

October 21, 2015

Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Attention: Joseph Holonich

Subject: Project No. 704 – BWRVIP Response to NRC Request for Additional Information on Appendix B to BWRVIP-139-A

Reference: Letter from Joseph J. Holonich (NRC) to Tim Hanley (BWRVIP Chairman), Request for Additional Information Related for License Renewal Appendix to “BWRVIP-139: Boiling Water Reactor Vessel Internals Project, Steam Dryer Inspection and Flaw Evaluation Guidelines” (TAC NO. ME2188), dated March 11, 2015

Enclosed are five (5) copies of the BWRVIP response to the NRC’s Request for Additional Information (RAI) on the license renewal appendix (Appendix B) of the EPRI report entitled “BWRVIP-139-A: BWR Vessel and Internals Project, Steam Dryer Inspection and Flaw Evaluation Guidelines.” The RAI was transmitted to the BWRVIP by the NRC letter referenced above.

Please note that the enclosed response contains proprietary information. A letter requesting that the response be withheld from public disclosure and an affidavit describing the basis for withholding this information are provided as Attachment 1. The response includes yellow shading and brackets to indicate the proprietary information. The proprietary information is also marked with the letters “TS” in the margin indicating the information is considered trade secrets in accordance with 10CFR2.390.

Two (2) copies of a non-proprietary version of the BWRVIP response to the RAI are also enclosed. This non-proprietary response is identical to the enclosed proprietary response except that the proprietary information has been deleted.

If you have any questions on this subject please call Ron DiSabatino (Exelon, BWRVIP Assessment Committee Technical Chairman) at 717.456.3685.

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PALO ALTO OFFICE

3420 Hillview Avenue, Palo Alto, CA 94304-1395 USA • 650.855.2000 • Customer Service 800.313.3774 • www.epri.com

Sincerely,



Andrew McGehee, EPRI, BWRVIP Program Manager

Tim Hanley, Exelon, BWRVIP Chairman



Kurt Edsinger
Director, PWR &
BWR Materials
EPRI

October 19, 2015

Document Control Desk
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Request for Withholding of the following Proprietary Information Included in:

Project No. 704 – BWRVIP Response to NRC Request for Additional Information on Appendix B to BWRVIP-139-A

To Whom It May Concern:

This is a request under 10 C.F.R. §2.390(a)(4) that the U.S. Nuclear Regulatory Commission ("NRC") withhold from public disclosure the report identified in the enclosed Affidavit consisting of the proprietary information owned by Electric Power Research Institute, Inc. ("EPRI") identified in the attached report. Proprietary and non-proprietary versions of the Response and the Affidavit in support of this request are enclosed.

EPRI desires to disclose the Proprietary Information in confidence to assist the NRC review of the enclosed submittal to the NRC. The Proprietary Information is not to be divulged to anyone outside of the NRC or to any of its contractors, nor shall any copies be made of the Proprietary Information provided herein. EPRI welcomes any discussions and/or questions relating to the information enclosed.

If you have any questions about the legal aspects of this request for withholding, please do not hesitate to contact me at (650) 855-2271. Questions on the content of the Report should be directed to Andy McGehee of EPRI at (704) 502-6440.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kurt Edsinger", is written over a light blue horizontal line.

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AFFIDAVIT

RE: Request for Withholding of the Following Proprietary Information Included In:

Project No. 704 – BWRVIP Response to NRC Request for Additional Information on Appendix B to BWRVIP-139-A

I, Kurt Edsinger, being duly sworn, depose and state as follows:

I am the Director of PWR and BWR Materials at Electric Power Research Institute, Inc. whose principal office is located at 3420 Hillview Avenue, Palo Alto, CA. ("EPRI") and I have been specifically delegated responsibility for the above-listed report that contains EPRI Proprietary Information that is sought under this Affidavit to be withheld "Proprietary Information". I am authorized to apply to the U.S. Nuclear Regulatory Commission ("NRC") for the withholding of the Proprietary Information on behalf of EPRI.

