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GNRO-2013/00044

June 27, 2013

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

SUBJECT: Request for Alternative in Accordance with 10 CFR 50.55a(a)(3)(i) Use of Boiling Water Reactor Vessel and Internals Project (BWRVIP) Guidelines in Lieu of Specific ASME Code Requirements (GG-ISI-017)
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Pursuant to Title 10 *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(i), Entergy Operations, Inc. (Entergy) hereby requests an alternative to specific portions of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," on the basis that the proposed alternative provides an acceptable level of quality and safety. Specifically, this proposed alternative requests the use of the Boiling Water Reactor Vessel and Internals Project (BWRVIP) guidelines in lieu of specific ASME Code Section XI Requirements.

Attachment 1 provides the Request for Alternative, GG-ISI-017. Attachment 2 provides a comparison of ASME Code Section XI examination requirements to BWRVIP examination requirements. Attachment 3 provides the reactor vessel internal inspection history for Grand Gulf Nuclear Station through refueling outage (RF) 18, the most recent refueling outage.

Entergy requests U.S. Nuclear Regulatory Commission staff review and approve this Request for Alternative by February 1, 2014 to support the upcoming February 2014 refueling outage, RF19.

There are no new commitments included in this document. If you have any questions concerning this letter, please contact Mrs. Linda Patterson at (601) 437-6442.

Sincerely,

CRR/slw

Attachments and CC: (see next page)

Attachments
1. Request for Alternative GG-ISI-017 - Use of BWRVIP Guidelines in Lieu of Specific ASME Code Section XI Requirements
2. Comparison of ASME Code Section XI Examination Requirements to BWRVIP Examination Requirements
3. Grand Gulf Reactor Vessel Internal Inspection History

cc: U.S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
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Attachment 1 to GNRO-2013/00044

Request for Alternative GG-ISI-017 - Use of BWRVIP Guidelines in Lieu of Specific ASME Code Section XI Requirements

Proposed Alternative GG-ISI-017
Use of Boiling Water Reactor Vessel and Internals Project (BWRVIP)
Guidelines in Lieu of Specific ASME Code Requirements
In Accordance With 10 CFR 50.55a(a)(3)(i)

1. American Society of Mechanical Engineers (ASME) Code Components(s) Affected

Components: See Table 1

Code Class: ASME Code Class 1

Examination Category: B-N-1 and B-N-2

Item Number(s):

- B13.10 - Vessel interior
- B13.20 - Interior attachments (welds) within beltline region
- B13.30 - Interior attachments (welds) beyond beltline region
- B13.40 - Core support structure

2. Applicable Code Edition and Addenda

ASME Section XI, 2001 Edition through 2003 Addenda

3. Applicable Code Requirements

ASME Section XI requires the examination of components within the Reactor Pressure Vessel. These examinations are included in Table IWB-2500-1 Category B-N-1 and B-N-2 and identified with the following item numbers:

B 13.10	Examine accessible areas of the reactor vessel interior each period by the VT-3 method (B-N-1).
B 13.20	Examine interior attachment welds within the beltline region each interval by the VT-1 method (B-N-2).
B 13.30	Examine interior attachment welds beyond the beltline region each interval by the VT-3 method (B-N-2).
B 13.40	Examine surfaces of the welded core support structure each interval by the VT-3 method (B-N-2).

These examinations are performed to assess the structural integrity of components within the boiling water reactor pressure vessel.

4. Reason for Request

In accordance with Title 10 Code of Federal Regulations (10 CFR) 50.55a(a)(3)(i), Entergy Operations, Inc. (Entergy) is requesting U.S. Nuclear Regulatory Commission (NRC) approval of a proposed alternative to the Code requirements on the basis that the use of the BWRVIP guidelines discussed below will provide an acceptable level of quality and safety.

The BWRVIP Inspection and Evaluation (I&E) guidelines have recommended aggressive specific inspection by Boiling Water Reactor (BWR) operators to completely identify material

condition issues with BWR components. A wealth of inspection data has been gathered during these inspections across the BWR industry. The BWRVIP I&E guidelines focus on specific and susceptible components, specify appropriate inspection methods capable of identifying real anticipated degradation mechanisms, and require re-examination at conservative intervals. In contrast, the code inspection requirements were prepared before the BWRVIP initiative and have not evolved with BWR inspection experience.

Use of this proposed alternative will maintain an adequate level of quality and safety and avoid unnecessary inspections, while conserving radiological exposure.

5. Proposed Alternative and Basis for Use

Proposed Alternative

Entergy requests authorization to utilize the alternative requirements of the BWRVIP Guidelines in lieu of the requirements of ASME Code Section XI Table IWB-2500-1. The proposed alternative is detailed in Table 1 for Examination Category B-N-1 and B-N-2.

Entergy will satisfy the Examination Category B-N-1 and B-N-2 requirements as described in Table 1 in accordance with BWRVIP guideline requirements. This request for alternative proposes to utilize the identified BWRVIP guidelines in lieu of the associated Code requirements, including examination method, examination volume, frequency, training, successive and additional examinations, flaw evaluations, and reporting.

The guidelines applicable to the subject Code Components in this proposed alternative are the following. Not all the components addressed by these guidelines are ASME Code Section XI components.

