January 17, 2001

Mr. Carl Terry, BWRVIP Chairman
Niagara Mohawk Power Company
Post Office Box 63
Lycoming, NY 13093

SUBJECT: ACCEPTANCE FOR REFERENCING OF "BWR VESSEL AND INTERNALS PROJECT, VESSEL ID ATTACHMENT WELD INSPECTION AND FLAW EVALUATION GUIDELINES (BWRVIP-48), EPRI REPORT TR-108724, AND APPENDIX A, DEMONSTRATION OF COMPLIANCE WITH THE TECHNICAL INFORMATION REQUIREMENTS OF THE LICENSE RENEWAL RULE (10 CFR 54.21)

Dear Mr. Terry:

By letter dated March 6, 1998, as supplemented by letters dated March 3, April 23 and April 30, 1999, the Boiling Water Reactor Vessel and Internals Project (BWRVIP) submitted the Electric Power Research Institute (EPRI) proprietary report TR-108724, "BWR Vessel and Internals Project, Vessel [Inner Diameter] ID Attachment Weld Inspection and Flaw Evaluation Guidelines (BWRVIP-48)," for NRC staff review and approval. The BWRVIP-48 report included an initial non-proprietary version, which was supplemented by an expanded non-proprietary version by letter dated April 23, 1999. Also included in the initial submittal was "Appendix A, Vessel ID Attachment Weld, Demonstration of Compliance with the Technical Information Requirements of the License Renewal Rule (10 CFR 54.21)," for staff review in accordance with the License Renewal Rule (10 CFR Part 54).

The BWRVIP-48 report contains generic guidelines to BWRVIP members on inspection and flaw evaluation (I&E) of the reactor pressure vessel (RPV) ID attachment welds, with the primary objective of ensuring the long term integrity of the safety-related attachments for the core spray piping and jet pumps, as well as other BWR vessel internal attachments, since any welds to the RPV, and thus to the pressure boundary, are safety-related per 10 CFR 50.2 and 10 CFR 50.55a. The guidelines provide recommendations for nondestructive evaluation (NDE) methods, inspection locations and inspection frequencies. The BWRVIP-48 report also recommends methods for use in evaluating the structural integrity significance of the flaws that are detected during the examinations. These guidelines recommend more stringent inspections for certain selected attachments.

By letter dated March 21, 1999, the staff forwarded its initial safety evaluation (SE) of the BWRVIP-48 report to the BWRVIP. This SE had several open items, and requested that the BWRVIP address these issues in a timely manner. By letter dated April 30, 1999, the BWRVIP responded to the open items in the staff's initial SE. The staff issued its final SE report (FSER) by letter dated September 29, 1999, which found the revised guidance of the BWRVIP-48 to be acceptable for the inspection and flaw evaluation of the subject internal components for the current operating period of BWRs.

As documented in the attached license renewal (LR) SE, the NRC staff has completed its review of the BWRVIP-48 report. As indicated in the LR SE, the staff finds the BWRVIP-48 report acceptable for licensees participating in the BWRVIP to reference in a LR application to the extent specified and under the limitations delineated in the LR SE. In order for licensees participating in the BWRVIP to rely on the report, they shall commit to the accepted aging management programs (AMPs) defined therein, and complete the action items described in the LR SE. By referencing the BWRVIP-48 report and the AMPs in it, and completing the action items, an applicant will provide sufficient information for the staff to make a finding that there is reasonable assurance that the applicant will adequately manage the effects of aging so that the intended functions of the reactor vessel internal components covered by the scope of the report will be maintained consistent with the current licensing basis during the period of extended operation.

The staff does not intend to repeat its review of the matters described in the report and found acceptable in the FSER when the report appears as a reference in license renewal applications, except to ensure that the material presented applies to the specified plant.

In accordance with the procedures established in NUREG-0390, "Topical Report Review Status," the staff requests that the BWRVIP publish the accepted version of the BWRVIP-48 report within 90 days after receiving this letter. In addition, the published version shall incorporate this letter and the FSER between the title page and the abstract.

To identify the version of the report that was accepted by the staff, the staff requests the BWRVIP include "A" following the report number (e.g., BWRVIP-48-A).

