December 18, 2020

Mr. Paul Garcia
Manager, MS &CI, Quality & Training
Framatome Fuel Fabrication
2101 Horn Rapids Road
Richland, WA

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION REPORT OF FRAMATOME FUEL FABRICATION FACILITY – RICHLAND, WASHINGTON, NO. 99902083/2020-201

Dear Mr. Garcia:

From October 27 through October 29, 2020, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at Framatome Fuel Fabrication (hereafter referred to as Framatome) facility in Richland, WA. This limited-scope routine inspection assessed Framatome's compliance with 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 technically-focused inspection specifically evaluated Framatome's implementation of the quality activities associated with: 1) design, analysis, and corrective actions associated Emergency Core Cooling System Performance Evaluations CASMO4/MICROBURN-B2 and Fuel Performance Modeling; 2) nonconforming materials, parts, or components; 3) and safety conscience work environment. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of Framatome's overall quality assurance (QA) or 10 CFR Part 21 programs.

Based on the results of this inspection, the NRC inspection team found the implementation of your QA program met the applicable technical and regulatory requirements imposed on you by your customers or NRC licensees. No findings of significance were identified.

In accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," of the NRC's "Rules of Practice," a copy of this letter, and its enclosure(s), will be made available electronically for public inspection in the NRC Public Document Room and from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning this matter, please contact Ms. Andrea Keim of my staff at (301) 415-1671.

Sincerely,

/RA by Paul Prescott for/

Kerri A. Kavanagh, Chief
Quality Assurance and Vendor Inspection Branch
Division of Reactor Oversight
Office of Nuclear Reactor Regulation

Docket No.: 99902083

EPID No.: I-2020-201-0029

Enclosure:
1. Inspection Report No. 99902083/2020-201
   and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION REPORT OF FRAMATOME FABRICATION FACILITY - Richland, Washington, NO. 99902083/2020-201. DATED: DECEMBER 18, 2020

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DATE	12/9/2020	12/10/2020	12/14/2020
OFFICE	NRR/DSS/SFNB	NRR/DRO/IQVB	
NAME	BParks	KKavanagh (PPresscott for)	
DATE	12/10/2020	12/18/2020	

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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF REACTOR OVERSIGHT
QUALITY ASSURANCE AND VENDOR INSPECTION REPORT

Docket No.:	99902083	
Report No.:	99902083/2020-201	
Vendor:	Framatome Fuel Fabrication - Richland 2101 Horn Rapids Road Richland, WA 99534	
Vendor Contact:	Mr. Paul Garcia Manager, MS &CI, Quality & Training Email: Paul.Garcia@framatome.com Phone: 509-375-8332	
Nuclear Industry Activity:	Framatome Fuel Fabrication’s scope of supply includes nuclear fuel design and fabrication, fuel related services, on-site services, and safety-related software for U.S. operating nuclear power plants.	
Inspection Dates:	October 27, 2020 – October 29, 2020	
Inspection Team Leader	Andrea Keim	NRR/DRO/IQVB
Inspectors:	Dong Park	NRR/DRO/IQVB
Technical Specialists:	Benjamin Parks Kevin Heller	NRR/DSS/SFNB NRR/DSS/SFNB
Approved by:	Kerri A. Kavanagh, Chief Quality Assurance and Vendor Inspection Branch Division of Reactor Oversight Office of Nuclear Reactor Regulation	

Enclosure

EXECUTIVE SUMMARY

FRAMATOME FUEL
FABRICATION
99902083/2020-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a vendor inspection at the Framatome Fuel Fabrication (hereafter referred to as Framatome) facility in Richland, WA, to verify that it had 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," The NRC inspection team conducted this inspection on October 27 - 29, 2020. This is the first NRC vendor inspection of the Richland, Washington facility, previously named AREVA Inc., and Siemens Power Corp.

This technically-focused inspection specifically evaluated Framatome's implementation of the quality activities associated with fuel design, fuel fabrication, and modelling software for operating U.S. nuclear power plants.

These regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR 50.46
- 10 CFR Part 21

During the course of this inspection, the NRC inspection team implemented inspection procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017, IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated May 16, 2019, and the safety conscious work environment (SCWE) portion of IP 71152, "Problem Identification and Resolution," Appendix 1, "Guidance for Gathering SCWE and PI&R Insights," dated February 26, 2015.

The results of the inspection are summarized below.

<u>10 CFR Part 21</u>

The NRC inspection team reviewed Framatome's policies and implementing procedures that govern the implementation of its 10 CFR Part 21 program to verify compliance with 10 CFR Part 21. The NRC inspection team: (1) reviewed the 10 CFR Part 21 postings; (2) reviewed a sample of purchase orders (POs); and (3) verified that Framatome's corrective action program provides a link to the 10 CFR Part 21 program. No findings of significance were identified.

<u>Design Control</u>

The NRC inspection team reviewed Framatome's policies and implementing procedures that govern the implementation of its design control process and software control to verify compliance with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed fuel calculations for emergency core cooling system (ECCS) performance, anticipated operational occurrences, and design basis accidents The NRC inspection team focused on calculations using the following design codes: 1) EXEM

BWR-2000 which is an ECCS evaluation model; 2) CASMO4/MICROBURN-B2 which is a core design computer code; and 3) RODEX2 for fuel performance modeling. The NRC inspection team reviewed calculation packages and associated condition reports (CRs) to verify that assumptions are adequately described and margins are not exceeded. In addition, the NRC inspection team discussed the calculation packages and CRs with technical staff. No findings of significance were identified.

Nonconforming Materials, Parts or Components and Corrective Action

The NRC inspection team reviewed Framatome's policies and implementing procedures that govern the implementation of its nonconforming materials, parts, or components and corrective action programs to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed a sample of Framatome's Component Nonconformance Condition Reports (CNCRs) and other types of CRs to verify that they demonstrate compliance with regulatory requirements and adherence to Framatome procedures. The NRC inspection team toured the manufacturing floor to identify the location of nonconforming and quality indeterminate items and observed a Manufacturing Screening Team (MST) meeting as they reviewed eleven CRs and one suggestion for improvement (SFI) item. No findings of significance were identified.

Safety Conscious Work Environment

During the inspection we observed the safety culture at the facility and discussed the processes available to Framatome personnel. In addition, the NRC inspection team performed interviews with 12 out of 29 employees in the Boiling Water Reactor (BWR) Core Design group. The NRC inspection team found that the Framatome staff appear to be comfortable raising nuclear, radiological or industrial safety concerns and pursuing issues with their supervisors and upper management. The NRC inspection team believes management would be responsive to any concerns identified and that these concerns are adequately resolved.

REPORT DETAILS

1. <u>10 CFR Part 21 Program</u>

   a. <u>Inspection Scope</u>

   The NRC inspection team reviewed the policies and implementing procedures that govern Framatome Fuel Fabrication's (hereafter referred to as Framatome) Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," program to verify compliance with the regulatory requirements. In addition, the NRC inspection team evaluated the 10 CFR Part 21 postings and a sample of Framatome's purchase orders (POs) for compliance with the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation," and 10 CFR 21.31, "Procurement Documents." The NRC inspection team also verified that Framatome's corrective action procedure provides a link to the 10 CFR Part 21 program. Furthermore, for a sample of 10 CFR Part 21 evaluations performed by Framatome, the NRC inspection team verified that Framatome had effectively implemented the requirements for evaluating deviations and failures to comply. The NRC inspection team verified that the notifications were performed in accordance with the requirements of 10 CFR 21.21, as applicable.

   The NRC inspection team also discussed the 10 CFR Part 21 program with Framatome's management and technical staff. The attachment to this inspection report lists the documents reviewed and personnel interviewed by the NRC inspection team.

   b. <u>Observations and Findings</u>

   No findings of significance were identified.

   c. <u>Conclusion</u>

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

2. <u>Design Control</u>

   a. <u>Inspection Scope</u>

   The NRC inspection team reviewed three Framatome-Richland analytic computer code systems to verify compliance with the regulatory requirements of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Criterion III, "Design Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50. The NRC inspection team focused on calculations using the following design codes: 1) EXEM BWR-2000 which is an emergency core cooling system (ECCS) evaluation model; 2) CASMO4/MICROBURN-B2 which is a core design computer code; and 3) RODEX2 for fuel performance modeling. The NRC inspection team reviewed fuel calculations from these models for ECCS performance, anticipated operational occurrences (AOOs), and design basis accidents (DBAs).

