

2011-050 _____ BWR Vessel & Internals Project (BWRVIP)

March 4, 2011

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

Attention: Jonathan Rowley

Subject: Project No. 704 – BWRVIP Response to NRC Request for Additional Information
on BWRVIP-86, Revision 1

Reference: Letter from Jonathan Rowley (NRC) to David Czufin (BWRVIP Chairman),
“Request for Additional Information on BWRVIP-86, Revision 1, “BWR Vessel and
Internals Project, Updated BWR Integrated Surveillance Program (ISP)
Implementation Plan,” (TAC NO. ME2190) dated August 17, 2010.

Enclosed are five (5) copies of the BWRVIP response to the NRC Request for Additional
Information (RAI) on the BWRVIP report entitled “BWRVIP-86, Revision 1: BWR Vessel and
Internals Project, Updated BWR Integrated Surveillance Program (ISP) Implementation Plan.”
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 margin bars
and yellow shading 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 10CFR2.390A.

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 Randy Schmidt (PSEG Nuclear, BWRVIP
Assessment Committee Technical Chairman) at 856.339.3740.

Sincerely,



Dave Czufin
Exelon
Chairman, BWR Vessel and Internals Project
Together . . . Shaping the Future of Electricity

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NRRC*



NEIL WILMSHURST
Vice President and
Chief Nuclear Officer

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March 02, 2011

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 Document:

BWRVIP Response to NRC Request for Additional Information (RAI) Regarding BWRVIP-86, Revision 1: BWR Vessel and Internals Project Integrated Surveillance Program (ISP) Implementation Plan

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 information identified in the enclosed Affidavit consisting of the proprietary information owned by Electric Power Research Institute, Inc. ("EPRI") identified above (the "Report"). Proprietary and non-proprietary versions of the Correspondence and the Affidavit in support of this request are enclosed.

EPRI desires to disclose the Report in confidence to assist the NRC. The Report 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 Report 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 (704) 704-595-2732. Questions on the content of the Report should be directed to **Randy Stark** of EPRI at (650) 855-2122.

Sincerely,

A handwritten signature in blue ink, appearing to read "Neil W.", with a stylized flourish at the end.

AFFIDAVIT

RE: Request for Withholding of the Following Proprietary Document:

BWRVIP Response to NRC Request for Additional Information (RAI) Regarding BWRVIP-86, Revision 1: BWR Vessel and Internals Project Integrated Surveillance Program (ISP) Implementation Plan

I, Neil Wilmshurst, being duly sworn, depose and state as follows:

I am the Vice President and Chief Nuclear Officer at Electric Power Research Institute, Inc. whose principal office is located at 1300 W WT Harris Blvd, Charlotte North Carolina ("EPRI") and I have been specifically delegated responsibility for the above-listed Report that is sought under this Affidavit to be withheld (the "Report"). I am authorized to apply to the U.S. Nuclear Regulatory Commission ("NRC") for the withholding of the Report on behalf of EPRI.

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

Withholding Based Upon Privileged And Confidential Trade Secrets Or Commercial Or Financial Information:

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

b. EPRI considers the Report and the proprietary information contained therein (the "Proprietary Information") to constitute trade secrets of EPRI. As such, EPRI holds the Report in confidence and disclosure thereof is strictly limited to individuals and entities who have agreed, in writing, to maintain the confidentiality of the Report. EPRI made a substantial economic investment to develop the Report, 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 Report. If the Report and 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 Report for their own commercial benefit and profit and without expending the substantial economic resources required of EPRI to develop the Report.

c. EPRI's classification of the Report and 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."

d. The Report and the Proprietary Information contained therein are not generally known or available to the public. EPRI developed the Report 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 Report. EPRI was required to devote these resources and effort to derive the Proprietary Information and the Report. As a result of such effort and cost, both in terms of dollars spent and dedicated employee time, the Report is highly valuable to EPRI.

e. 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 and Report 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 being the premises and place of business of Electric Power Research Institute, Inc.

Date: 3-2-2011

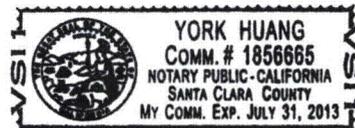
Neil Wilmshurst
Neil Wilmshurst

(State of California)
(County of Santa Clara)

Subscribed and sworn to (or affirmed) before me on this 2nd day of March, 2011, by Neil Wilmshurst, proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

Signature Y. Huang (Seal)

My Commission Expires 31st day of July, 2013.



