Indiana Michigan
Power Company
500 Circle Drive
Buchanan, MI 49107 1395

AEP
INDIANA
MICHIGAN
POWER

August 11, 2004

AEP:NRC:4034-10
10 CFR 54

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

SUBJECT: Donald C. Cook Nuclear Plant, Units 1 and 2
Docket Nos. 50-315 and 50-316
License Renewal Application - Response to Requests for Additional Information on Aging Management Programs
(TAC Nos. MC1202 and MC1203)

Dear Sir or Madam:

By letter dated October 31, 2003, Indiana Michigan Power Company (I&M) submitted an application to renew the operating licenses for Donald C. Cook Nuclear Plant, Units 1 and 2 (Reference 1).

During the conduct of its review, the Nuclear Regulatory Commission (NRC) Staff identified areas where additional information was needed to complete its review of the license renewal application (LRA). This letter responds to Staff requests for additional information (RAIs) pertaining to the aging management program descriptions in the following LRA sections:

- B.1.1 Alloy 600 Aging Management
- B.1.2 Bolting and Torquing Activities
- B.1.3 Boral Surveillance
- B.1.9 Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection
- B.1.41 Water Chemistry Control – Chemistry One-Time Inspection

These RAIs were documented in NRC letters dated May 7, 2004, May 19, 2004, and July 2, 2004 (References 2, 3, and 4, respectively).

The enclosure to this letter provides an affirmation pertaining to the statements made in this letter. Attachment 1 provides the additional information requested from the NRC Staff. Attachment 2 provides the two regulatory commitments made in this letter in response to RAIs B.1.1.2-1 and B.1.1.2-3 for the new

A104

Alloy 600 Aging Management Program. It is noted that these commitments supplement the commitment to implement the new Alloy 600 Aging Management Program, as summarized on Page 1 of Attachment 1 to the LRA cover letter (Reference 1).

Should you have any questions, please contact Mr. Richard J. Grumbir, Project Manager, License Renewal, at (269) 697-5141.

Sincerely,

Joseph N. Jensen
Site Vice President

NH/rdw

Enclosure: Affirmation

Attachments:
1. Response to Requests for Additional Information for the Donald C. Cook Nuclear Plant License Renewal Application – Aging Management Programs
2. List of Regulatory Commitments

References:

1. Letter from M. K. Nazar, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Units 1 and 2, Application for Renewed Operating Licenses," AEP:NRC:3034, dated October 31, 2003 [Accession No. ML033070177].
2. Letter from J. Rowley, NRC, to M. K. Nazar, I&M, "Request for Additional Information for the Review of the Donald C. Cook Nuclear Plant, Unit 1 and 2 License Renewal Application," dated May 7, 2004 [Accession No. ML041280509].
3. Letter from J. Rowley, NRC, to M. K. Nazar, I&M, "Request for Additional Information for the Review of the Donald C. Cook Nuclear Plant, Unit 1 and 2 License Renewal Application," dated May 19, 2004 [Accession No. ML041400073].
4. Letter from J. Rowley, NRC, to M. K. Nazar, I&M, "Request for Additional Information for the Review of the Donald C. Cook Nuclear Plant, Units 1 and 2 License Renewal Application," dated July 2, 2004 [Accession No. ML041840194].

c: J. L. Caldwell, NRC Region III
K. D. Curry, AEP Ft. Wayne, w/o attachment
J. T. King, MPSC, w/o attachment
J. G. Lamb, NRC Washington DC
MDEQ – WHMD/HWRPS, w/o attachment
NRC Resident Inspector
J. G. Rowley, NRC Washington DC

AFFIRMATION

I, Joseph N. Jensen, being duly sworn, state that I am Site Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request with the Nuclear Regulatory Commission on behalf of I&M, and that the statements made and the matters set forth herein pertaining to I&M are true and correct to the best of my knowledge, information, and belief.

Indiana Michigan Power Company

Joseph N. Jensen
Site Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 11th DAY OF August, 2004

Julie E Newmiller
Notary Public

JULIE E. NEWMILLER
Notary Public, Berrien County, MI
My Commission Expires Aug 22, 2004

My Commission Expires 8-22-2004

Response to Requests for Additional Information for the Donald C. Cook Nuclear Plant License Renewal Application Aging Management Programs

This attachment provides Indiana Michigan Power Company's (I&M's) responses to the Donald C. Cook Nuclear Plant (CNP) License Renewal Application (LRA) Requests for Additional Information (RAIs) pertaining to the Aging Management Program descriptions in the following LRA sections:

- B.1.1 Alloy 600 Aging Management
- B.1.2 Bolting and Torquing Activities
- B.1.3 Boral Surveillance
- B.1.9 Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection
- B.1.41 Water Chemistry Control – Chemistry One-Time Inspection

The RAIs addressed in this attachment were received in Nuclear Regulatory Commission (NRC) letters dated May 7, 2004, May 19, 2004, and July 2, 2004 (References 1, 2, and 3, respectively).

References

1. Letter from J. Rowley, NRC, to M. K. Nazar, I&M, "Request for Additional Information for the Review of the Donald C. Cook Nuclear Plant, Unit 1 and 2 License Renewal Application," dated May 7, 2004 [Accession No. ML041280509].
2. Letter from J. Rowley, NRC, to M. K. Nazar, I&M, "Request for Additional Information for the Review of the Donald C. Cook Nuclear Plant, Unit 1 and 2 License Renewal Application," dated May 19, 2004 [Accession No. ML041400073].
3. Letter from J. Rowley, NRC, to M. K. Nazar, I&M, "Request for Additional Information for the Review of the Donald C. Cook Nuclear Plant, Units 1 and 2 License Renewal Application," dated July 2, 2004 [Accession No. ML041840194].

RAI B.1.1.2-1:

The applicant's commitment did not identify that the lessons learned from industry initiatives and research will become part of the Alloy 600 Aging Management Program. Since the program has not been developed, the applicant has not demonstrated that the Alloy 600 Aging Management Program will identify and assist in managing the effects of Age Related Degradation Mechanisms (ARDM).

The staff requests the applicant to modify commitment A.2.1.1 and the Program Description to state that lessons learned from industry initiatives and research will be used as part of the Alloy 600 Aging Management Program. The commitment needs to state that the Alloy 600 Aging Management Program will be submitted for staff review and approval three years prior to the period of extended operation to determine if the program demonstrates an ability to manage the effects of aging per 10 CFR 50.54.21(a)(3).

I&M Response to RAI B.1.1.2-1:

As described in LRA Section B.1.1, program element Monitoring and Trending, guidance developed by the Electric Power Research Institute (EPRI) Material Reliability Program (MRP) and the owners groups is expected to be used to identify critical locations for inspection and augment existing inservice inspections (ISI) at CNP, where appropriate. Similarly, in program element Operating Experience, the LRA states that industry and plant-specific operating experience will be considered in the development of this program, as appropriate. Additionally, as discussed in I&M's response to RAI B.1.1.2-3, the commitment to implement a new Alloy 600 Aging Management Program will be enhanced to include the following:

> I&M will continue to participate in industry initiatives, such as the Westinghouse Owners Group and the EPRI MRP. Susceptibility rankings and program inspection requirements regarding Alloy 82/182 pipe butt welds will be consistent with the later version of the EPRI MRP safety assessment or its successors.

