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U.S. Nuclear Regulatory Commission
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Hope Creek Generating Station
Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: Response to NRC Request for Additional Information, dated April 14, 2010,
Related to Section B.2.2.5 of the Hope Creek Generating Station License
Renewal Application

Reference: Letter from Mr. Donnie Ashley (USNRC) to Mr. Thomas Joyce (PSEG Nuclear,
LLC) "HOPE CREEK GENERATING STATION, LICENSE RENEWAL
APPLICATION - REQUEST FOR ADDITIONAL INFORMATION FOR SECTION
2.2.5, BORAL MONITORING PROGRAM (TAC NO. ME1832)", dated April 14,
2010

In the referenced letter, the NRC requested additional information related to the Boral
Monitoring Program associated with the Hope Creek Generating Station License Renewal
Application (LRA). Enclosure A contains the responses to this request for additional
information. Enclosure B contains updated versions of the LRA Appendix A and Appendix B
Boral Monitoring Program descriptions.

Enclosure C provides an update to the License Renewal Commitment List (LRA Appendix A,
Section A.5). This update includes a new enhancement to the Boral Monitoring Program
involving site specific Boral coupon testing. There are no other new or revised regulatory
commitments contained in this letter.

If you have any questions, please contact Mr. Ali Fakhar, PSEG Manager - License Renewal, at
856-339-1646.

A142
NRR

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 5/11/10

Sincerely,



Paul J. Davison
Vice President, Operations Support
PSEG Nuclear LLC

Enclosures: A. Responses to Request for Additional Information
B. Updates to LRA Appendix A & B Boral Monitoring Program Descriptions
C. Update to License Renewal Commitment List

cc: S. Collins, Regional Administrator – USNRC Region I
B. Brady, Project Manager, License Renewal – USNRC
R. Ennis, Project Manager - USNRC
NRC Senior Resident Inspector – Hope Creek
P. Mulligan, Manager IV, NJBNE
L. Marabella, Corporate Commitment Tracking Coordinator
T. Devik, Hope Creek Commitment Tracking Coordinator

Enclosure A

Responses to Request for Additional Information related to the Boral
Monitoring Program (A.2.2.5/B.2.2.5) associated with the Hope Creek
Generating Station License Renewal Application (LRA)

RAI 2.2.5-1
RAI 2.2.5-2
RAI 2.2.5-3

RAI 2.2.5-1

Element 2 (Preventive Actions), Element 4 (Detection of Aging Effects), and Element 5 (Monitoring and Trending) of the Boral Monitoring Program contain the sentence, "The assumption is that the spent fuel pool environments, including the pool's water chemistry and radiation field, and the Boral material characteristics are consistent enough so that the results at other BWR [boiling water reactor] sites are representative of the results if the Hope Creek Boral test coupons were inspected and/or tested."

The position that spent fuel pool environments between different BWR plants can be considered to come from a single population has not been supported by the staff. The draft Interim Staff Guidance of November 2009 (LR-ISG-2009-01), cited specific examples of industry operating experience that have shown extrapolations on plant-specific data that were incorrect in trying to determine the future condition of neutron absorbing material in spent fuel pools. The staff clarified that an applicant should consider both plant-specific and industry operating experience in a license renewal application (LRA), and that the plant-specific operating experience should include data from an on-going inspection and monitoring program.

Please discuss your plan to implement changes to your Boral Monitoring Program that will include regular inspections of the spent fuel pool test coupons at Hope Creek Unit 1.

PSEG Response:

As described in UFSAR Section 9.1.2.4, the Hope Creek Boral Monitoring Program monitors Boral test coupon results at other BWR sites. The program is based on the position that BWR Boral test coupons constitute a single population with common characteristics and that the test coupons are representative of the Boral in the spent fuel rack walls. This methodology was accepted by the NRC as documented in Section 9.1.2 of NUREG-1048, Safety Evaluation Report Related to the Operation of Hope Creek Generating Station. Boral has been widely used in BWR spent fuel pool environments for over 30 years. It is not a recently introduced material or a material with limited application. Hope Creek is unaware of any data or physical phenomenon inconsistent with the treatment of BWR Boral test coupons as a single population.