Non-Proprietary BWRVIP Response to NRC Request for Additional
Information on BWRVIP-86, Rev 1

**BWRVIP Response to
NRC Request for Additional Information (RAI) Regarding
BWRVIP-86, Revision 1: “BWR Vessel and Internals Project
Integrated Surveillance Program (ISP) Implementation Plan”**

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

RAI 1

There are no definite indications of the processes through which any of the neutron fluences in the document were produced. Please confirm that all updated fluence calculations were performed using Nuclear Regulatory Commission (NRC) approved methodology and where appropriate it should be noted if the calculations were consistent with the requirements and guidance provided by Regulatory Guide 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence.” It would be beneficial to include language and indications of this consistency within the technical report. This issue has been noted previously.

From the final safety evaluation of Boiling Water Reactor Vessel and Internals Project (BWRVIP)-86, page 15 and BWRVIP-86, Revision 1 page B-18:

- (1) RPV [reactor pressure vessel] and surveillance capsule fluences will be established as based on the use of an NRC-approved fluence methodology that will provide acceptable results based on the available dosimetry data,
- (2) if one methodology is used to determine the neutron fluence values for a licensee's RPV and one or more different methodologies are used to establish the neutron fluence values for the ISP [Integrated Surveillance Program] surveillance capsules which “represent” that RPV in the ISP, the results of these differing methodologies are compatible (i.e., within acceptable levels of uncertainty for each calculation).

From the safety analysis cover letter for BWRVIP-116 and BWRVIP-86, Revision 1 page C-2:

The NRC staff has completed its review of the BWRVIP-116 report and the associated RAI responses. The staff finds that the final proposed BWRVIP ISP(E) (as addressed in the attached safety evaluation) is acceptable for BWR licensees implementation provided that all licensees continue to use one or more compatible neutron fluence methodologies acceptable to the NRC staff, i.e., which comply with the guidance in Regulatory Guide 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence,” to determine surveillance capsule and RPV neutron fluences. Compatible in this case

may be understood to mean neutron fluence methodologies which provide results that are within acceptable levels of uncertainty for each calculation. This condition of ISP(E) implementation is necessary to ensure that data from surveillance capsules included in the ISP(E) may be appropriately shared between BWR facilities and that the basis for the neutron fluence determined from a specific capsule and the RPV which it is intended to represent are comparable. This issue is related to the requirements for an ISP found in items a., b., and c., of Appendix H to 10 CFR Part 50, Paragraph III.C.1.

A statement attesting to adherence to NRC accepted methodology and Regulatory Guide 1.190 is buried within Section 5.3 but no explicit mention of the nature and pedigree of the neutron fluence values reported is made throughout the rest of the document or prefacing any of the values presented.

BWRVIP Response to RAI 1

The fluences presented in BWRVIP-86, Revision 1 [1], can be categorized as follows:

- BWR vessel fluences (e.g., 1/4T End of License (EOL) fluences)
- Capsule Fluences
 - Fluences of capsules already tested
 - Projected fluences of ISP capsules at the time of a planned future withdrawal and test
 - Fluences of capsules that will be tested by the ISP and any non-ISP capsules that may be withdrawn by a non-host plant for the purposes of assessing RPV integrity

Each category has a different developmental background, and each category is addressed below.

BWR Vessel Fluences

The BWR vessel fluences (e.g., the fluences in BWRVIP-86, Revision 1 Tables 4-1, 4-2, 4-7, 7-2, etc.) are based on fluence data provided to the BWRVIP in Adjusted Reference Temperature (ART) tables submitted by the utilities. Whenever the BWRVIP issues new ISP surveillance data, the utilities are requested to evaluate the data (if applicable to the plant) and provide an updated ART table to the BWRVIP. The ART tables are to be based on the most recent vessel fluence calculation. The BWRVIP uses the fluence information from the ART table submissions to periodically evaluate and revalidate the ISP capsule withdrawal schedule and ISP Test matrix.

The BWRVIP has no role in determining the specific method(s) employed by each utility to determine the RPV and surveillance capsule fluence. However, as stipulated on page 12 of the NRC's Safety Evaluation of the ISP [2], plant-specific fluence methodology was established as an issue to be resolved between each individual plant and the NRC.