The last paragraph of LRA Section A.2.1.1 is revised as follows:

> "The Alloy 600 Aging Management Program will detect cracking from primary water stress corrosion cracking (PWSCC) using the examination and inspection requirements specified in ASME Section XI. *Guidance developed by the EPRI Material Reliability Program and the owners groups will be used to identify susceptibility rankings and program inspection requirements regarding Alloy 82/182 pipe butt welds.* This program will be implemented prior to the period of extended operation."
>
> [NOTE: The text added for clarification in response to RAI B.1.1.2-3 is in *italics*.]

Therefore, the commitment to develop a new Alloy 600 Aging Management Program and the Program Description, as amended by these RAI responses, adequately address the requested changes regarding the use of lessons learned from industry initiatives and research in the development of this aging management program.

The Alloy 600 Aging Management Program commitment will also be revised to indicate that an inspection plan will be submitted for staff review and approval three years prior to the period of extended operation to determine if the program demonstrates an ability to manage the effects of aging per 10 CFR 54.21(a)(3).

RAI B.1.1.2-2:

Detection of Aging Effects: The applicant stated that the Alloy 600 aging Program will be able to detect cracking by PWSCC prior to loss of component intended function. The applicant stated that the components will receive a volumetric examination during each inspection interval in accordance with the 1989 Edition of ASME Section XI, Examination Category B-F.

The applicant also stated that the intent of this element was to detect cracking by PWSCC prior to the loss of component intended function without the justification to support the program's ability to accomplish this.

The staff requests the applicant to provide justification, including codes and standards referenced that the technique and frequency used in the Alloy 600 Aging Management Program are adequate to detect the aging effects before a loss of system or component function occurs.

I&M Response to RAI B.1.1.2-2:

The inspection techniques and frequencies for the components that will be included in the Alloy 600 Aging Management Program and that will receive volumetric inspection are those described in American Society of Mechanical Engineers (ASME) Section XI, Examination Category B-F. As discussed in the Acceptance Criteria program element of LRA Section B.1.1, dissimilar metal welds subject to volumetric inspections each inspection interval will meet the acceptance criteria defined in ASME Section XI, IWB-3514.

The reactor vessel, pressurizer, and steam generator components that will be included in the Alloy 600 Aging Management Program are described in the Scope program element of LRA Section B.1.1. This program will include the consideration of industry operating experience in developing the inspection frequency, techniques, and acceptance criteria. For example, NRC Bulletin 2003-02, *Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity*, details industry experience with leaking reactor vessel lower head penetrations fabricated from nickel-based alloy material. NRC Bulletin 2004-01, *Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors*, was issued in May 2004. These recent bulletins indicate the evolving nature of regulatory guidance related to Alloy 600 materials.

Given that aging of Alloy 600 is an issue relevant to current plant operation and in accordance with the license renewal principles discussed in the Statements of Consideration for the Final Part 54 Rule, the existing regulatory process, which includes consideration of industry operating experience, will ensure that the Alloy 600 Aging Management Program can effectively manage cracking of Alloy 600 material due to primary water stress corrosion cracking (PWSCC). Thus, the adequacy of techniques and frequencies to be used in the program to detect aging effects before a loss of system or component function occurs is assured. Related CNP inspections of

nickel-based alloy components that are within the scope of the new Alloy 600 Aging Management Program due to evolving regulatory guidance issued under the existing regulatory process, including NRC Bulletin 2004-01 and any subsequent correspondence, will carry forward into the period of extended operation. This provides assurance that the plant-specific licensing basis will be maintained during the renewal term in the same manner and to the same extent as during the original licensing term.

Therefore, because development of the Alloy 600 Aging Management Program inspection techniques and frequencies will be based upon the ASME Section XI, current and on-going industry operating experience, and the existing regulatory process, this program will be adequate to detect the aging effects before a loss of system or component function occurs.

RAI B.1.1.2-3:

Acceptance Criteria: The applicant stated that the acceptance criteria for volumetric and visual inspections will be based upon the requirements in ASME Section XI.

As a minimum, the applicant is required by 10 CFR 50.55a to comply with the flaw acceptance criteria specified for ASME Class 1 components in the ASME Code Section XI, Articles IWA-3000 and IWB-3000, regardless of whether the material is fabricated from Alloy 600. The applicant may use alternative acceptance criteria either by the applicant or the industry if the alternative criteria have been submitted to and accepted by the staff pursuant to 10 CFR 50.55a(a)(3). The acceptance criteria stated was not definitive enough to determine if the applicant would allow pressure boundary leakage if the fracture mechanics analysis proved that the component could perform its intended function.

The staff requests the applicant to discuss the process for calculating specific numerical values of conditional acceptance criteria to ensure that the structure and component intended functions will be maintained under all CLB design conditions. The discussion needs to focus on how pressure boundary leakage due to PWSCC will be handled.

I&M Response to RAI B.1.1.2-3:

As stated in LRA Section B.1.1, the acceptance criteria for volumetric inspections of dissimilar metal weld (Alloy 82/182) locations, as required by ASME Section XI, Examination Category B-F, will be in accordance with ASME Section XI, Paragraph IWB-3514. Allowable flaw standards for dissimilar metal welded joints are discussed in ASME Section XI, Subparagraph IWB-3514.4, which references allowable flaw standards for austenitic piping in Table IWB-3514-2. The flaw acceptance standards for austenitic piping in ASME Section XI, Table IWB-3514-2, are contained in EPRI NP-1406-SR, *Nondestructive Examination Acceptance Standards*, May 1980, Section J, and are based on the net-section ductile yielding criterion. Allowable flaw sizes in ASME Section XI, Table IWB-3514-2, are based on

net-section ductile yielding criterion, since linear elastic fracture mechanics could not be used without modifications to account for plastic effects, and elastic-plastic fracture analysis was not fully developed when ASME Section XI, Table IWB-3514-2 acceptance standards were developed. Leakage is not permitted regardless of flaw size.

I&M will continue to participate in industry initiatives, such as the Westinghouse Owners Group and the EPRI MRP. Susceptibility rankings and program inspection requirements regarding Alloy 82/182 pipe butt welds will be consistent with the later version of the EPRI MRP safety assessment or its successors. Through use of operating experience, should the industry develop alternative acceptance criteria for ASME Section XI, Examination Category B-F, based on the EPRI MRP regarding inspection of dissimilar metal welds, I&M would evaluate applicability to CNP and implement the pertinent acceptance criteria accordingly.