Sincerely,

/***RA***/

Christopher I. Grimes, Branch Chief
License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project No. 704

Enclosure: Final Safety Evaluation Report

cc w/encl: See next page

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Christopher I. Grimes, Branch Chief
License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
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Enclosed SER provided by memorandum from W. Bateman, EMCB, to C. Grimes, RLSB, dated December 13, 2000, Accession number ML003778903

DOCUMENT NAME: G:\RLSB\ANAND\BWRVIP-48.WPD

OFFICE	LA:DRIP	PM:RLSB:DRIP	SC:RLSB:DRIP	BC:RLSB:DRIP
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DATE	12/20/00	12/20/00	12/21/00	12/21/00
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DATE	01/10 /01	01/15/01	01/17/01	

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FINAL LICENSE RENEWAL SAFETY EVALUATION REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION FOR BWR VESSEL AND INTERNALS PROJECT, VESSEL ID ATTACHMENT WELD INSPECTION AND FLAW EVALUATION GUIDELINES (BWRVIP-48) EPRI REPORT TR-108724, FOR COMPLIANCE WITH THE LICENSE RENEWAL RULE (10 CFR PART 54)

1.0 INTRODUCTION

1.1 Background

By letter dated March 6, 1998, as supplemented by letters dated March 3, April 23 and April 30, 1999, the Boiling Water Reactor Vessel and Internals Project (BWRVIP) submitted the Electric Power Research Institute (EPRI) proprietary report TR-108724, "BWR Vessel and Internals Project, Vessel [Inner Diameter] ID Attachment Weld Inspection and Flaw Evaluation Guidelines (BWRVIP-48)," for NRC staff review and approval. The BWRVIP-48 report included an initial non-proprietary version, which was supplemented by an expanded non-proprietary version by letter dated April 23, 1999. Also included in the initial submittal was "Appendix A, Vessel ID Attachment Weld, Demonstration of Compliance with the Technical Information Requirements of the License Renewal Rule (10 CFR 54.21)," for staff review in accordance with the License Renewal Rule (10 CFR Part 54). Any BWRVIP member utility may reference this report in a license renewal application to satisfy the requirements of (1) 10 CFR 54.21(a)(3) for demonstrating that the effects of aging on the reactor vessel components within the scope of this report will be adequately managed and (2) 10 CFR 54.21(c)(1) for demonstrating the appropriate findings regarding evaluation of time-limited aging analyses (TLAAs) for the bracket attachments for the period of extended operation.

The BWRVIP-48 report contains generic guidelines to BWRVIP members on inspection and flaw evaluation (I&E) of the reactor pressure vessel (RPV) ID attachment welds, with the primary objective of ensuring the long term integrity of the safety-related attachments for the core spray piping and jet pumps, as well as other BWR vessel internal attachments, since any welds to the RPV, and thus to the pressure boundary, are safety-related per 10 CFR 50.2 and 10 CFR 50.55a. The guidelines provide recommendations for nondestructive evaluation (NDE) methods, inspection locations and inspection frequencies. The BWRVIP-48 report also recommends methods for use in evaluating the structural integrity significance of the flaws that are detected during the examinations. The intent of the BWRVIP-48 guidelines is that BWRVIP members will adopt the inspection recommendations as a supplement to the currently used ASME Section XI requirements. These guidelines recommend more stringent inspections for certain selected attachments.

By letter dated March 21, 1999, the staff forwarded its initial safety evaluation (SE) of the BWRVIP-48 report to the BWRVIP. This SE had several open items, and requested that the BWRVIP address these issues in a timely manner. By letter dated April 30, 1999, the BWRVIP responded to the open items in the staff's initial SE. The staff issued its final SE report (FSER)

by letter dated September 29, 1999, which found the revised guidance of the BWRVIP-48 to be acceptable for the inspection and flaw evaluation of the subject internal components for the current operating period of BWRs.

1.2 Purpose

The staff reviewed the BWRVIP-48 report and its Appendix A to determine whether its guidance will provide acceptable levels of quality for inspection and flaw evaluation of the subject safety-related RPV internal components within the scope of the report during the period of extended operation. The staff also considered compliance with the LR Rule in order to allow applicants for renewal the option of incorporating the BWRVIP-48 guidelines by reference in a plant-specific integrated plant assessment (IPA) and associated TLAAs.