Based on this prerequisite established by the NRC, many (not all) utilities have conducted or are in the process of updating their fluence calculations in accordance with the stipulations in the SE. Consequently, there are some plants for which updated fluence evaluations might not have been performed since joining the ISP, because no commitment exists to perform a “backfit” Reg. Guide 1.190 fluence evaluation for each vessel. Regardless, it is recognized and understood by the BWRVIP utilities that any future vessel and surveillance capsule fluence evaluations will be based on the use of an NRC-approved fluence methodology consistent with the guidance provided in Regulatory Guide 1.190.

Fluences of Capsules Already Tested

All ISP and SSP capsules that have been tested by the BWRVIP since establishment of the ISP have had a fluence evaluation which used an NRC-accepted methodology compliant with Regulatory Guide 1.190, as stated in Section 5.3 of BWRVIP-86, Revision 1. These capsules include all nine Supplemental Surveillance Program (SSP) capsules (capsule A – I), the River Bend 183° capsule, and the Monticello 300° capsule. Because SSP Capsules D, G and H were tested before Reg. Guide 1.190 was issued, the fluence evaluation reported in the original capsule test report [3] was not initially compliant; however, BWRVIP reevaluated that fluence using a compliant method in 2007 and issued a revised capsule report [4].

The fluences reported in BWRVIP-86, Revision 1, for capsules tested under plants’ individual surveillance programs, prior to the ISP, are the values reported in the capsule’s 10CFR50 Appendix H test report. Obviously, most if not all were tested - and the fluences determined - before Reg. Guide 1.190 was issued. No commitment exists to perform a “backfit” Reg. Guide 1.190-compliant re-evaluation of those fluences, but the BWRVIP will employ an NRC-accepted methodology compliant with Regulatory Guide 1.190 for all future ISP capsule tests.

Projected Capsule Fluences

The projected ISP capsule fluences presented in the report are based on estimated capsule lead factors multiplied by the vessel inside diameter (ID) fluence at the scheduled time of capsule withdrawal. The vessel ID fluence at the scheduled time of capsule withdrawal is extrapolated from the best available information (e.g., the vessel fluence determined at the most recent capsule withdrawal, or an End of License fluence) and an estimated plant capacity factor. Once again, the projected fluence is extrapolated from the fluence reported in a plant’s most recent ART table provided to the BWRVIP.

Determination of Fluences at Time of Future Capsule Tests

All future ISP capsules will have a fluence evaluation which uses an NRC-accepted methodology compliant with Regulatory Guide 1.190, as stated in Section 5.3 of BWRVIP-86, Revision 1. Likewise, fluences of non-ISP capsules that may be withdrawn by a non-host plant for the purposes of assessing RPV integrity, will have had a fluence

evaluation which uses an NRC-accepted methodology compliant with Regulatory Guide 1.190

RAIs involving Section 3, BWR Surveillance Programs Before the ISP

RAI 2

In Tables 3-2 and 3-3 there are several updated chemistry values, for instance in Table 3-2 the nickel content for Browns Ferry 1, Fitzpatrick, Hatch 2, River Bend, and Susquehanna were updated. In Table 3-3 the chemistries from Browns Ferry 1, Dresden 3, Duane Arnold, Grand Gulf, Hope Creek, LaSalle 1, Perry, River Bend, and Susquehanna 1 were updated from the values presented in BWRVIP-86-A and/or the NRC staff's Reactor Vessel Integrity Database (RVID). Please clarify whether each affected licensee has reported those changes to, and had them accepted by, the NRC.

BWRVIP Response to RAI 2

Tables 3-2 and 3-3 of BWRVIP-86, Revision 1, present the best estimate chemistries for BWR surveillance plates and welds, respectively. The values presented in BWRVIP-86-A (and RVID) were based on reported estimates available at the time that the tables were originally generated during development of the ISP, in the 1999-2000 timeframe. The reported estimates were generally taken from General Electric capsule reports for each plant that had already tested a capsule and/or Generic Letter 92-01 (and supplements) responses and represented the licensed values.