The NRC inspection team reviewed a sample of calculation packages analysis guidelines and design group correspondence associated with the development, maintenance and application of the computer codes. Further, the NRC inspection team evaluated associated condition reports (CRs), interviewed cognizant engineers and management, reviewed associated safety analysis guidelines, and reviewed additional calculation documents detailing resolution of any identified issues related to each of the analytic computer models.

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

b. <u>Observations and Findings</u>

b.1 <u>Emergency Core Cooling System Performance Evaluation</u>

The NRC inspection team reviewed revisions of plant-specific calculations using the computer code system known as the EXEM BWR-2000 ECCS evaluation model. Framatome uses EXEM BWR-2000 to demonstrate compliance with the requirements contained in 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," for its supported customers. The NRC inspection team also reviewed any associated CRs and the basis for specific assumptions.

The NRC inspection team focused on calculations for two plants which were more complex than similar calculations prepared for other boiling water reactor (BWR) plants because they exhibited lower margin to the NRC regulatory acceptance criteria contained in 10 CFR 50.46(b). The NRC inspection team reviewed the documentation for the closure of the associated CRs. The NRC inspection team observed that the CR evaluations appeared to adequately address each technical issue.

The NRC inspection team interviewed engineers responsible for both the plant-specific calculation and the development of the computer code system. The engineers confirmed that, despite the assumption in question was not addressed in analysis guidelines at the time, it was subject to independent design review during analysis by discussing and evaluating the analytic assumption with expert engineers in both the applications group (i.e., those engineers who apply the computer codes to perform plant-specific analysis) and the code development group (i.e., those who develop, qualify, and maintain the computer code system). The engineers also provided additional correspondence as evidence that these design reviews occurred while the calculation was being prepared. The NRC inspection team evaluated the level of design review applied to this unique assumption and found it technically adequate.

The NRC inspection team also compared a licensing report which was based on a plant-specific calculation and which was submitted to the NRC staff for review in a license amendment request. The NRC staff reviewers determined that the calculation was acceptable as documented in the safety evaluation for Amendment Numbers 264 and

269 to the Quad Cities Units 1 and 2, respectively.[1] The NRC inspection team also discussed specific details related to this assumption with the responsible engineers. The NRC inspection team verified that the assumption had been accepted by the NRC staff in another ECCS evaluation model[2] that Framatome furnishes. Based on the considerations described above, the NRC inspection team determined that, in addition to receiving an appropriate level of design review, the input assumption itself was technically justified.

b.2 CASMO4/MICROBURN-B2 Application Evaluation

The NRC inspection team reviewed two revisions of the guidelines governing application of the CASMO4/MICROBURN-B2 code system. The CASMO4/MICROBURN-B2 code system is a set of BWR neutronics core design codes consisting of a lattice spectrum/depletion code and a steady state reactor core simulator code. The guidelines detail application of the code system to ensure consistency in analyses across operating reactors and consistency with the restrictions and approved uncertainty limits. The revised guidelines were put in place to address an issue associated with degrading agreement between measured and predicted conditions as identified in the statistical results of plant-specific benchmarking analyses.

The NRC inspection team reviewed Framatome's documentation on the "Jumpstart" method to executing benchmarking analyses. A CR was opened to perform a thorough evaluation of the technical adequacy of the Jumpstart method with full quality assurance documentation to: (1) assess whether the approach is within the scope of the NRC's safety evaluation for the methodology described in EMF-2158(P)(A); (2) perform an in-depth investigative root cause analysis of the issue and evaluate plant, fuel, and cycle characteristics that may influence it; and (3) incorporate the Jumpstart method into applicable guidelines. The NRC inspection team reviewed the calculation documents associated with each of these corrective actions for the closure of the CRs.

