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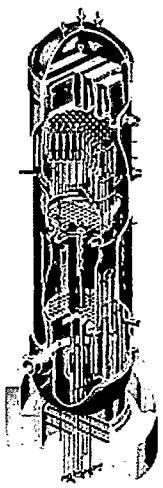
2020 TECHNICAL REPORT

BWRVIP-94, Revision 4: BWR Vessel and Internals Project

Program Implementation Guide



BWRVIP-94, Revision 4:
BWR Vessel and Internals Project

Program Implementation Guide

3002019689

Final Report, November 2020

EPRI Project Manager
W. McGruder

All or a portion of the requirements of the EPRI Nuclear Quality Assurance Program apply to this product.

YES (NO)

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The Electric Power Research Institute (EPRI) prepared this report.

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BWRVIP-94, Revision 4: BWR Vessel and Internals Project—Program Implementation Guide. EPRI, Palo Alto, CA: 2020. 3002019689.

ABSTRACT

This document establishes a framework for structuring and strengthening existing BWR vessel and internals programs to ensure consistent application of guidelines by BWR Vessels and Internals Project (BWRVIP) members.

Program elements outlined in this document include inspection, assessment, repair, and mitigation activities. The document refers utilities to BWRVIP guidelines (BWRVIP documents) for technical details.

EPRI, in conjunction with the BWRVIP, will maintain this guide as an EPRI document and revise it as necessary. BWRVIP guidelines and this document recognize the need for analysis and flexibility within each plant-specific program.

Section 1, "Introduction," provides background, discusses member utility responsibilities, and discusses the process for revising referenced BWRVIP guidelines.

Section 2, "Vessel and Internals Program," defines the program elements and implementing guidance for strengthening existing vessel and internals programs.

Section 3, "BWR Vessel and Internals Program Support Elements," identifies the program elements necessary to ensure long-term vessel and internals reliability.

Section 4, "References," identifies documents referenced or used in development of this document as well as documents necessary for implementation of program requirements.

Appendix A, "BWRVIP Utility Commitment Letters to NRC," provides BWRVIP utility commitments to the NRC.

Appendix B, "Guidelines for Deviation Disposition," provides guidance for dispositioning deviations from BWRVIP recommendations.

Appendix C, "BWRVIP Emergent Issues Protocol," describes the expectations for the communication and evaluation of emergent BWR vessel and internals materials issues.

Appendix D, "Record of Revisions – BWRVIP-94NP, Revision 2," provides details of revisions made in BWRVIP-94NP, Revision 2.

Appendix E, "Record of Revisions – BWRVIP-94NP, Revision 3," provides details of revisions made in BWRVIP-94NP, Revision 3.

Appendix F, "Record of Revisions – BWRVIP-94, Revision 4", provides details of revision made in BWRVIP-94, Revision 4.

Keywords
Boiling water reactor
Stress corrosion cracking
Vessel and internals
BWRVIP implementation

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EXECUTIVE SUMMARY

Deliverable Number: 3002019689

Product Type: Technical Report

Product Title: BWRVIP-94, Revision4: BWR Vessel and Internals Project—Program Implementation Guide

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PRIMARY AUDIENCE: BWRVIP program owners

SECONDARY AUDIENCE: BWRVIP committee members and plant personnel who interface with the BWRVIP Program

KEY RESEARCH QUESTION

Provide Boiling Water Reactor Vessels and Internals Project (BWRVIP) members with the framework and guidance for administering their BWR vessel and internals programs.

RESEARCH OVERVIEW

This document is provided to ensure consistent application of BWRVIP guidelines by BWRVIP member utilities in accordance with the requirements of Nuclear Energy Institute (NEI) 03-08, "Guideline for the Management of Materials Issues, Revision 3," March 2017.

KEY FINDINGS

- This document establishes a framework for structuring and strengthening existing BWRVIP programs to ensure consistent application of guidelines by BWRVIP members. The program elements outlined in this document include inspection, assessment, repair, and mitigation activities. The document refers utilities to BWRVIP guidelines (BWRVIP documents) for technical details.
- Revision 4 of this document incorporates clarifications and updates to programmatic implementation and utility experience since the publication of Revision 3. The revision also expands the guidance to discuss applicability of the report to international members and those not governed by NEI 03-08.

WHY THIS MATTERS

Consistent application of BWRVIP guidelines across the utilities is a critical aspect of the management of materials aging issues and for maintaining regulatory confidence in the industry's implementation of the NEI 03-08 materials initiative.

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EXECUTIVE SUMMARY

HOW TO APPLY RESULTS

The guidance herein is to be incorporated into the BWRVIP programs of all U.S. BWR utility members and considered by international BWR utility members as applicable.

LEARNING AND ENGAGEMENT OPPORTUNITIES

- Upon publication of this report, BWRVIP members are notified by letter of its download availability. The changes being made in this revision will be briefed during the next BWRVIP technical committee meetings.

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PROGRAM: Boiling Water Reactor Vessel and Internals Program (BWRVIP), P41.01.03

IMPLEMENTATION CATEGORY: Category 1, Regulatory

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PREAMBLE

The BWRVIP Executive Committee (EC) has approved this document for publication and implementation. Furthermore, the BWRVIP EC concurs that:

- U.S. utilities shall continue to meet the BWRVIP commitments to the NRC to implement BWRVIP documents (these commitments to the NRC are identified in the BWRVIP letters in Appendix A),
- Utilities shall continue to implement BWRVIP documents described herein,
- Utilities shall develop an implementation plan at each plant, and
- BWRVIP documents shall be implemented in accordance with a controlled program that complies with 10CFR50, Appendix B or with the applicable quality assurance requirements of their respective regulatory regime.

RECORD OF REVISIONS

BWRVIP-94	Original Report (1006288)
BWRVIP-94, Revision 1	The report as originally published (1006288) was revised to incorporate updates to reflect utility experience since the original publication. The revised report also incorporates guidance from the following NEI documents issued since the original publication of BWRVIP-94: 1. NEI 03-08, "Guideline for the Management of Materials Issues," May 2003. 2. "Materials Guidelines Implementation Protocol," Revision 0, May 2004. BWRVIP commitment letters transmitted to the NRC in 1997 have also been included in a new Appendix A. All changes are marked with margin bars.
BWRVIP-94NP, Revision 2	BWRVIP-94, Revision 1 was revised to incorporate updates to reflect utility experience since the publication of Revision 1. The revised report also incorporates guidance from the following documents issued since the publication of BWRVIP-94, Revision 1: 1. Self-Assessment of the Boiling Water Reactor Vessel & Internals Project, September 2006 (BWRVIP Correspondence File Number 2006-033) 2. 2008 Self-Assessment Report – BWRVIP Program (BWRVIP Correspondence File Number 2009-104) 3. NEI 03-08, Revision 2, "Guideline for the Management of Materials Issues," January 2010 4. 2010 Self-Assessment Report – BWRVIP Program (BWRVIP Correspondence File Number 2010-261A) All changes are marked with margin bars. Details of the revisions can be found in Table D-1.
BWRVIP-94NP, Revision 3	BWRVIP-94, Revision 2 was revised primarily to incorporate guidance from the following documents issued since the publication of BWRVIP-94, Revision 2: 1. 2013 Joint NEI 03-08 Materials Issue Programs Self-Assessment, January 2014 (BWRVIP Correspondence File Number 2014-014) 2. 2016 Joint Self-Assessment BWRVIP, CHEM, MRP, and SGMP Programs, Final Report December 2016 3. NEI 03-08, Revision 3, "Guidance for the Management of Materials Issues," March 2017 4. Materials Issue Programs Common Administrative Procedures, Revision 0, November 2017 With the exception of some minor editorial corrections, all changes within the body of the document (i.e., beyond those made to the front matter) are marked with margin bars. Details of the revisions can be found in Table E-1.

BWRVIP-94, Revision 4	BWRVIP-94, Revision 4 was revised to incorporate guidance from the following documents and reports issued since the publication of BWRVIP-94, Revision 3: 1. Materials Issue Programs Common Administrative Procedures, Revision 1, July 2020 The revision also includes clarifications and changes to program implementation guidance. The revision also expands the guidance to discuss applicability of the BWRVIP program elements to international members and those members not governed by NEI 03-08. With the exception of some minor editorial corrections, all changes within the body of the document (i.e., beyond those made to the front matter) are marked with margin bars. Details of the revisions can be found in Table F-1.