In addition to monitoring the BWR Boral test coupon results at other BWR sites, the Hope Creek Boral Monitoring Program monitors for operational problems in the Hope Creek spent fuel racks that could indicate problems with Boral performance. Hope Creek spent fuel pool chemistry trends are also monitored for loss of material from Boral. There have been no operational problems or chemistry trends indicating a Boral performance problem at Hope Creek.

The Hope Creek Boral Monitoring Program includes criteria that will trigger testing of Hope Creek Boral coupons. These criteria are based on the Boral test results at other BWR sites, operational problems in the Hope Creek spent fuel racks, and Hope Creek spent fuel pool chemistry trends. Since none of these criteria have been met, Hope Creek has not yet tested its Boral coupons.

Hope Creek is confident that the Boral Monitoring Program ensures that the Boral in the Hope Creek spent fuel racks meets its design function as described in the Hope Creek spent fuel rack

criticality analysis. However, based on recent industry operating experience and issues outlined in the NRC's draft Interim Staff Guidance of November 2009 (LR-ISG-2009-01), Hope Creek recognizes concerns from the staff relating to the conditions of Boral material in site specific applications. Therefore, the Hope Creek Boral Monitoring Program will be enhanced to include inspection, testing and evaluation of one coupon prior to the period of extended operation and one coupon within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements with an acceptance criteria of no more than a 10% increase in thickness and no more than a 5% decrease in B-10 areal density.

Updates to LRA Appendix A and Appendix B as a result of the added enhancement can be found in Enclosure B. Updates to LRA Appendix A, Section A.5, the License Renewal Commitment List, can be found in Enclosure C.

RAI 2.2.5-2

Element 6 (Acceptance Criteria) contains the following sentences:

If the test report conclusion indicates at least one of the two acceptance criteria is unsatisfactory, the test report information will be entered into the Hope Creek corrective action program for further evaluation. Additionally, this could trigger the requirement to retrieve one Boral test coupon from the Hope Creek spent fuel pool and initiate inspection, testing and evaluation in accordance with the Boral Monitoring Program.

Please describe the test results that would require a spent fuel pool test coupon to be retrieved, inspected, tested, and evaluated.

PSEG Response:

Tests results from another BWR would be entered into the Hope Creek corrective action program for further evaluation under any of the following situations. The evaluation would verify the validity of the information, determine its applicability to Hope Creek, and evaluate the potential impact on the spent fuel rack criticality analysis.

- Test results do not meet acceptance criteria at the BWR from which the coupon came.
- Test results would not meet acceptance criteria at Hope Creek.
- Test results indicate a reduction in neutron absorbing capability outside of the variation attributed to measurement uncertainty.
- Test results generate corrective actions involving Boral material condition at the BWR from which the coupon came.
- Test results may be outside of expectations for a single population with common characteristics; specifically BWR Boral test coupons.

Based on the evaluation of the test results from other BWR sites, testing of Hope Creek Boral test coupons would be triggered if any of the following conditions are met.

- Test results from other BWRs indicate a reduction in the neutron-absorbing capability of Boral that, if it occurred at Hope Creek, could challenge the Hope Creek spent fuel pool criticality analysis; specifically, a reduction approaching the assumed minimum B-10 areal density.
- Test results from other BWRs indicate a statistical variation impacting the intended function of Boral to absorb neutrons that is outside of the expectations for a single population with common characteristics; in particular BWR Boral test coupons.

RAI 2.2.5-3

Please discuss the following regarding the spent fuel pool racks:

- a. If and how the racks are vented.
- b. What constitutes a drag test.
- c. The basis for the conclusion that the 15 cells marked as "DO NOT USE" did not suffer from Boral deformation.

PSEG Response:

- a. The Hope Creek spent fuel pool contains twenty-two high-density racks. These racks use Boral as the neutron absorber. As part of the original design, the Boral sheets are vented and exposed to spent fuel pool water. Each Boral sheet is held in place against the cell wall by a stainless steel wrapper. The wrapper is not sealed around the Boral sheet. The wrapper is spot welded to the cell wall.

