

**From:** "Tyner, Donna" <dtynr@entergy.com>  
**To:** "Kimberly Green" <KJG1@nrc.gov>,"Bo Pham" <BMP@nrc.gov>  
**Date:** 1/4/2008 1:56:57 PM  
**Subject:** IPEC RAI Replies - SGTI and Chemistry; BOP  
**cc:** "Charles Caputo" <ccapu90@entergy.com>,"MICHAEL D STROUD" <MSTROUD@entergy.com>

Attached in advance are electronic copies of IPEC's RAI responses NL-08-004 - SGTI and Chemistry and NL-08-005 - BOP. Hard copy will follow in the mail.

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**Creation Date:** 1/4/2008 1:56:57 PM  
**From:** "Tyner, Donna" <dtynr@entergy.com>

**Created By:** dtynr@entergy.com

**Recipients**

"Charles Caputo" <ccapu90@entergy.com>  
"MICHAEL D STROUD" <MSTROUD@entergy.com>  
"Kimberly Green" <KJG1@nrc.gov>  
"Bo Pham" <BMP@nrc.gov>

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nrc.gov

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Attached in advance are electronic copies of IPEC's RAI responses NL-08-004 - SGTI and Chemistry and NL-08-005 - BOP.  
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Entergy Nuclear Northeast  
Indian Point Energy Center  
450 Broadway, GSB  
P.O. Box 249  
Buchanan, NY 10511-0249  
Tel 914 788 2055

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Fred Dacimo  
Vice President  
License Renewal

January 4, 2008

Re: Indian Point Units 2 & 3  
Docket Nos. 50-247 & 50-286

NL-08-005

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

SUBJECT: **Reply to Request for Additional Information  
Regarding License Renewal Application--(Balance of Plant Systems)**

Reference: NRC letter dated December 7, 2007; "Requests for Additional Information for the Review of the Indian Point Nuclear Generating Unit Nos. 2 and 3, License Renewal Application"

Dear Sir or Madam:

Entergy Nuclear Operations, Inc is providing, in Attachment I, the additional information requested in the referenced letter pertaining to NRC review of the License Renewal Application for Indian Point 2 and Indian Point 3. The additional information provided in this transmittal addresses staff questions regarding Balance of Plant Systems.

There are no new commitments identified in this submittal. If you have any questions or require additional information, please contact Mr. R. Walpole, Manager, Licensing at (914) 734-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 1-4-08.

Sincerely,

*Fred R. Dacimo for*  
Fred R. Dacimo *per telecon*  
Vice President  
License Renewal

cc: next page

cc: Mr. Bo M. Pham, NRC Environmental Project Manager  
Ms. Kimberly Green, NRC Safety Project Manager  
Mr. John P. Boska, NRC NRR Senior Project Manager  
Mr. Samuel J. Collins, Regional Administrator, NRC Region I  
Mr. Sherwin E. Turk, NRC Office of General Counsel, Special Counsel  
Mr. Mark Cox, NRC Senior Resident Inspector, IP2  
Mr. Paul Cataldo, NRC Senior Resident Inspector, IP3  
Mr. Paul D. Tonko, President, NYSERDA  
Mr. Paul Eddy, New York State Dept. of Public Service

**ATTACHMENT I TO NL-08-005**

**REPLY TO NRC REQUEST FOR ADDITIONAL INFORMATION**

**REGARDING**

**LICENSE RENEWAL APPLICATION**

**(Balance of Plant Systems)**

**ENTERGY NUCLEAR OPERATIONS, INC  
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 and 3  
DOCKETS 50-247 and 50-286**

INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3  
LICENSE RENEWAL APPLICATION (LRA)  
REQUESTS FOR ADDITIONAL INFORMATION (RAI)

The U.S. Nuclear Regulatory Commission (NRC or staff) has reviewed the information related to the Balance of Plant Systems provided by the applicant in the Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3) LRA. The staff has identified that additional information is needed to complete the review as addressed below.

**2.2 PLANT LEVEL SCOPING RESULTS**

**RAI 2.2A-1**

LRA Table 2.2-2-IP2, "Mechanical Systems Not within the Scope of License Renewal," identifies that the hot penetration cooling system is excluded from the scope of license renewal and references Updated Final Safety Analysis Report (UFSAR) Section 5.1.4.2.2 as its basis. UFSAR Section 5.1.4.2.2 provides a local area temperature limit of 250 degrees Fahrenheit (°F) and states that cooling is provided for hot penetrations through the use of air-to-air heat exchangers.