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Description
ASME	American Society of Mechanical Engineers
BWR	Boiling Water Reactor
BWRVIP	Boiling Water Reactor Vessel and Internals Project
CNR	Customer Notification Report
CFR	Code of Federal Regulations
EC	Executive Committee
EOC	Executive Oversight Committee
EPRI	Electric Power Research Institute
HWC	Hydrogen Water Chemistry
I&E	Inspection & Evaluation
IASCC	Irradiation Assisted Stress Corrosion Cracking
IGSCC	Intergranular Stress Corrosion Cracking
INPO	Institute of Nuclear Power Operations
INR	Indication Notification Report
IP	Issue Program
NDE	Nondestructive Evaluation (or Examination)
NEI	Nuclear Energy Institute
NIS-1	Owner's Report for Inservice Inspections
NMCA	Noble Metal Chemical Application
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OAR-1	Owner's Activity Report
OLNC	Online NobleChem™
RIC	Research Integration Committee

CONTENTS

LIST OF TABLES

1
INTRODUCTION

This document is provided to ensure consistent application of BWR Vessel and Internals Project (BWRVIP) guidelines by BWRVIP member utilities. Revision 4 of this document incorporates clarifications and updates addressing programmatic implementation and utility experience gained since the publication of Revision 3 of this document. This document, in combination with the Material Issue Program Common Administrative Procedure [1], and Nuclear Energy Institute (NEI) 03-08 [2], "Guideline for the Management of Materials Issues, Revision 3," March 2017, hereafter referred to as NEI 03-08, provide the framework for development and management of the BWRVIP program NEI 03-08 outlines the policy and practices that the industry commits to follow in managing materials aging issues.

1.1 Background

Intergranular stress corrosion cracking (IGSCC) in austenitic stainless steel piping was identified as a major issue for BWRs in the 1980s. At the same time, EPRI and the BWR owners recognized that reactor internals were potentially susceptible to IGSCC. Shroud cracking in 1993 and 1994 confirmed that IGSCC of BWR vessel internals is a significant issue for boiling water reactors. Subsequent plant inspections have confirmed cracking in other internal components, particularly in the heat affected zone of welds.

As a result, the BWRVIP was formed in June 1994 as an association of member utilities focused on BWR vessel and internals issues. Formation and support of the BWRVIP is a voluntary industry initiative with all U. S. and most international BWR utilities as members.

BWR vessel and internals components were analyzed and prioritized, resulting in BWRVIP guidelines that have been reviewed and approved by the BWRVIP Executive Committee (EC). Meeting the intent of BWRVIP guidelines approved by the BWRVIP EC, including this program guide, is the responsibility of each utility. These initiatives are a reflection of the commitment of BWRVIP member utilities to safe, reliable and cost-effective reactor operation.

The BWRVIP has expended considerable resources developing technical guidance on inspection, assessment, mitigation and repair strategies to meet challenges posed by IGSCC, irradiation-assisted stress corrosion cracking (IASCC) and other age-related degradation mechanisms. Water chemistry control, including hydrogen water chemistry (HWC), Noble Metal Chemical Application (NMCA) and/or Online NobleChem™ (OLNC), are examples of industry's commitment through the BWRVIP to manage aging and inhibit vessel and internals degradation.

Technical guidance has matured to include recommendations regarding non-destructive examination (NDE), inspection scope and frequency, flaw evaluation and crack growth rate assumptions, analysis of inspection data, repair criteria and mitigation strategies to inhibit IGSCC/IASCC and other age-related degradation mechanisms.

1.2 Implementation Requirements

In accordance with the implementation requirements of NEI 03-08, the requirement that utilities have a BWR vessel and internals program in accordance with this document is considered "mandatory" while all other elements of BWRVIP-94 are considered "needed." BWRVIP members not governed by NEI 03-08 should review all elements of BWRVIP-94 and implement the guidance as applicable and in accordance with the regulatory and plant-specific requirements of the station. Those members that do not fully implement the BWRVIP Program are encouraged to implement the elements applicable to their station.

1.3 Roles and Responsibilities in Accordance with NEI 03-08 (U.S. Members Only)

The BWRVIP is an industry materials management Issue Program (IP) governed by NEI 03-08. NEI 03-08 identifies the roles and responsibilities of industry groups that address material issues and utility participants in those groups as outlined below.

1.3.1 Roles and Responsibilities of the BWRVIP

The BWRVIP is responsible for:

- Meeting the intent of NEI 03-08
- following accepted industry practices for the management of materials issues
- Resolving materials issues that fall within the scope of the BWRVIP
- Informing the applicable EC of situations that affect the disposition of materials issues
- Providing high quality deliverables that meet the intent of NEI 03-08 for all issues addressed
- Establishing and maintaining a nuclear safety focused culture
- Performing periodic self-assessments and gap analyses
- Maintaining a set of performance metrics to monitor operations
- Defining the regulatory interface responsibilities at the outset of addressing any major issue
- Identifying implementation requirements for deliverables and guidelines
- Developing a process to determine which deliverables require industry enforcement and implementation follow-up
- Maintaining appropriate lateral communication among groups to effectively coordinate materials issues
- Developing and maintaining a Strategic Work Plan [3] that includes evaluating strategic issues through the use of such tools as the Materials Degradation Matrix [4] and the Issue Management Tables [5]
- Reporting to the applicable executive committee on the status of materials issues under the BWRVIP cognizance

- Establishing and following a protocol for managing emerging issues to ensure that the affected utility receives prompt and sufficient support and that communications with other ips adequately coordinate related activities
- Utilizing the document screening tool in Appendix C of NEI 03-08 to determine when documents warrant Nuclear Regulatory Commission (NRC) review and approval
- Providing input to the annual report that is sent to the NRC notifying them of the applications of the NEI 03-08 document screening process
- Evaluating the need to revise BWRVIP guidelines based on industry operating experience

Note that EPRI acts as the program manager responsible for maintaining technical documents as directed by the BWRVIP.

1.3.2 Roles and Responsibilities of Individual BWRVIP Utilities

Each U.S. utility is committed to NEI 03-08 and shall meet the requirements as outlined in NEI 03-08, including implementation of all "mandatory" and "needed" elements and shall meet the following expectations:

- Participate in the BWRVIP, including:
  - Fund the BWRVIP
  - Contribute technical resources and executive leadership to the BWRVIP efforts
  - Share all materials operating experience, including prompt communication of significant materials degradation to the BWRVIP
  - Implement appropriate BWRVIP guidelines and recommendations
- Evaluate current business and strategic plans for appropriate focus on materials issues

1.4 Member Responsibilities

Each BWRVIP member agrees to evaluate existing program elements against those described in Sections 2 and 3 and revise and strengthen their programs, where necessary, to meet the intent of this document and the referenced BWRVIP guidelines.

In addition to meeting the intent of all BWRVIP guidelines, each BWRVIP member shall also review and consider relevant operating experience and information contained in applicable regulatory notices and other industry documents when evaluating the need to improve existing vessel and internals programs.

The features of a successful vessel and internals program include the following necessary elements:

Vessel and Internals Integrity Elements:

- Vessel and internals program development and documentation
- Inspection
- Repairs
- Maintenance of vessel and internals integrity

Program Support Elements:

- Water chemistry control
- Quality assurance
- Corrective action
- Self-assessment
- Reporting

1.5 Utility Requirements

The BWRVIP program includes both domestic and international utilities. This section outlines the generic requirements for all BWRVIP member utilities. Requirements specific to domestic and international BWRs are also described below. All utilities are expected to review the requirements and implement the guidance in BWRVIP guidance, including this document, as applicable. The applicable BWRVIP guidelines, which have been approved by the BWRVIP Executive Committee, are listed on the EPRI BWRVIP website (http://www.epri.com/bwrvip).

Generic Requirements (Both Domestic and International Utilities)

BWRVIP member utilities will review past implementation strategies and adjust programs and plans accordingly to ensure utility alignment with the guidelines.

