



Program Management Office  
1000 Westinghouse Drive  
Cranberry Township, Pennsylvania 16066

WCAP-17788- NP, Revision 0  
Project Number 694

December 19, 2017

OG-17-335

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555-0001

Subject: PWR Owners Group

**Submittal of Responses to NRC Requests for Additional Information (RAIs) and Revisions to Topical Report WCAP-17788-P/WCAP-17788-NP, Revision 0, "Comprehensive Analysis and Test Program for GSI-191 Closure" related to Volumes 1 and 4 in Support of the Closure of GSI-191 (PA-SEE-1090)**

References:

- 1.) OG-15-296, "Submittal of WCAP-17788: "Comprehensive Analysis and Test Program for GSI-191 Closure (PA-SEE-1090)", July 17, 2015
- 2.) NRC letter, "Acceptance for Review of the Pressurized Water Reactor Owners Group Topical Report WCAP-17788, "Comprehensive Analysis and Test Program for GSI-191 Closure (TAC No. MF6536)," (ML15351A425), dated January 8, 2016
- 3.) NRC Letter, "Request for Additional Information Related to Volume 1 of Pressurized Water Reactor Owners Group Topical Report WCAP-17788 'Comprehensive Analysis and Test Program for GSI-191 Closure,'" April 2016, ADAMS Accession No. ML16078A166.
- 4.) NRC Letter, "Request for Additional Information Regarding Pressurized Water Reactor Owner's Group Topical Report WCAP-17788, 'Comprehensive Analysis and Test Program for GSI-191 Closure,' (TAC No. MF6536)," August 2016, ADAMS Accession No. ML16228A527

On July 17, 2015, the Pressurized Water Reactor Owners Group (PWROG) requested formal NRC review and approval of WCAP-17788-NP, Revision 0, in accordance with the Nuclear Regulatory Commission (NRC) Topical Report (TR) program for review and acceptance for referencing in regulatory actions (Reference 1). The NRC staff issued an acceptance for review letter to the PWROG on January 8<sup>th</sup>, 2016 (Reference 2).

The purpose of this letter is to transmit the responses to requests for additional information (RAIs) from the U.S. Nuclear Regulatory Commission (NRC) related to WCAP-17788-P Volume 1 and 4 provided via References 3 and 4, respectively.

The proprietary RAI response is broken into three enclosures; Westinghouse (WEC), Combustion Engineering (CE), and Babcock & Wilcox (B&W). Each enclosure is specific to the plant categories and thermal-hydraulic computer codes used to perform the analyses documented

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in WCAP-17788-P/NP, Volume 4. One exception is the responses to Volume 1 RAI Questions. As shown in Table 1, these responses are provided in the Westinghouse enclosure; however, the response to RAI 1.1 is applicable to all plant categories, and the response to RAI 1.9 is applicable to the CE and B&W plant categories. The non-proprietary response is broken into three similar enclosures.

RAI Question	WEC	CE	B&W	RAI Question	WEC	CE	B&W	RAI Question	WEC	CE	B&W
1.1c	X			4.8c		X	X	4.24a	X	X	X
1.1d	X			4.9a	X	X	X	4.24b	X	X	X
1.2a	X			4.9b	X	X	X	4.24c	X	X	X
1.9	X			4.9c	X	X	X	4.24d	X	X	
4.1a	X	X	X	4.9d	X	X	X	4.24e	X	X	X
4.1b		X		4.9e	X	X	X	4.24f		X	X
4.1c	X	X	X	4.10	X	X	X	4.24g			X
4.2a	X			4.11a		X		4.24h	X	X	X
4.2b	X			4.11b		X		4.25a	X		
4.2c	X			4.11c		X		4.25b	X		
4.2d	X			4.12	X			4.25c	X		
4.2e	X			4.13	X			4.25d	X	X	X
4.2f	X			4.14	X			4.25e	X	X	X
4.2g	X			4.15	X			4.25f	X	X	X
4.2h	X			4.16a	X	X	X	4.26a		X	
4.3a	X			4.16b		X		4.26b		X	
4.3b	X			4.16c		X		4.27	X	X	X
4.3c	X			4.16d	X	X	X	4.28	X	X	
4.3d	X			4.17a	X			4.29	X	X	X
4.3e	X			4.17b	X	X	X	4.30a	X	X	X
4.3f	X			4.17c	X	X	X	4.30b	X	X	
4.3g	X			4.17d	X	X	X	4.30c	X	X	X
4.4a			X	4.18	X						
4.4b			X	4.19a	X						
4.4c			X	4.19b	X	X	X				
4.4d			X	4.20	X	X	X				
4.4e			X	4.21	X	X	X				
4.4f			X	4.22			X				
4.5a	X	X	X	4.23a	X	X	X				
4.5b	X	X	X	4.23b	X	X	X				
4.5c	X	X	X	4.23c	X	X	X				
4.6a	X			4.23d	X	X	X				
4.6b	X	X	X	4.23e	X	X	X				
4.6c	X	X		4.23f		X					
4.7	X	X	X	4.23g		X					
4.8a	X	X	X	4.23h		X					
4.8b	X			4.23i	X	X	X				