Unacceptable indications require detailed analysis, repair, or replacement. The acceptance standards established in ASME Section XI, Subarticle IWB-3500, ensure that all Service Conditions (A through D) are protected by maintaining the safety margin of the component throughout the service life of the component. When evaluating an operating component for an indication that exceeds the allowable acceptance standards in Subarticle IWB-3500, Section XI requires the use of the original safety margins for all operating conditions (i.e., normal, upset, emergency, and faulted conditions). The safety margins vary for specific cases (e.g., component and geometry) but are always consistent or conservative with respect to the original design margins. If a component is designed to the allowable limit of the applicable Class 1 design code, no flaws larger than the acceptance standards of ASME Section XI can be justified by the flaw analysis methods prescribed in ASME Section XI.

Should additional nickel-based alloy locations (weld and base metal) be identified for inspection (volumetric, surface, or visual) based on industry operating experience, where acceptance standards are not included in ASME Section XI, acceptance standards will be developed using appropriate analytical techniques (e.g., elastic-plastic fracture mechanics). As an option, the latest Code methodology, as accepted pursuant to 10 CFR 50.55a, may be used.

Additional inspections of nickel-based alloy locations required in response to regulatory correspondence (e.g., NRC Bulletins and Generic Letters) or to industry initiatives (e.g., MRP) during the current term of operation will carry forward into the period of extended operation. I&M's response to RAI B.1.1.2-1 discusses submittal of the Alloy 600 Aging Management Program inspection plan to the NRC for review and approval.

Therefore, because development of the Alloy 600 Aging Management Program acceptance criteria will be based upon the ASME Section XI, guidance provided by industry initiatives and owner's groups, and the existing regulatory process, this program will ensure that the structure and component intended functions that would be impacted by pressure boundary leakage due to PWSCC will be maintained under all current licensing basis design conditions.

RAI B.1.2-1:

The AMP 1.2, "Bolting and Torquing Activities," an existing plant specific program is credited for managing loss of mechanical closure integrity. The program covers bolting in high temperature systems and in applications subject to significant vibration. The staff notes that NUREG-1801 credits AMP XI.M 18 Bolting Integrity for monitoring loss of material, cracking, and loss of preload. In addition, accepted bolting integrity programs (such as EPRI 104213) recommend monitoring for loss of preload as one of the parameters monitored/inspected. Monitoring for cracking of high strength bolts (actual yield strength equal or greater than 150 ksi) is also recommended.

As such, the applicant is requested to provide the following information:

(a) Identify the areas of the Bolting Integrity Program at Cook which are consistent with the AMP XI.M.18 in the GALL report, and also those aspects in which it is different.

(b) Discuss how the loss of preload aging effect would be managed by the Bolting and Torquing Activities AMP at Cook.

(c) Discuss the inspections associated with the Bolting and Torquing Activities AMP at Cook which may be beyond the requirements of ASME Section XI.

(d) Are there any high strength bolts included within the boundary of these three systems (Engineered Safety Features, Auxiliary, and Steam & Power Conversion Systems)?

(e) The LRA does not identify loss of preload as an AERM for bolts in the Auxiliary System at Cook. Explain how this aging effect would be managed in this system.

(f) SCC in stainless steel bolts can potentially occur depending on a combination of factors such as stainless steel grade, method of hardening (for example, strain, precipitation or age hardening) environment and stress levels. Discuss how these factors were taken into account to determine whether or not SCC is an applicable aging effect.

I&M Response to RAI B.1.2-1:

(a) The Bolting and Torquing Activities Program is an existing plant-specific program that was not compared to the NUREG-1801, Section XI.M18, Bolting Integrity Program.

The program described in NUREG-1801, Section XI.M18, covers all bolting within the scope of license renewal including safety-related bolting, bolting for nuclear steam supply system component supports, bolting for other pressure retaining components, and structural bolting. It includes periodic inspection of closure bolting for many aging effects, including loss of preload, cracking, and loss of material. Cracking of non-Class 1 stainless steel bolting

is not an aging effect requiring management (see response to paragraph (f) below). Loss of material is managed by other programs identified in LRA Appendix B, as indicated in the LRA Section 3 aging management review results tables. Thus, the plant-specific Bolting and Torquing Activities Program, which is used only to prevent loss of mechanical closure integrity, is not comparable to NUREG-1801, Section XI.M18.

In LRA Section B.1.2, the ten attributes of the Bolting and Torquing Activities Program were provided to allow for assessment of this program, independent of NUREG-1801, Section XI.M18.

(b) The Bolting and Torquing Activities Program manages loss of preload by assuring that proper torque values are applied to bolted closures. With proper design of bolted closures, selection of appropriate torque values prevents loss of preload due to vibration or thermal cycles.

(c) The Bolting and Torquing Activities Program is a preventive program. The associated inspections are a check of the bolt torque performed after joint assembly and verification of proper gasket compression after torquing.

(d) CNP piping material specifications do not permit, nor have they historically permitted, high-strength bolting in non-Class 1 systems. Review of operating experience did not identify problems with cracking of high strength bolting in air environments.

(e) Bolting in high temperature systems and in applications subject to significant vibration is subject to loss of mechanical closure integrity due to loss of preload. As discussed in paragraph (b), above, the Bolting and Torquing Activities Program manages loss of preload by assuring that proper torque values are applied to bolted closures. With proper design of bolted closures, selection of appropriate torque values prevents loss of preload due to vibration or thermal cycles. The Bolting and Torquing Activities Program implements this approach to manage loss of mechanical closure integrity due to loss of preload for the mechanical systems presented in LRA Tables 3.2.2-2, 3.3.2-7, 3.3.2-8, 3.3.2-9, 3.3.2-11, and 3.4.2-1 through 3.4.2 4.

(f) Stress corrosion cracking (SCC) occurs through the combination of high stress (both applied and residual tensile stresses), a corrosive environment, and a susceptible material. Proper lubricants and sealant compounds are used to minimize the potential for SCC. The Bolting and Torquing Activities Program specifies appropriate lubricants and sealants to preclude introduction of significant contaminants.

In the aging management reviews, sufficient stress to initiate SCC was assumed if stainless steel bolting was subject to a corrosive environment. However, SCC very rarely occurs in austenitic stainless steels below 140°F. In the instances where SCC was observed in stagnant, oxygenated, borated water below 140°F, the presence of a significant contaminant

(halogens, specifically chlorides) was identified to be affecting the failed components. Since stainless steel bolted closures are exposed to ambient temperature rather than high temperature process fluids, cracking of non-Class 1 stainless steel bolting is not an aging effect requiring management.

RAI B.1.2.2-1:

Program Scope: The applicant stated that the Bolting and Torquing Activities Program covers bolting in high temperature systems and in applications subject to significant vibration, as identified in the aging management reviews.

The Program Scope did not identify the applicable AMP's that are credited with managing age related degradation of bolting or threaded fasteners.

The staff requests the applicant to identify the AMP's that are credited with managing age related degradation of bolting and/or threaded fasteners and identify the material and the systems they are in.