The BWRVIP should be consulted if questions arise on the interpretation or implementation of BWRVIP guidelines. A form for requesting an interpretation or asking an implementation question is posted on the EPRI BWRVIP web site. Responses to utility questions and interpretations of BWRVIP guidelines will be issued periodically by the BWRVIP and will be posted on the EPRI BWRVIP web site.

Domestic Utilities

Domestic utilities governed by the U.S. NRC have specific commitments to implementing BWRVIP guidance in accordance with NEI 03-08 and utility commitments made to the NRC. U.S. member utilities shall implement any of these guidelines containing "mandatory" or "needed" guidance to the fullest extent possible.

U.S. BWRVIP utility commitments to the NRC to implement BWRVIP guidance are described in the letters in Appendix A. The current status of the NRC review of each of the BWRVIP documents transmitted to the NRC is listed on the EPRI BWRVIP website. Requirements for reporting when full compliance with BWRVIP guidance is not met is described in Section 3.5.

When this document and other BWRVIP guidelines are approved by the Executive Committee and are initially distributed, or subsequently revised, each utility shall modify their vessel and internals program documentation to reflect the new requirements and shall implement the guidance within two refueling outages, unless a different schedule is identified by the BWRVIP at the time of document distribution. Implementation is to be based on the date of the distribution/notification letter to the members. Implementation means not only incorporating the requirements into the utility program, but also performing the initial or baseline inspection and evaluation requirements.

If new guidance approved by the Executive Committee includes revisions to NRC approved BWRVIP guidance that are less conservative than those approved by the NRC, this less conservative guidance shall be implemented only after NRC approves the changes. "NRC approved" generally means the document was submitted to the NRC for review and approval and a final Safety Evaluation (SE) has been issued and is to be incorporated into publication of a "-A" document or equivalent. NRC approved guidance may be implemented upon issuance of the BWRVIP notification/distribution letter containing the final NRC SE for the guidance. Alternatively, if the revised guidance screened out from submittal to the NRC in accordance with NEI 03-08 Appendix C, utilities may implement the guidance subject to any licensing restrictions at the site (e.g., commitments to use previous revisions under license renewal or with ASME Code relief requests). All BWRVIP guidance shall be implemented in accordance with the utilities' plant-specific licensing requirements. BWRVIP guidance cannot be used by BWRVIP members as an alternative to licensing requirements or as a justification for failure to meet plant specific licensing commitments without review prior to implementation to determine if approval by the regulator is required. It is the responsibility of BWRVIP utility members to determine and document the plant-specific applicability of BWRVIP guidelines.

Allowances for delaying implementation may be made in certain cases. For example, limited equipment availability or delays in developing appropriate inspection techniques could justify not implementing the appropriate guidance within the required two refueling outages. Implementation of new examination methodology that is developed for components, or portions of components, for which no previous examination methodology existed, needs to be linked to the technique demonstrations. Once a technique demonstration has been performed in accordance with BWRVIP-03 and the results have been published (i.e., a BWRVIP demonstration number has been assigned and the results of the demonstration have been documented in a letter to the vendor and all BWRVIP Committee members), the required BWRVIP inspections for which the new examination methodology was developed shall be implemented as soon as practical considering tooling availability and individual plant schedules, configurations and needs and acceptance of the demonstration by the utility. Plant-specific commitments to the regulator may also result in the need to deviate from BWRVIP guidelines.

For BWRVIP inspection and evaluation guideline re-inspection frequencies that are defined in terms of calendar years, the re-inspection interval may be extended by up to 6 months. However, for any reinspection interval based on a plant-specific flaw evaluation, the re-inspection interval shall not exceed that justified by the flaw evaluation.

Some of the documents identified on the BWRVIP website, or parts of documents, may not be applicable to some plants for various reasons. For example, not all plants have Low Pressure Coolant Injection (LPCI) lines so guidelines related to that component are not applicable to those plants and, likewise, repair design criteria are not applicable to plants without such repairs.

BWRVIP committee membership is composed of utility personnel. Committee membership may be supplemented by consultants and vendors as appropriate to accomplish assigned tasks. The BWRVIP Executive Committee provides oversight of BWRVIP activities.

Deviation dispositions shall be prepared for decisions to deviate from existing and future "mandatory" or "needed" BWRVIP guidelines, including recommended inspection strategies, techniques and evaluation of results. Guidance on dispositioning deviations is provided in Appendix B. If the specified implementation schedule (typically two refueling outages) is extended to account for unusual circumstances, the deviation disposition process shall be used and include a technical basis that addresses any increased risk incurred by extending the implementation schedule.

For BWRVIP guidance classified as "needed," if a U.S. utility pursues an option different than that in the BWRVIP guidance and the option has been specifically submitted to and approved by the utilities' regulator (e.g., a license amendment or relief request), a deviation disposition is not required. In such cases, the utility shall inform the BWRVIP of the option utilized and the related regulator approval. BWRVIP guidelines that are included in the scope of this program are identified on the BWRVIP website.

NEI 03-08 states: "As deliverables or guidelines are developed, expected actions should be classified as to relative level of importance:

- Mandatory – to be implemented at all plants where applicable.
- Needed – to be implemented wherever possible but alternative approaches are acceptable.
- Good practice – implementation is expected to provide significant operational and reliability benefits, but the extent of use is at the discretion of the individual plant/utility."

Future BWRVIP documents shall identify level of importance classifications when published. The level of importance classifications are more commonly referred to as the NEI 03-08 implementation requirements. BWRVIP guidelines that contain NEI 03-08 implementation requirements are identified in the "NEI 03-08 Documents List" that is posted under the "Links" section of the BWRVIP website's home page. In this and future BWRVIP documents, the word "shall" is used to denote "mandatory" or "needed" elements and "should" or "may" denotes "good practices." Deviations from the "mandatory" and "needed" guidance require a deviation disposition in accordance with Appendix B. An example of an alternative approach to a "needed" element that would require a deviation disposition is a plant that performed an engineering evaluation of core plate bolts and determined that an acceptable alternative to the inspection of the bolts as described in BWRVIP-25 was to verify by UT from the shroud OD that sufficient bolts were in place to provide the necessary support.

International Utilities

International utilities should evaluate BWRVIP guidelines containing actionable guidance and implement the applicable guidance as necessary. International utilities should implement the latest revision of BWRVIP guidance approved for implementation by the BWRVIP Executive Committee. The BWRVIP recognizes that international utilities may have specific requirements imposed by their regulators related to managing BWR internals. Nothing in BWRVIP guidance supersedes the regulatory and plant-specific rules and requirements governing international utilities unless approved by the utility's regulator. Future BWRVIP documents shall include discussion of implementation of requirements and guidance that may not be applicable for utilities not governed by NEI 03-08 and/or the U.S. NRC. International utilities may contact the BWRVIP or use the form on the BWRVIP website to request an interpretation or ask implementation questions related to applicability of guidance.

International utilities are not required to submit deviation dispositions. However, program documents should clearly indicate the BWRVIP guidance that the utility is implementing as a part of their site specific BWRVIP program. Periodic self-assessments of program documents and guidance implementation in accordance with the applicable quality assurance requirements of the utility are also encouraged.

1.6 Emergent Issues

Utilities shall communicate new materials issues with generic significance to the BWRVIP in order to allow an evaluation of the generic aspects of the information in a timely manner. The BWRVIP shall then ensure that the BWRVIP members are kept informed of new and emergent issues. This notification and information sharing shall be by e-mail, paper copy or reference to the BWRVIP website or other sources as appropriate for the issue and urgency. Sources of identification of emergent issues shall include day-to-day BWRVIP EPRI personnel contacts with utilities as well as EPRI and BWRVIP utility personnel involvement with industry-wide activities and organizations (e.g., NEI, INPO, NRC, EPRI Nuclear Power Council, etc.). Additional detail on emergent issues is provided in Appendix C, BWRVIP Emergent Issues Protocol.