To assess the consistency of the Jumpstart method with the restrictions and uncertainty limits in the NRC's safety evaluation for EMF-2158(P)(A), FS1-0044487 also relies on input from calculation document FS1-0037418, Revision 1.0, "Guidelines for BWR Neutronics Analysis CASMO-4/MICROBURN-B2 (safety evaluation report restrictions)."

In addition to reviewing the CRs and calculation documents, the NRC inspection team interviewed engineers responsible for both the development of the Jumpstart approach and the procedures for its application. The engineers indicated that the Jumpstart method is typically applied when a customer transitions from one vendor to another because there may be inconsistencies between the way the other vendor and Framatome generate data, but that the Jumpstart method is applied in situations where there is an observed divergence in a plant's benchmark statistics. The engineers

[1] License amendment available in NRC's Agencywide Document Access and Management System (ADAMS) at ADAMS Package No. ML16218A498.
[2] ANP-10332P-A, "AURORA-B: An Evaluation Model for Boiling Water Reactors; Application to Loss of Coolant Accident Scenarios," March 2019. Relative to this assumption, AURORA-B provides a higher-order representation of the associated thermal-hydraulic phenomena, and it should be noted that the staff's acceptance of this assumption in AURORA-B should not, in a standalone sense, be construed as conclusive evidence that the assumption is appropriate in the lower-order code system (i.e., EXEM BWR-2000).

confirmed that the need to apply it in the latter case has only happened a couple of times over the course of 20 years. The engineers also confirmed that, in either of the cases, documentation is generated identifying its application because the plant-specific benchmarking must be performed again, and because it is intended that the code developers are made aware any time the method is applied.

The NRC inspection team observed, based on the documentation included with CR 2019-937, the associated technical analyses, and interviews with Framatome engineers, that Framatome adequately determined application of the Jumpstart method was consistent with the restrictions and uncertainty limits in the NRC safety evaluation approving EMF-2158(P)(A) for use. The NRC inspection team also observed that the Jumpstart method had been incorporated into the applicable guidelines. The NRC inspection team determined that Framatome's review of the Jumpstart method was technically adequate. The NRC inspection team did not identify any instances where application of the Jumpstart method was inconsistent with NRC regulatory requirements.

b.3 Fuel Performance Modeling

The NRC inspection team reviewed CRs and calculation packages that document the evaluation and application of burnup-dependent limits to ensure adequate safety margins are maintained for fuel operating in its second and third fuel cycles. Framatome identified an assumption made when performing core designs for several NRC-licensed facilities that could have led to an inadequate amount of margin in the linear heat generation rate (LHGR) of affected fuel assemblies. This margin is required to offset the potential increase in fuel assembly LHGR that would follow a postulated over-power transient.

The NRC inspection team verified the adequacy of the actions taken to address the issue documented in the CR. The vendor used a combination of explicit analyses and comparisons to more modern fuel performance code, which is documented in BAW-10247PA, Revision 0, "Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors" (i.e., RODEX4). The methods associated with RODEX4 did not include the same potentially non-conservative assumption that had been used in RODEX2. The RODEX4 models are also based on more recent experimental data and considered a more accurate fuel performance model relative to RODEX2. The NRC inspection team verified that appropriately conservative limits were developed for each affected customer and documented. Finally, the NRC inspection team verified that the vendor revised its RODEX2 modeling guidelines to prevent recurrence of the issue. The NRC inspection team found that the vendor satisfactorily evaluated the issue, identified the extent of condition, developed a technically adequate resolution, and revised guidelines to prevent recurrence.

c. Conclusion

The NRC inspection team concluded that Framatome implemented its design and software control programs with respect to the following codes and methods:

- The EXEM BWR-2000 ECCS evaluation model documented in EMF-2361(P)(A);
- The CASMO4/MICROBURN-B2 core design computer code system documented in EMF-2158(P)(A); and

- The RODEX2 fuel performance model documented in XN-NF-81-58(P)(A), Revision 1, Supplements 1 and 2.