- BWRVIP-03, "BWR Vessel and Internals Project, Reactor Pressure Vessel and Internal Examination Guidelines"
- BWRVIP-18, Revision 1, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines"
- BWRVIP-25, "BWR Core Plate Inspection and Flaw Evaluation Guidelines"
- BWRVIP-26-A, "BWR Top Guide Inspection and Flaw Evaluation Guidelines"
- BWRVIP-27-A, BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines"
- BWRVIP-38, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines"
- BWRVIP-41, Revision 3 "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines"
- BWRVIP-42, Revision 1, " Low Pressure Coolant Injection (LPCI) Coupling Inspection and Flaw Evaluations"
- BWRVIP-47-A, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines"
- BWRVIP-48-A, "Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines"
- BWRVIP-76, Revision 1, "BWR Core Shroud Inspection and Flaw Evaluation Guidelines"
- BWRVIP-94, Revision 2, "BWRVIP Vessel and Internals Project Program Implementation Guide"
- BWRVIP-100-A, Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds"

Note: If flaw evaluations are required for BWRVIP-76 examinations, the fracture toughness values of BWPVIP-100-A will be utilized.

Table 1 below compares current ASME Code Section XI IWB-2500-1, Examination Category B-N-1 and B-N-2 requirements with the above current BWRVIP guideline requirements, as applicable, to Entergy's BWR/6 units.

In addition, the Entergy reactor vessel internals inspection programs have been developed and implemented to satisfy the requirements of BWRVIP-94, "BWRVIP Vessel and Internals Project Program Implementation Guide." It is recognized that the BWRVIP executive committee periodically revises the BWRVIP guidelines to include enhancements in inspection techniques and flaw evaluation methodologies. BWRVIP-94, Revision 2 states that where guidance in existing BWRVIP documents has been supplemented or revised by subsequent correspondence approved by the BWRVIP Executive Committee, the vessel and internals program shall be modified to reflect the new requirements and implement the guidance within two refueling outages, unless a different schedule is specified by the BWRVIP. However, if new guidance approved by the Executive Committee includes changes 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, which generally means publication of a "-A" document or equivalent. Therefore, where the revised version of a BWRVIP inspection guideline continues to also meet the requirements of the version of the BWRVIP inspection guideline that forms the safety basis for the NRC authorized proposed alternative to the requirements of 10 CFR 50.55a, it may be implemented. Otherwise, the revised guidelines will only be implemented after NRC approval of the revised BWRVIP guidelines or a plant-specific request for alternative has been approved. Table 1 below only represents the most current comparison.

Any deviations from the referenced BWRVIP Guidelines for the duration of the proposed alternative will be appropriately documented and communicated to the NRC, per the BWRVIP Deviation Disposition Process. Currently, Entergy deviations from the subject guidelines above are summarized in Table 1 below.

Inspection services, by an Authorized Inspection Agency, will also be applied to the proposed alternative actions of this Request for Alternative.

Basis for Use

BWRs now examine reactor internals in accordance with BWRVIP guidelines. These guidelines have been written to address the safety significant vessel internal components and to examine and evaluate the examination results for these components using appropriate methods and reexamination frequencies. The BWRVIP has established a reporting protocol for examination results and deviations. The NRC has agreed with the BWRVIP approach in principal and has issued Safety Evaluations for many of these guidelines (see References).

As additional justification, Attachment 2, Comparison of Code Examination Requirements to BWRVIP Examination Requirements provides specific examples which compare the inspection requirements of ASME Code Section XI Table IWB-2500-1, Item Numbers B13.10, B13.20, B13.30, and B13.40 to the inspection requirements in the BWRVIP documents. Specific BWRVIP documents are provided as examples. This comparison also includes a discussion of the inspection methods.

Therefore, the use of the BWRVIP guidelines as an alternative to the subject Code requirements, as shown by the comparison of Code Examination Requirements to BWRVIP Examination Requirements in Table 1 and Attachment 2, provide an acceptable level of quality and safety and will not adversely impact the health and safety of the public.

6. Duration of Proposed Alternative

The duration of the proposed alternative is for Grand Gulf's third 10-year interval commencing on **May 31, 2008** and ending on **July 1, 2017.**

7. Precedents

Similar Request for Alternatives have been previously approved for the following Entergy and other industry plants.

A. US NRC Letter to Entergy Nuclear Operations, "Safety Evaluation of Relief Request RI-01, Vermont Yankee Nuclear Power Station (TAC. No. MC0690), dated September 19, 2005 (ADAMS-Accession Number ML052370244)

B. US NRC Letter to Entergy Nuclear Operations, James A. Fitzpatrick Nuclear Power Plant, "Relief Request No. RR-6, Implementation of BWRVIP Guidelines in Lieu of ASME Code, Section XI Requirements on Reactor Vessel Internals Components Inspection (TAC NO. MD4758), dated February 28, 2008 (ADAMS-Accession Number ML080300307)

C. US NRC Letter to FirstEnergy Nuclear Operating Company, "Perry Nuclear Power Plant, Unit No.1, RE: Safety Evaluation in Support of 10 CFR 50.55a Requests for the Third 10-Year In-service Inspection Interval (TAC Nos. ME5373, ME5376, ME5377, ME5379, AND ME5380), dated January 31, 2012 (ADAMS-Accession Number ML120180372)

D. US NRC Letter to Detroit Edison Co, "Fermi 2 - Evaluation of Applicable 10-Year Interval Inservice Inspection Relief Request - Use of Boiling Water Reactor Vessel and Internals Project (BWRVIP) Guidelines in Lieu of Specific ASME Code Requirements (TAC NO. ME6765), dated February 17, 2012 (ADAMS-Accession Number ML120370286)