2
VESSEL AND INTERNALS PROGRAM

The purpose of a vessel and internals program is to ensure the integrity of BWR vessel and safety-related internal components, which may be susceptible to IGSCC/IASCC and other age-related degradation. Each utility's program shall address current BWRVIP guidance for mitigation, inspection, assessment, and repair. The program shall receive the appropriate level of senior management oversight and review. BWRVIP members shall implement the requirements of the program through controlled plant procedures. The program can be implemented by integration of its elements into existing utility programs or by a separate, stand-alone program.

2.1 Vessel and Internals Program Development and Documentation

Members shall develop, maintain, and document processes and procedures necessary to implement the provisions of the BWRVIP Inspection and Evaluation Guidelines. At a minimum these processes and/or procedures shall:

1. Identify the component examinations and locations necessary to comply with the BWRVIP guidelines listed on the BWRVIP website.
2. Provide for updating the examination lists to incorporate changes to the BWRVIP guidelines listed on the BWRVIP website.
3. Provide for the performance and documentation for all examinations and evaluations required by the guidelines listed on the BWRVIP website.
4. Provide a means of continued consideration and appropriate inclusion of operating experience from similar BWRs.
5. Ensure scope expansion is performed in accordance with the applicable guidelines.
6. Document any cases where the processes or procedure requirements deviate from those presented in the BWRVIP guidelines due to plant-specific conditions not already accounted for in the guidelines. Appendix B provides additional guidance on preparing deviation dispositions.
7. Ensure that the examination methods used comply with the requirements contained in the latest revision of BWRVIP-03 including any interim NDE demonstrations.
8. Provide for methods to document and evaluate unacceptable conditions.
9. Provide for the reporting of inspection results to the BWRVIP.

2.2 Inspection

BWRVIP Inspection and Flaw Evaluation (I&E) guidelines, Repair Design Criteria, and supporting documents listed on the BWRVIP website provide guidance for inspection and evaluation of inspection results and shall be used to develop an inspection plan and long-term

vessel and internals strategy. Plant-specific vessel and internals inspection plans shall comply with all applicable ASME Code and regulatory requirements in addition to BWRVIP requirements. When BWRVIP guidance and ASME Code requirements overlap or conflict, approval of the regulator may be required to use the BWRVIP guidance in lieu of ASME Code requirements.

Each utility shall plan and perform inspections and appropriately evaluate results according to the BWRVIP I&E guidelines, and associated correspondence (i.e., letters), that have been approved by the BWRVIP Executive Committee and are listed in the "NEI 03-08 Documents List" on the EPRI website. With the exception of instances where a plant has licensing commitments to specific revisions of BWRVIP I&E guidelines, the guideline revisions listed in the "NEI 03-08 Documents List" shall be used.

2.3 Repairs

The purpose of repairing internal components is to maintain structural integrity of vessel and internal components for continued operation. Utilities shall qualify and implement repair methods in accordance with appropriate design and licensing requirements as well as applicable BWRVIP repair guidelines (including BWRVIP-95-A). Unless otherwise stated, repairs implemented prior to the issuance of BWRVIP guidelines do not need to be evaluated for compliance with the BWRVIP guidance. Additionally, repairs designed in accordance with BWRVIP guidance do not need to be re-evaluated when subsequent revisions to that guidance are published.

2.4 Maintenance of Vessel and Internals Integrity

BWR vessel and internals shall be monitored to preclude a component from being unable to fulfill its intended design function. The monitoring shall include an ongoing assessment of internals health, identification and tracking of plant-specific considerations, industry experience, and inspection scope, techniques, re-inspection plans and analysis of data as outlined in the applicable guidelines.

A long-term inspection strategy shall be maintained that identifies the elements necessary to continue meeting current BWRVIP guidelines for the vessel and each internal component. Typically, this strategy will identify inspection and re-inspection plans for a minimum of three future outages.

3
BWRVIP VESSEL AND INTERNALS PROGRAM SUPPORT ELEMENTS

The elements listed are important to provide for the long-term reliability of the vessel and internal components. Implementation of these elements is required to comply with this document.

3.1 Water Chemistry Control

Each utility shall have procedures for optimizing primary water chemistry to inhibit IGSCC and IASCC in accordance with the acceptance criteria in the most recent version of EPRI BWR Water Chemistry Guidelines.

3.2 Quality Assurance

Each utility shall ensure that their vessel and internals program conforms to the requirements of 10 CFR 50, Appendix B or equivalent quality assurance requirements for non-U.S. utilities. In addition, all BWRVIP member programs shall contain the following necessary elements:

- A description of the elements of the vessel and internals program such as those identified in Section 2.1.
- Vessel and internals program records, including inspection results and data (inspection datasheets, indication notification reports (INRs), IVVI and ultrasonic final reports, etc.) shall be maintained as part of quality assurance records.
- Planned and periodic audits or self-assessments, as outlined in Section 3.4, shall be carried out to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the vessel and internals program.

3.3 Corrective Action

Each utility shall integrate the corrective action reporting process for the management, identification, trending and resolution of vessel and internals issues.

3.4 Self-Assessment

BWRVIP members shall perform periodic self-assessments of their vessel and internals management programs. This review shall be performed by knowledgeable utility personnel or a contractor with independent experts selected by the utility on a periodic basis to review the program's rigor and adherence to industry guidance. An INPO "review visit" can serve as a self-assessment. The self-assessment shall identify areas for program improvement, along with program strengths. The assessment shall include a review of all applicable BWRVIP guidelines,

identify the program's compliance with the guidance, and identify plans in place to ensure complete compliance with these guidelines. A review of any deviation disposition shall be performed as part of the self-assessment.

Periodic self-assessments of the BWRVIP IP itself are to be performed in accordance with the IP self-assessment requirements of NEI 03-08.

3.5 Reporting

These reporting guidelines are specific to U.S. utilities under the jurisdiction of the U.S. NRC. However, international utilities are encouraged to provide the BWRVIP with a summary of all inspections, associated results, and new repairs to reactor pressure vessel internals in accordance with this guidance. International utilities are also encouraged to share industry report-outs and the results of program assessments.

If at any time a utility does not implement any portion of an applicable "mandatory" or "needed" BWRVIP guideline that has been approved by the Executive Committee, the utility shall notify the NRC and the BWRVIP within 45 days of the utility executive concurrence with the deviation disposition.

- The NRC notification shall consist of the licensee transmitting a letter to the NRC Document Control Desk with copies to the NRC Plant Project Manager, the NRC BWRVIP Project Manager, the NRC Site Resident Office and the NRC Regional Office. The licensee shall clearly state what they are deviating from, i.e., inspection requirements, inspection schedule, etc. of the BWRVIP guidelines, the justification for the deviation and what is being done in lieu of the requirements, as necessary. In addition, the letter should be very clear to indicate that the letter is being transmitted for information only and that the licensee is not requesting any action from the NRC staff. If the deviation disposition is related to a deviation from BWRVIP flaw evaluation requirements, the notification letter shall indicate that the associated flaw evaluation is available for submittal for information only upon request. A copy of the complete deviation disposition need not be included with the letter. In cases where inspection recommendations cannot be implemented and that situation is stated in the BWRVIP document transmitted to the NRC, the BWRVIP transmittal of the document to the NRC is considered the notification to the NRC that a BWRVIP recommendation is not implemented. In such cases, utility notification to the NRC is not required. The NRC shall also be notified if changes are made to the utility's Vessel and Internals Program that affect implementation of "mandatory" and "needed" BWRVIP guidelines. Deviations from BWRVIP guidelines do not need to be submitted to the NRC for approval unless specifically required by the BWRVIP guideline document or other utility commitments.
- The BWRVIP notification shall consist of the licensee transmitting by letter or email a complete copy of the deviation disposition to the BWRVIP Program Manager.

When "-A" documents are transmitted to the NRC, utilities shall review previously identified deviations applicable to any earlier version of that document and determine applicability of the deviation to the "-A" version and notify the NRC as appropriate.

Licensees shall forward a copy of the IVVI and volumetric final reports for reactor internals inspections provided by the utilities' inspection vendors within 120 days following completion of an outage. All vendor proprietary information shall be removed from the final reports prior to

transmittal to EPRI. The final reports shall include, at a minimum, the scope of inspections, all datasheets, and INRs/customer notification reports (CNRs). However, utilities are encouraged to submit any non-proprietary information included with the final reports. Utilities are also required to report any newly installed reactor internals repair hardware or replacement components completed during the associated outage. These BWRVIP reporting requirements do not replace any existing requirements for reporting directly to the NRC.