I&M Response to RAI B.1.2.2-1:

Aging management reviews of the following systems credit the Bolting and Torquing Activities Program with managing loss of mechanical closure integrity for carbon and stainless steel bolting:

Exposed to High Temperatures or Vibration from Diesel Engines

System	LRA Section	LRA Table
Fire protection (fire pump diesel engine)	3.3.2.1.7	3.3.2-7
Emergency diesel engine	3.3.2.1.8	3.3.2-8
Security diesel engine	3.3.2.1.9	3.3.2-9

Exposed to High Temperatures

System	LRA Section	LRA Table
Containment isolation	3.2.2.1.2	3.2.2-2
Miscellaneous systems in scope for 10 CFR 54.4(a)(2)	3.3.2.1.11	3.3.2-11
Main feedwater	3.4.2.1.1	3.4.2-1
Main steam	3.4.2.1.2	3.4.2-2

System	LRA Section	LRA Table
Auxiliary feedwater	3.4.2.1.3	3.4.2-3
Steam generator blowdown	3.4.2.1.4	3.4.2-4

The aging management review of the reactor coolant system (RCS) credits the Bolting and Torquing Activities Program, in conjunction with the Inservice Inspection Program and the Boric Acid Corrosion Prevention Program, with managing loss of mechanical closure integrity for:

- low alloy steel and stainless steel bolting for Class 1 valves and blind flanges, as listed in LRA Table 3.1.2-3;
- low alloy steel bolting for reactor coolant pump main flange and pressurizer manway bolting, as listed in LRA Tables 3.1.2-3 and 3.1.2-4; and
- low alloy steel and carbon steel bolting for steam generator components, as listed in LRA Table 3.1.2-5.

RAI B.1.2.2-2:

Preventive Actions: The applicant stated that the Preventive Actions include proper selection of bolting material and use of appropriate lubricants and sealants in accordance with Electric Power Research Institute (EPRI) guidelines. The applicant stated that the initial inspection of bolting for pressure-retaining components includes a check of the bolt torque and uniformity of the gasket compression after assembly. Hot torque checks are not applied to all bolted closures within the scope of this program, but are controlled procedurally if it is a vendor-recommended action or if it is determined that hot torque is necessary on a case-by-case basis.

The Preventive Actions did not clearly indicate what EPRI guidelines would be utilized to select proper bolting material, lubricants and sealants. The applicant did not identify what actions and materials would be used for replacement to demonstrate acceptable management of ARDMs.

The staff requests the applicant to identify the EPRI guidelines to be used for selection of bolting materials lubricants and sealants, including specific actions and material replacements to demonstrate acceptable management of ARDMs. Also, provide an example of a case by case basis that would require a hot torque check of a bolted closure.

I&M Response to RAI B.1.2.2-2:

The EPRI guidelines used are NP-5067, *Good Bolting Practices*, and TR-104213, *Bolted Joint Maintenance & Applications Guide.*

Fastener material replacements are performed in accordance with piping specifications or approved configuration changes. Piping specifications require that boric acid corrosion resistant

fastener material be used for bolted joints on systems containing borated water. Also, low yield strength bolting and low chloride and sulfur content threaded fastener lubricants are specified to minimize the potential for SCC.

The site maintenance procedure for the feedwater stop check valves provides an example of hot torque requirements. The procedure requires re-torquing of the bonnet cap screws at normal operating temperature and pressure as a final post-maintenance condition, as recommended by the vendor technical manual.

RAI B.1.2.2-3:

Parameters Monitored or Inspected: The applicant stated that torque values are monitored when the bolted closure is assembled. The applicant also stated that maintenance personnel visually inspect components involving bolted closures to assess their general condition during maintenance. Gaskets, gasket seating surfaces, and fasteners are inspected for damage that would prevent proper sealing.

The staff found that this element does not provide adequate detail to assure that ARDMs are managed. Since closure bolting is exposed to air, moisture, and leaking fluid (boric acid) environments, it is subject to loss of material and crack initiation and growth.

The staff requests the applicant to: (a) inspect the bolting closures during maintenance, (b) confirm that the program inspections are integrated with the CNP ISI program and the results are tracked within the CNP ISI program, (c) confirm the visual inspections are performed in accordance with ASME Code Section XI, and (d) and provide justification for excluding loss of material and crack initiation and growth from this element.

I&M Response to RAI B.1.2.2-3:

The Bolting and Torquing Activities Program manages loss of mechanical closure integrity due to loss of preload for closure bolting in high-temperature systems and applications subject to significant vibration.

Loss of material is excluded from this program because other programs, such as the Boric Acid Corrosion Prevention Program and the System Walkdown Program, which are described in LRA Sections B.1.4 and B.1.38, respectively, manage loss of material for closure bolting and loss of mechanical closure integrity for closure bolting exposed to boric acid. Specific applications are identified in LRA Section 3 aging management review results tables. Loss of material (and ultimately loss of mechanical closure integrity) for external surfaces, such as closure bolting, is a long-term aging effect that would be observed well before aging progressed to the point of loss of intended function. Therefore, visual inspections for loss of material and loss of mechanical closure integrity, as required by the Boric Acid Corrosion Prevention

Program and System Walkdown Program, are adequate to assure that the closure bolting can perform its intended function.

Crack initiation and growth are excluded from this program because the Inservice Inspection Program manages cracking of bolted closures in Class 1 systems. Both the Inservice Inspection – ASME Section XI, Subsection IWB, IWC, and IWD Program and the Inservice Inspection – ASME Section XI, Subsection IWE Program, which are described in LRA Sections B.1.14 and B.1.15, respectively, provide for ASME Section XI inservice inspections of Class 1 bolted closures. Specific applications are identified in LRA Section 3.1 aging management review results tables. Cracking is not an aging effect requiring management for non-Class 1 bolting applications due to low operating temperatures compared to Class 1 bolting applications and the use of low yield strength bolting and low chloride and sulfur content threaded fastener lubricants.

RAI B.1.2.2-4:

Detection of Aging Effects: The applicant stated that the Detection of Aging Effects is a preventive program. The applicant stated that actions performed under the program prevent the aging effect of loss of mechanical closure integrity. The applicant stated this program is credited with managing the loss of mechanical closure integrity for bolted connections and bolted closures.

The applicant stated that the intent of this element was to manage the loss of mechanical closure integrity for bolted connections and bolted closures. However, the applicant did not provide justification to support the program's ability to accomplish this.

The staff requests the applicant to provide justification, including codes and standards referenced that the technique and frequency used at CNP are adequate to detect the aging effects before a loss of component function occurs.

I&M Response to RAI B.1.2.2-4:

The Bolting and Torquing Activities Program manages loss of mechanical closure integrity due to loss of preload for closure bolting in high-temperature systems and applications subject to significant vibration. Specific applications are identified in the LRA Section 3 aging management review results tables.

Program standards are EPRI NP-5067, *Good Bolting Practices*, and TR-104213, *Bolted Joint Maintenance & Applications Guide*. These standards are used throughout the industry and have proven effective in managing loss of preload for closure bolting. Review of operating experience did not identify problems with loss of preload for bolted closures at CNP.

RAI B.1.2.2-5:

Monitoring and Trending: The applicant stated that torque values are monitored during the bolt torquing process, and that trending is not applicable to this program.