8. References

A. Letter from NRC to BWRVIP, dated January 30, 2012, "Final Safety Evaluation for Electric Power Research Institute Boiling Water Reactor Vessel and Internals Project Technical Report 1016568, 'BWRVIP-18, Revision 1: BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines (TAC No. ME2189)'," (ADAMS-Accession Number ML113620684)

B. US NRC Letter to BWRVIP, dated December 19, 1999, "Final Safety Evaluation of BWRVIP Vessel and Internals Project, "BWR Vessel and Internals Project, BWR Core Plate Inspection and Flaw Evaluation Guidelines (BWRVIP-25)," EPRI Report TR-107284, December 1996 (TAC NO. M97802)

C. US NRC Letter to BWRVIP, dated September 9, 2005, "NRC Approval Letter of BWRVIP-26-A, "BWR Vessel and Internals Project Boiling Water Reactor Top Guide Inspection and Flaw Evaluation Guidelines"

D. US NRC Letter to BWRVIP, dated June 10, 2004, Proprietary Version of NRC Staff Review of BWRVIP-27-A, "BWR Standby Liquid Control System/Core Plate ΔP Inspection and Flaw Evaluation Guidelines"

E. US NRC Letter to BWRVIP, dated July 24, 2000, "Final Safety Evaluation of the "BWR Vessel and Internals Project, BWR Shroud Support Inspection and Flaw Evaluation Guidelines (BWRVIP-38)," EPRI Report TR-108823 (TAC NO. M99638)

F. US NRC Letter to BWRVIP, dated February 4, 2001, "Final Safety Evaluation of the "BWR Vessel and Internals Project, BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines (BWRVIP-41)," (TAC NO. M99870)

G. BWRVIP-42NP, Revision 1 "BWR Vessel and Internals Project, Low Pressure Coolant Injection (LPCI) Coupling Inspection and Flaw Evaluations," dated October 2012 (ML12349A309)

H. US NRC Letter to BWRVIP, dated September 9, 2005, "NRC Approval Letter of BWRVIP-47-A, "BWR Vessel and Internals Project Boiling Water Reactor Lower Plenum Inspection and Flaw Evaluation Guidelines"

I. US NRC Letter to BWRVIP, dated July 25, 2005, "NRC Approval Letter of BWRVIP- 48-A, 'BWR Vessel and Internals Project Vessel ID Attachment Weld Inspection and Flaw Evaluation Guidelines'"

J. BWRVIP-76NP, Revision 1: BWR Vessel and Internals Project BWR Core Shroud Inspection and Flaw Evaluation Guidelines, dated May 2011 (ML11195A182)

K. Letter from Chairman, BWR Vessel and Internals Project to NRC, "Project No. 704 - BWRVIP Program Implementation Guide (BWRVIP-94NP, Revision 2)," dated September 22, 2011 (MLI1271A058)

L. US NRC Letter to BWRVIP, dated November 1, 2007, "NRC Approval Letter of Comment for BWRVIP-100-A, BWR Vessel and Internals Project, Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds"

Table 1
Comparison of ASME Code Section XI Table IWB-2500-1 Examination Category B-N-1 and B-N-2 Requirements to BWRVIP Guidance Requirements [1]

ASME Table IWB-2500-1 Item No.	Component	ASME Exam Scope	ASME Exam	ASME Frequency	Applicable BWRVIP Alternative	BWRVIP Exam Scope	BWRVIP Exam	BWRVIP Frequency
B13.10	Reactor Vessel Interior	Accessible Areas (Non-specific)	VT-3	Each Period	BWRVIP-18-R1, 25, 26-A, 27-A, 38, 41 42-R1, 47-A, 48-A, 76-R1	Overview examinations of components during BWRVIP examinations are performed to satisfy Code VT-3 inspection requirements.		
B13.20	Interior Attachments Within Beltline - Riser Braces	Accessible Welds	VT-1	Each 10-year Interval	BWRVIP-48-A Table 3-2	Riser Brace Attachment	EVT-1	100% in first 12 years, 25% during each subsequent 6 years
	Lower Surveillance Specimen Holder Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	VT-1	Each 10-year Interval
B13.30	Interior Attachments Beyond Beltline - Steam Dryer Hold-down Brackets	(Rarely Accessible)	VT-3	Each 10-year Interval	BWRVIP-48-A Table 3-2	Bracket Attachment	VT-3	Each 10-year Interval
	Guide Rod Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	VT-3	Each 10-year Interval
	Steam Dryer Support Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	EVT-1	Each 10-year Interval
	Feedwater Sparger Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	EVT-1	Each 10-year Interval
	Core Spray Piping Primary Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	EVT-1	Every 4 Refueling Cycles
	Core Spray Piping Supplemental Brackets (Grand Gulf)				BWRVIP-48-A Table 3-2	Bracket Attachment	EVT-1	Every 4 Refueling Cycles
	Upper Surveillance Specimen Holder Brackets				BWRVIP-48-A Table 3-2	Bracket Attachment	VT-3	Each 10-year Interval
	Shroud Support (Weld H9) including gussets where applicable				BWRVIP-38 Section 3.1.3.2 Figures 3-2 and 3-5	Weld H9[2] including gussets	EVT-1 or UT	Maximum of 6 years for EVT-1, Maximum of 10 years for UT
	Shroud Support Legs (H12) Welds				BWRVIP-38 Section 3.2.3	Weld H12	Per [3] BWRVIP-38 NRC SER (7/24/2000), inspect with appropriate method	When Accessible