As soon as the ISP was approved, the BWRVIP undertook a data generation effort in 2002-2003, to ensure that the surveillance data provided to the plants by the ISP were generated consistently. This effort included a methodical re-evaluation / verification of surveillance material best estimate chemistries to ensure that all available data had been considered and that the appropriate protocols for determination of best estimate chemistry were being applied consistently in each case. These protocols were based on the NRC guidance provided to industry in [6], which included the following:

- “Surveillance weld chemistry should continue to be based on the chemistry data for that specific weld rather than the heat best-estimate chemistry.”

The BWRVIP verified the best estimate chemistry for each ISP surveillance material. For surveillance welds, only measurements for the specific surveillance weldment were considered. (In some of the capsule reports which had served as the source for the BWRVIP-86A chemistries, some qualification weld data had occasionally been included even though there was no indication that the surveillance material was taken from that same weldment.) For surveillance plates, all available CMTR and specimen chemistry measurements were considered. Also, it was found that some SSP materials were from the same weldment or plate as a plant surveillance material. Because independent chemistry measurements had been taken on some SSP materials during assembly of the

SSP capsules, those chemistry measurements were appropriately considered in the best estimate of the “source” plant surveillance material chemistry. The results of the BWRVIP’s verification / re-evaluation of material chemistries are reflected in the revised best estimate chemistry values documented in BWRVIP-86, Revision 1.

Tables 1 and 2 below describe the causes for the revisions to surveillance material chemistries made in BWRVIP-86, Revision 1.

Regarding licensee reports to the NRC on the topic of surveillance material chemistry, the BWRVIP is not informed of communications between the plants and the NRC regarding these revised best estimate chemistries. The data being used in the BWRVIP ISP has been reported to the NRC by BWRVIP-86, Revision 1.

Table 1
Chemistry Revisions for BWR Surveillance Plates

“Content Deleted – EPRI Proprietary Information”

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Table 2
Chemistry Revisions for BWR Surveillance Welds

“Content Deleted – EPRI Proprietary Information”

RAI 3

In Table 3-4 the chemistry values for the Oyster Creek SSP Capsule, B&W/EPRI Linde 80 weld was markedly changed from the BWRVIP-86-A reported value. Please clarify whether this change was reported to, and accepted by, the NRC and if this change warranted reevaluation.

BWRVIP Response to RAI 3

The chemistry values reported in BWRVIP-86-A (and the earlier BWRVIP-78 and BWRVIP-86 reports) for B&W/EPRI Linde 80 weld "Content Deleted – EPRI Proprietary Information" were based on values reported in a 1995 EPRI/CRIEPI report, "Integrated Reactor Vessel Surveillance Program, A Joint EPRI-CRIEPI RPV Embrittlement Study, Program Update Report, Volume 1." In 2002, separate work was performed to reassess the chemistries of some materials in that program, and information was received from B&W that the best estimate Cu for heat B&W/EPRI Linde 80 weld was "Content Deleted – EPRI Proprietary Info" Given the marked change in Cu, EPRI contracted BWX Technologies, Inc. – the contractor who was testing SSP Capsule E, F, and I at the time – to perform chemistry tests on three broken Charpy halves of the material. The chemistry values for B&W/EPRI Linde 80 weld reported in BWRVIP-86, Revision 1 "Content Deleted – EPRI Proprietary Information" represent the mean of those measurements [23]. As documented chemistry measurements taken on the actual surveillance material, they are deemed as authoritative. These revised values have been previously reported to the NRC in BWRVIP-111, Revision 1, "Testing and Evaluation of BWR Supplemental Surveillance Capsules E, F, and I" [24].

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It is noted that B&W/EPRI Linde 80 weld is not used in the BWRVIP ISP as a representative surveillance material, is not known to be a weld heat used in any BWR vessel, and is not used for any purpose in the ISP.

RAI 4

A reference is made on page 3-3 of BWRVIP-86 Revision 1, to Table 3-7. Please clarify if that reference should refer to Table 3-5 instead.

BWRVIP Response to RAI 4

The reference to Table 3-7 on page 3-3 of BWRVIP-86, Revision 1, should refer to Table 3-5. The reference will be corrected. Additionally, the reference to Table 3-6 on page 3-3 of BWRVIP-86 Revision 1, should refer to Table 3-4. This reference will also be corrected

RAIs Involving Section 4, ISP Capsule Irradiation, Withdrawal and Testing

RAI 5

Tables 4-1 and 4-2 include numerous updated chemistry and neutron fluence values including some strongly different neutron fluence values such as that of the River Bend surveillance plate and the Clinton weld. Please clarify whether each affected licensee has reported those changes to, and had them accepted by, the NRC.