Section 54.21 of the License Renewal Rule requires, in part, that each application for license renewal contain an integrated plant assessment (IPA) and an evaluation of TLAAs. The IPA must identify and list those structures and components subject to an aging management review and demonstrate that the effects of aging will be adequately managed so that their intended functions will be maintained consistent with the current licensing basis (CLB) for the period of extended operation. In addition, 10 CFR 54.22 requires that each application include any technical specification changes or additions necessary to manage the effects of aging during the period of extended operation as part of the renewal application.

If a license renewal applicant participating in the BWRVIP confirms that the BWRVIP-48 report applies to it and that the results of the Appendix A IPA and TLAA evaluation are in effect at its plant, then no further review by the NRC staff of the issues described in the documents is necessary, except as specifically identified by the staff in its safety evaluation below. With this exception, such an applicant may rely on the BWRVIP-48 report for the demonstration required by Section 54.21(a)(3) with respect to the components and structures within the scope of the report. Under such circumstances, the NRC staff intends to rely on the evaluation in this safety evaluation (SE) report to make the findings required by 10 CFR 54.29 with respect to a particular application.

1.3 Organization of this Report

Because the BWRVIP-48 report, as supplemented and modified, is proprietary, this SE was written so as not to repeat information contained in the propriety portions of the report. The staff does not discuss in any detail the proprietary provisions of the guidelines nor the parts of the guidelines it finds acceptable. A brief summary of the contents of the BWRVIP-48 report is given in Section 2.0 of this SE, with the NRC staff's evaluation presented in Section 3.0. The conclusions are summarized in Section 4.0. The presentation of the evaluation is structured according to the organization of the BWRVIP-48 report.

2.0 SUMMARY OF BWRVIP-48 REPORT

The BWRVIP-48 report and its Appendix A contain a generic evaluation of the management of the effects of aging of the subject components so that the intended functions will be maintained consistent with the CLB for the period of extended operation. This evaluation applies to BWR applicants who have committed to implementing the BWRVIP-48 report and want to incorporate the report and Appendix A by reference into a plant-specific IPA and associated TLAA.

2.1 BWRVIP-48 Topics

The BWRVIP-48 report addresses the following topics in the following order:

- Bracket Attachment Configurations – The BWRVIP-48 report describes in detail, with reference to a collection of figures, the various designs of attachments for various components and BWR plant types. The particular bracket designs used at each of the U.S. BWR plants are identified, along with safety classification of the component supported by the brackets. The attachments for the core spray piping and jet pumps have been classified as safety-related, as well as other BWR vessel internal attachments as any welds to the reactor pressure vessel (RPV) and thus to the pressure boundary are safety-related per 10 CFR 50.2 and 10 CFR 50.55a.

- Susceptibility Factors – The primary damage mechanisms for vessel ID attachment welds are fatigue and stress corrosion cracking (SCC). However, to date, plant operating experience has provided no evidence of significant fatigue degradation. Various factors, including materials, stress state, and environmental conditions, that affect stress corrosion cracking of components are described as they apply to vessel attachment welds. The most susceptible weld materials for stress corrosion cracking are identified along with other materials that are less susceptible. The conductivity and electrochemical corrosion potential of the BWR coolant are identified as important environmental factors to be addressed on a plant-specific basis. It is noted that the use of hydrogen water chemistry can reduce the likelihood of stress corrosion cracking for those plants that have implemented this practice. The BWRVIP-48 report cites a list of historical occurrences of attachment weld cracking, with specific incidents discussed in detail. In no case has there been cracking that has propagated into the vessel base material. The most susceptible welds are those for Alloy 182 attachments, and the only cracking of these welds has been at non-GE foreign plants.

- Potential Failure Locations – The potential failure locations are identified only in general terms as being in attachment welds or in the adjacent heat affected zones. It is implied that each plant would identify specific welds for inspection based on knowledge of the materials and welding parameters for the welds. While there have been no observed cases to date of stress corrosion cracks propagating through the stainless steel cladding and into the carbon steel vessel wall, the proposed inspection strategy is designed to address this possibility.