All Boral test coupons are vented and exposed to spent fuel pool water.

The Hope Creek spent fuel pool contains one low-density rack. This rack is used to store control rods and defective fuel storage containers. It does not use any neutron absorber.

- b. Drag testing is performed for two purposes: 1) to verify that the spent fuel rack cell was fabricated with the required dimensions and 2) to detect deformation in the walls of a spent fuel rack cell once the spent fuel racks are placed in service. Drag testing can be performed under dry or wet conditions. A drag test consists of lowering and then withdrawing a test gauge or dummy bundle while monitoring a load cell for elevated friction or "drag". If the cell has insufficient mechanical clearance, the load cell will show a lower reading on insertion and/or a higher reading on withdrawal due to the elevated friction. The acceptance criteria for the drag test is the maximum allowed change in the load cell reading from the nominal value.

A "test gauge" or "dummy bundle" has a cross-sectional area similar to or greater than an actual fuel assembly. Its length is similar to an actual fuel assembly. It does not contain nuclear fuel. Oversized test gauges or dummy bundles are typically used in drag testing so that any results bound the behavior of an actual fuel assembly. For example, post-fabrication testing of a cell designed with a width of 6.04 inches for a fuel assembly with a width of 5.47 inches may require dry drag testing with a test gauge whose width is 5.94 inches. The test gauge width is close to the cell design width. Wet drag testing for the same cell may use a dummy bundle with a width of 5.75 inches. Its width, although smaller than the test gauge, is conservative with respect to an actual fuel assembly.

example, a drag test using an oversized test gauge close to the cell design width could have an acceptance criteria of 165 lbs. A drag test using a smaller but still oversized dummy bundle could have an acceptance criteria of 40 lbs.

A drag test begins by lowering the test gauge or dummy bundle into the spent fuel rack cell while monitoring a load cell. A decrease in the load cell reading more than the acceptance criteria is a drag test failure. If the test gauge or dummy bundle hangs up prior to full insertion, it is a drag test failure. The test gauge or dummy bundle is then withdrawn while monitoring the load cell reading. An increase in the load cell reading more than the acceptance criteria is a drag test failure. A test failure is entered into the corrective action program for evaluation. The evaluation could specify repairs, require additional testing, place restrictions on usage of the cell, or prevent usage of the cell.

- c. The 15 cells marked "DO NOT USE" failed dry drag tests that were performed as part of the post-fabrication testing of the associated spent fuel racks prior to their placement in the spent fuel pool. Following placement of the associated spent fuel racks in the spent fuel pool, wet drag testing was performed on these cells using a dummy bundle with a smaller cross-sectional area than the test gauge used in the dry drag testing. 14 of the 15 cells passed the wet drag test. These cells were marked "DO NOT USE" for any fuel assemblies except for once-burned natural uranium fuel assemblies. This restriction limited the potential channel distortion of the fuel assembly stored in the cell and thus the need for additional clearance. Channel distortion is the process by which the fuel channel bows or bulges due to operation in the reactor core. 1 of the 15 cells did not pass the wet drag test. This cell was marked "DO NOT USE" for any fuel assemblies.

Boral deformation is caused by the interaction between water and Boral. Since all 15 cells marked "DO NOT USE" failed dry drag tests prior to exposure to water, it is not plausible that the drag test failures were caused by Boral deformation.

Enclosure B

Hope Creek License Renewal Application (LRA) Appendix A and Appendix B Program Description Updates associated with the Response to RAI B.2.2.5-1

Note: To facilitate understanding, the entire original LRA Appendix A and Appendix B Program Descriptions for the Boral Monitoring Program have been repeated in this Enclosure, with revisions indicated. Changes are highlighted with bolded italics for inserted text and strikethroughs for deleted text.