The NRC inspection team also determined that the design control processes used were in accordance with the regulatory requirements of Criterion III, “Design Control,” of Appendix B to 10 CFR Part 50; 10 CFR 50.46, insofar as it applies to the evaluations performed using EXEM BWR-2000; and GDC 10, “Reactor design,” insofar as it applies to the evaluations performed using CASMO4/MICROBURN-B2 and RODEX2. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Framatome is implementing its policies, procedures, and corrective actions associated with the design and software control. No findings of significance were identified.

3. Nonconforming Materials, Parts or Components and Corrective Action

a. Inspection Scope

The NRC inspection team reviewed Framatome’s policies and implementing procedures that govern the implementation of its nonconforming materials, parts, or components and corrective action programs to verify compliance with the requirements of Criterion XV, “Nonconforming Materials, Parts, or Components,” and Criterion XVI, “Corrective Action,” of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed a sample of Component Nonconformance Condition Reports (CNCRs) and other types of CRs to verify that they demonstrate compliance with regulatory requirements and adherence to Framatome procedures.

The NRC inspection team toured the manufacturing floor to identify locations of nonconforming and quality indeterminate items with the Quality Specialist and Lead Machinist. The nonconforming and quality indeterminate items were segregated in designated areas and were identifiable with appropriately filled out hold tags. CNCRs that were generated from nonconforming or quality indeterminate items were reviewed to verify they were; (1) dispositioned in accordance with the applicable procedures, (2) documented with appropriate technical justification for the dispositions, (3) took adequate corrective action regarding the nonconforming items to prevent recurrence, and (4) evaluated for or 10 CFR Part 21 applicability.

The NRC inspection team observed a Manufacturing Screening Team (MST) meeting as they reviewed eleven CRs and one suggestion for improvement item. The MST participants felt confident to voice opinions and make suggestions that were welcomed and incorporated demonstrating traits of a positive safety culture. The NRC inspection team verified that the MST reviewed the CRs to ensure that the technical deficiencies have been appropriately evaluated, dispositioned, and reported to customers.

The NRC inspection team reviewed a contract requirements document (CRD) to determine the type of deviation and nonconformances that are linked to the product for review and concurrence required by the customer.

The NRC inspection team also reviewed a sample of CRs to verify: (1) adequate documentation and description of conditions adverse to quality; (2) an appropriate analysis of the cause of these conditions and the corrective actions taken to prevent recurrence, as applicable; (3) direction for review and approval by the responsible authority; (4) a description of the current status of the corrective actions; and (5) the follow-up actions taken to verify timely and effective implementation of the corrective actions.

The NRC inspection team also discussed the nonconforming materials, parts, or components and corrective action programs with Framatome's management and technical staff. The documents reviewed by the inspectors are included in the attachment to this inspection report.

b. Observation and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that Framatome is implementing its nonconforming materials, parts, or components and corrective action programs in accordance with the regulatory requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that Framatome is effectively implementing its policies and procedures associated with the nonconforming materials, parts, or components and corrective action programs. No findings of significance were identified.

4. Safety Conscious Work Environment Program

a. Inspection Scope

The NRC inspection team reviewed Framatome's policies and implementing procedures for ensuring an environment for raising nuclear safety concerns. The NRC inspection team selected and interviewed a sample of technical staff in Framatome's BWR Core Designgroup to gain insight on the willingness of Framatome staff in Fuel Design to raise nuclear safety concerns. The NRC inspection team and Framatome management discussed the Framatome 2020 SCWE assessment and recommendations. The NRC inspection team interviewed twelve technical employees in the Core Design BWR group. These interviews did not include management or supervisors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded based on the interviews with staff that the SCWE is adequate and the Framatome staff were aware that there are other processes in place including employee concerns program, differing professional opinion program, and reporting directly to the NRC to address nuclear safety issues.

The NRC inspection team determined that the Framatome staff are willing to raise nuclear safety concerns. The Framatome staff appear to be more comfortable raising concerns to their supervisor or manager. The staff can enter issues directly into the corrective action program; however, most prefer to submit issues through their supervisor or manager to enter an issue into the corrective action program.