Also included in the enclosed responses are proposed revisions to WCAP-17788-P/WCAP-17788-NP, Volumes 1 and 4. After receipt of the Final Safety Evaluation, the NRC Approved version of the TR will incorporate the proposed revisions.

Enclosed are:

1. LTR-SEE-17-102, Attachment 1, "Westinghouse Responses to NRC RAIs Related to WCAP-17788, Volumes 1 and 4 Supporting the Closure of GSI-191 (PA-SEE-1090) and Mark-ups to WCAP-17788 PROPRIETARY Attachment" (Proprietary)
2. LTR-SEE-17-102, Attachment 2, "Westinghouse Responses to NRC RAIs Related to WCAP-17788, Volumes 1 and 4 Supporting the Closure of GSI-191 (PA-SEE-1090) and Mark-ups to WCAP-17788 NON-PROPRIETARY Attachment", (Non-Proprietary)
3. LTR-SEE-17-102, Attachment 3, AREVA Licensing Report ANP-3583P, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – CE Plants" (Proprietary)
4. LTR-SEE-17-102, Attachment 4 AREVA Licensing Report ANP-3583NP, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – CE Plants" (Non-Proprietary)
5. LTR-SEE-17-102, Attachment 5, AREVA Licensing Report ANP-3584P, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – B&W Plants" (Proprietary)
6. LTR-SEE-17-102, Attachment 6, "AREVA Licensing Report ANP-3584NP, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – B&W Plants" (Non-Proprietary)

As enclosures 1, 3, and 5 contain information proprietary to Westinghouse Electric Company LLC ("Westinghouse"), AREVA Inc. , or in some cases both parties, it is supported by two Affidavits: one each signed by Westinghouse (Enclosure 7) and AREVA Inc. (Enclosure 8), the owners of the information. The Affidavits set forth the basis on which the information may be withheld from public disclosure by the Nuclear Regulatory Commission ("Commission") and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations.

Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse and/or AREVA Inc. be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations. As specific ownership of the information is not marked, each affidavit should be consulted to identify the appropriate justifications for withholding of the respective information.


Correspondence with respect to the copyright or proprietary aspects of the item listed above or the supporting Affidavits should reference Enclosure 7 and Enclosure 8 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 3 Suite 310, Cranberry Township, Pennsylvania 16066, as well as Philip Opsal, OF-34, AREVA Inc., 3315 Old Forest Road, Lynchburg, VA 24501.

Correspondence related to this transmittal should be addressed to:

Mr. W. Anthony Nowinowski, Program Manager  
PWR Owners Group, Program Management Office  
Westinghouse Electric Company  
1000 Westinghouse Drive  
Cranberry Township, Pennsylvania 16066

If you have any questions, please do not hesitate to contact me, Jack Stringfellow, at (205) 992-7037 or Mr. W. Anthony Nowinowski of the Owners Group Program Management Office at 412-374-6855.

Sincerely yours,



Jack Stringfellow, Chairman  
PWR Owners Group

NJS:jdb:cah

cc: PWROG SEE Committee  
PWROG Licensing Committee  
PWROG Steering Committee  
PWROG PMO  
PWROG Tiger Team  
J. Spring – W  
P. Stevenson – W  
T. Croyle – W  
J. Andrachek – W  
G. Wissinger – Areva  
D. Page-Blair – Areva  
P. Opsal - Areva  
V. Cusumano – NRC  
A. Smith – NRC  
L. Perkins – NRC

Enclosures:

- ✓ 1. LTR-SEE-17-102, Attachment 1, "Westinghouse Responses to NRC RAIs Related to WCAP-17788, Volumes 1 and 4 Supporting the Closure of GSI-191 (PA-SEE-1090) and Mark-ups to WCAP-17788 PROPRIETARY Attachment" (Proprietary)
- ✓ 2. LTR-SEE-17-102, Attachment 2, "Westinghouse Responses to NRC RAIs Related to WCAP-17788, Volumes 1 and 4 Supporting the Closure of GSI-191 (PA-SEE-1090) and Mark-ups to WCAP-17788 NON-PROPRIETARY Attachment", (Non-Proprietary)
- ✓ 3. LTR-SEE-17-102, Attachment 3, AREVA Licensing Report ANP-3583P, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – CE Plants" (Proprietary)
- ✓ 4. LTR-SEE-17-102, Attachment 4 AREVA Licensing Report ANP-3583NP, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – CE Plants" (Non-Proprietary)
- ✓ 5. LTR-SEE-17-102, Attachment 5, AREVA Licensing Report ANP-3584P, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – B&W Plants" (Proprietary)
- ✓ 6. LTR-SEE-17-102, Attachment 6, "AREVA Licensing Report ANP-3584NP, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – B&W Plants" (Non-Proprietary)

7. CAW-17-4688, "Application for Withholding Proprietary Information from Public Disclosure" (Non-Proprietary)
8. AREVA Affidavit for Enclosures 1, 3 and 5 to PWR Owners Group Letter OG-17-355 dated December 18, 2017, "Submittal of Responses to NRC Requests for Additional Information (RAIs) and Revisions to Topical Report WCAP-17788-P/WCAP-17788-NP, Revision 0, 'Comprehensive Analysis and Test Program for GSI-191 Closure' Related to Volumes 1 and 4 in Support of the Closure of GSI-191 (PA-SEE-1090)" (Non-Proprietary)



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USA

U.S. Nuclear Regulatory Commission  
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CAW-17-4688

December 18, 2017

APPLICATION FOR WITHHOLDING PROPRIETARY  
INFORMATION FROM PUBLIC DISCLOSURE

**Subject:** LTR-SEE-17-102, Attachment 1, "Responses to NRC RAIs Specific to WCAP-17788, Volume 1 Supporting the Closure of GSI-191 (PA-SEE-1090) and Mark-ups to WCAP-17788, Volume 1 PROPRIETARY Attachment" (Proprietary)

The Application for Withholding Proprietary Information from Public Disclosure is submitted by Westinghouse Electric Company LLC ("Westinghouse"), pursuant to the provisions of paragraph (b)(1) of Section 2.390 of the Nuclear Regulatory Commission's ("Commission's") regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-17-4688 signed by the owner of the proprietary information, Westinghouse. The Affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying Affidavit by Pressurized Water Reactor Owners Group (PWROG).

Correspondence with respect to the proprietary aspects of the Application for Withholding or the Westinghouse Affidavit should reference CAW-17-4688 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 2 Suite 259, Cranberry Township, Pennsylvania 16066.

A handwritten signature in black ink, appearing to read 'James A. Gresham'.

James A. Gresham, Manager  
Regulatory Compliance

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

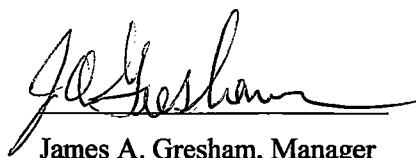
SS

COUNTY OF BUTLER:

I, James A. Gresham, am authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC ("Westinghouse") and declare that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

Executed on: \_\_\_\_\_

12/18/17



James A. Gresham, Manager  
Regulatory Compliance

- (1) I am Manager, Regulatory Compliance, Westinghouse Electric Company LLC (“Westinghouse”), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.
- (2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Nuclear Regulatory Commission’s (“Commission’s”) regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.
- (4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission’s regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
  - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.
  - (ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitute Westinghouse policy and provide the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

    - (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of



Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

- (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.
  - (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
  - (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
  - (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
  - (f) It contains patentable ideas, for which patent protection may be desirable.
- (iii) There are sound policy reasons behind the Westinghouse system which include the following:
- (a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.
  - (b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.
  - (c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

- (d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.
  - (e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.
  - (f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- (iv) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, is to be received in confidence by the Commission.
- (v) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.
- (vi) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-SEE-17-102, Attachment 1, "Responses to NRC RAIs Related to WCAP-17788, Volumes 1 and 4 Supporting the Closure of GSI-191 (PA-SEE-1090) and Mark-ups to WCAP-17788 PROPRIETARY Attachment" (Proprietary)" (Proprietary), for submittal to the Commission, being transmitted by PWROG letter OG-17-335. The proprietary information as submitted by Westinghouse is that associated with RAI responses related to the approval of WCAP-17788 and may be used only for that purpose.
- (a) This information is part of that which will enable Westinghouse to obtain approval of WCAP-17788.