A.2.2.5 Boral Monitoring Program

The Boral Monitoring Program is an existing program that monitors the Boral test coupon inspection and/or testing results at other boiling water reactor (BWR) sites. If these results indicate a problem with Boral neutron absorbing material potentially affecting its intended function (i.e., absorb neutrons), Hope Creek will initiate inspection and/or testing of its Boral test coupons in the Hope Creek spent fuel pool (SFP). ***The Boral Monitoring Program will be enhanced to include:***

- 1. Inspection, testing and evaluation of one coupon from the Hope Creek spent fuel pool prior to the period of extended operation and one coupon within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements with an acceptance criteria of no more than a 10% increase in thickness and no more than a 5% decrease in B-10 areal density.***

This enhancement will be implemented prior to the period of extended operation, with the inspections performed in accordance with the schedule described above.

B.2.2.5 Boral Monitoring Program

Program Description

The Boral Monitoring Program is an existing program that monitors the Boral test coupon inspection and/or testing results at other Boiling Water Reactor (BWR) sites. If these results indicate a problem with the Boral neutron absorbing material potentially affecting its intended function (i.e., absorb neutrons), Hope Creek will initiate inspection and/or testing of its Boral test coupons in the Hope Creek spent fuel pool (SFP). ***In addition, one coupon from the Hope Creek spent fuel pool will be inspected, tested and evaluated prior to the period of extended operation and one coupon will be inspected, tested and evaluated within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements, as further described under Element 6, below.***

Aging Management Program Elements

The results of an evaluation of each element against the 10 elements described in Appendix A of the Standard Review Plan of License Renewal Applications for Nuclear Power Plants, NUREG-1800, are provided below.

Scope of Program – Element 1

The Boral Monitoring Program is an existing program that monitors the Boral test coupon inspection and/or testing results at other Boiling Water Reactor (BWR) sites. If these results indicate a problem with the Boral neutron absorbing material potentially affecting its intended function (i.e., absorb neutrons), Hope Creek will initiate inspection and/or testing of its Boral test coupons in the Hope Creek spent fuel pool (SFP). This practice is consistent with the Hope Creek UFSAR and previous NRC information.

The Boral Monitoring Program will be enhanced to include inspection, testing and evaluation of one coupon from the Hope Creek spent fuel pool prior to the period of extended operation and one coupon within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements.

Preventive Actions – Element 2

The Boral Monitoring Program is an existing program that monitors the Boral test coupon inspection and/or testing results at other Boiling Water Reactor (BWR) sites. If these results indicate a problem with the Boral neutron absorbing material potentially affecting its intended function (i.e., absorb neutrons), Hope Creek will initiate inspection and/or testing of its Boral test coupons in the Hope Creek spent fuel pool (SFP). The assumption is that the spent fuel pool environments, including the pool's water chemistry and radiation field, and the Boral material characteristics are consistent enough so that the results at other BWR sites are representative of the results if the Hope Creek Boral test coupons were inspected and/or tested. The Boral Monitoring Program aging management programs used at these other BWR sites is a

condition monitoring program and does not include activities for prevention or mitigation of aging effects.

The Boral Monitoring Program aging management program used at these other BWR sites is a condition monitoring program and does not rely on preventive actions.

Parameters Monitored/Inspected – Element 3

The Boral surveillance performed by other Boiling Water Reactor (BWR) sites include visual inspections and/or testing of their Boral test specimens or coupons to monitor changes in physical properties of the Boral in the spent fuel pool. Examination of the Boral test coupon include visual examination and photography, and may include dimensional measurements, weight and density/specific gravity measurement, and neutron attenuation measurement. The Boral test coupon is visually examined to detect aging affects such as corrosion, pitting, swelling, or other degradation. The Boral test coupon may be photographed if, in the judgment of the technician, there is any information of significance that should be photographically documented. Dimensional measurements such as length, width and thickness are taken to document if physical changes are occurring in the Boral test coupon. The Boral test coupon is weighed and in some instances, the density/specific gravity is calculated to determine if there any changes in the physical properties. A measurement by neutron attenuation is performed to determine if there has been any change in the Boron-10 content.

One coupon from the Hope Creek spent fuel pool will be inspected, tested and evaluated prior to the period of extended operation and one coupon will be inspected, tested and evaluated within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements.

These inspections and/or testing are performed by a qualified contractor or measurement laboratory and will ensure against unexpected degradation of the Boral neutron-absorbing material.