The staff finds that this element does not provide adequate detail to assure that ARDMs are adequately managed. The applicant previously stated that maintenance personnel perform visual inspections to assess the general conditions in the bolted closures.

The staff requests the applicant to confirm that the program inspections are integrated with the CNP ISI program and state where the results of these visual inspections are being integrated. Further, please provide justification for not trending the results of the visual inspections.

I&M Response to RAI B.1.2.2-5:

Under the Bolting and Torquing Activities Program, loss of mechanical closure integrity is managed by proper torquing during assembly of the bolted closure. This program is a preventive program, rather than an inspection program. Visual inspections to manage the effects of aging are not included in this program. In LRA Section B.1.2, program element Parameters Monitored or Inspected, the phrase, "visually inspect components used in the bolted closures to assess their general condition during maintenance," is a description of how bolting and torquing activities are performed. Prior to assembly, the mating surfaces and bolting components are inspected for manufacturing defects, nicks, dents, or scratches. After assembly, the closure is inspected for uniformity of gasket compression, proper thread engagement, and proper locking tab installation.

Torque values are the only parameters monitored because the aging effect being managed is loss of mechanical closure integrity, or loss of preload, not loss of material or cracking. As described in I&M's response to RAI B.1.2.2-3, loss of material and cracking are managed by other programs such as the Boric Acid Corrosion Prevention Program, System Walkdown Program, and Inservice Inspection Program, where applicable. Thus, the Bolting and Torquing Activities Program does not include inspection results to trend.

RAI B.1.2.2-6:

Acceptance Criteria: The applicant stated that the acceptance criteria are provided in CNP site procedures. The applicant stated that a typical criterion is that mating surfaces are smooth and free of major defects. Other criteria include proper and adequate thread engagement and use of appropriate torque values.

The NRC staff found that the applicant's acceptance criteria was not definitive enough to determine if the applicant would allow pressure boundary leakage if the component could perform its intended function.

The staff requests the applicant to discuss how pressure boundary leakage will be handled and what requirements would be utilized to determine what is considered acceptable leakage and when a repair/replacement is considered necessary.

I&M Response to RAI B.1.2.2-6:

As discussed in the Statements of Consideration for the Final Part 54 Rule, the first principle of license renewal is that, with the exception of age-related degradation unique to license renewal and possibly a few other issues related to safety only during the period of extended operation of nuclear power plants, the regulatory process is adequate to ensure that the licensing bases of all currently operating plants provides and maintains an acceptable level of safety so that operation will not be inimical to public health and safety or common defense and security. Leakage is documented and evaluated through the Corrective Action Program. The quantity of leakage deemed acceptable and the need for repair or replacement is determined in accordance with requirements of the existing plant processes and activities that are addressed by the existing regulatory process. As a matter of conservative operating practice, administrative limits for which CNP would take action are established significantly below regulatory requirements.

RAI B.1.3-1:

(a) Discuss the correlation between measurements of the physical properties of Boral coupons and the integrity of the Boral panels in the storage racks.

(b) Are the wrappers for the storage racks vented to allow the escape of the hydrogen gas that would be generated if the Boral corrodes? If they are not vented, what measures are taken to prevent them from bulging?

(c) What is the accuracy of the neutron attenuation and thickness measurement techniques used for monitoring the Boral coupons? What is the accuracy of the neutron attenuation and thickness measurements required to detect degradation of the Boral panels in the spent fuel racks?

(d) The most recent coupon tests found no "significant" changes. Provide the justification for this statement, including the amount of change that was found.

(e) Describe the "minor corrosion pitting" found during the most recent Boral coupon testing (application, p. B-25). Discuss the trending procedure required to ensure that the pitting will not increase to affect the functionality of the Boral.

(f) Describe the corrective actions that would be implemented if coupon test results are not acceptable.

(g) The Boral Surveillance AMP (application, p. B-25) states that no program changes were considered necessary as a result of industry experience with hydrogen gas generation. Discuss the technical basis for this conclusion.

(h) The UFSAR [Updated Final Safety Analysis Report] supplement (application, p. A-12) and the Boral Surveillance AMP (application, p. B-23) list specific gravity as one of the parameters monitored. However, specific gravity is not discussed as part of the acceptance criteria in the AMP. How is the specific gravity used to manage aging of the storage racks?

(i) In September 2003, an inspection of Boral test coupons at Seabrook Nuclear Station revealed bulging and blistering of the aluminum cladding. Discuss the impact, if any, that this event is considered to have on the Boral Surveillance Program at Cook.

I&M Response to RAI B.1.3-1:

(a) The coupon tree is moved each refueling outage to be surrounded by the highest powered discharged fuel assemblies. Since the coupons are exposed to a higher cumulative dose than the Boral panels, the coupons degrade faster than the Boral panels. Because the coupon trees are surrounded by the most freshly discharged fuel assemblies, acceptable physical properties of Boral coupons in the trees provide a definitive indication of the acceptability of the Boral panels in the storage racks.

(b) The storage racks are vented.

(c) The accuracy of the thickness measurement of Boral coupons is ± 0.001 inches. The required accuracy of the thickness measurement is ± 0.005 inches.

Neutron attenuation measurements are compared with measurements on a reference standard Boral coupon. Because the measurements are relative, an accuracy range is not specified.

(d) Recent Boral coupon tests found no significant changes as discussed below.

Dimensions

Dimensions at eleven locations of the coupon were measured and compared with dimensions of the coupon when it was fabricated. Change in dimensions ranged from - 0.67% to + 1.19%. Differences in dimensions were attributed to an oxide layer on the edge of the coupon or irregularities in edge and surface conditions.

Dry Weight

After the coupon had been dried to remove residual moisture, it weighed 470.6 g. The original dry weight of the coupon was 468.08 g. The small (0.54%) increase in coupon weight was attributed to an oxide layer on the surface of the coupon.

Specific Gravity and Density

The density of the coupon, measured by immersion weighing, was 2.51 g/cm^3. The original density of the coupon was 2.50 g/cm^3, for a difference of approximately 0.5%.

Neutron Attenuation Measurements and Boron-10 (B-10) Areal Density

Based on measurements taken at five locations on each coupon, the average areal density of the coupon was 0.0350 g (B-10)/cm^2. The original average areal density of the coupon was 0.0336 g (B-10)/cm^2. The difference between areal densities was within the precision of the measurements.

(e) The most recent Boral coupon visual inspection identified small corrosion pits on the coupon surface.

After visual inspection, during heating to remove residual moisture, eight blisters formed on the coupon surface. Blisters form when the aluminum cladding is breached by a small hole caused either by mechanical impacts during manufacturing or by a corrosion pit. Moisture enters the core of the coupon at the location of the hole or pit, subsequent corrosion seals the moisture in the core, and heating causes the cladding to separate from the core, forming a blister. Microscopy revealed a pit or small hole in the cladding at each blister location. The corrosion pitting would not affect Boral function.

Coupon test results are compared with baseline data and past test results to ensure that Boral function is not adversely affected. Adverse conditions are evaluated as part of the Corrective Action Program.

(f) Measurement acceptance criteria are as follows.