BWRVIP Response to RAI 5

Vessel Fluence Changes

The origin of the vessel fluences reported in Tables 4-1 and 4-2 was described in detail above in the response to RAI 1. The fluences were taken from Adjusted Reference Temperature (ART) tables submitted to the BWRVIP when the ISP participants evaluated new ISP data. Determination of RPV fluence is the responsibility of each BWR plant. The BWRVIP is not generally informed of plant communications with the NRC staff regarding vessel fluence evaluations and necessarily assumes that the plant has complied with applicable protocols for communication with the NRC staff regarding fluence evaluations. However, it is the responsibility of each BWR participant in the ISP to inform the BWRVIP when its vessel fluence evaluation changes.

In ISP training conducted by the BWRVIP for participant plants, the BWRVIP has stressed the importance of providing the most recent best estimate fluence values to the BWRVIP when the plant submits updated ART tables. Initially, some plants were reluctant to submit best estimate values and wanted to report only “licensing” values. The BWRVIP found that these “licensing” values were usually bounding (artificially high), and although the values may provide a certain desirable margin for licensing issues, they were not useful as a basis for running a technically sound ISP. Specifically, what may be “conservative” fluence value for licensing can be unconservative when planning ISP capsule withdrawals; “bounding” or artificially high vessel fluence values inherently suggest that a capsule will reach a target fluence before it is actually achieved (capsule fluences prior to withdrawal are estimated from vessel fluence and a lead factor). Because the ISP desires to withdraw a capsule when a target fluence is actually achieved, best estimate fluences are desirable.

Vessel Plate and Weld Chemistries

In Table 4-1, only one plate chemistry value is different from that reported in BWRVIP-86-A: Cooper C2307-2 Ni wt%. The value reported in BWRVIP-86-A (and BWRVIP-78 and 86 before it) was based on the Ni content value for C2307-2 reported in Table 3-1 of [25]. However, there are four chemistry tests performed on C2307-2 Charpy specimens reported in Table 3-3 of that capsule report, which were not considered in the best estimate; the BWRVIP has properly included them in the best estimate Ni shown in BWRVIP-86, Revision 1.

With regard to the weld chemistries in Table 4-2: all vessel weld chemistries which differ from BWRVIP-86-A are for Chicago Bridge & Iron (CB&I) weld heats. When BWRVIP-86 and BWRVIP-86-A were published, no comprehensive evaluation of CB&I weld best estimate chemistries like the evaluations accomplished in the 1990s for Combustion Engineering and Babcock & Wilcox (B&W) welds had been performed. In the late 1990's, EPRI conducted a data mining effort for CB&I weld chemistry data. As part of the BWRVIP ISP data generation effort in 2002-2003, a thorough evaluation of that data – including determination of best estimate chemistry values – was undertaken. Where possible and appropriate, coil-weighted best estimate chemistry values were calculated for CB&I weld heats used in U.S. BWRs, consistent with the NRC guidance provided in [6] and Section 2.2 of NUREG-1511, Supplement 2 [26]. The CB&I weld best estimates were provided to the BWRs and are reflected in the vessel chemistry values listed for CB&I heats in Table 4-2.

The BWRVIP is not aware of what chemistry values these eleven plants have submitted to the NRC or what the NRC has approved as licensing values for the heat numbers listed in Table 4-2. The BWRVIP recognizes that there may be plant-specific reasons for maintaining a weld chemistry licensing value that is different from the CB&I best estimates listed in Table 4-2. However, for the purposes of administering the ISP, best estimate values calculated using uniformly applied protocols which implement applicable NRC guidance will provide the most robust technical basis for the ISP test matrix, and that has been the approach taken.