- (b) Further this information has substantial commercial value as follows:
- (i) Westinghouse plans to sell the use of similar information to its customers for the purpose of providing information that can be used to gain margin in terms of allowable fiber loads at the core inlet in a post-LOCA scenario.
  - (ii) Westinghouse can sell support and defense of industry guidelines and acceptance criteria for plant-specific applications.
  - (iii) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluation justifications and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

## **Proprietary Information Notice**

Transmitted herewith are proprietary and non-proprietary versions of a document, furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the Affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

## **Copyright Notice**

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

Letter for Transmittal to the NRC

The following paragraphs should be included in your letter to the NRC Document Control Desk:

Enclosed are:

1. LTR-SEE-17-102, Attachment 1, "Westinghouse Responses to NRC RAIs Related to WCAP-17788, Volumes 1 and 4 Supporting the Closure of GSI-191 (PA-SEE-1090) and Mark-ups to WCAP-17788 PROPRIETARY Attachment" (Proprietary)
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3. LTR-SEE-17-102, Attachment 3, AREVA Licensing Report ANP-3583P, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – CE Plants" (Proprietary)
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As enclosures 1, 3, and 5 contain information proprietary to Westinghouse Electric Company LLC ("Westinghouse"), AREVA Inc. , or in some cases both parties, it is supported by two Affidavits: one each signed by Westinghouse (Enclosure 7) and AREVA Inc. (Enclosure 8), the owners of the information. The Affidavits set forth the basis on which the information may be withheld from public disclosure by the Nuclear Regulatory Commission ("Commission") and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations.

Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse and/or AREVA Inc. be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations. As specific ownership of the information is not marked, each affidavit should be consulted to identify the appropriate justifications for withholding of the respective information.

Correspondence with respect to the copyright or proprietary aspects of the item listed above or the supporting Affidavits should reference Enclosure 7 and Enclosure 8 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 2 Suite 259, Cranberry Township, Pennsylvania 16066, as well as Philip Opsal, OF-34, AREVA Inc., 3315 Old Forest Road, Lynchburg, VA 24501.



Licensing Report ANP-3584P, Revision 1, "Responses to RAIs on WCAP-17788 Volume 4 – B&W Plants" (Proprietary)

Information contained in these Documents has been classified by AREVA as proprietary in accordance with the policies established by AREVA Inc. for the control and protection of proprietary and confidential information.

4. These Documents contain information of a proprietary and confidential nature and is of the type customarily held in confidence by AREVA and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in these Documents as proprietary and confidential.

5. These Documents have been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in these Documents be withheld from public disclosure. The request for withholding of proprietary information is made in accordance with 10 CFR 2.390. The information for which withholding from disclosure is requested qualifies under 10 CFR 2.390(a)(4) "Trade secrets and commercial or financial information."

6. The following criteria are customarily applied by AREVA to determine whether information should be classified as proprietary:

- (a) The information reveals details of AREVA's research and development plans and programs or their results.
- (b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.
- (c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for AREVA.

- (d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for AREVA in product optimization or marketability.
- (e) The information is vital to a competitive advantage held by AREVA, would be helpful to competitors to AREVA, and would likely cause substantial harm to the competitive position of AREVA.

The information in these Documents is considered proprietary for the reasons set forth in paragraphs 6(b), 6(c) and 6(d) above.

7. In accordance with AREVA's policies governing the protection and control of information, proprietary information contained in these Documents has been made available, on a limited basis, to others outside AREVA only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. AREVA policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

*Philip C. Ouel*

SUBSCRIBED before me this 18<sup>th</sup>  
day of December, 2017.

*Sherry L. McFaden*

Sherry L. McFaden  
NOTARY PUBLIC, COMMONWEALTH OF VIRGINIA  
MY COMMISSION EXPIRES: 10/31/18  
Reg. # 7079129