- A decrease of no more than 5% in B-10 content, as determined by neutron attenuation.
- An increase in thickness at any point should not exceed 10% of the initial thickness at that point.

If either of these two criteria are not met, an engineering evaluation is performed to identify the need for further testing (such as blackness testing on the storage racks) or other corrective action. In accordance with the Corrective Action Program, additional actions may be

prescribed on a case-by-case basis, based on the evaluation of unacceptable coupon test results.

(g) Industry operating experience with hydrogen gas generation was documented and evaluated within the Corrective Action Program. Two operating experience reports are of significant interest as discussed in the following.

The first operating experience report addressed hydrogen gas that was formed by interaction of spent fuel pool water and Boral plates in a multi-purpose canister (MPC) manufactured by Holtec International (Holtec). Though the Boral plates used in the MPC had been pre-passivated in accordance with Holtec procedures, a small amount of unpassivated material remained after the pre-passivation process. The unpassivated material interacted with water to produce aluminum oxide and free hydrogen gas.

Passivation is a chemical treatment of metal to form a protective oxide film over the material. This same effect occurs naturally over a short period of time (days or weeks) for aluminum, after being is introduced to an acidic environment, such as the spent fuel pool. The new spent fuel racks were installed at CNP in the early 1990's; therefore, even if the aluminum in the spent fuel racks was not properly passivated before installation, the process would have already been completed naturally by this time.

Hydrogen gas only represented a safety concern in this incident because an MPC is a relatively small container. Hydrogen gas concentrated inside a container is an explosion hazard. By comparison, the spent fuel pool configuration is not conducive to containing or concentrating hydrogen gas.

The second operating experience report is discussed in paragraph (i) below.

(h) Specific gravity is one of several physical parameters used to identify early indications of Boral degradation. An unexplained decrease in specific gravity could indicate loss of material and would result in an engineering evaluation and possibly a change in measurement schedule.

(i) The operating experience from Seabrook was evaluated within the Corrective Action Program.

The blisters observed on the Seabrook coupon are different than the blisters observed on the CNP coupon. As discussed in paragraph (e) above, the blisters on the CNP coupons are attributed to the coupon heating process, which removes residual moisture from the coupon, whereas the Seabrook coupon blisters were observed during visual inspection prior to heating and subsequent testing. In addition, while Seabrook spent fuel racks were manufactured by Westinghouse, the CNP racks were manufactured by Holtec and differences in material specifications may exist.

FPLE Seabrook filed a 10 CFR 21 report on September 15, 2003 (2003-0022-00). Holtec advised that they are receiving inquiries from other licensees on this issue and that they will evaluate their design and develop an in-house report for this issue, to be completed in 2004.

Two tracking actions remain within the Corrective Action Program. The first action will ensure additional information on the Part 21 issue is received and evaluated for CNP. The second action is to ensure consideration is given to the Seabrook experience when the results of the next CNP Boral coupon test are compared to prior results.

RAI B.1.9.2-1:

Program Description: The applicant stated that the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program is comparable to the program described in NUREG-1801 with an exception. The program is based on responses to NRC Bulletins 2002-01 and 2002-02, instead of GL 97-01.

The Program Description submitted in the application did not include reference to the NRC Bulletin 2003-02, NRC Order EA-03-009 dated February 11, 2003, and the First Revised NRC Order EA-03-009 dated February 20, 2004 as part of the CLB for the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection.

The staff requests the applicant to update its Program Description to include reference to NRC Bulletin 2002-01, 2002-02, 2003-02, Order EA-03-009 dated February 11, 2003 and the First Revised NRC Order EA-03-009 dated February 20, 2004.

I&M Response to RAI B.1.9.2-1:

As noted in LRA Section B.0.1, Overview, for those aging management programs that are comparable to the programs described in Sections X and XI of NUREG-1801, the LRA summarizes the degree of consistency with the ten program elements of the NUREG-1801 program. Details of the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program are contained in site documentation and not in the LRA because this program is consistent with, but includes an exception to, NUREG-1801, Section XI.M11.

The issue of reactor pressure vessel head penetration inspections, which are addressed by the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program, is the subject of First Revised NRC Order EA-03-009 and is an evolving 10 CFR 50 issue. The NRC issued Order EA-03-009 "Issuance of Order Establishing Interim Inspection for Reactor Vessel Heads at Pressurized Water Reactors," on February 11, 2003, and issued First Revised NRC Order EA-03-009, which superseded NRC Order EA-03-009 in its entirety, on

Commission Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," AEP:NRC:4054-03, dated March 9, 2004 [Accession No. ML041610308].

3. Letter from J. A. Zwolinski, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1, Reactor Pressure Vessel Lower Head Penetration Inspection Results," AEP:NRC:4054-04, dated March 25, 2004 [Accession No. ML040920397].
4. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 2, Request for Relaxation from Nuclear Regulatory Commission Revised Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," AEP:NRC:4054-05, dated April 30, 2004 [Accession No. ML041320622].
5. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Units 1 and 2, Supplement to Request for Relaxation from Nuclear Regulatory Commission Revised Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," AEP:NRC:4054-06, dated June 24, 2004 [Accession No. ML041820138].

RAI B.1.9.2-2:

Preventive Actions: The applicant stated in the Program Description that ASME Section XI, Inservice Inspection and Water Chemistry Control Programs are used in conjunction with this program to manage cracking of the reactor vessel head penetrations.

The applicant did not state that material replacement was an available option to prevent or mitigate the potential for PWSCC.

The staff requests the applicant to include a preventive action section in its program to include examples of actions taken or to be taken to prevent ARDMs, the types of materials considered for replacement, and also include compliance with the First Revised NRC Order EA-03-009 or successor regulatory requirements.

I&M Response to RAI B.1.9.2-2:

As described in LRA Section B.1.9, the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program is consistent with, but includes an exception to, the program attributes described in NUREG-1801, Section XI.M11. Details of compliance with the NUREG-1801 program are available in site documentation. NUREG-1801, Section XI.M11, specifies the following Preventive Actions: "Preventive measures to mitigate PWSCC are in accordance with EPRI guidelines in TR-105714. The program description and the evaluation and technical basis of monitoring and maintaining reactor water chemistry are presented in NUREG 1801, Chapter XI.M2, Water Chemistry."

The Primary and Secondary Water Chemistry Control Program provides preventive measures to minimize the potential for cracking of nickel-based alloy nozzles. With inclusion of enhancements, this program, which is described in LRA Section B.1.40.1, will be consistent with NUREG-1801, Section XI.M2.

The Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program is designed to manage the effects of PWSCC. The program does not preclude material replacement as an option to prevent or mitigate PWSCC. When a part is replaced, appropriate materials for replacement purposes (such as Alloy 690 and 52/152 weld materials) are selected in accordance with good engineering practice.

I&M's obligations to comply with First Revised NRC Order EA-03-009 and successor orders or regulations, and order conditions thereto, will be carried forward through the period of extended operation. As discussed in the I&M response to RAI B.1.9.2-1, this is consistent with the Statements of Consideration for the Final Part 54 Rule.