EPRI Information is identified in solid underline inside double square brackets. An example of such identification is as follows:

[[This sentence is an example]]

Tables containing EPRI proprietary information are identified with double square brackets before and after the object. The proprietary information is also marked with the letters "TS" in the margin indicating the information is considered trade secrets in accordance with 10CFR2.390A.

EPRI requests that the Proprietary Information be withheld from the public on the following bases:

Withholding Based Upon Privileged And Confidential Trade Secrets Or Commercial Or Financial Information (see e.g., 10 C.F.R. § 2.390(a)(4)):

a. The Proprietary Information is owned by EPRI and has been held in confidence by EPRI. All entities accepting copies of the Proprietary Information do so subject to written agreements imposing an obligation upon the recipient to maintain the confidentiality of the Proprietary Information. The Proprietary Information is disclosed only to parties who agree, in writing, to preserve the confidentiality thereof.

b. EPRI considers the Proprietary Information contained therein to constitute trade secrets of EPRI. As such, EPRI holds the Information in confidence and disclosure thereof is strictly limited to individuals and entities who have agreed, in writing, to maintain the confidentiality of the Information.

c. The information sought to be withheld is considered to be proprietary for the following reasons. EPRI made a substantial economic investment to develop the Proprietary Information and, by prohibiting public disclosure, EPRI derives an economic benefit in the form of licensing royalties and other additional fees from the confidential nature of the Proprietary Information. If the Proprietary Information were publicly available to consultants and/or other businesses providing services in the electric and/or nuclear power industry, they would be able to use the Proprietary Information for their own commercial benefit and profit and without expending the substantial economic resources required of EPRI to develop the Proprietary Information.

d. EPRI's classification of the Proprietary Information as trade secrets is justified by the Uniform Trade Secrets Act which California adopted in 1984 and a version of which has been adopted by over forty states. The California Uniform Trade Secrets Act, California Civil Code §§3426 – 3426.11, defines a "trade secret" as follows:

"Trade secret" means information, including a formula, pattern, compilation, program device, method, technique, or process, that:

(1) Derives independent economic value, actual or potential, from not being generally known to the public or to other persons who can obtain economic value from its disclosure or use; and

(2) Is the subject of efforts that are reasonable under the circumstances to maintain its secrecy."

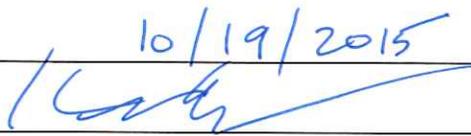
e. The Proprietary Information contained therein are not generally known or available to the public. EPRI developed the Information only after making a determination that the Proprietary Information was not available from public sources. EPRI made a substantial investment of both money and employee hours in the development of the Proprietary Information. EPRI was required to devote these resources and effort to derive the Proprietary Information. As a result of such effort and cost, both in terms of dollars spent and dedicated employee time, the Proprietary Information is highly valuable to EPRI.

f. A public disclosure of the Proprietary Information would be highly likely to cause substantial harm to EPRI's competitive position and the ability of EPRI to license the Proprietary Information both domestically and internationally. The Proprietary Information can only be acquired and/or duplicated by others using an equivalent investment of time and effort.

I have read the foregoing and the matters stated herein are true and correct to the best of my knowledge, information and belief. I make this affidavit under penalty of perjury under the laws of the United States of America and under the laws of the State of California.

Executed at 3420 Hillview Avenue, Palo Alto, CA. being the premises and place of business of Electric Power Research Institute, Inc.

Date: _____

10/19/2015


Kurt Edsinger

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

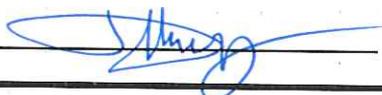
State of California
County of Santa Clara.