Table 1 (continued)

Comparison of ASME Code Section XI Table IWB-2500-1 Examination Category B-N-1 and B-N-2 Requirements to BWRVIP Guidance Requirements (1)

ASME Table IWB-2500-1 Item No.	Component	ASME Exam Scope	ASME Exam	ASME Frequency	Applicable BWRVIP Alternative	BWRVIP Exam Scope	BWRVIP Exam	BWRVIP Frequency
B13.40	Welded Core Support Structure - Shroud Support	Accessible Surfaces	VT-3	Each 10-year Interval	BWRVIP-38 Section 3.1.3.2 Figures 3-2 and 3-5	Shroud Support Weld H8 / H9 and Leg Welds including gussets as applicable	EVT-1 or UT	Based on as-found conditions to a maximum 6 years for one side EVT-1, 10 years for UT where accessible
	Shroud Horizontal Welds				BWRVIP-76-R1 Section 2.2 Figure 3-3	Welds H1-H7 as applicable	EVT-1 or UT	Based on as-found conditions to a maximum 10 years for UT when inspected from both sides of the welds
	Shroud Vertical Welds				BWRVIP-76-R1 Section 2.3 Figure 3-3	Vertical and Ring-Segment Welds as applicable	EVT-1 or UT	Maximum 6 years for one-sided EVT-1, 10 years for UT of horizontal welds
	Shroud Repairs(4)				BWRVIP-76-R1 Section 3.5	Tie-Rod Repair	VT-3	In accordance with designer recommendations per BWRVIP-76 R1

Note:
(1) This table provides only an overview of the requirements. For more details, refer to ASME Section XI, Table IWB-2500-1 and the appropriate BWRVIP Document.
(2) In accordance with Appendix A of BWRVIP-38, a site specific evaluation will determine the minimum required weld length to be examined.
(3) When inspection tooling and methodologies are available, they will be utilized to establish a baseline inspection of these welds.
(4) No repairs have been performed on the shroud.

Attachment 2 to GNRO-2013/00044

Comparison of ASME Code Section XI Examination Requirements to BWRVIP Examination Requirements

COMPARISON OF ASME CODE SECTION XI EXAMINATION REQUIREMENTS TO BWRVIP EXAMINATION REQUIREMENTS

The following discussion provides a comparison of the examination requirements provided in American Society of Mechanical Engineers (ASME) Code Section XI Table IWB-2500-1, examination category B-N-1 and B-N-2, Item Numbers B13.10, B13.20, B13.30, and B13.40, to the examination requirements in the Boiling Water Reactor Vessel and Internals Project (BWRVIP) guidelines. Specific BWRVIP guidelines are provided as examples for comparisons. This comparison also includes a discussion of the examination methods.

1. Code Requirement - B13.10 - Reactor Vessel Interior Accessible Areas (B-N-1)

The ASME Section XI Code requires a VT-3 examination of reactor vessel accessible areas, which are defined as the spaces above and below the core made accessible during normal refueling outages. The frequency of these examinations is specified as the first refueling outage, and at intervals of approximately 3 years, during the first inspection interval, and each period during each successive 10-year Inspection Interval. Typically, these examinations are performed every other refueling outage of the Inspection Interval. This examination requirement is a non-specific requirement that is a departure from the traditional Section XI examinations of welds and surfaces. As such, this requirement has been interpreted and satisfied differently across the domestic fleet. The purpose of the examination is to identify relevant conditions such as distortion or displacement of parts, loose, missing, or fractured fasteners, foreign material, corrosion, erosion, or accumulation of corrosion products, wear, and structural degradation.

Portions of the various examinations required by the applicable BWRVIP Guidelines require access to accessible areas of the reactor vessel during each refueling outage. Examination of Core Spray Piping and Spargers (BWRVIP-18-R1), Top Guide (BWRVIP-26-A), Jet Pump Welds and Components (BWRVIP-41), Interior Attachments (BWRVIP-48-A), Core Shroud Welds (BWRVIP-76-R1), Shroud Support (BWRVIP-38), Low Pressure Coolant Injection (LPCI) couplings (BWRVIP-42-R1), and Lower Plenum Components (BWRVIP-47-A) provides such access. Locating and examining specific welds and components within the reactor vessel areas above, below (if accessible), and surrounding the core (annulus area) entails access by remote camera systems that essentially perform equivalent VT-3 examination of these areas or spaces as the specific weld or component examinations are performed. This provides an equivalent method of visual examination on a more frequent basis than that required by the ASME Section XI Code. Evidence of wear, structural degradation, loose, missing, or displaced parts, foreign materials, and corrosion product buildup can be, and has been observed during the course of implementing these BWRVIP examination requirements.

Therefore, the specified BWRVIP Guideline requirements meet or exceed the subject Code requirements for examination method and frequency of the interior of the reactor vessel. Accordingly, these BWRVIP examination requirements provide an acceptable level of quality and safety as compared to the subject Code requirements.

