar Unit 1 RSG, (Secondary Head Item 2), Contract #16346, dated November 17, 2003

Sequoyah 1, Steam Generator Lower Shell, Item #1:Hanjung, Customer Order 211866 Rev. 2, CFI Order 80030001 Heat R0482,CMTR 1347 Rev. 3 for Hanjung 211866 Rev. 2

Certified Material Test Report No. 1540 for TVA Watts Bar Unit 1 RSG, Contract No. 16346, December 28, 2003

Internal Manufacturing Traveler Sheets No. 82081001, December 5, 2002, for TVA Watts Bar Unit 1 RSG

Certified Material Test Report No. 1646 for Comanche Peak – Unit 1, October 10, 2006

Internal Manufacturing Traveler Sheets No. 84001001, October 1, 2004, for Comanche Peak – Unit 1

Internal Manufacturing Traveler Sheets No. 11321001, November 4, 2003, for Comanche Peak – Unit 1

Certified Material Test Report No. 1868 for A.N.O. 2, June 28, 2006

Internal Manufacturing Traveler Sheets No. 85151001, March 13, 2005, for A.N.O. 2

Certified Material Test Report No. 1349 for Hanjung, Revision 4, December 11, 2000

Internal Manufacturing Traveler Sheets No. 89590001, April 14, 2000, for Hanjung

Certified Material Test Report No. 1356 for Hanjung, Revision 3, December 12, 2000

Internal Manufacturing Traveler Sheets No. 89590010, August 30, 2000, for Hanjung

Internal Manufacturing Traveler Sheets No. 89590011, August 30, 2000, for Hanjung

Internal Manufacturing Traveler Sheets No. 89590026, August 30, 2000, for Hanjung

Certified Material Test Report for VC Summer Order 724103, December 11, 1992

Internal Manufacturing Traveler Sheets No. 108965, April 06, 1994, for V.C. Summer

Certified Material Test Report for VC Summer Order 108966, February 2, 1993

Internal Manufacturing Traveler Sheets No. 108966, September 18, 1992, for V.C. Summer

Certified Material Test Report No. 1546 for Beaver Valley Unit 1, Revision 1, December 15, 2003

Internal Manufacturing Traveler Sheets No. 82161001, May 5, 2003, for Beaver Valley Unit 1

Internal Manufacturing Traveler Sheets No. 700814/54, June 23, 1970, for Prairie Island

Internal Manufacturing Traveler Sheets No. 700814/54, July 28, 1970, for Prairie Island

Internal Manufacturing Traveler Sheets No. 700772/54, September 3, 1969, for Prairie Island

Internal Manufacturing Traveler Sheets No. 700772/54, October 15, 1969, for Prairie Island

Other

AREVA Approved Supplier List, (document is maintained live so no revision number or date)

AREVA NP Discrepancy Notice (AREVA NP nonconformance report), 9023659, dated March 30, 2017

AREVA NP Discrepancy Notice (AREVA NP nonconformance report), 9023687, dated March 30, 2017

AREVA Inc. letter to the NRC, Interim Report of an Evaluation of a Deviation Pursuant to 10 CFR 21.21(a)(2), dated December 7, 2016

AREVA NP (Engineering Evaluation), D02-TFPF-IN-17-0100 Rev. A, dated March 18, 2017

AREVA NP guidance document (Directs technical expert to verify engineering evaluation), Note d'organisation du Projet Conformite Creusot Forge, D02-ARV-01-108-346, dated March 18, 2017

PCCF-Guide des Activities du Pole Technique (Explains how Engineering team shall perform evaluation), D002-ARV-01-109-056, dated March 17, 2017

Procedure de traitement des ecarts– Project Conformite Creusot Forge (Explains the creation of the Project Team), D02-ARV-01-108-602, dated March 17, 2017

EPM-17-TB-098, Evaluation of the risk of presence of residual positive segregation on the Millstone Unit 2 replacement pressurizer heads, Revision A, February 21, 2017

EPM-17-TB-097, Revision A, Evaluation of the risk of presence of residual positive segregation on the St. Lucie Unit 1 replacement pressurizer heads, February 21, 2017

Manufacturing Program PTF 052, Revision C, November 16, 2004

Manufacturing Program PFT 051, Revision B, October 26, 2004

Manufacturing Program PTF-021, Revision B, March 25, 2004

Consigne Technique, Regles pour le chutage tete et pided, AREVA NP Creusot Forge CF CT F025, Revision 1

Corrective Action Report Number 05051, October 21, 2005, for Beaver Valley

5. CRs Submitted During the Inspection

2017-2131, 2017-2163, and 2017-2164

6. ACRONYMS USED

ACF	AREVA Creusot Forge
ASME	American Society of Mechanical Engineers
CR	condition report
CFR	*Code of Federal Regulations*
CMTR	Certified Material Test Reports
IP	inspection procedure
LSD	Lingotà Solidification Dirigée
NRC	U.S. Nuclear Regulatory Commission
NRO	Office of New Reactors
QA	quality assurance
RPV	reactor pressure vessel
RTNDT	reference temperature of nil ductility transition
SG	Steam Generator
%C	percent carbon