- Background and Inspection History – Data on service-related failures of components are summarized. Inspections have been performed at all plants in accordance with ASME Section XI requirements. In the beltline region, the bracket attachment welds have been examined using the enhanced visual examination (EVT-1) requirements specified in the BWRVIP-03 report. Other attachments have been examined using VT-3 inspections. Degradation has been observed at only five plants, with no cases of cracks that have extended into the vessel base material. Two of the plants were foreign non-GE plants, where IGSCC cracks were found in Alloy 182 welds. Three U.S. plants experienced cracking by either fatigue (caused by a high moment due to an improperly positioned seismic block) or cracking within clad material.

- BWRVIP Inspection Guidelines – The guidelines for inspecting bracket attachments are summarized in Table 3-1 of the BWRVIP-48 report as revised. All inspections of the brackets for core spray piping and jet pumps are by the EVT-1 technique. The examination volumes are limited to the attachment weld and the adjacent heat-affected regions of the vessel clad. Unless specifically stated, the selection of welds for inspection are the same as in the plant's current ASME Section XI, Class I program. Additional examinations are required for brackets associated with core spray piping, jet pump risers, steam dryers, and feedwater attachments. The additional inspections are performed in two steps. First, there is a set of baseline inspections, which address essentially all of the identified critical welds. Once the baseline examination is completed, reinspections are to be performed at intervals ranging from once every four refueling outages to once in 12 years. If flaws are found, the reinspection frequency will be based on the governing flaw growth rates and mechanisms.

- Acceptance Criteria and Reporting – The guidelines state the inspection results should be reported to the regulatory authorities having jurisdiction at the owner's facility. Flaws may be accepted on the allowable sizes given for Class I components of ASME Section XI. A detailed fracture mechanics evaluation following the approach described in Section 4.3 of the BWRVIP-48 report can also be performed to determine the suitability of a degraded bracket for continued plant operation.

- Loads – This section describes the methodology and the loads to be used in fracture mechanics evaluations that address the consequences of detected flaws on structural integrity. The evaluation should begin by considering the design loads originally specified by the NSSS supplier, and should be updated to be consistent with the current plant-licensing basis. If the failure is known to be the result of unanticipated loads, such as vibration, these service loads should be included in the evaluation. The evaluation should also review loads used in recent evaluations of the attached components (core spray piping or jet pumps) to ensure consistency with other structural evaluations.

- Load Combinations – Loads should be combined in a consistent manner. The BWRVIP-48 report notes that the loads as specified by the General Electric Co. (GE) have already included load combinations and do not need special consideration.

2.2 Identification of Structures and Components Subject to an Aging Management Review

10 CFR 54.21(a)(1) requires that an IPA identify and list those structures and components within the scope of license renewal that are subject to an aging management review. Structures and components subject to an aging management review shall encompass those structures and components that (1) perform an intended function, as described in 10 CFR 54.4, without moving parts or without a change in configuration or properties and (2) are not subject to replacement based on a qualified life or specified time period. These structures and components are also referred to as "passive" and "long-lived" structures and components, respectively.

Section 2.0 of the BWRVIP-48 report describes the intended function and failure consequences of the core spray piping bracket, jet pump riser braces, steam dryer holddown braces, guide rod, feedwater sparger, and surveillance sample holder bracket attachments. Maintaining their contribution to the structural integrity of the vessel under normal, upset, emergency, and faulted

scenarios will ensure the shutdown capability of the reactor and maintain it in a safe-shutdown condition.

In Appendix A, the BWRVIP-48 report identified the passive and long-lived components as required by 10 CFR 54.21(a)(1). The BWRVIP-48 report noted that the attachment between the bracket and the vessel wall defines the evaluation boundary and this portion of the bracket is subject to aging management review. In some cases, the attachment is a simple weld and, on others, it includes a weld build-up pad on the vessel.

2.3 Effects of Aging

The BWRVIP-48 report identified the aging mechanisms and aging effects for the bracket attachments using the guidance from NUMARC 90-02, "BWR Reactor Pressure Vessel License Renewal Industry Report," Revision 1, dated August 1992, and the resolution to the NRC's questions on this industry report. The BWRVIP-48 report also used NUREG-1557, dated October 1996 (Ref. 4), to correlate the aging effects and their associated aging mechanisms. Using these reports, the BWRVIP-48 report determined that crack initiation and growth is the only aging effect that requires aging management review for the bracket attachments.