2. Code Requirement - B 13.20 - Interior Attachments Within the Beltline (B-N-2)

The ASME Section XI Code requires a VT-1 examination of accessible reactor interior surface attachment welds within the beltline each 10-year interval. In the boiling water reactor, this includes the jet pump riser brace welds-to-vessel wall and the lower

surveillance specimen support bracket welds-to-vessel wall. In comparison, the BWRVIP requires the same examination method and frequency for the lower surveillance specimen support bracket welds, and requires an enhanced visual examination technique (EVT-1) examination on the remaining attachment welds in the beltline region in the first 12 years, and then 25% during each subsequent 6 years.

The jet pump riser brace examination requirements are provided below to show a comparison between the Code and the BWRVIP examination requirements.

Comparison to BWRVIP Requirements - Jet Pump Riser Braces (BWRVIP-41) and BWRVIP-48-A)

- The ASME Code requires a 100% VT-1 examination of the jet pump riser brace-to reactor vessel wall pad welds each 10-year interval.
- The BWRVIP requires an EVT-1 examination of the jet pump riser brace-to-reactor vessel wall pad welds the first 12 years and then 25% during each subsequent 6 years.
- BWRVIP-48-A specifically defines the susceptible regions of the attachment that are to be examined.

The Code VT-1 examination is conducted to detect discontinuities and imperfections on the surfaces of components, including such conditions as cracks, wear, corrosion, or erosion. The BWRVIP enhanced VT-1 (EVT-1) is conducted to detect discontinuities and imperfections on the surface of components and is additionally specified to detect potentially very tight cracks characteristic of fatigue and inter-granular stress corrosion cracking (IGSCC), the relevant degradation mechanisms for these components. General wear, corrosion, or erosion although generally not a concern for inherently tough, corrosion resistant stainless steel material, would also be detected during the process of performing a BWRVIP EVT-1 examination.

The ASME Code visual examination method requires (depending on applicable ASME Edition) that a letter character with a height of 0.044 inches can be read. The BWRVIP EVT- 1 visual examination method requires the same 0.044 inch resolution on the examination surface and additionally the performance of a cleaning assessment and cleaning as necessary. While the jet pump riser brace configuration varies depending on the vessel manufacturer, BWRVIP-48-A includes diagrams for each configuration and prescribes examination for each configuration.

The calibration standards used for BWRVIP EVT-1 exams utilize the same Code characters, thus assuring at least equivalent resolution compared to the Code. Although the BWRVIP examination may be less frequent, it is a more comprehensive method. Therefore, the enhanced flaw detection capability of an EVT-1, with a less frequent examination schedule provides an acceptable level of quality and safety to that provided by the ASME Code.

3. Code Requirement - B13.30 - Interior Attachment Beyond the Beltline Region (B-N-2)

The ASME Section XI Code requires a VT-3 examination of accessible reactor interior surface attachment welds beyond the beltline each 10-year interval. In the boiling water reactor, this includes the core spray piping primary and supplemental support bracket welds to- vessel wall, the upper surveillance specimen support bracket welds-to-vessel wall, the feedwater sparger support bracket welds-to-reactor vessel wall, the steam dryer support and

hold down bracket welds-to-reactor vessel wall, the guide rod support bracket weld-to reactor vessel wall, the shroud support plate-to-vessel welds, and shroud support gussets. BWRVIP-48-A requires as a minimum the same VT-3 examination method as the Code for some of the interior attachment welds beyond the beltline region, and in some cases specifies an enhanced visual examination technique EVT-1 for these welds. For those interior attachment welds that have the same VT-3 method of examination, the same scope of examination (accessible welds), the same examination frequency (each 10 year interval) and ASME Section XI flaw evaluation criteria, the level of quality and safety provided by the BWRVIP requirements are equivalent to that provide by the ASME Code.

For the Core Spray support bracket attachment welds, the steam dryer support bracket attachment welds, the feedwater sparger support bracket attachment welds, and the shroud support plate-to-vessel welds, as applicable, the BWRVIP Guidelines require an EVT-1 examination at the same frequency as the Code, or at a more frequent rate. Therefore, the BWRVIP requirements provide the same level of quality and safety to that provided by the ASME Code.

The Core Spray piping bracket-to-vessel attachment weld is used as an example for comparison between the Code and BWRVIP examination requirements as discussed below.

Comparison to BWRVIP Requirements - Core Spray Piping Bracket Welds (BWRVIP-48-A)

- The Code examination requirement is a VT-3 examination of each weld every 10 years.
- The BWRVIP examination requirement is an EVT-1 for the core spray piping bracket attachment welds with each weld examined every four cycles (8 years for units with a two year fuel cycle).

The BWRVIP examination method EVT-1 has superior flaw detection and sizing capability, the examination frequency is greater than the Code requirements, and the same flaw evaluation criteria are used.

The Code VT-3 examination is conducted to detect component structural integrity by ensuring the components general condition is acceptable. An enhanced EVT-1 is conducted to detect discontinuities and imperfections on the examination surfaces, including such conditions as tight cracks caused by IGSCC or fatigue, the relevant degradation mechanisms for BWR internal attachments.

Therefore, with the EVT-1 examination method, the same examination scope (accessible welds), an increased examination frequency (8 years instead of 10 years) in some cases, the same flaw evaluation criteria (ASME Code Section XI), the level of quality and safety provided by the BWRVIP criteria is superior to that provided by the ASME Code.