RAI 6

In Section 4.1.2 the argument is made that changes to the target limiting material need not be made whenever the vessel limiting material changes. This argument is supported by citing that changes are neither required by ASTM E185-82, “Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels,” nor likely to occur and therefore the test matrix set of target materials will remain static with regard to future changes in vessel limiting materials. This reasoning holds merit and provides value to the document, but the staff considers that the below conclusions stated on page 4-11 are too strictly negative with regards to accounting for changes in vessel limiting materials;

BWRVIP evaluation of the effects or consequences of changes in vessel limiting materials has shown that the ISP test matrix does not need to be changed when vessel limiting materials change. Therefore, the test matrix set of target vessel materials will remain “static” with regard to future changes in vessel limiting materials. The reasons are discussed below.

and again on page 4-14,

The BWRVIP evaluation concluded that the guidance of ASTM E 185-82 does not require the ISP to maintain a “dynamic” test matrix in which the target material changes whenever the vessel limiting material changes; that no technical benefit would be derived from doing so; and that maintenance of a “dynamic” test matrix would not cause valuable surveillance data to be considered that is not already being considered. It would, however, detract from the long-term effectiveness of the ISP by reducing its ability to monitor specific high-value surveillance materials over time. For these reasons, the ISP test matrix (either target vessel material or representative surveillance material) will not be changed when a vessel limiting material changes.

It is the understanding of the staff that the arguments put forth in Section 4.1.2 state, in simple terms, that the ISP [and ISP(E)] need not be changed every time a small fluctuation in neutron fluence or chemistry analysis changes the vessel limiting material.

Please clarify if this is the intent, and provide language that is less strict. It would be expected that if major new information came forward concerning the nature or properties of vessel materials (for example, reevaluation of RPV material embrittlement due to the use of new embrittlement models) that would then suggest a change in vessel limiting material, and consequently target limiting materials, such change would be evaluated and considered for possible implementation within the program. The current text of BWRVIP-86, Revision 1 seems to preclude this eventuality.

BWRVIP Response to RAI 6

The intent of the discussions presented in Section 4.1.2 was to show that the ISP test matrix as approved should be changed only if the test matrix and schedule cannot be fulfilled because an assigned representative surveillance material is no longer available, e.g., due to circumstances such as a prolonged or early shutdown of an ISP host plant. The discussions show that the general concept of changing the ISP test matrix whenever a change in vessel limiting material occurs – regardless of the cause – does not enhance the technical merit of the ISP but rather detracts from its effectiveness.

It appears from the Staff’s question that although the Staff accepts the BWRVIP’s justification for not changing the ISP in some situations (such as a small fluctuation in neutron fluence or chemistry analysis changing the vessel limiting material), the Staff believes that changes to the ISP test matrix may be appropriate if changes to limiting materials are a result of new embrittlement models. The BWRVIP position is that the technical rationale presented in Section 4.1.2 is generic for all changes to vessel limiting material and that there is no technical basis for differentiating the policy as a function of the cause of change in limiting material.

The BWRVIP will investigate with interest the effects of future embrittlement models (e.g., new revisions to Reg. Guide 1.99) on the BWR fleet and any changes to vessel limiting materials that may result. However, this issue has been raised before, in NRC

Question #4 of the final NRC RAI on BWRVIP-86 [27], and the BWRVIP response [28] at that time is appropriate to this question as well:

“The BWRVIP is not in a position to speculate what future revisions of Regulatory Guide 1.99 might include or what the appropriate technical approach to address them might be. The BWRVIP will of course meet its legal obligations that the ISP must comply with applicable law and regulations. However, it is inappropriate to provide a commitment to update the ISP program before the nature and technical basis for the updates are known.

Any revisions to the ISP will be submitted for NRC staff review and approval.”

RAI 7

Figures 4-1 and 4-2 are nearly unreadable in printed format. Please reformat these figures for readability and clarity. Enlarging the figures which are already segregated to their own pages as well as using more distinct shapes and colors would be preferable with special attention being paid to the appearance of the figures when printed in black and white. Additionally the two figures should have a consistent selection of shapes with regards to data plotted. Currently there is no stylistic consistency between the two plots which leads to confusion between them.

BWRVIP Response to RAI 7

Replacement figures are provided below.

“Content Deleted – EPRI Proprietary Information”

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Replacement Figure 4-1, “Chemistry Plot for BWR Vessel and Surveillance Welds”

“Content Deleted – EPRI Proprietary Information”

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Replace Figure 4-2, “Chemistry Plot for BWR Vessel and Surveillance Plates”

RAI 8

Numerous chemistries were updated with the Individual Vessel Evaluation tables as noted in the revision notes. Please clarify whether each affected licensee has reported those changes to, and had them accepted by, the NRC.