Section 2.0 of the BWRVIP-48 report discussed the causes of crack initiation and growth and provided a susceptibility assessment, and also discussed the susceptibility factors of environment, materials, and stress state. The BWRVIP-48 report discussed each of the potential cracking locations, determining that:

- Brackets with Alloy 182 attachment welds would be most susceptible to SCC, particularly for coolant conditions with high electrical conductivity or electrochemical corrosion potential (ECP) levels.

- Brackets with furnace sensitized stainless steels (from the post-weld heat treatment) would also have a high susceptibility to SCC.

- Brackets with non-furnace sensitized stainless steels or low alloy steel attachment welds would be expected to have a lower susceptibility to SCC.

The BWRVIP-48 report's review of the degradation history, presented in Section 3.1 of the report, determined that there were only five BWRs that have experienced any degradation or cracking of brackets. Further, most indications have been found in steam dryer support and hold down brackets, and no propagation has been found into the RPV base metal.

2.4 Aging Management Programs

10 CFR 54.21(a)(3) requires, for each component identified, that the applicant demonstrate that the effects of aging will be adequately managed so that the intended function will be maintained consistent with the CLB for the period of extended operation.

Section 3.0 of the BWRVIP-48 report discussed the inspection strategy to be used for ensuring that cracks that might occur in the bracket attachments are detected in a timely manner. The program involves a baseline inspection and reinspection of the attachments using EVT-1 examination methods. In case of detection of an indication in a bracket attachment, ultrasonic (UT) inspections are required to determine if the indication has propagated into the vessel wall. The BWRVIP-48 report concluded that both its inspection program and plant-specific considerations will result in verification of the structural integrity in the CLB for the subject safety-related components.

2.5 Time-Limited Aging Analyses (TLAAs)

10 CFR 54.21(1)(c) requires that each application for license renewal contain an evaluation of TLAA as defined in 10 CFR 54.3, and that the applicant shall demonstrate that :

(iv) The analyses remain valid for the period of extended operation:

(v) The analyses have been projected to the end of the period of extended operation; or

(vi) The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

TLAAs are those licensee calculations and analyses that:

(1) involve the bracket attachments within the scope of license renewal,

(2) consider the effects of aging,

(3) involve time-limited assumptions defined by the current operating term,

(4) were determined to be relevant by the licensee in making a safety determination,

(5) involve conclusions or provide the basis for conclusions related to the capability of the bracket attachments to perform their intended function, and

(6) are contained or incorporated by reference in the CLB.

If a plant-specific analysis identified by an applicant meets all six criteria above, the analysis will be considered a TLAA for license renewal and evaluated by the applicant.

The susceptibility of the bracket attachments to fatigue due to thermal cycling and vibration induced loads results in a potential TLAA issue. The BWRVIP-48 report evaluated this issue under 10 CFR 54.21(c)(1)(ii) by projecting the analysis to the end of the period of extended operation. The BWRVIP-48 report found that the typical cumulative usage factors are below the 0.4 threshold specified in NUMARC 90-02 during the current and extended operating periods.

3.0 STAFF EVALUATION

The staff's FSER of the BWRVIP-48 report for the current term was transmitted by letter dated September 29, 1999 to Carl Terry, BWRVIP Chairman. The NRC staff determined that the contents and recommendations in the BWRVIP-48 report, when coupled with the BWRVIP's response dated March 3, 1999, resulting from the information requests at the meeting of December 17, 1998, and the report revisions in response to the open items identified in the staff's initial safety evaluation (SE) of March 21, 1999, by letter dated April 30, 1999, provides sufficient and acceptable basis for performing examinations and evaluating postulated flaw indications for the subject vessel ID attachments. The NRC staff concluded that licensee implementation of the guidelines in the BWRVIP-48 report, as revised, will provide an acceptable level of quality for inspection and flaw evaluation of the components addressed for the current operating term.