4. Code Requirement - B13.40 - Integrally Welded Core Support Structures (B-N-2)

The ASME Code requires a VT-3 examination of accessible surfaces of the welded core support structure each 10-year interval. In the boiling water reactor, the welded core support structure has primarily been considered the shroud support structure, including the shroud support plate (annulus floor), the shroud support ring, the shroud support welds, and the shroud support legs and gussets (if accessible). In later designs, the shroud itself is considered part of the welded core support structure. Historically, this requirement has been interpreted and satisfied differently across the industry. The proposed alternate

examination replaces this ASME requirement with specific BWRVIP guidelines that examine susceptible locations for known relevant degradation mechanisms.

Comparison to BWRVIP Requirements - BWR Shroud Support (BWRVIP-38)

- The Code requires a VT-3 of accessible surfaces each 10-year interval.
- The BWRVIP requires either an enhanced visual examination technique (EVT-1) or volumetric examination (UT).

BWRVIP recommended examinations of integrally welded core support structures are focused on the known susceptible areas of this structure, including the welds and associated weld heat affected zones. In many locations, the BWRVIP guidelines require a volumetric examination of the susceptible welds at a frequency identical to the Code requirement.

For other integrally welded core support structure components, the BWRVIP requires an EVT-1 or UT of core support structures. The core shroud is used as an example for comparison between the Code and BWRVIP examination requirements as shown below.

Comparison to BWRVIP Requirements - BWR Core Shroud Examination and Flaw Evaluation Guideline (BWRVIP-76 Rev. 1)

- The Code requires a VT-3 examination of accessible surfaces every 10 years.
- The BWRVIP requires an EVT-1 examination from the inside and outside surface where accessible or ultrasonic examination of each core shroud circumferential weld that has not been structurally replaced with a shroud repair at a calculated "end of interval" (EOI) that will vary depending upon the amount of flaws present, but not to exceed ten years.

The BWRVIP recommended examinations specify locations that are known to be vulnerable to BWR relevant degradation mechanisms rather than "accessible surfaces". The BWRVIP examination methods (EVT-1 or UT) are superior to the Code required VT-3 for flaw detection and characterization. The BWRVIP examination frequency is equivalent to or more frequent than the examination frequency required by the Code. The superior flaw detection and characterization capability, with an equivalent or more frequent examination frequency and the comparable flaw evaluation criteria, results in the BWRVIP criteria providing a level of quality and safety equivalent to or superior to that provided by the ASME Code.

Attachment 3 to GNRO-2013/00044

Grand Gulf Reactor Vessel Internal Inspection History

GRAND GULF REACTOR VESSEL INTERNAL INSPECTION HISTORY

Component	Inspection Date	Type	Inspection Results
Core Shroud	Spring 1995	UT	Baseline per BWRVIP-01. All accessible areas of H3, H4, H6A and H7. No indications.
	Spring 1998	UT	All accessible areas of H3, H4, H6A, H7. No indications.
	Spring 2004	UT	15.1% of H3 Lower Side and 34.6% of H4. Due to equipment failures this examination was deferred to next outage.
	Fall 2005	UT	44% of H3 Lower Side, 56.6% H4 Both Sides, 17.3% H6A Both Sides and @ 20% H7 Both Sides. One indication with characteristics associated with IGSCC/IASCC was detected on the lower side of the H4 weld. Indication is 1.11" in length. Due to disassembly of the JP11 mixer, a VT-3 examination was performed on accessible areas of H10, H11 and H12. No indications
Shroud Support	Spring 1992	VT-1	Shroud shelf weld. No indications. (SIL 572)
	Spring 1995	VT-3	SSHAC @ 180°. No indications.
	Fall 1996	VT-1	Sect XI. Period 3 of 10yr interval. RF05/6 Attachment welds to vessel and shroud plate to shroud weld. No indications.
	Spring 1998	UT	10.7% of total circumference of H8 (shroud support plate to shroud weld) and 15.4% of H9 (shroud support plate to vessel weld). No indications.
	Fall 2002	VT-1	SSAHC @ 0°. No indications.
	Fall 2005	VT-1	SSAHC @ 0°. No indications.
	Spring 2007	EVT-1	15% of the top of H8 and 18.5% of the top of H9. No indications were noted.
	Fall 2008	VT-1	SSAHC @ 0°. No indications noted.
	Spring 2012	EVT-1	15% of the top of H8 and 18.5% of the top of H9. No indications were noted
Core Spray Piping	Spring, 1998	EVT-1	All accessible piping locations. No indications.
	Fall 1999	EVT-1	All accessible P2, P2a, P3a, P5. 25% of remaining piping locations. No indications.
	Spring 2001	EVT-1	All accessible P2, P2a, P3a, P5. 25% of remaining piping locations. No indications.
	Fall 2002	EVT-1	All target welds (P3a and P5) with 25% of remaining piping locations. No indications.
	Spring 2004	EVT-1	All target welds (P3a and P5) with 25% of remaining piping locations. No indications.
	Fall 2005	EVT-1	All target welds (P3a and P5) with 25% of remaining piping locations. No indications.
	Spring 2007	EVT-1	All target welds (P3a and P5) with 25% of remaining piping locations. No indications.
	Fall 2008	EVT-1	All target welds (P3a and P5) with 25% of remaining piping locations. No indications.
	Spring 2010	EVT-1	All target welds (P3a and P5) with 25% of remaining piping locations. No indications.
	Spring 2012	VT-1 / VT-3 EVT-1	All target welds (P3a and P5) with 25% of remaining piping locations. Indication discovered on P8A as documented on INR GGNS-IVVI-12-02
Core Spray Sparger	Fall 1996	VT-3	Augmented exam per IE 80-13. No indications noted.
	Spring 1998	EVT-1/ CS-VT-1	Accessible areas of spargers, tee boxes, brackets and supports. Broken tack welds @ Cap Screw 7A.
	Fall 1999	VT-1/VT-3	Upper Sparger- Accessible areas of spargers, tee boxes, brackets and supports. No indications noted.
	Fall 2002	VT-1/VT-3	All core spray sparger target welds and all accessible areas of the lower sparger welds. No indications noted. All accessible areas of Core Spray Brackets (SB). Broken tack welds @ Cap Screw 7A previously reported.