Flaw evaluations performed in accordance with the guidance in BWRVIP reports for the acceptance of inspection results do not require transmittal to, or approval by, the NRC.

Flaw evaluations that deviate from the guidance in BWRVIP reports (e.g., assumptions, methods, acceptance criteria, etc.) require a deviation disposition. Deviations from BWRVIP flaw evaluation guidance may include but are not limited to: a) use of crack growth rates or fracture toughness values not in compliance with the current versions of BWRVIP-99 or BWRVIP-100, b) failure to consider all loads, and c) the failure to appropriately consider cracking in the uninspected length of welds. The NRC notification letter of the deviation disposition shall indicate that the flaw evaluation and any subsequent revisions to the flaw evaluations will be submitted to the NRC upon request for information only. If a flaw evaluation is provided to the NRC in accordance with this guidance, the flaw evaluation shall also be provided to the BWRVIP. However, it is important to note that BWRVIP guidance does not supersede ASME Section XI requirements for reporting flaws and flaw evaluations.

If a utility determines that implementation as described in an applicable BWRVIP document cannot be achieved, or that meaningful inspection results cannot be obtained in spite of best efforts, the utility shall notify the BWRVIP as soon as practical with sufficient details to support development of alternative actions. These notifications, as well as planned actions by the BWRVIP, will be summarized and reported to the NRC by the BWRVIP. Appendix B provides additional detail on preparing and submitting deviation dispositions.

Section XI of the ASME Boiler and Pressure Vessel Code contains rules for inspection, flaw evaluation and repair/replacement of certain components that are also addressed as part of the BWRVIP program. The Code requirements are detailed in Table IWB-2500, Category B-N-2, Welded Core Support Structures and Interior Attachments to Reactor Vessel. In order for BWRVIP I&E Guidelines to be used in lieu of the ASME Code requirements, each licensee must obtain relief from the Code via the process described in 10CFR50.55a. This is best accomplished by using the technical alternative provision contained in 10CFR50.55a(z)(1).

The form and format of the reporting of inspection results shall be in accordance with licensee's established procedures. This may include, but is not limited to, submittal by letter or as an attachment to ASME Code required documentation (NIS-1, OAR-1, etc.).

Industry report-outs are necessary to share information on failure mechanisms, NDE technique applications, repair effectiveness, operating experience, and other items. This information is typically shared by the BWRVIP and member utilities during BWRVIP advisory meetings. Member utilities also agree to share results of assessments outlined in Section 3.4 with the BWRVIP if the results have potential generic significance.

4
REFERENCES

1. EPRI Materials Issue Program (IP) Common Administrative Procedure, Revision 1, July 2020.
2. NEI 03-08, Revision 3, "*Guideline for the Management of Materials Issues*", February 2017.
3. BWRVIP Strategic Plan, Current Revision.
4. *EPRI Materials Degradation Matrix, Revision 4.* EPRI, Palo Alto, CA: 2018. 3002013781.
5. *BWRVIP-167, Revision 4: BWR Vessel and Internals Project: Boiling Water Issue Management Tables.* EPRI, Palo Alto, CA: 2020 3002018319.

NOTE: Some documents listed above may be revised prior to the next revision of this document. Utilities are required to use the latest approved version of all reference documents for the purposes of implementing programmatic requirements.

A
BWRVIP UTILITY COMMITMENT LETTERS TO NRC

97-461

BWRVIP

BWR Vessel &
Internals Project _____ *Issue Management and Resolution*

May 30, 1997

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

Attention: Brian Sheron

Subject: BWR Utility Commitments to the BWRVIP

The purpose of this letter is to reaffirm the BWR utility commitments to the goals, objectives and products of the BWR Vessel and Internals Project (BWRVIP).

All 21 U. S. BWR/2-6 utilities identified in Attachment 1 have been active members of the BWRVIP since its inception in 1994. The BWRVIP utility members are proud of the record and successes achieved by the BWRVIP and we will continue to complete the activities of the BWRVIP with dispatch. Based on a poll of the BWRVIP Executive Committee members, the U. S. BWRVIP utility members unanimously concur with the following renewed commitments:

1. we will continue to provide financial and technical resources needed to complete the BWRVIP Program Plan,
2. we will actively participate in completing the BWRVIP Program Plan,
3. we will implement the BWRVIP products at each of our plants as appropriate considering individual plant schedules, configurations and needs,
4. if a plant does not implement the applicable BWRVIP products, the plant will provide timely notification to the NRC staff, and
5. we will continue to work closely with the NRC staff to the successful and timely conclusion of the BWRVIP Program Plan.

The BWRVIP remains on schedule to provide the BWRVIP products to the NRC staff and we look forward to prompt NRC review and acceptance of these products.

Please feel free to contact me if you have any questions on this subject.

Sincerely,

Carl Terry
Niagara Mohawk Power Company
Chairman, BWR Vessel and Internals Project

Reply To: Carl Terry, BWRVIP Chairman, Niagara Mohawk Power Company, P. O. Box 63, Lycoming, NY 13093 • Phone: (315) 349-7263 • Fax: (315) 349-4753

Attachment 1

U. S. BWRVIP Utility Members

Boston Edison
Carolina Power & Light
Centerior
ComEd
Detroit Edison
Entergy
GPU Nuclear
IES Utilities
Illinois Power
Nebraska Public Power District
New York Power Authority
Niagara Mohawk Power Company
Northeast Utilities
Northern States Power
PECO Energy
Pennsylvania Power & Light
Public Service Electric & Gas
Southern Nuclear
TVA
Vermont Yankee
Washington Public Power Supply System

97-870

BWRVIP

BWR Vessel &
Internals Project — *Issue Management and Resolution*

October 30, 1997

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

Attention: Brian Sheron

References:
1. Letter from Carl Terry (BWRVIP Chairman) to Brian Sheron (NRC), "BWRVIP Utility Commitments to the BWRVIP," dated May 30, 1997.
2. Letter from Brian W. Sheron (NRC) to Carl Terry (BWRVIP Chairman), "BWR Utility Commitments to the BWRVIP," dated July 29, 1997.

Subject: BWRVIP Utility Commitments to the BWRVIP

The purpose of this letter is to clarify the BWRVIP utilities understanding of the expectations of the NRC staff regarding implementation of BWRVIP products.

On May 30, 1997 the BWRVIP transmitted the Reference 1 letter to the NRC staff that provided several BWRVIP utility commitments. These included implementing the BWRVIP products at each BWR as appropriate, considering individual plant schedules, configurations, and needs; and to provide timely notification to the NRC staff if a plant does not implement the applicable BWRVIP products. The BWRVIP utilities understood that the extent and type of NRC comments on the submitted products could affect the content of the original submittal, and may lead to additional BWRVIP review and possibly a resubmittal.

Reference 2 requested notification by a BWR licensee of a decision not to fully implement a BWRVIP report as approved by the NRC staff within 45 days of the report approval. The BWRVIP agrees to this 45 day response period. However, as we discussed at our meeting on October 9, 1997, a generic implementation commitment can only apply if the NRC staff approves the document as submitted by the BWRVIP. If the NRC staff conditionally approves a BWRVIP document, resolution of comments may be required including resubmittal of a BWRVIP document. It is the intention of the BWRVIP to inform the NRC staff within 45 days of your approval if such a situation exists.

Reply To: Carl Terry, BWRVIP Chairman, Niagara Mohawk Power Company, P. O. Box 63, Lycoming, NY 13093 • Phone: (315) 349-7263 • Fax: (315) 349-4753

If you have any questions on this subject please contact Vaughn Wagoner of CP&L, BWRVIP Integration Committee Technical Chairman, at (919) 546-7959.