The staff has further reviewed the BWRVIP-48 report and its Appendix A to determine if it demonstrates that the effects of aging on the reactor vessel components' intended functions will be maintained consistent with the CLB for the period of extended operation in accordance with 10 CFR 54.21(a)(3). This is the last step in the IPA described in 10 CFR 54.21(a).

Besides the IPA, Part 54 requires an evaluation of TLAA in accordance with 10 CFR 54.21(c). The staff reviewed the BWRVIP-48 report to determine if the TLAA covered by the report were evaluated for license renewal in accordance with 10 CFR 54.21(c)(1).

3.1 Structures and Components Subject to Aging Management Review

The staff agrees that the bracket attachments are subject to aging management review because they perform intended functions without moving parts or without a change in configuration or properties. The staff concludes that BWR applicants for license renewal must identify the appropriate subject safety-related RPV internal components as subject to aging management review to meet the applicable requirements of 10 CFR 54.21(a)(1).

3.2 Intended Functions

The staff agrees that the intended functions of the bracket attachments are as stated. The function is to maintain the structural integrity of the vessel under normal, upset, emergency, and faulted conditions.

3.3 Effects of Aging

The information necessary to demonstrate compliance with the requirements of the license renewal rule 10 CFR 54.21 is provided in Appendix A of the BWRVIP-48 report. The BWR Reactor Pressure Vessel Industry Report NUMARC 90-02, Revision 1, August 1992, and the resolution to the NRC's questions on that Industry Report were used to identify the aging mechanisms for the bracket attachments. If the industry report concluded that the aging mechanism is significant then the aging mechanism was included in the aging management review. Using this methodology it was determined that crack initiation and growth is the only aging effect that required aging management review.

Accordingly, NUREG-1557 states that crack initiation and growth are the aging effects that need to be considered. The staff agrees that this mechanism is the only one applicable to the attachments.

3.4 Aging Management Programs

The staff evaluated the BWRVIP's aging management program to determine if it contains the following 10 elements constituting an adequate aging management program for license renewal:

(1) Scope of Program: The program contains preventative measures to mitigate SCC; inservice inspection (ISI) to monitor the effects of SCC on the intended function of the components, and repair and/or replacement as needed to maintain the ability to perform the intended function

(2) Preventive Actions: Mitigation is by selection of materials resistant to stress corrosion cracking. Coolant water chemistry is monitored and maintained in accordance with EPRI guidelines. Maintaining high water purity reduces susceptibility to SCC. Hydrogen additions are effective in reducing electrochemical (corrosion) potentials in the recirculation piping system, but are less effective in the core region. Noble metal additions, through a catalytic action, appear to increase the effectiveness of hydrogen additions in the core region.

(3) Parameters Monitored or Inspected: Inspection and flaw evaluation are performed in accordance with ASME, Section XI, Class I, and BWRVIP guidelines, as approved by the NRC.

(4) Detection of Aging Effects: Inspection in accordance with ASME, Section XI, and BWRVIP guidelines assures that degradation due to SCC is detected before any loss of the intended function of the attachment welds.

(5) Monitoring and Trending: The inspection schedule is in accordance with applicable approved BWRVIP guidelines and is adequate for timely detection of cracks. Scope of examination expansion and re-inspection beyond the baseline inspection are required if flaws are detected.

(6) Acceptance Criteria: Any degradation is evaluated in accordance with Section XI, and the applicable approved BWRVIP guidelines.

(7) Corrective Actions: Repair and replacement will be in accordance with Section XI, and the applicable approved BWRVIP guidelines.

(8) & (9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes and administrative controls are implemented in accordance with the requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the license renewal period.

(10) Operating Experience: Very few plants have experienced degradation of the bracket attachments. Most indications have been found in the steam dryer support and hold down brackets. The inspection history also showed that none of the indications had propagated into the vessel base metal.

The staff's final evaluation of the BWRVIP-48 report was transmitted by letter dated September 28, 1999 (Ref. 5). For the reasons set forth in that SER, the staff concluded that the inspection strategy and evaluation methodologies discussed in the BWRVIP-48 report are acceptable. Implementation of the above inspection program provides reasonable assurance that crack initiation and growth will be adequately managed such that the intended functions of the subject safety-related RPV internal components will be maintained consistent with the CLB in the extended operating period.