Detection of Aging Effects – Element 4

The Boral surveillance performed by other Boiling Water Reactor (BWR) sites include visual inspections and/or testing of the Boral test specimens or coupons to monitor changes in physical properties of Boral. These Boral test coupons are in the spent fuel pool and subject to irradiated fuel assemblies to ensure that the Boral test coupons of the BWR sites are representative of their Boral in their spent fuel pool storage racks. Also, the assumption is that the spent fuel pool environments and the Boral neutron absorbing material characteristics are consistent enough for the other BWR sites so that the inspection and/or testing results from other sites are representative of the results if the Hope Creek Boral test coupons were examined. Examination of the Boral test coupon include visual examination and photography, and may include dimensional measurements, weight and density/specific gravity measurement, and neutron attenuation measurement. The Boral test coupon is visually examined to detect aging affects such as corrosion, pitting, swelling, or other degradation. The test coupon may be photographed if, in the judgment of the technician, there is any information of

significance that should be photographically documented. Dimensional measurements such as length, width and thickness may be taken to document if physical changes are occurring in the test coupon, which could indicate a change in the Boral material affecting its intended function. The Boral test coupon is weighed and in some instances, the density/specific gravity is calculated to determine if there any changes in the physical properties. A measurement by neutron attenuation is performed to determine if there has been any change in the Boron-10 content. The Boral test coupons for these other BWR sites are removed in accordance with a prescribed schedule that is site specific. Hope Creek will request test reports from the Boral surveillance program of these other BWR sites every two years for evaluation and trending. ***In addition, one coupon from the Hope Creek spent fuel pool will be inspected, tested and evaluated prior to the period of extended operation and one coupon will be inspected, tested and evaluated within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements.***

The use of operating experience from these other BWR sites should result in more industry operating experience data or test reports than would be obtained with a Hope Creek Boral coupon testing surveillance program. Generally these BWR sites' surveillance programs would retrieve a coupon or coupons for examination every refueling cycle for about the first five refueling cycles after initiating their surveillance program. Then their surveillance program would continue with a frequency of approximately once every five refueling cycles to perform examinations on their Boral test coupons going forth. Other BWR sites' surveillance programs utilize an inspection frequency that may be based on a multi-year surveillance (i.e., every two years), therefore different from what was previously described. Using multiple BWR sites for obtaining Boral coupon test results will ensure that a sufficient number of test reports are available for evaluation and trending to provide reasonable assurance that the Hope Creek Boral Monitoring Program will maintain the intended function of the Boral neutron absorbing material during the period of extended operation.

Monitoring and Trending – Element 5

The Boral Monitoring Program monitors the Boral test coupon inspection or testing results at other Boiling Water Reactor (BWR) sites. If these results indicate a problem with the Boral neutron absorbing material potentially affecting its intended function (i.e., absorb neutrons), Hope Creek will initiate inspection and/or testing of its Boral test coupons in the Hope Creek spent fuel pool (SFP). The assumption is that the spent fuel pool environments and the Boral neutron absorbing material characteristics are consistent enough for the other BWR sites so that the inspection and/or testing results from other sites are representative of the results if the Hope Creek Boral test coupons were inspected and/or tested. This assumption is justified since the industry testing results do not show significant variation from BWR site to BWR site. Hope Creek will request test reports from the Boral surveillance program of these other BWR sites every two years for evaluation and trending. The test results will be used to assess the condition of the Boral neutron absorbing material used in the Hope Creek spent fuel pool storage racks. The test results will provide the information and data needed to perform trending for indication of a potential degradation that may impact the performance of the Boral neutron absorbing material. A summary of test results received from other BWR Boral surveillance will be entered into the plant document