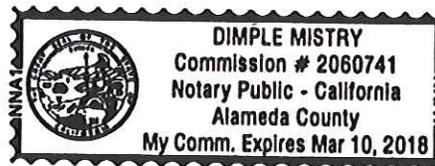
On October 19, 2015. before me, Dimple Mistry, Public Notary.
(insert name and title of the officer)

personally appeared Kurt Edsinger.
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature  (Seal)



Non-Proprietary BWRVIP Responses to NRC Requests For Additional
Information on BWRVIP-139-A , Appendix B

Each item from the NRC Request for additional information (RAI) is repeated below verbatim followed by the BWRVIP Response to that item.

RAI No. BWRVIP-139-Appendix B-1

Background: Section B.1 of Appendix B to Boiling Water Reactor (BWR) Vessel Internals Project (BWRVIP)-139 provides the following information marked as trade secrets (i.e., proprietary information):

The steam dryer is a non-safety-related component considered within the scope of license renewal to address the potential for aging to have an adverse impact on safety-related components (§54.4(a)(2)). The intended function is to retain sufficient structural integrity to prevent the generation of loose parts which could affect surrounding safety-related components in a manner that challenges the ability of these safety-related components to shut down the reactor, provide adequate core cooling, or isolate the main steam lines.

Issue: The staff notes that the designated proprietary information does not meet the criteria in 10 CFR 2.390(b)(4) because it is already available in public sources or of a type that is not customarily withheld from the public.

Request: Provide the basis for identifying the italicized information in the quoted paragraph in the “Issue” section of this RAI as a “Trade Secret” and justify why this meets the five criteria for proprietary withholding in paragraph §(b)(3) of 10 CFR 2.390.

BWRVIP Response to RAI No. BWRVIP-139-Appendix B-1

The proprietary version of BWRVIP-139-A Appendix B will be revised to reflect that the subject paragraph is no longer considered a “Trade Secret” of EPRI.

RAI No. BWRVIP-139-Appendix B-2

Background: The background section in RAI BWRVIP-139-DLR-1 is applicable to this RAI.

Section B.3.(a) of Appendix B to BWRVIP-139 provides the following information marked as trade secrets (i.e., proprietary information):

The only steam dryer aging effect requiring management by BWRVIP-139-A is crack initiation and growth. Cracking can result from stress corrosion, fatigue, or interaction of these two degradation mechanisms.

IGSCC of high-carbon stainless steel materials has occurred in steam dryers across the domestic fleet. Steam dryer locations with a history of IGSCC include dryer end plates, drain channels, support rings, and skirts. Factors influencing development of IGSCC include weld sensitization of Type 304 materials, cold work induced through cold forming or machining, and the influence of fatigue in developing crack initiation sites. Crack growth due to IGSCC has been shown to be stable and, in many cases, self-limiting.

Fatigue cracking is a second degradation mechanism contributing to crack initiation and growth. Fatigue cracking is the result of flow regime instabilities and subsequent pressure loadings on dryer components. In many cases, the flow instabilities resulted from new

conditions introduced by power uprating. Steam dryer locations affected by fatigue include dryer hoods, end plates, drain channels, skirts, tie bars, lifting rods, and other miscellaneous locations such as level screws, seismic blocks, and angle brackets. To date, the most significant fatigue cracking has been associated with outer hood cracking in BWR/3 units subsequent to power uprate.

Loss of material due to corrosion, erosion, or wear of the stainless steel steam dryer materials is not an aging effect requiring management by BWRVIP-139-A. Corrosion is adequately managed by the plant's water chemistry program. Water chemistry controls implemented consistent with EPRI BWR Water Chemistry Guidelines limit impurities that could contribute to localized corrosion.

Stainless steels are generally resistant to steam erosion. Operating history to date confirms that significant loss of material due to corrosion and erosion is not occurring in the field. Loss of material due to wear is not an aging effect requiring management. Although minor wear at bracket interface surfaces may occur, this loss of material does not represent a challenge to the steam dryer's intended function of maintaining the structural integrity of the assembly.