BWRVIP Response to RAI 8

In the BWRVIP Responses to RAI 2 and RAI 5 above, the chemistry changes in Tables 3-2, 3-3, 3-4, 4-1, and 4-2 were explained and justified. The chemistries from those tables are used throughout the Appendix A Individual Vessel Evaluations (IVEs); therefore, where a material best estimate chemistry changed in Table 3-2, 3-3, 3-4, 4-1, or 4-2, the corresponding value in the IVEs also changed. For example, changes in the best estimate vessel weld chemistry in Table 4-2 resulted in a change of the target vessel weld where it appears in Appendix A. Changes to surveillance material chemistries in Tables 3-2, 3-3, and 3-4 are reflected everywhere that the material is listed in any table in the IVEs. All changes in specific material chemistries have been evaluated and in no instance do the revised chemistries affect the conclusions of the IVEs.

The BWRVIP has noted one additional change in the IVEs that should have been made in BWRVIP-86, Revision 1, but was omitted. In the IVE for Cooper plate (page A-14), the Ni content for the target vessel plate heat C2307-2 was listed as "Content Deleted - EPRI Proprietary Info"; the correct value, based on Table 4-1, is "Content Deleted - EPRI Proprietary Info". This will be corrected in a revision to the report.

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Regarding licensee reports to the NRC on the topic of these changes: These changes are the same as the changes addressed in the response to RAI 2 and RAI 5. As previously noted, the BWRVIP is not informed of communications between the plants and the NRC regarding these revised best estimate chemistries. The data being used in the BWRVIP ISP has been reported to the NRC by BWRVIP-86, Revision 1.

Additional Information Provided by the BWRVIP (not related to the NRC RAIs)

In 2009-2010, the BWRVIP conducted a periodic review of the ISP withdrawal schedule. Based on that review, several necessary corrections to BWRVIP-86, Revision 1 were identified which are discussed below. The BWRVIP requests that these corrections be included in the staff's review of this RAI response.

1. The "Content Deleted - EPRI Proprietary Info" capsule will be withdrawn in "Content Deleted - EPRI Proprietary Info". This was incorrectly identified as "Content Deleted - EPRI Proprietary Info" in BWRVIP-86, Revision 1. This correct "Content Deleted - EPRI Proprietary Info" will be made to BWRVIP-86, Revision 1.
2. The "Content Deleted - EPRI Proprietary Info" capsule scheduled for withdrawal in "Content Deleted - EPRI Proprietary Info" will attain an estimated "Content Deleted - EPRI Proprietary Info" versus the previously estimated "Content Deleted - EPRI Proprietary Info". Although this is a slightly lower EFY, it is acceptable because the change in fluence is negligible. This correction will be made to BWRVIP-86, Revision 1.
3. The ISP(E) capsules will be tested in the year shown in the ISP(E) capsule withdrawal schedule, not the EFY. The BWRVIP proposes to implement the