Core Spray Sparger (continued)	Fall 2005	VT-1/EVT-1	All core spray sparger target welds and all accessible areas of the upper sparger welds. Accessible areas of Core Spray Sparger Brackets (SB). No indications noted. Broken tack welds @ Cap Screw 7A previously reported. Additional broken tack weld identified at Cap Screw 15C.
	Fall 2008	EVT-1/VT-1	All core spray sparger target welds and all accessible areas of the lower sparger welds. Accessible areas of Core Spray Sparger Brackets (SB). No indications noted. Broken tack welds @ Cap Screw 7A and 15C previously reported.
	Spring 2010	VT-1	Performed examinations of previous indications at Cap Screw 7A and 15C. No changes noted.
	Spring 2012	EVT-1 / VT-1	All core spray sparger target welds and all accessible areas of the upper sparger welds. Accessible areas of Core Spray Sparger Brackets (SB) were inspected with no indications. Performed examinations of previous indications at Cap Screw 7A and 15C. No changes noted. Tack weld indications on alignment sleeve documented on INR GGNS-IVVI-12-03 and INR GGNS-IVVI-12-05.
Top Guide (Rim, etc.)	Fall 1996	VT-3	Accessible surfaces and fasteners. No indications noted.
	Spring 2001	VT-3	Accessible surfaces and fasteners. No indications noted.
	Spring 2007	VT-3	Accessible surfaces and fasteners. No indications noted.
	Spring 2012	EVT-1	Accessible surfaces and fasteners. Indication documented under INR GGNS-IVVI-12-06.
Core Plate (Rim, etc.)	Fall 1996	VT-3	Sect. XI, under core plate. Where access was provided in RF08, camera work was performed. No indications noted.
	Spring 2007	VT-3	Accessible surfaces of the shroud support structure. No indications were noted.
SLC	N/A	N/A	N/A
Jet Pump Assembly	Fall 1996	UT	UT performed on JP beams. Two beams cracked in RF06 and all were replaced with Unit 2 spares. No UT exams were done in RF07. RF08 changed out all beams with the new GE design
	Spring 1998	MVT-1/ VT-3	Accessible areas of RS-3 weld on JP 0102, JP 0304 and JP 0506. VT-3 on flow restriction on JP 09, 10, 11 and 24. No indications noted.
	Fall 1999	EVT-1	Accessible areas of RS-3 weld at JP07/08, JP09/10 and JP11/12. No indications noted.
	Spring 2001	EVT-1	Accessible areas of RS-1 and RS-2 welds on JP01/02. No indications noted.
	Fall 2002	EVT-1	All required locations for JP 0304 and JP 0910. Examination exceptions are RB-1b, RB-1d, RB2a-d for JP0304; welds DF-1 for JP03 and JP04; DF-3 for JP03 and JP10; IN-1 and IN-2 for JP04; IN-2 for JP10. No indications noted.
	Spring 2004	EVT-1/VT-1	Completed remaining examinations on JP 0304 and 0910. Completed baseline on 50% of low and medium priority locations and 100% of high priority (RS-3) locations. Identified and inspected an additional RS-1 weld at JP 0910 and inspected additional weld at the DF-3 location. The additional weld at the DF-3 location was identified in the Fall 2002 outage (DF-3a). No indications noted.
	Fall 2005	EVT-1	Wedge examinations were completed on 12 jet pumps. Wedge exams have been completed on all jet pumps with no indications. Examined one IN-1 and IN-2 location with no indications noted.
	Spring 2007	EVT-1/UT	Wedge examination performed on 4 wedges due to disassembly of Jet Pumps in previous outages. EVT-1 was performed on the Riser Brace to vessel weld (5 locations). UT performed on 21 of 24 Jet Pump beams. Three beams have been replaced with new beams and do not require UT at this time.
	Fall 2008	EVT-1	Performed examinations on Jet Pump wedges 1 thru 12. No wear was identified; however slight wear was noted on wedge rods JP 01, JP 02, JP 05, JP 06, JP 07 and JP 09. No additional exams were performed.