retrieval system. If these results indicate a problem with the Boral neutron absorbing material affecting its intended function (i.e., absorb neutrons), Hope Creek will initiate inspection and/or testing of its Boral test coupons. Test results obtained from seven BWR sites for the period of 2004 through 2007, have provided evidence that supports the use of the existing Boral Monitoring Program for detecting and managing the aging affects of Boral. The test results from these seven BWR sites can be summarized as follows: examinations of the coupons involved visual observations, dimensional measurements (length, width and thickness), weight and density determinations and neutron attenuation measurements and the examination results were that material performance was satisfactory. Additionally, there were some minor issues noted (e. g., clad pitting, clad blistering, and light oxide film of the clad) but there has been no impact on the Boral neutron absorbing material affecting its intended function. Using the test results from these seven BWR sites provides supporting data and documentation that supports the conclusion that using operational experience provides reasonable assurance that the detecting and managing of aging affects from other BWR sites can be used to predict the potential aging affects of the Boral material used in the Hope Creek spent fuel pool storage racks. Hope Creek intends to continue the current Hope Creek Boral Monitoring Program practice into the period of extended operation.

Acceptance Criteria – Element 6

The Boral Monitoring Program monitors the Boral test coupon inspection and/or testing results at other Boiling Water Reactor (BWR) sites. Hope Creek will request test reports from the Boral surveillance programs of these other BWR sites every two years for evaluation and trending. These BWR sites' Boral surveillance programs have acceptance criteria that are focused on the type of inspection and/or testing that are performed within their surveillance program. The Boral surveillance performed by other BWR sites may include visual inspections and/or testing of the Boral test specimens or coupons. The Boral surveillance program performed by other BWR sites vary from a qualitative type program such that visual inspections only are performed to a quantitative type program such that in addition to visual inspections, dimensional measurements are performed along with testing of the Boron-10 content. These programs monitor changes in physical properties of the Boral by performing visual examinations and/or test measurements on representative Boral test coupons so that the intended function "absorb neutrons" will be maintained during the period of extended operation.

The acceptance criteria utilized for the Boral neutron absorbing material will be based on the type of test results that are obtained from the other BWR site's test report. For those BWR sites that perform only a qualitative visual examination to assess the condition of their Boral neutron absorbing material, the Hope Creek qualitative acceptance criteria will be based on those results. If the conclusion from the BWR site's test report indicates satisfactory results, no addition action is required but to document the receipt of that test report for trending in the accordance with the Hope Creek Boral Monitoring Program. If the test report conclusion indicates performance less than satisfactory, the test report information will be entered into the Hope Creek corrective action program for further evaluation. The corrective action process will perform an evaluation to determine if the test results are acceptable or if further action is required, such as requesting additional previous or historical test results from the

same BWR site that can be used for correlating trends of the Boral neutron absorbing material performance. Additionally, if as a result of historical trending of these test results shows that an divergence or inconsistency in the test report results indicates potential degradation of the Boral neutron absorbing material performance corrective actions will be initiated. This could trigger the requirement to retrieve one Boral test coupon from the Hope Creek spent fuel pool and initiate inspection and/or testing and evaluation in accordance with the Boral Monitoring Program. For those BWR sites that perform quantitative examinations of their coupons that include visual observations, dimensional measurements (length, width and thickness), weight and density determinations and neutron attenuation measurements, the quantitative acceptance criteria is 1) the increase in thickness at any point should not exceed 10% of the initial thickness at that point and 2) a decrease of no more than 5% in Boron-10 content, as determined by neutron attenuation, is acceptable. If the conclusion from the BWR site's test report indicates satisfactory results, no addition action is required but to document the receipt of that test report for trending in the accordance with the Hope Creek Boral Monitoring Program. If the test report conclusion indicates at least one of the two acceptance criteria is unsatisfactory, the test report information will be entered into the Hope Creek corrective action program for further evaluation. Additionally, this could trigger the requirement to retrieve one Boral test coupon from the Hope Creek spent fuel pool and initiate inspection, testing and evaluation in accordance with the Boral Monitoring Program. Utilizing the Hope Creek Boral Monitoring Program and the Corrective Action Program in performing evaluations and trending of test results provide reasonable assurance that the Hope Creek Boral Monitoring Program will maintain the intended function of the Hope Creek Boral neutron absorbing material during the period of extended operation.