RAI B.1.9.2-3:

Parameters Inspected or Monitored: The staff reviewed this element and concluded that the applicant needs to provide information for this element.

The applicant stated that the program monitors the effects of PWSCC on the intended function of the CRDM [control rod drive mechanism] and other Alloy 600 head penetrations by detection and sizing of cracks and coolant leakage by ISI. The staff requests the applicant to state that monitoring will be in accordance with the First Revised Order EA-03-009 dated February 20, 2004 and also identify specifically how cracks will be sized.

I&M Response to RAI B.1.9.2-3:

As described in response to RAI B.1.9.2-1, details of the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program are contained in site documentation and not

the LRA, because this program is consistent with, but includes an exception to, the program attributes described in NUREG-1801, Section XI.M11.

The Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program monitors cracking of nickel-based alloy nozzles with partial penetration welds in the reactor vessel closure head. The issue of reactor pressure vessel head penetration inspections, which are addressed by this aging management program, is the subject of First Revised NRC Order EA-03-009 and is an evolving 10 CFR 50 issue. I&M's current licensing basis applicable to implementation of the requirements of First Revised NRC Order EA-03-009, including monitoring requirements and flaw characterization, is embodied in References 1 through 5 for RAI B.1.9-1. The second principle of license renewal, as discussed in the Statements of Consideration for the Final Part 54 Rule, states that the plant-specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term. Therefore, on-going I&M inspection and evaluation activities (i.e., monitoring activities) to comply with First Revised NRC Order EA-03-009 and successor orders or regulations, and order conditions thereto, will be carried forward through the period of extended operation.

RAI B.1.9.2-4:

Detection of Aging Effects: NUREG-1801 identifies that the scope and schedule of inspections, including the leakage detection system is based on NRC GL 97-01. The applicant stated that the CNP program is based on responses to NRC Bulletins 2002-01 and 2002-02, instead of NRC GL 97-01.

The staff requests the applicant to update its Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection program to include reference to Bulletin 2002-03, Order EA-03-009 dated February 11, 2003, and the First Revised Order EA-03-009 dated February 20, 2004 as the basis for scope and schedule of the inspections. Also, the program needs to identify any enhanced leakage detection methods used for detecting small leaks during plant operation and identify programs and models used to assess PWSCC susceptibility for CNP.

I&M Response to RAI B.1.9.2-4:

As described in response to RAI B.1.9.2-1, details of the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program are contained in site documentation and not the LRA, because this program is consistent with, but includes an exception to, the program attributes described in NUREG-1801, Section XI.M11.

The issue of reactor pressure vessel head penetration inspections, which are addressed by the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program, is the subject of First Revised NRC Order EA-03-009 and is an evolving 10 CFR 50 issue. I&M's

current licensing basis applicable to implementation of the requirements of First Revised NRC Order EA-03-009, is embodied in References 1 through 5 for RAI B.1.9.2-1. On-going inspection and evaluation activities to comply with First Revised NRC Order EA-03-009 and successor orders or regulations, and order conditions thereto, will be carried forward through the period of extended operation. This is consistent with the second principle of license renewal, as discussed in the Statements of Consideration for the Final Part 54 Rule, which states that the plant-specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term.

Operability requirements for RCS leakage detection systems (containment atmosphere particulate radioactivity, sump level and flow, humidity, and atmosphere gaseous radioactivity monitoring systems) are specified in the CNP Technical Specifications. Enhanced leakage detection methods were not required in response to NRC Generic Letter 97-01, NRC Order EA-03-009, or First Revised NRC Order EA-03-009.

NRC Bulletin 2003-02 applies to bottom-mounted instrumentation nozzles on the reactor vessel rather than control rod drive mechanism and other vessel head penetrations. Aging effects for bottom-mounted instrumentation nozzles will be managed by the Alloy 600 Aging Management Program described in LRA Section B.1.1. Commitments made in response to Bulletin 2003-02 will be carried forward through the period of extended operation.

RAI B.1.9.2-5:

Monitoring and Trending: NUREG-1801 states inspection schedules are based on the susceptibility assessments in GL 97-01.

The staff requests the applicant to update B.1.9 to include a Monitoring and Trending element. The element should include current inspection schedules and frequency of inspections based on any findings of initial inspections, how inspection results are used to update susceptibility models, and identify models that are used to evaluate crack growth and flaw evaluations.

I&M Response to RAI B.1.9.2-5:

As described in response to RAI B.1.9.2-1, details of the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program are contained in site documentation and not the LRA, because this program is consistent with, but includes an exception to, the program attributes described in NUREG-1801, Section XI.M11.

The issue of reactor pressure vessel head penetration inspections, which are addressed by the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program, is the subject of First Revised NRC Order EA-03-009 and is an evolving 10 CFR 50 issue. I&M's current licensing basis applicable to implementation of the requirements of First Revised NRC

Order EA-03-009, including inspection schedule and frequency requirements, is embodied in References 1 through 5 for RAI B.1.9.2-1. The second principle of license renewal, as discussed in the Statements of Consideration for the Final Part 54 Rule, states that the plant-specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term. Therefore, on-going inspection and evaluation activities to comply with First Revised NRC Order EA-03-009 and successor orders or regulations, and order conditions thereto, will be carried forward through the period of extended operation.

RAI B.1.9.2-6:

Acceptance Criteria: NUREG-1801 states that any indication detected needs to be evaluated in accordance with Section XI of the ASME Code or other acceptable flaw evaluation criteria. To verify the adequacy of the long-term inspection program and acceptance criteria and assess if there have been significant changes since the applicants response to NRC GL 97-01, the applicant should provide references to appropriate industry model revisions or provide updated information on crack initiation and crack growth data and models used.

The staff requests the applicant to update B.1.9 to include an Acceptance Criteria element and to provide updated information on crack initiation and crack growth data and models used. Additionally, include references to the NRC Bulletins 2002-01, 2002-02, 2003-02, Order EA-03-009 dated February 11, 2003, and the First Revised NRC Order EA-03-009.

I&M Response to RAI B.1.9.2-6:

As described in response to RAI B.1.9.2-1, details of the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program are contained in site documentation and not the LRA, because this program is consistent with, but includes an exception to, the program attributes described in NUREG-1801, Section XI.M11.

The issue of reactor pressure vessel head penetration inspections, which are addressed by the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program, is the subject of First Revised NRC Order EA-03-009 and is an evolving 10 CFR 50 issue. I&M's current licensing basis applicable to implementation of the requirements of First Revised NRC Order EA-03-009, including acceptance criteria and updated information on crack initiation and crack growth data and models used, is embodied in References 1 through 5 for RAI B.1.9.2-1. The second principle of license renewal, as discussed in the Statements of Consideration for the Final Part 54 Rule, states that the plant-specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term. Therefore, on-going inspection and evaluation activities to comply with First Revised NRC Order EA-03-009 and successor orders or regulations, and order conditions thereto, will be carried forward through the period of extended operation.