Aging effects associated with irradiation induced degradation (i.e. irradiation embrittlement, IASCC, and irradiation induced stress relaxation) are not aging effects requiring management for the steam dryer. The steam dryer is located high in the reactor vessel, away from the core.

Loss of fracture toughness due to thermal aging is not an aging effect requiring management for the steam dryer. Significant reductions in fracture toughness that could challenge the structural integrity of the steam dryer are not plausible.

Issue: The staff notes that the designated proprietary information does not meet the criteria in 10 CFR 2.390(b)(4) because it is already available in public sources or of a type that is not customarily withheld from the public.

Request: Provide the basis for identifying the italicized information in the quoted paragraph in the "Issue" section of this RAI as a "Trade Secret" and justify why this meets the five criteria for proprietary withholding in paragraph §(b)(3) of 10 CFR 2.390

BWRVIP Response to RAI No. BWRVIP-139-Appendix B-2

The proprietary version of BWRVIP-139-A Appendix B will be revised to reflect that the subject paragraphs are no longer considered a "Trade Secret" of EPRI.

RAI No. BWRVIP-139-Appendix B-3

Background: The summary of the regulatory requirements in the background section of RAI BWRVIP-139-DLR-1 are applicable to this RAI.

Section B.3.(b) of Appendix B to BWRVIP-139 provides the following information marked as confidential or privileged commercial information (i.e., proprietary information):

The inspection technique used by the inspection program is VT-1-89 visual examination. VT-1 examination performed using the examination requirements described in 1989 Edition of ASME Section XI (VT-1-89) has been shown to be adequate to detect cracks that are significant enough to potentially challenge the intended function described above in Section B.1 (i.e., to maintain EPRI Proprietary Licensed Material structural integrity). If

an indication is detected, additional inspections to assess the extent of cracking are recommended. Section 5.2 describes the inspection technique.

Issue: The staff notes that the designated proprietary information does not meet the criteria in 10 CFR 2.390(b)(4) because it is already available in public sources or of a type that is not customarily withheld from the public.

Request: Provide the basis for identifying the italicized information in the quoted paragraph in the “Issue” section of this RAI as a “Trade Secret” and justify why this meets the five criteria for proprietary withholding in paragraph §(b)(3) of 10 CFR 2.390.

BWRVIP Response to RAI No. BWRVIP-139 Appendix B-3

The proprietary version of BWRVIP-139-A Appendix B will be revised to reflect that the subject paragraph is no longer considered a “Trade Secret” of EPRI. Note that the words “EPRI Proprietary Licensed Material” shown in the quoted paragraph in the RAI, do not appear in the same paragraph in BWRVIP-139-A Appendix B.

RAI No. BWRVIP-139-Appendix B-4

Background: Appendix B of the BWRVIP-139 report includes Section B.2, “Steam Dryer Components Subject to Aging Management Review.” In this section of the appendix, the EPRI BWRVIP makes the following non-proprietary statement with respect to meeting Section §54.21(a)(1) of the license renewal Rule:

§54.21(a)(1) of the license renewal rule provides the requirements for identifying components that are subject to aging management review. The steam dryer license renewal evaluation boundary includes those steam dryer components that are required to accomplish the intended function described above in Section B.1 (i.e., to maintain structural integrity). The approach used in BWRVIP-139-A does not rely on evaluation to exclude any steam dryer sub-component from aging management review. FMEA, finite element structural analyses, and operating experience are used as inputs to guide development of an integrated inspection program that manages aging of the entire steam dryer.