The Boral Monitoring Program will perform inspection, testing and evaluation of one coupon from the Hope Creek spent fuel pool prior to the period of extended operation and one coupon within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements with an acceptance criteria of no more than a 10% increase in thickness and no more than a 5% decrease in B-10 areal density.

Utilizing the Hope Creek Boral Monitoring Program and the Corrective Action Program in performing testing, evaluations and trending of test results provides reasonable assurance that the Hope Creek Boral Monitoring Program will maintain the intended function of the Hope Creek Boral neutron absorbing material during the period of extended operation.

Corrective Actions – Element 7

See response to Element 6 above. Evaluations are performed for inspection results that do not satisfy acceptance criteria and a notification is initiated to document the concern in accordance with plant administrative procedures that meet the requirements of 10 CFR Part 50, Appendix B. The corrective action program and specific corrective action steps as specified in procedures ensure that any conditions adverse to quality are promptly corrected. If the deficiency is assessed to be significantly adverse to quality, the cause of the condition is determined and an action

plan is developed to preclude recurrence.

Confirmation Process – Element 8

The corrective action program and specific corrective action steps as specified in procedures ensure that any conditions adverse to quality are promptly corrected. If the deficiency is assessed to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude recurrence.

The Boral Monitoring Program aging management program used at these other BWR sites is a condition monitoring program and does not rely on preventative or mitigative actions.

Degraded conditions are documented in accordance with the 10 CFR Part 50, Appendix B corrective action program. This program ensures that conditions adverse to quality are promptly corrected, with follow-up activities as required to confirm that the corrective actions were completed. If the condition is assessed to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to prevent recurrence. In addition, the components in the scope of this program are periodically monitored. Continued periodic inspections will confirm the effectiveness of prior corrective actions taken.

Administrative Controls – Element 9

The procedures used to implement Boral Monitoring Program aging management program are included in the quality assurance program that provides for formal reviews and approvals. Site quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. This aging management program is included in the Hope Creek license renewal UFSAR supplement.

Operating Experience – Element 10

Demonstration that the effects of aging are effectively managed is achieved through objective evidence that shows that aging effects are being adequately managed. The following examples of operating experience provide objective evidence that the Boral Monitoring Program will be effective in assuring that the intended function(s) will be maintained consistent with the CLB for the period of extended operation:

1. Trending recent test results from other BWR sites for the past five years demonstrates that the Boral neutron absorbing material is performing satisfactorily and no significant degradations have been observed or documented. Industry operating experience was obtained from seven Boiling Water Reactor (BWR) sites for Boral test coupons. These seven test reports show no aging effect significantly impacting the intended function. Utilizing the operating experience from existing Boral surveillance programs at these other BWR sites provides a technical basis to demonstrate that Hope Creek does not need to implement an inspection and/or testing surveillance program of their Boral test coupons. Below is summary of the industry operating experience for these seven BWR sites:

These BWR plants submit their Boral test coupon(s) to a qualified vendor for

inspection and testing in accordance with the vendor's Boral surveillance program. The inspection and testing of these test coupon(s) generally involves visual observations and photography, dimensional measurements (length, width and thickness), weight and density determinations, and neutron attenuation measurements. Additionally, most of the BWR plants included B-10 areal density measurements with the surveillance program. The vendor prepares a report documenting the inspection and testing results and submits the report to the BWR plant. The following summarizes the inspection and testing results from the various BWR plants:

The visual inspections of the coupon showed that with the exception of some localized pitting and some blistering of the aluminum skin of the coupons exposed to the spent fuel pool water, the condition of the coupons were as expected. It was noted that both the pitting and blistering were conditions of appearance and did not affect the function of the material. Within the accuracy of the measurements for the length, width, and thickness measurements, there were no significant changes from the initial pre-irradiated benchmarked measurements. The coupon showed a slight increase in weight and density that were within the expected accuracy of the measurements. The neutron attenuation test results showed that there was no loss of Boron-10 from the coupon. The conclusion from the inspection and tests results was that the Boral neutron absorbing material in the spent fuel storage racks have retained their dimensional and neutron-absorption properties and capable of continuing to perform their intended function to absorb neutrons.