3.5 Time Limited Aging Analyses (TLAAs)

One of the mechanisms that can cause degradation of the bracket attachment is fatigue. In those instances where a fatigue analysis was required, the fatigue cumulative usage factors were extended to 60 years and determined to be very low when compared to the Code allowable value of 1.0. More specifically, conservatively calculated usage factors were shown to range from a low of 0.05 to a high of 0.52. Further detailed computations yield usage factors below the 0.4 threshold used to consider the effects of BWR water environmental conditions on fatigue life.

4.0 CONCLUSIONS

The staff has reviewed the subject BWRVIP-48 report submitted by the BWRVIP. On the basis of its review, as set forth above, the staff concludes that the BWRVIP-48 report provides an acceptable demonstration that the BWRVIP member utilities referencing this report will adequately manage the aging effects of reactor vessel components within the scope of the report, with the exception of the noted renewal applicant action items set forth in Section 4.1 below, so that there is reasonable assurance that the bracket attachments will perform their intended functions in accordance with the CLB during the period of extended operation.

The staff also concludes that, upon completion of the renewal applicant action items, the BWRVIP-48 report provides an acceptable evaluation of time-limited aging analyses for the bracket attachments for the BWRVIP member utilities referencing this report for the period of extended operation.

Any BWRVIP member utility may reference this report in a license renewal application to satisfy the requirements of (1) 10 CFR 54.21(a)(3) for demonstrating that the effects of aging on the reactor vessel components within the scope of this report will be adequately managed and (2) 10 CFR 54.21(c)(1) for demonstrating the appropriate findings regarding evaluation of TLAA for the bracket attachments for the period of extended operation.

The staff further concludes that, upon completion of the renewal applicant action items set forth in Section 4.1 below, referencing the BWRVIP-48 report and its Appendix A in a license renewal application and summarizing in an FSAR supplement the aging management programs and the TLAA evaluations contained in this report will provide the staff with sufficient information to make the necessary findings required by Sections 54.29(a)(1) and (a)(2) for components within the scope of this report.

4.1 Renewal Applicant Action Items

The following are license renewal applicant action items to be addressed in the plant-specific license renewal application when incorporating the BWRVIP-48 report in a renewal application:

(1) The license renewal applicant is to verify that its plant is bounded by the BWRVIP-48 report. Further, the renewal applicant is to commit to programs described as necessary in the BWRVIP-48 report to manage the effects of aging on the functionality of the bracket attachments during the period of extended operation. Applicants for license renewal will be responsible for describing any such commitments and identifying how such commitments will be controlled. Any deviations from the aging management programs within the BWRVIP-48 report described as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the reactor vessel components or other information presented in the report, such as materials of construction, will have to be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).

(2) 10 CFR 54.21(d) requires that an FSAR supplement for the facility contain a summary description of the programs and activities for managing the effects of aging and the evaluation of TLAA for the period of extended operation. Those applicants for license renewal referencing the BWRVIP-48 report for the bracket attachments shall ensure that the programs and activities specified as necessary in the BWRVIP-48 report are summarily described in the FSAR supplement.

(3) 10 CFR 54.22 requires that each application for license renewal include any technical specification changes (and the justification for the changes) or additions necessary to manage the effects of aging during the period of extended operation as part of the renewal application. In its Appendix A to the BWRVIP-48 report, the BWRVIP stated that there are no generic changes or additions to technical specifications associated with the bracket attachments as a result of its aging management review and that the applicant will provide the justification for plant-specific changes or additions. Those applicants for license renewal referencing the BWRVIP-48 report for the bracket attachments shall ensure that the inspection strategy described in the BWRVIP-48 report does not conflict or result in any changes to their technical specifications. If technical specification changes do result, then the applicant should ensure that those changes are included in its application for license renewal.

5.0 REFERENCES

1. Letter from Carl Terry, BWRVIP, to USNRC, “BWR Vessel and Internals Project, Vessel [Inner Diameter] ID Attachment Weld Inspection and Flaw Evaluation Guidelines (BWRVIP-48),” EPRI Report TR-108724, dated March 6, 1998.

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