Issue: The regulation in 10 CFR 54.21(a)(1) requires a license renewal applicant to perform a plant-specific integrated plant assessment (IPA) of those structures and components (SCs) that have been scoped in for license renewal in accordance with 10 CFR 54.4 and to identify all SCs that would need to be screened in for an AMR. The regulation in 10 CFR 54.21(a)(1) identifies that the SCs subject to an AMR are those SCs that have been scoped in for license renewal in accordance with 10 CFR 54.4 and that: (a) do not involve moving parts or changes in configuration, and (b) are not subject to replacement based on a qualified life or specified time period.¹ It was not evident whether the EPRI BWRVIP is making a determination that all steam dryer components would need to be within the scope of an AMR or whether only those steam dryer components that are defined as “passive, long-lived” components for the LRA will need to be within the scope of an AMR.

¹ Collectively referred to as “passive, long-lived” SCs.

EPRI BWRVIP has not identified loss of material due to wear as an applicable aging effect requiring management for BWR steam dryer assemblies and their subcomponents. In addition, provide your basis (i.e., justify) why the BWRVIP has not credited either [[

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]] would be entered into a BWR applicants corrective action program and assessed for its impact on both the safety related components at the plants and the applicant’s bases (i.e., program element criteria) for implementing the BWRVIP-139-A guidelines under the scope of the licensee’s BWR Vessel Internals program.

BWRVIP Response to RAI No. BWRVIP-139-Appendix B-5

As stated in Section 3.1 of BWRVIP-139-A, “The steam dryer does not perform a safety function and is not required to prevent or mitigate the consequences of accidents. Although the steam dryer is not a safety related component, the steam dryer is designed to withstand design basis events without the generation of loose parts. For a potentially degraded steam dryer, the structural integrity is considered to be adequate if the safety consequences of any loose parts that may be generated have been previously analyzed to be acceptable. The ability to shut down the reactor (control rod insertion), provide adequate core cooling, and the ability to isolate the main steam lines must be assured. This requirement can be met by assuring that the dryer support ring and dryer skirt remain intact.”

Accordingly, the focus of BWRVIP-139-A is to inspect regions of the dryer that may be expected to exhibit cracking due to high residual stresses near welds or acoustic loading from the main steam lines, where if unmonitored, have the potential for generation of loose parts. BWRVIP-139-A does not call for inspection of steam dryer components for wear per se. Wear at surfaces that may have relative motion (vessel support brackets against steam dryer support ring for example) would not be expected to result in the loss of structural integrity of the steam dryer. BWRVIP-139-A does call for a VT-1-89 inspection of the entire steam dryer support ring to look for cracking, which includes the steam dryer support brackets that are integral to the support ring. These VT-1-89 inspections would be expected to reveal any wear at the mating surfaces of the support ring and the vessel support brackets (lugs) and such wear would be noted in the IVVI report and input into the plant’s corrective action program. Vessel support brackets are not part of the steam dryer but rather a component of the vessel. Inspection of vessel support brackets is covered by the each plant’s ASME Section XI ISI Program. Between the VT-1-89 inspections of the steam dryer support ring and the ISI inspections of the support lugs (which are done in accordance with BWRVIP-48-A and GALL Rev 2 AMR XI.M4), management of wear as an aging degradation mechanism is effectively covered without the need to specifically address it within BWRVIP-139-A, Appendix B.

For clarification, the seventh paragraph of Section B.3 of BWRVIP-139-A Appendix B will be replaced with the following paragraph:

Stainless steels are generally resistant to steam erosion. Operating history to date confirms that significant loss of material due to corrosion and erosion is not occurring in the field. Loss of material due to wear is not an aging effect requiring additional management. Although minor wear at bracket interface surfaces has been detected, this loss of material did not represent a challenge to the steam dryer’s intended function of

maintaining the structural integrity of the assembly. Furthermore, if sufficient wear were to occur that would challenge steam dryer functionality it would be readily detectable under the existing requirements to periodically examine the upper support ring employing visual VT-1 (89). While outside the scope of this I&E Guideline, potential wear of the vessel lug mating surfaces to the steam dryer would likewise be detected during visual (VT-3) examinations conducted in accordance with ASME Code Section XI, Category B-N-2 Item B13.30.