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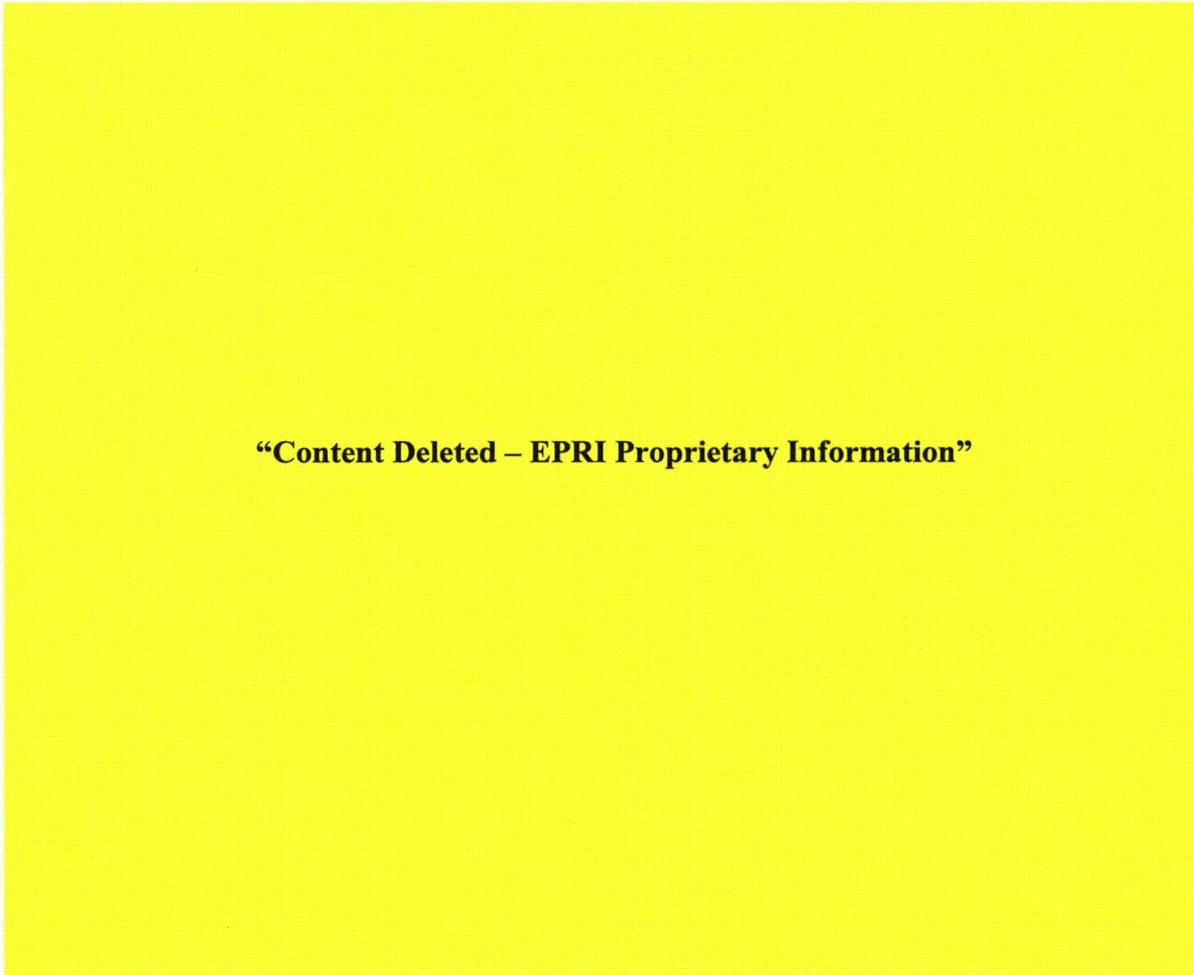
following protocol for informing the NRC of changes to the ISP(E) capsule withdrawal schedule:

Although the capsule withdrawal schedule identifies a Year and an EFPY for each withdrawal, ISP(E) capsules will be withdrawn for testing in the year shown in the schedule (plus or minus one year, to align with outage schedules). The NRC will be informed only if the EFPY at that year is less than that shown in the schedule; if the EFPY will be less, then the BWRVIP must reevaluate and inform the NRC how the ISP intends to address the shortfall in capsule EFPY/fluence.

4. For clarity, the ISP capsule withdrawal schedule (original license period) as currently recommended (e.g., correcting the <sup>"Content Deleted - EPR
Proprietary Information"</sup> EFPY misprint and updating the <sup>"Content Deleted - EPR
Proprietary Info"</sup> EFPY for <sup>"Content Deleted - EPR
Proprietary Info"</sup>) is provided in Table 1. These changes will be made to BWRVIP-86, Revision 1.

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Table 1
Updated ISP Capsule Withdrawal Schedule (Original License Period)



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1. Bold font highlights differences with the NRC-approved schedule given in BWRVIP-86-A.
2. Cooper is estimated to attain 32, not 34, EFPY
3. This Duane Arnold EFPY was incorrectly published as 32 EFPY in BWRVIP-86, Revision 1; correct value is 28 EFPY, which is the same as the approved schedule in BWRVIP-86-A; however, to coincide with the plant's outage schedule, the capsule's year of withdrawal is being changed to 2012.
4. Final Monticello capsule for the ISP original license period was withdrawn & tested in 2007 at 28.2 EFPY.
5. When BWRVIP-86-A was originally approved, it included the withdrawal of two additional Perry capsules (in addition to the capsule previously tested at 5.5) in the original license period: one at 18.5 EFPY in ~ 2012 and another at 30 EFPY in ~2026. However, the NRC subsequently approved the reclassification of the 30 EFPY capsule as a license renewal capsule to be tested at 40 EFPY in 2039. Therefore, only one Perry capsule remains to be tested for the original license period ISP.

All other bolded changes to withdrawal year or EFPY were explained in BWRVIP-86, Revision 1.

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