Sincerely,

Carl Terry
Niagara Mohawk Power Company
Chairman, BWR Vessel and Internals Project

c: C. E. Carpenter, NRC
BWRVIP Executive Committee

B
GUIDELINES FOR DEVIATION DISPOSITION

Introduction

The purpose of this appendix is to identify the considerations and documentation that must be developed and reside in a utility's Vessel and Internals Program if deviations are taken from any of the "mandatory" or "needed" elements presented in the aforementioned BWRVIP guidelines. Deviation from these recommendations requires a deviation disposition in accordance with this appendix. Deviation dispositions do not need to be submitted to the NRC. However, the NRC shall be notified of any deviation from BWRVIP guidelines transmitted to the NRC as described in Section 3.5.

General Considerations

1. When it is determined that actions will be taken or implemented in a plant's vessel and internals program which are not consistent with the elements documented in the applicable BWRVIP guideline, a deviation disposition shall be written and made part of the utility's vessel and internals program. A utility's vessel and internals program includes supporting programs such as chemistry programs. Deviation dispositions shall be required when utility procedures, inspections, methodology, or guidelines are inconsistent with the intent of the supporting BWRVIP guidelines, regardless of NRC review and approval status. All deviation dispositions shall be entered into the utilities' corrective action program.
2. Deviation dispositions are normally prepared and approved prior to deviating from the applicable BWRVIP guidelines. For planned deviation dispositions, the utility shall notify the NRC and the BWRVIP within 45 days of the utility executive concurrence with the deviation disposition. In those cases where a plant inadvertently deviates from BWRVIP guidelines (e.g., misses a "needed" inspection or evaluation requirement), the issue shall be entered into the plants corrective action program upon discovery and the deviation disposition shall be prepared and approved by utility executive concurrence within 90 days from initial discovery. The NRC and the BWRVIP must still be notified within 45 days of utility executive concurrence. If the utility can restore compliance prior to the 90 days from initial discovery, no deviation disposition is required. However, the corrective action and its disposition shall be referenced in the site program documentation.
3. The deviation disposition shall provide the basis for determining that the proposed deviation meets the same objective and intent, or level of conservatism exhibited by the BWRVIP guidelines.
4. In no case shall any deviation to the vessel and internals program allow a change to a plant's licensing basis without the approvals required by regulation.

5. A thorough, formal engineering review of a proposed deviation should include and consider input from a wide variety of sources. The engineering review shall be supported by calculations when warranted.
6. The BWRVIP reviews all deviation dispositions submitted to determine if the deviation is necessary, technically sound, and maintains the integrity of the fleet-wide BWRVIP program. However, the BWRVIP does not approve deviation dispositions. Deviation dispositions are approved by the utility executive as indicated by signature on the final deviation.

Deviation Disposition Document Structure

1. The deviation disposition shall reference the applicable BWRVIP guideline.
2. The deviation disposition shall be explicit in detailing the deviation that is being taken and why it is acceptable. It should clearly identify all available information and resources, which allow the deviation to be acceptable.
3. The deviation disposition shall clearly state how long the deviation will be in effect with a specific end date identified in the deviation disposition or in the corrective action program.
4. The deviation disposition shall clearly identify the impact that the deviation will have on meeting the intent of the guideline.
5. The deviation disposition shall clearly identify the appropriate approval signatures, dates, and shall be controlled as part of the utility's document control procedure.
6. The deviation disposition shall receive final concurrence from the responsible utility or plant executive.
7. All approved deviation dispositions shall be sent to the BWRVIP for documentation. The BWRVIP post all approved deviation dispositions on the BWRVIP website for access and awareness for all BWRVIP member utilities.
8. The deviation and the supporting disposition shall be entered into the corrective action program at the plant.
9. The disposition of a deviation from a "mandatory" document or element shall receive concurrence by a knowledgeable materials expert independent of the utility justifying the deviation.
10. Flaw evaluations that deviate from the guidance in BWRVIP reports (e.g., assumptions, methods, acceptance criteria, etc.) require a deviation disposition. Deviations from BWRVIP flaw evaluation guidance may include but are not limited to: a) use of crack growth rates or fracture toughness values not in compliance with the current versions of BWRVIP-99 or BWRVIP-100, b) failure to consider all loads, and c) the failure to appropriately consider cracking in the uninspected length of welds. The NRC notification letter of the deviation disposition shall indicate that the flaw evaluation and any subsequent revisions to the flaw evaluations will be submitted to the NRC upon request for information only. If a flaw evaluation is provided to the NRC in accordance with this guidance, the flaw evaluation shall also be provided to the BWRVIP.

Reporting

The reporting requirements for deviation dispositions are given in Section 3.5.

Archiving of Deviation Dispositions

Utilities shall inform the BWRVIP of deviation dispositions that have been closed or are no longer in effect. The BWRVIP maintains a list of closed or archived deviation dispositions that are no longer in effect on the BWRVIP website. The BWRVIP also advises the NRC of archived or closed deviation dispositions on a periodic basis.

C
BWRVIP EMERGENT ISSUES PROTOCOL

Protocol

NEI 03-08 identifies utility and IP actions to be taken when an emergent materials issue with generic significance to the industry is identified at a nuclear power plant. The BWRVIP emergent issues protocol below provides specific actions tailored to BWR vessel and internals materials degradation issues.

The first step is for a utility to recognize a new BWR vessel and internals materials related finding with potential generic significance that needs to be communicated to the BWRVIP. Examples of such findings include but are not limited to the following:

1. Any through wall leakage is identified in a BWR vessel (includes the nozzle assemblies out to the process piping to safe-end or safe-end-extension weld).
2. An unplanned plant shutdown is elected due to BWR vessel or internals materials issue.
3. Inspection results are unexpected and have the potential for generic implications.
4. Mitigation results are unexpected and have the potential for generic implications.
5. First of a kind materials degradation issues in a BWR vessel, vessel internals or primary reactor coolant boundary (e.g., operating experience that is beyond that previously reported in INPO's OE database).

Once a utility recognizes a finding with potential generic significance, they shall communicate this information to the EPRI BWRVIP Program Manager or the BWRVIP Research Integration Committee (RIC) Chair as soon as possible after the finding is characterized. This communication must include the timeframe within which any BWRVIP response on the issue is needed. The expectation is for the utility to provide the information within 24 hours of characterization if possible. If the EPRI BWRVIP Program Manager or the BWRVIP RIC Chair is not available, then the utility shall contact the chair of the applicable BWRVIP committee and/or focus group. BWRVIP contact information is available on the BWRVIP website http://www.epri.com/bwrvip (must have an EPRI website log-on ID and password to access).

The EPRI BWRVIP Program Manager and BWRVIP RIC Chair shall discuss the information and determine the need for a BWRVIP RIC conference call to evaluate the significance (technical and regulatory) of the finding and its potential effect on the BWR fleet. If necessary, the RIC shall discuss the issue relative to: a) assisting the affected utility, b) informing the entire industry, c) initiating an action plan to investigate and address the issue. The INPO representative, typically INPO's EC member or one of their Materials Review Visit Leads, shall be invited to participate in the RIC conference call.

The RIC also considers:

- Safety significance
- Demonstration of a new degradation type
- Effect on the basis of industry guidance
- Effect on the existing knowledge base
- Expected regulatory significance
- Need for additional expertise or knowledge
- Promoting, if practical, obtaining root cause analysis of the flaws via destructive testing (e.g., boat sample)

The BWRVIP RIC Chair shall communicate the issue, related information and unresolved issues to the Executive Oversight Committee (EOC) Chair for a potential joint EOC emergent issue conference call on the topic. If the EOC Chairs determine that another IP should have the lead on this issue, the BWRVIP will take direction from that IP. Otherwise, the BWRVIP shall take the actions required in NEI 03-08 to resolve the issue and develop any implementation actions. Figure A-1 in the EPRI Materials IP Common Administrative procedure provides a flowchart for the Emergent Issue process. Appendix A, Attachment 1 of the EPRI Materials IP Common Administrative procedure provides an OE screening questionnaire that is used as a tool to determine if follow-up actions to address an emergent issue are warranted. The tool provides questions that assist in the determination and can be modified as necessary to fit a particular issue. The EPRI Materials IP Common Administrative procedure can be found on the BWRVIP website in the Library.