RAI No. BWRVIP-139-Appendix B-6

Background: NRC Aging Management Program (AMP) XI.M9, “BWR Vessel Internals,” in GALL Report (current version is Revision 2), provides an acceptable AMP that may be used to manage those aging effects that may occur in reactor vessel internal (RVI) components in BWR designs. This includes those aging effects that may occur in the steam dryer assemblies and their subcomponents. Currently, GALL AMP XI.M9, invokes the current methodology in Technical Report No. BWRVIP-139-A as the basis for managing aging that may occur in a BWR steam dryer assembly and its subcomponents.

Issue: The methodology in Technical Report (TR) No. BWRVIP139-A will be implemented within the scope of either a GALL-based or plant-specific AMP for an applicant’s BWR RVI components. However, the methodology in TR No. BWRVIP-139 Appendix B does not provide any criteria on how the methodology in BWRVIP-139-A report will be factored into the scope of the AMP that will be used to manage aging in BWR RVI components. The methodology in BWRVIP-139-A, Appendix B, also does not establish how the methodology in BWRVIP-139-A will be applied to the steam dryer assemblies and their components as part of the procedural controls for implementing the applicable AMP.

Request: Provide the basis why the BWRVIP-139, Appendix B report methodology does not contain any applicable guidelines regarding the relationship between the AMP that will be applied to an applicant’s BWR RVI components and the methodology in TR No. BWRVIP-139-A that will be applied to the BWR steam dryer components. Specifically, provide the basis why the methodology in BWRVIP-139, Appendix B, does not establish that: (a) the methodology in TR No. BWRVIP-139-A will need to be incorporated into the scope of the plant-specific or GALL-based AMP that will be applied to an applicant’s BWR RVI components, and (b) the methodology in BWRVIP-139-A will be applied to the steam dryer assemblies and their components as part of the procedural controls for implementing the applicable AMP during a proposed period of extended operation (including proposed subsequent license renewal periods).

BWRVIP Response to RAI No. BWRVIP-139-Appendix B-6

BWRVIP-139-A Appendix B will be revised to add the following statement: “Should a utility chose to implement the steam dryer inspection guidance described in BWRVIP-139-A as part of either a GALL-based or plant specific AMP that will be applied to an applicant’s BWR steam dryer components, the BWRVIP-139-A methodology will be applied as part of procedural controls for implementing the applicable AMP during a proposed period of extended operation (including proposed subsequent license renewal periods).”

RAI No. BWRVIP-139-Appendix B-7

Background: Some of the BWR plants that have received renewed operating licenses are either currently operating at NRC-approved 20% extended power uprate (EPU) conditions or have requested approval of 20% EPUs and are awaiting the Commission’s decision on the requested power uprate amendments.

Issue: The BWRVIP-139-A report [[
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Recent plant experience indicates that cracking may develop very rapidly in existing dryers and replacement steam dryers during operations at full-EPU or partial-EPU power levels (Refer to events summarized in NRC Information [IN] Notice 2013-10, “Programs for Monitoring Boiling-Water Reactor Steam Dryer Integrity,” dated June 14, 2013 [ML13003A049]).

Request: Given the information in IN No. 2013-10, provide the basis why the previous visual inspection methods and frequencies in BWRVIP-139-A for detecting and managing cracking are adequate to managing fatigue and intergranular stress-corrosion cracking (IGSCC) induced cracking in BWR steam dryer components during a proposed period of extended operation, both at partial-EPU and full-EPU operating conditions.

BWRVIP Response to RAI No. BWRVIP-139-Appendix B-7

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In addition as mandated by the NRC SE on BWRVIP-139,

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This re-inspection strategy is considered adequate for on-going monitoring of steam dryer degradation considering the potential for both fatigue and IGSCC cracking through the license renewal period.