The summary of the inspection and testing results for the seven BWR plants discussed above provides objective evidence that the use and trending of industry operating experience demonstrates that the Boral neutron absorbing material will be capable of continuing to perform its intended function absorb neutrons.

2. Hope Creek has had no fuel assembly or blade guide movement impacted by Boral deformation (e.g., swelling, blistering). Almost every cell of the spent fuel pool racks have been accessed except for those cells listed as "DO NOT USE". Station procedure "Supplemental Hope Creek Special Nuclear Material and Core Component Storage Information," describes the Spent Fuel Pool cells that are considered as "DO NOT USE" cells. Older fuel assemblies (i.e., early plant discharges) have been moved to support Dry Cask Storage campaigns and Thermal Management requirements. There have been no problems experienced either removing fuel assemblies from these cells or inserting other fuel assemblies into these cells. There are 15 cells on the "DO NOT USE" list due to high cell friction. These cells failed drag tests in 1989 (1 cell) and 1992 (14 cells) soon after installation of the spent fuel pool racks and are thus not attributable to Boral deformation. The spent fuel pool racks were installed in multiple phases at Hope Creek. The other cells on this "DO NOT USE" list have interference problems (i.e., with hangers, equipment stored in the spent fuel pool, identification strips, the refueling bridge), have damage at the top of the cells, contain failed fuel assemblies, or contain other equipment (i.e., dummy bundle). There is one cell where the fuel assembly sits high in the cell but this behavior has not been attributed to Boral deformation. Camera inspection did not show Boral swelling or blistering. Therefore, based on the actual usage of the spent fuel pool racks, Hope

Creek has no problems with the Boral performance and there is reasonable assurance that the Hope Creek Boral performance is no different from the industry Boral performance. It is acceptable to continue to monitor industry Boral performance rather than perform inspections and /or testing of the Hope Creek Boral test coupons.

As discussed in the examples above, the operating experience of the Boral Monitoring Program did not show any adverse trend in performance. Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. There is sufficient confidence that the implementation of the Boral Monitoring Program will effectively identify degradation prior to failure. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Boral Monitoring Program are performed to identify areas that need improvement to maintain the quality performance of the program.

Exceptions to NUREG-1800

None.

Enhancements

None.

Prior to the period of extended operation, the following enhancement will be implemented:

- 1. The Boral Monitoring aging management program will be enhanced to include inspection, testing and evaluation of one coupon from the Hope Creek spent fuel pool prior to the period of extended operation and one coupon within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements with an acceptance criteria of no more than a 10% increase in thickness and no more than a 5% decrease in B-10 areal density. Program Elements Affected: Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4) and Acceptance Criteria (Element 6)***

Conclusion

The existing ***enhanced*** Boral Monitoring Program aging management program provides reasonable assurance of neutron-absorbing capacity and loss of material/general corrosion aging effects are adequately managed so that the intended functions of components within the scope of license renewal will be maintained consistent with the current licensing basis during the period of extended operation.

Enclosure C

Hope Creek License Renewal Application (LRA) Appendix A, Section A.5, License Renewal Commitment List Updates associated with the Response to RAI B.2.2.5-1

Note: To facilitate understanding, the entire original Boral Monitoring Program Commitment (No. 44) from the LRA is repeated with revisions indicated. Changes are highlighted with bolded italics for inserted text and strikethroughs for deleted text.

NO.	PROGRAM OR TOPIC	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
44	Boral Monitoring Program	<p>Existing program is credited.</p> <p><i>Boral Monitoring Program is an existing program that will be enhanced to include:</i></p> <ol style="list-style-type: none"> <i>1. Inspection, testing and evaluation of one coupon from the Hope Creek spent fuel pool prior to the period of extended operation and one coupon within the first 10 years after entering the period of extended operation. Testing will include dimensional and neutron attenuation measurements with an acceptance criteria of no more than a 10% increase in thickness and no more than a 5% decrease in B-10 areal density.</i> 	A.2.2.5	<p>Ongoing</p> <p><i>Program to be enhanced prior to the period of extended operation.</i></p> <p><i>Inspection schedule identified in commitment.</i></p>	Section B.2.2.5