5. Entrance and Exit Meetings

On Tuesday, October 27, 2020, the NRC inspection team discussed the scope of the inspection with Mr. Paul Garcia and other members of Framatome's management and technical staff. On Tuesday, November 3, 2020, the NRC inspection team presented the inspection results and observations during an exit meeting via teleconference with Mr. Garcia and other members of Framatome'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 and Persons Interviewed

Name	Title	Affiliation	Entrance*	Exit*	Interviewed
Andrea Keim	Inspection Team Leader	NRC	X	X	
Dong Park	Inspector	NRC	X	X	
Benjamin Parks	Technical Specialist	NRC	X	X	
Kevin Heller	Technical Specialist	NRC	X	X	
Kerri Kavanagh	Branch Chief	NRC		X	
Paul Garcia	Manager, MS & CI	Framatome	X	X	X
Pat McQuade	Manager, CAP	Framatome	X	X	
Tim Tate	Manager, EHS&L	Framatome		X	
Calvin Manning	Manager, Licensing and Compliance	Framatome	X	X	X
Charlie Holman	Manager, Operational Quality	Framatome	X		X
Robert Schnepp	Manager, Core Design BWR, Richland	Framatome	X	X	
Jeff Morris	Manager, Mechanics & Materials, Richland	Framatome	X	X	
Lance Stephens	Manager, Operations Stategy and Supply Chain	Framatome	X	X	
Gayle Elliott	Deputy Director EPC - Lynchburg	Framatome		X	X
Jason Medina	Group Leader Mechanics & Materials	Framatome	X	X	
Kevin Quick	Manager, Codes and Methods, Core Design BWR	Framatome	X	X	X
Celia Gentz	Manager, Procurement	Framatome	X	X	
Ernie Hockens	Manager Plant Operations	Framatome	X	X	
Jaime Castaneda	Quality Specialist MS&CI	Framatome	X		X
Dan Jordheim	Advisory Engineer	Framatome	X	X	
Ralph Grummer	Consultant	Y.Farawila, et.al., Inc.			X

Name	Title	Affiliation	Entrance*	Exit*	Interviewed
Paul Smith	Supervisor, BWR Neutronics Codes and Methods	Framatome			X
Darrell Carr	Supervisor, Thermal Hydraulics	Framatome			X
Scott Franz	Advisory Engineer	Framatome			X
Bendedict Biegler	Lead Machinist, Component Center	Framatome			X
Juan Ibarra	Manufacturing Tech 2 Rod Loading	Framatome			X

*Entrance and Exit meetings were held via Teleconference call

2. INSPECTION PROCEDURES USED

- Inspection Procedure (IP) 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated May 16, 2019

- IP 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017

- IP 71152, "Problem Identification and Resolution," Appendix A, "Guidance for Gathering SCWE and P&IR Insights," dated February 26, 2015

3. DOCUMENTS REVIEWED

Policies and Procedures

- D02-ARV-01-101-817, "Framatome Integrated Management System Manual," Revision F, dated August 24, 2020
- QAP-04, "Design Control," Revision 7, dated March 1, 2018
- QAP-13, "Control of Nonconforming Product and Corrective Action," Revision 12, dated February 3, 2020
- 0405-40, "US Fuel Design Control," Revision 024, dated July 29, 2020
- 1703-77, "US Fuel Corrective Action Program (WEBCAP)," Revision 042, dated July 15, 2019
- 1703-88, "US Fuel Corrective Action Program (DEVONWAY ICAP)," Revision 001, dated March 2, 2020
- 1703-89, "US Fuel Condition Report and Suggestion for Improvement Screening Process," Revision 001, dated March 2, 2020
- SOP-40855, "Standard Operating Procedure - Control of Nonconforming Items," Version 10.0, dated October 15, 2018
- EMF-2001(P) P110,5090, Revision 1, "Guidelines for BWR Safety Analysis: LOCA Analysis – Recirculation Lines," dated January 20, 2009.
- EMF-2001(P) P110,5030, Revision 3, "Guidelines for BWR Safety Analysis: Initial Operating Conditions for LOCA Analysis," dated April 3, 2014.
- EMF-2001(P) P110,5060, Revision 2, "Guidelines for BWR Safety Analysis: RELAX

Base Input Decks (AUTORLXBD)," dated February 18, 2011.