	Spring 2010	EVT-1	Completed baseline examinations (148 locations). Performed additional inspections of Jet Pump Wedges (12) and Riser Braces (12) due to Laguna Verde OE. No indications were noted.
	Spring 2012	UT	UT performed on 21 of 24 Jet Pump beams. Three beams have been replaced with new beams and do not require UT at this time. No indications noted.
CRD Guide Tube	Fall 1996	VT-3	8 guide tubes. When accessibility permits. No indications noted.
	Spring 1998	VT-3	34 CRGT-1 exams completed with no indications noted
	Spring 2001	VT-3	12 guide tubes. 12 FS/GT-ARPIN-1 and CRGT-1. Accessible portions of CRGT-2 (2 places). No indications noted.
	Fall 2002	EVT-1	CRGT-2 & 3 (10 places). FS/GT-ARPIN-1 (2 places). No indications noted.
	Spring 2008	EVT-1	Completed baseline exams on 10 CRD Guide Tubes. No indications were noted.
Dry Tubes	Spring 1998	VT-3	11 guide tubes. No indications noted.
	Fall 2002	VT-1	Accessible areas of 6 LPRM dry tubes. No indications noted.
	Spring 2007	VT-1	Accessible areas of 14 SRM/IRM and 7 LPRMS. No indications noted.
	Fall 2008	VT-1	Performed inspections on 24 LPRM dry tubes. No indications noted
	Spring 2010	VT-1	Performed exams on 14 SRM/IRM dry tubes. Four dry tubes had indications.
	Spring 2012	VT-1	Performed inspections on 5 LPRM dry tubes. No indications noted.
Instrument Penetrations	Fall 1996	VT-3	No indications.
Vessel ID Brackets	Fall 1996	VT-1 / VT-3	Section XI every 10 years on Attachment welds. Other parts of brackets on general VT-3 exam. No indications.
	Spring 2004	VT-1	Section XI Jet Pump attachment welds at two locations was inspected. No indications.
	Fall 2005	VT-1 / VT-3	Section XI CS Piping Brackets, FW Sparger End Brackets, Guide Rod Brackets (upper), Steam Dryer Brackets, Surveillance Sample Brackets and attachment welds at JP1112. Due to disassembly of the JP11 mixer an examination was performed at one Shroud Support Stub weld. No indications.
	Spring 2007	VT-1 / VT-3	Section XI Jet Pump attachment welds at 5 locations. VT-3 of accessible areas of H9. No indications noted.
LPCI Coupling	Spring 1996	VT-1	VT-1 on LPCI @ Az. 141° due to a previous loose parts impact concern. No indications.
	Spring 1998	EVT-1	All chosen welds on LPCI couplings @ Az 39° and 141°. No indications.
	Fall 1999	VT-1	All accessible areas @ 219°. VT-1 on LPCI @ Az. 141° due to a previous loose parts impact concern. No indications.
	Spring 2001	VT-1	VT-1 on LPCI @ Az. 141° due to a previous loose parts impact concern. No indications.
	Fall 2002	EVT-1	All accessible areas @ Az 39°. No indications. VT-1 on LPCI @ Az. 141° due to a previous loose parts impact concern. No indications.
	Fall 2005	VT-1	VT-1 on LPCI @ Az. 141° due to a previous loose parts impact concern. No indications.
	Spring 2007	EVT-1	VT-1 on all accessible areas of LPCI @ 141°. Extra weld was located on the strut assembly at all LPCI locations. No indications noted.
	Fall 2008	EVT-1	EVT-1 performed on the extra welds (6-4a) that were noted during RF15 at each LPCI strut. No indications were noted.
	Spring 2010	EVT-1	Exams were performed on LPCI @ 219°. No indications were noted.
Steam Dryer	Spring 2007	VT-1	Completed BWRVIP-139 examination. Cracked tack welds were noted on all (4) lifting lugs. No movement was noted. Eleven indications (IGSCC) were identified on the dryer upper support ring. No indications were longer than 3 ½".
	Fall 2008	VT-1	Examined areas identified during RF15. Additional crack was noted on a lifting lug and addition linear indication (1" lg.) was identified on the Upper Support Ring.
	Spring 2010	VT-1	Examined previous indications (cracked tack welds at lifting lugs and IGSCC cracking on the upper support ring). No changes were noted.

Dissimilar Metal Welds on Reactor Nozzles	Spring 2007	UT	N1A-KB Nozzle to Safe End Weld N2A-KB Nozzle to Safe End Weld N2K-KB Nozzle to Safe End Weld K2M-KB Nozzle to Safe End Weld K2N-KB Nozzle to Safe End Weld K9A-KB Nozzle to Safe End Weld N9A-KC Safe End to Safe End Ext No recordable indications noted.
	Fall 2008	UT	N5B-KB Nozzle to Safe End Weld N5B-KC Safe End to Safe End Ext. N4A-KB Nozzle to Safe End Weld N4F-KB Nozzle to Safe End Weld N4B-KB Nozzle to Safe End Weld No recordable indications.
	Spring 2010	UT	N02B-KB Nozzle to Safe End Weld N02C-KB Nozzle to Safe End Weld N02D-KB Nozzle to Safe End Weld N02E-KB Nozzle to Safe End Weld N06A-KB Nozzle to Safe End Weld N06A-KC Safe End to Extension N09B-KB Nozzle to Safe End Weld No recordable indications.
	Spring 2012	UT	N01B-KB Nozzle to Safe End Weld N02F-KB Nozzle to Safe End Weld N02G-KB Nozzle to Safe End Weld N02H-KB Nozzle to Safe End Weld N02J-KB Nozzle to Safe End Weld N04C-KB Nozzle to Safe End Weld N04D-KB Nozzle to Safe End Weld N05A-KB Nozzle to Safe End Weld N05A-KC Safe End to Extension N06B-KB Nozzle to Safe End Weld N06B-KC Safe End to Extension N06C-KB Nozzle to Safe End Weld N06C-KC Safe End to Extension N09A-KB Nozzle to Safe End Weld Crack was discovered in N06B-KB weld and weld overlay was completed satisfactorily. Ref. CR-GGN-2012-06386.