Regulatory Interface

The BWRVIP is a global program with member utilities governed by other regulatory bodies. The BWRVIP is committed to improving overall understanding of regulatory issues facing the worldwide BWR fleet and to ensure that these regulatory issues are appropriately considered within BWRVIP R&D plans and priorities.

For the U.S. BWRVIP members, communication with the Nuclear Regulatory Commission (NRC) is integral to gaining and maintaining the NRC's confidence in the ability of the BWRVIP and the U.S. members to manage BWR vessel and internals materials degradation issues safely and effectively, without excessive regulatory actions, or oversight. Therefore, when emergent BWR vessel and internals materials issues arise, open and timely communication between the BWRVIP and the NRC is imperative. The following guidance is provided:

- In no case shall the BWRVIP contact the NRC on an emergent issue without permission (at least verbally, but email is preferred) from the subject plant's point-of-contact (POC) for the emergent issue or from their management. Generally, the NRC shall not be contacted by the BWRVIP until the emergent issue has been communicated by the licensee to the Office of Nuclear Reactor Regulation (NRR) through the NRR Project Manager for the subject plant.

- BWRVIP communications with NRR shall be made to the NRC staff levels commensurate with the severity of the emergent issue as determined by the BWRVIP EOC Chair, EPRI BWRVIP Program Manager, and/or BWRVIP RIC Chair.

The focus of the BWRVIP communications with the NRC shall be the generic implications of the emergent materials issue and what actions (if any) the BWRVIP is taking or considering.

D
RECORD OF REVISIONS, BWRVIP-94NP, REVISION 2

BWRVIP-94NP, Revision 2	BWRVIP-94, Revision 1 was revised to incorporate updates to reflect utility experience since the publication of Revision 1. The revised report also incorporates guidance from the following documents issued since the publication of BWRVIP-94, Revision 1: 1. Self-Assessment of the Boiling Water Reactor Vessel & Internals Project, September 2006 (BWRVIP Correspondence File Number 2006-033) 2. 2008 Self-Assessment Report – BWRVIP Program (BWRVIP Correspondence File Number 2009-104) 3. NEI 03-08, Revision 2, "Guideline for the Management of Materials Issues," January 2010 4. 2010 Self-Assessment Report – BWRVIP Program (BWRVIP Correspondence File Number 2010-261A) All changes are marked with margin bars. Details of the revisions can be found in Table D-1.
END	

Table D-1
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
	Editorial	Updated reference to NEI 03-08, Revision 2, in Section 1
Update Section 1.2.1 and 1.5 to reflect updates in NEI 03-08, Revision 2	2010 BWRVIP Self-Assessment	Sections 1.2.1 and 1.5 updated to incorporate minor revisions in NEI 03-08, e.g., replace reporting to NEI with reporting to EPRI Materials Degradation/Aging Action Plan Committee, etc.
Clarify language to indicate if the two cycle implementation requirement is extended, a deviation disposition shall be used and include a technical basis that addresses any increased risk by extending the 2-cycle window	2006 BWRVIP Self-Assessment	Added clarification to Section 1.4
Delete list of applicable BWRVIP documents in Section 1.5 and replace with reference to the BWRVIP website for up-to-date listing	2006 and 2010 BWRVIP Self Assessments	Revised Sections 1.4 and 1.5 to refer to the BWRVIP website for current list of applicable reports
Clarify schedule for implementation of new inspection techniques	BWRVIP Inquiry 2007-005	Added clarification in Inquiry 2007-005 to Section 1.4
Clarify that NRC approved means a "-A" document or equivalent	EPRI	Added clarification to Section 1.4
Clarify that for "needed' documents, a different utility option that requires NRC review and approval does not require a deviation disposition	Utility	Added clarification to Section 1.4
Add Emergent Issues Protocol from BWRVIP Operating Principles and Procedures	2010 BWRVIP Self-Assessment	Added new Section 1.5 and Appendix C
Add NEI 03-08 implementation requirements statement in accordance with BWRVIP Operating Principles and Procedures	EPRI	Added new Section 1.6
Clarify that deviations from some BWRVIP documents require submittal to the NRC (e.g., BWRVIP-95-A)	Utility	Added clarification to Section 3.5 that deviations from BWRVIP guidelines do not need to be submitted to the NRC unless approval is specifically required by the BWRVIP document
Revise BWRVIP-94 to include requirement for utility to notify BWRVIP as soon as practical of obstacles to implementing "mandatory" or "needed" guidance	2008 BWRVIP Self-Assessment	Added clarification to Section 3.5

Table D-1 (continued)
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Clarify "cannot be implemented" and "meaningful results" when describing utility notification to BWRVIP of inability to implement guidance	2006 BWRVIP Self-Assessment	Clarified wording in Section 3.5
In accordance with NEI 03-08, clarify Section 3.5 to explain that NRC and the BWRVIP shall be notified of deviations from all BWRVIP guidance documents, not just NRC-approved documents	2006 BWRVIP Self-Assessment	Added clarification to Section 3.5 and Appendix B
Clarify guidance on reporting of flaw evaluations that deviate from the guidance in BWRVIP documents	2006 BWRVIP Self-Assessment	Added new item to Appendix B regarding reporting of flaw evaluations that differ from BWRVIP guidance
Clarify that flaw evaluations submitted to NRC but not deviating from BWRVIP guidance (e.g., flaw evaluations for fluences >3 x 10^{21} n/cm^2) should also be submitted to the BWRVIP	BWRVIP-76-A Review Group	Added clarification to Section 3.5.
Clarify that the BWRVIP shall submit BWRVIP inspection summaries to the NRC and that there is no BWRVIP requirement for utilities to report these to the NRC	EPRI	Added clarification to Section 3.5
Consider adding protocol for informing NRC and BWRVIP of archived/closed deviation dispositions	Utility	Added statements in Appendix B that BWRVIP shall maintain a list of archived/closed deviation dispositions on the BWRVIP website and shall advise the NRC of archived or closed deviation dispositions on a periodic basis.
Consider changing "will" to "shall" throughout, as appropriate	Utility	Selectively changed "will" to "shall" in a number of locations

E
RECORD OF REVISIONS, BWRVIP-94NP, REVISION 3

BWRVIP-94NP, Revision 3	BWRVIP-94, Revision 2 was primarily revised to incorporate guidance from the following documents issued since the publication of BWRVIP-94, Revision 2: 1. 2013 Joint NEI 03-08 Materials Issue Programs Self-Assessment, January 2014 (BWRVIP Correspondence File Number 2014-014) 2. 2016 Joint Self-Assessment BWRVIP, CHEM, MRP & SGMP Programs, Final Report December 2016 3. NEI 03-08, Revision 3, "Guidance for the Management of Materials Issues," March 2017 4. Materials Issue Programs Common Administrative Procedures, Revision 0, November 2017 With the exception of some minor editorial corrections, all changes within the body of the document (i.e., beyond those made to the front matter) are marked with margin bars. Details of the revisions can be found in Table E-1.

Table E-1
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Update front matter to EPRI's current publication format	EPRI Publications	Incorporated elements of the old Executive Summary into the Abstract and replaced the old Executive Summary with one meeting the current EPRI publications format.
Update terminology for BWRVIP Integration Committee to Research Integration Committee	Editorial	Throughout the report revised "Integration Committee" to "Research Integration Committee" and "IC" to "RIC."
Update revision references	Editorial and NEI 03-08, Revision 3	Updated the BWRVIP-94 and NEI 03-08 revision references in the Introduction section.
BWRVIP Issue Program roles and responsibilities under NEI 03-08	NEI 03-08, Revision 3	Added two roles and responsibilities to Section 1.2.1 consistent with those specified in NEI 03-08, Revision 3.
BWRVIP Issue Program roles and responsibilities under NEI 03-08	2013 Joint Material IP Self-Assessment, EPRI PIP 2014-0025	Moved the BWRVIP's responsibility to revise BWRVIP guidelines as necessary to address operating experience from Section 1.4, Utility Requirements, to Section 1.2.1, Roles and Responsibilities of the BWRVIP.
BWRVIP utilities roles and responsibilities under NEI 03-08	NEI 03-08, Revision 3	Minor editorial changes to the roles and responsibilities in Section 1.2.2 to make them consistent with NEI 03-08.
Timing requirements for utility implementation of BWRVIP guidelines	2013 Joint Materials IP Self-Assessment, EPRI PIP 2014-0030	Added clarification to Section 1.4 that the timing for implementation of BWRVIP guidelines is to be based on the date of the BWRVIP transmittal/notification letter for the report (rather than the report publication date).
Utility requirements for incorporation of revised BWRVIP guidance	NEI 03-08, Revision 3	Revised Section 1.4 to reflect the new NEI 03-08 NRC document screening process and how it affects implementation of revised BWRVIP guidance.
Timing requirements for utility implementation of BWRVIP guidelines	BWRVIP Interim Guidance Letter 2014-015	Added a paragraph to Section 1.4 that incorporates the 6-month extension period for implementation of BWRVIP guidance as stipulated in BWRVIP letter 2014-015.