Commitments made in response to NRC Bulletin 2003-02 apply to lower vessel head penetrations, which will be addressed in the Alloy 600 Aging Management Program and not the Control Rod Drive Mechanism and Other Vessel Head Penetration Inspection Program. On-going commitments made in response to NRC Bulletin 2003-02 will be carried forward to the period of extended operation.

RAI B.1.41-1:

LRA Section B.1.41, "Water Chemistry Control - Chemistry One-Time Inspection," describes a new program for verifying the effectiveness of the chemistry control programs. The application does not include all of the information necessary for the staff to review the program. According to the description, on page B-131 of the LRA, the program will be consistent with the Section XI.M32 of the GALL. However, the same description also states that the scope of the program will be narrower than that of GALL Section XI.M32. Since the differences between the applicant's program and the GALL program are not evident, the staff requests that the applicant address the following:

(a) Program Scope List the systems, components, and locations within the scope of this program. Discuss how this scope was determined.

(b) Parameters Monitored/Inspected Describe the parameters to be measured for each inspection included in this program, and explain how these parameters relate to the degradation mechanisms/aging effects for the components within the scope of the program.

(c) Detection of Aging Effects Describe the criteria for prioritizing the components within the scope of this program and the method for defining the inspection sample set. In addition, describe the various methods for detecting the aging effects and the bases (standards) for these methods.

(d) Monitoring and Trending Describe how monitoring and trending of plant-specific and industry-wide experience are being used to support the effectiveness of this program.

(e) Acceptance Criteria Describe the acceptance criteria for each inspection covered by this program, and the actions taken resulting from unexpected or unacceptable results.

(f) Operating Experience Although this is a new program, the staff requests that the applicant discuss the review of recent surveillance and/or maintenance results that were used to determine which components to include in the scope of a chemistry one-time inspection.

I&M Response to RAI B.1.41-1:

The NUREG-1801, Section XI.M32, One-Time Inspection Program is contained in two CNP aging management programs – the Small Bore Piping Program described in LRA Section B.1.30 and the Chemistry One-Time Inspection Program described in LRA Section B.1.41. These two programs comprise all the elements of NUREG-1801, Section XI.M32. There are no resultant differences between the NUREG-1801, Section XI.M32 program and the two programs listed in the LRA. An additional one-time inspection of pressurizer spray head components will also be included in the Pressurizer Examinations Program described in LRA Section B.1.24. Additional clarification is provided below:

(a) The Chemistry One-Time Inspection Program is a new program that will be developed and initiated prior to the period of extended operation. The program will address components for which water chemistry control programs have been credited as an aging management program in the LRA Section 3 aging management review results tables and will focus on materials and environments for which NUREG-1801 specifies the need for verification of effectiveness of water chemistry control programs. Examples include carbon steel components in applicable steam and power conversion systems.

The scope of the Chemistry One-Time Inspection Program will be narrower than that of NUREG-1801, Section XI.M32, because one-time inspection of small bore piping in the RCS will be performed under the Small Bore Piping Program. The Small Bore Piping Program is also a new program that will be developed and initiated prior to the period of extended operation. This program is credited for managing cracking of small bore Class 1 piping in the RCS (including pipe, fittings, and branch connections less than 4-inch nominal pipe size [NPS]) that does not receive volumetric inspection in accordance with ASME Section XI, Examination Category B-J or B-F.

(b) As indicated in LRA Section B.1.41, the Chemistry One-Time Inspection Program will be consistent with the general program elements described in NUREG-1801, Section XI.M32. As stated in NUREG-1801, Section XI.M32, the Chemistry One-Time Inspection Program will monitor "parameters directly related to the degradation of a component. Inspection is performed in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Code and 10 CFR 50, Appendix B, by using a variety of non-destructive examination (NDE) methods, including visual, volumetric, and surface techniques."

The Small Bore Piping Program inspection will be a one-time volumetric examination of a representative sample of susceptible items in selected locations of Class 1 piping less than 4-inch NPS. The volumetric technique chosen will permit detection and sizing of service- and SCC-induced cracking of small bore Class 1 piping.

(c) The Chemistry One-Time Inspection Program will include a representative sample of the components that credit the water chemistry control programs for managing their aging effects. The program will focus on materials and environments for which NUREG-1801 specifies the need for verification of effectiveness of water chemistry control programs. The program will include components in low-flow areas.

The Small Bore Piping Program sample inspection locations will be determined utilizing a risk-informed approach based on generally accepted practices (such as Code Case N-560). This consists of a degradation mechanism evaluation to assess the failure potential of the piping system under consideration and a consequence evaluation to assess the impact on plant safety in the event of a piping failure. Once the sample locations are determined, examinations for cracking will be performed using approved and qualified volumetric examination techniques, such as ultrasonic testing or radiography.

Non-destructive evaluations, including visual, ultrasonic, and surface techniques, will be performed by qualified personnel following procedures consistent with the ASME Code and 10 CFR 50, Appendix B.

(d) Plant-specific and industry-wide experience will be considered in the selection of techniques and timing of inspections for these programs.

(e) As indicated in LRA Section B.1.41, the Chemistry One-Time Inspection Program will be consistent with the general program elements described in NUREG 1801, Section XI.M32, which states, "Any indications or relevant conditions of degradation detected are evaluated. Ultrasonic thickness measurements are to be compared to predetermined limits, such as design minimum wall thickness."

Acceptance criteria for the Small Bore Piping Program will be in accordance with ASME Section XI, where applicable. Otherwise, acceptance standards will be determined prior to the inspections. Any identified cracks will be evaluated and if appropriate, entered in the Corrective Action Program.

Corrective actions for both programs will be in accordance with the description of corrective actions in NUREG-1801, Section XI.M32.

(f) As stated above, the Chemistry One-Time Inspection Program and Small Bore Piping Program are new programs that have not yet been created. When the programs are developed, prior to the period of extended operation, recent surveillance and maintenance results, and plant-specific and industry-wide experience, will be considered in the selection of components to be included in the sample set.

LIST OF REGULATORY COMMITMENTS

The following table summarizes the actions committed to by Indiana Michigan Power Company (I&M) in this document. Any other actions discussed in this submittal represent intended or planned actions by I&M. They are described to the Nuclear Regulatory Commission (NRC) for information and are not regulatory commitments.

Commitment	Date
I&M Response to RAI B.1.1.2-1: The Alloy 600 Aging Management Program commitment will also be revised to indicate that an inspection plan will be submitted for staff review and approval three years prior to the period of extended operation to determine if the program demonstrates an ability to manage the effects of aging per 10 CFR 54.21(a)(3).	Unit 1: October 25, 2011 Unit 2: December 23, 2014
I&M Response to RAIs B.1.1.2-1 and B.1.1.2-3: I&M will continue to participate in industry initiatives, such as the Westinghouse Owners Group and the EPRI MRP. Susceptibility rankings and program inspection requirements regarding Alloy 82/182 pipe butt welds will be consistent with the later version of the EPRI MRP safety assessment or its successors.	Unit 1: October 25, 2011 Unit 2: December 23, 2014