- EMF-2001(P) P110,5015, Revisions 2 and 3, "Guidelines for BWR Safety Analysis: Database Preparation for LOCA Analysis," dated May 29, 2009 (Revision 2) and March 27, 2015 (Revision 3).
- EMF-2001(P) P110,5020, Revision 2, "Guidelines for BWR Safety Analysis: Basis for MAPLHGR Limits," dated March 27, 2013.
- EMF-2001(P) P110,5010, Revision 0, "Guidelines for BWR Safety Analysis: LOCA Analysis," dated June 28, 2004.
- FS1-0037385, Revision 2.0, "Guidelines for BWR Neutronics Analysis Benchmarking, Core Follow and Projection," dated March 2, 2020.
- FS1-0037383, Revision 1.0, "Guidelines for BWR Neutronics Analysis MICROBURN-B2 Model Setup," dated April 12, 2019.
- EMF-2000(P), Guideline 2.7, Revision 2, dated February 8, 2012.
- FS1-0037418, Revision 1.0, "Guidelines for BWR Neutronics Analysis CASMO-4/MICROBURN-B2 (SER Restrictions)," dated May 2, 2018.

Component Nonconformance Condition Reports (CNCRs)

- List of CNCRs closed over the past year
- CR 2018-7259 dated August 15, 2018
- CR 2019-766, dated March 21, 2019
- CR 2019-3718, dated November 26, 2019
- CR 2020-1979, dated September 22, 2020
- CR 2020-1866, dated September 08, 2020
- CR 2020-1151, dated May 28, 2020
- CR 2019-4078, dated November 27, 2019
- CR 2019-3972, dated November 13, 2019

Corrective Action Reports/Condition Reports (CRs)

- List of Corrective Actions closed over past 3 years
- CR 2018-7294, dated August 16, 2018
- CR 2018-7711, dated August 30, 2018
- CR 2018-7712, dated August 30, 2018
- CR 2018-7713, dated August 30, 2018
- CR 2019-1258, dated June 14, 2019
- CR 2019-0687, dated March 06, 2019
- CR 2020-0333, dated February 07, 2020
- CR 2018-6504, dated July 23, 2018
- CR 2018-6685, dated July 26, 2018
- CR 2014-7066, dated November 11, 2014
- CR 2018-4905, dated May 15, 2018
- CR 2019-0937, dated May 23, 2019
- CR 2017-6197, dated October 31, 2017

Calculation Notes

- FS1-0016588, Revisions 1 and 3, "Quad Cities LOCA Break Spectrum for Limiting Breaks SF-HPCI for ATRIUM 10XM," dated October 17, 2014 (Revision 1) and February 24, 2015 (Revision 3).

- FS1-0044789, Revision 2.0 “Evaluation of Lattice Designs that Contribute to Higher TIP Deviations,” dated October 31, 2019.
- FS1-0044487, Revision 1.0, “MICROBURN-B2 Jumpstart Evaluation,” dated July 2, 2019.
- FS1-0044587, Revision 1.0, “Analysis Supporting Nodal Exposure Adjustments for MICROBURN-B2 Benchmark Analyses with Jumpstart Initial Conditions,” dated June 26, 2019.
- FS1-0013757, Revision 1.0, “Dresden and Quad Cities Benchmark TIP Statistics and Report Input Safety Related,” dated February 20, 2014.

Corrective Actions generated during this inspection

None

Procurement Documents (PO)

- FS1-0041748, “CRD - Brunswick BRK2-25,” Revision 7.0, dated October 22, 2020
- Fuel Fabrication and Related Services Supply Agreement for the Brunswick Nuclear Plant Between Duke Energy Progress, LLC and AREVA, Inc, dated January 31, 2017