Table E-1 (continued)
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Sources for obtaining BWRVIP documents and listing of BWRVIP reports with NEI 03-08 implementation requirements	Revised EPRI Materials Issue Program website (i.e., cockpit) structure	Revised Section 1.4 to clarify the EPRI.com sources for obtaining BWRVIP reports and getting a list of the BWRVIP reports that contain NEI 03-08 implementation requirements.
Revisions of BWRVIP reports to be used	Editorial	Revised Section 2.2 to clarify that revisions of BWRVIP reports to be used are as stated in the NEI 03-08 documents list and that use of the latest revision is subject to licensing commitments at the plant site.
Clarification of reporting requirements.	EPRI	Clarified that complete copies of deviation dispositions need not be submitted to the NRC. Also clarified that completed deviation dispositions shall be submitted to the BWRVIP Program Manager (previously just said submit to the BWRVIP). Additionally, clarified that industry information such as operating experience is typically reported-out at BWRVIP advisory meetings. Finally, clarified that utilities only need to report the results of self-assessments when the results have potential generic significance.
Requirements for deviation dispositions	Editorial	Replaced ambiguous wording (i.e., may not be) with more accurate wording.
Timing requirements for utility preparation of deviation dispositions	EPRI and Utility Feedback	Added a requirement in Appendix B that deviation dispositions for inadvertent deviations be entered into the utilities corrective action program and be prepared and approved within 90 days of discovery.

Table E-1 (continued)
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Emergent Issues Protocol	2016 Joint Materials IP Self-Assessment, EPRI CAR 2017-002	Revised Appendix C to be consistent with the Emergent Issues Protocol that was developed for the Materials Issue Programs in response to EPRI CAR 2017-002 and incorporated in the EPRI Materials Issue Program Common Administrative Procedures. Major revisions include a revised flow chart and incorporation of an operating experience screening questionnaire.

F
RECORD OF REVISIONS, BWRVIP-94, REVISION 4

BWRVIP-94, Revision 4	BWRVIP-94, Revision 4 was revised to incorporate guidance from the following documents and reports issued since the publication of BWRVIP-94, Revision 3: 1. Materials Issue Programs Common Administrative Procedure, Revision 1, July 2020 The revision also includes clarifications and changes to program implementation guidance. The revision also expands the guidance to discuss applicability of the BWRVIP program elements to international members and those members not governed by NEI 03-08. With the exception of some minor editorial corrections, all changes within the body of the document (i.e., beyond those made to the front matter) are marked with margin bars. Details of the revisions can be found in Table F-1.

Table F-1
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Updated Acknowledgements, Preamble, Abstract, and Executive Summary	Editorial – Correct the product revision and add Appendix F- Record of Revisions for BWRVIP-94 R4	Updated the BWRVIP-94 references where appropriate and updated the abstract to include Appendix F. Updated acknowledgements to align with standard formatting. Included Section 4 – References, Clarifications for domestic and international utilities.
Updated Revision References	Editorial – Correct the product and related reference revisions	Updated the BWRVIP-94 and Materials IP Common Administrative Procedure references throughout the report. Included Section 4 – References.
Updated Project Manager	EPRI BWRVIP	Updated the BWRVIP Project Manager name and contact information in the front matter.
Updated Record of Revisions	Editorial – Necessary to describe revision changes	Provided general description of changes in the report.
Added Acronyms and Abbreviation	EPRI BWRVIP	Added an acronyms and abbreviations table
Updated Contents	EPRI BWRVIP	Attachment C-1 (Operating Experience Screening Questionnaire) and the reference in the table of contents was removed from BWRVIP-94. The Operating Experience Screening Questionnaire is located in the Materials IP Common Administrative Procedure. The attachment was removed to limit duplication and ensure that the two documents do not get out of sync. Reordered the Implementation section to move it higher in the document.
Removed List of Figures	EPRI BWRVIP	Figure C-1 (Materials Issue Programs Emergent Issue Process Flow Chart) and the reference in the list of figures was removed from BWRVIP-94. Materials Issue Programs Emergent Issue Process Flow Chart can be found in the Materials Administrative IP Common Procedure. The attachment was removed to limit duplication and ensure that the two documents do not get out of sync.
Updated List of Tables	EPRI BWRVIP	Added Table F-1 Revision Details to outline changes made in this revision.

Table F-1 (continued)
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Updated Section 1.2 Implementation Requirements	EPRI BWRVIP	The implementation requirements were moved up in Section 1.0. The implementation requirements were also expanded to cover implementation by members not governed by NEI 03-08 and those members not fully implementing the BWRVIP Program.
Updated Section 1.3. Roles and Responsibilities in accordance with NEI 03-08	Materials IP Common Administrative Procedure	Updated to align with new structure for reporting emergent issues in the Materials IP Common Administrative Procedure. The IP executive committees replaced the Materials Action Plan Committee (MAPC) as the oversight and support for managing disposition of materials issues.
Updated Section 1.5 Utility Requirements	EPRI BWRVIP	Updated/reorganized language to acknowledge that NRC approval of documents is necessary only for U.S. utilities. Clarified guidance to note that BWRVIP guidance does not supersede a utilities plant-specific licensing requirement. Clarified guidance to describe utility responsibility to determine plant-specific applicability of BWRVIP guidance. Added additional guidance and clarification for differences between international and domestic BWRVIP members.
Updated Section 3.2 Quality Assurance	EPRI BWRVIP	Expanded quality assurance requirements to include those stations that follow a different QA process than Appendix B.
Updated Section 3.5 Reporting	EPRI BWRVIP	Updated flaw evaluation guidance to remove requirement that flaw evaluations that deviate from BWRVIP guidance be sent to the NRC. Instead, flaw evaluations that deviate from BWRVIP guidance must be submitted to the NRC only if requested by the NRC. Clarified guidance for BWRVIP-76 flaw evaluations based on limitations in BWRVIP-99-A.
Added Section 4 – References	EPRI BWRVIP	Added a list of related documents necessary for development of this report and for implementation of program requirements.

Table F-1 (continued)
Revision Details

Required Revision	Source of Requirement for Revision	Description of Revision Implementation
Updated Appendix B Guidelines for Deviation Disposition	EPRI BWRVIP	Updated deviation disposition guidance to clarify timeline of deviation disposition and allow utilities to resolve deviations within 90 days in lieu of preparing a deviation. Added a statement that EPRI BWRVIP reviews deviation dispositions but does not provide approval of deviations. Updated flaw evaluation guidance to remove requirement that flaw evaluations that deviate from BWRVIP guidance be sent to the NRC.
Updated Appendix C BWRVIP Emergent Issues Protocol	Materials IP Common Administrative Procedure	Updated to align with new structure for reporting emergent issues in the Common Materials Administrative Procedure. Figure C-1 (Materials Issue Programs Emergent Issue Process Flow Chart) and the reference in the list of figures was removed from BWRVIP-94. Attachment C-1 (Operating Experience Screening Questionnaire) and the reference in the Contents was removed from BWRVIP-94. Both can be found in the Common Materials Administrative Procedure. Figure C-1 and Attachment C-1 were removed to limit duplication and ensure that the two documents do not get out of sync. Clarified the BWRVIP commitment to understanding and supporting global regulatory issues.
Added Record of Revisions for BWRVIP-94 Revision 4	EPRI BWRVIP	Added Appendix F.
END		

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