Cooling of hot containment penetrations minimizes age-related, heat-induced degradation of local concrete surrounding the penetration. Therefore, it may have an intended function in accordance with 10 CFR 54.4(a). Justify the exclusion of the hot penetration cooling system from the scope of license renewal.

**Response for RAI 2.2A-1**

The hot penetration cooling (HPC) system removes heat from penetrations for hot piping systems to limit the temperature of the surrounding concrete during normal plant operation. It is not required to function during accident conditions and has no functions that meet 10CFR54.4(a)(1) criteria. In addition, it is not relied on to perform a function that demonstrates compliance with the Commission's regulations identified in 10 CFR 54.4(a)(3). Failure of the system cannot prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1) and therefore is not in scope for 10 CFR 54.4(a)(2). Therefore the HPC system is not in the scope of license renewal.

In order to lose significant structural properties, concrete must be held at high temperatures for an extended period of time. The hottest penetrations at IPEC are the main steam lines, which normally operate at a temperature of 507°F. The results of a heat transfer analysis indicate that in the improbable case that all cooling air would be lost to the main steam penetration, the surrounding concrete would reach a maximum temperature of 200°F in approximately 100 hours and 280°F in approximately 1000 hours. It is not credible that cooling air would be lost for a significantly long period of time since the failure of the air blower drive motors is alarmed in the control room. Therefore the failure of the hot penetration cooling system would not adversely impact the concrete in the penetrations.

### **RAI 2.2B-1**

LRA Table 2.2-2-IP3, "Mechanical Systems Not within the Scope of License Renewal" identifies that the breathable air system is excluded from the scope of license renewal and references UFSAR Section 9.10 as its basis. UFSAR Section 9.10 states that the breathable air system is a non-category I system, except for the penetration into containment, where breathable air is provided inside containment through a spare penetration line.

Confirm whether the breathable air containment penetration is within scope of license renewal or justify its exclusion.

### **Response for RAI 2.2B-1**

The breathable air containment penetration is within scope of license renewal as shown on drawing LRA-9321-24043-0 and reviewed as part of the containment penetrations system in section 2.3.2.5 of the LRA. It is shown as capped penetration X-X at coordinates (3, F). Aging management review results of the piping penetration are provided in LRA table 3.2.2-5-IP3.

### **2.3.3.1 Spent Fuel Pit Cooling**

#### **RAI 2.3B.3.1-1**

The Indian Point Unit 3 UFSAR, page 91, references a backup spent fuel cooling system that operates in parallel with the normal spent fuel pit (SFP) cooling system during refueling activities. The normal SFP cooling system is in scope for 10 CFR 54.4(a)(1) with the intended function of providing a pressure boundary for the component cooling system and the safety injection system, and 10 CFR 54.4(a)(2) for physical interaction.

Components from the backup spent fuel cooling system are not identified as being within scope of license renewal. Explain why the components from the backup spent fuel cooling system are not in scope, or revise LRA Tables 2.3.3-1-IP3 and 3.3.2-1-IP3 to include these components as types subject to aging management review (AMR).

#### **Response for RAI 2.3B.3.1-1**

The backup SFP cooling (BUSFPC) system is a nonsafety-related system that has no functions meeting 10 CFR 54.4(a)(1) scoping criteria and is not relied on to perform a function that demonstrates compliance with the Commission's regulations identified in 54.4(a)(3). The system is normally drained when the plant is in operation such that its failure cannot prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1) through spatial interaction. The components in the BUSFPC system are also not directly connected to safety-related equipment. Therefore the BUSFPC system does not meet the scoping criteria of 10 CFR 54.4(a)(1), (a)(2), or (a)(3) and is not in the scope of license renewal.

### **2.3.3.14 Emergency Diesel Generator System**

#### **RAI 2.3A.3.14-1**

License renewal drawing LRA-9321-2028-0 for the Unit 2 jacket water to diesel generators identifies that the jacket water pumps (at locations H-4, E-4, and B-4) for Diesel Engine No. 21, 22, and 23 respectively, are not subject to AMR in accordance with 10 CFR 54.21(a) because they are "Not a Long Lived Component."

NUREG-1800, Rev. 1, Table 2.3-2, "Examples of Mechanical Components Screening and Basis for Disposition," provides examples of passive, long-lived components such as diesel engine jacket water, skid-mounted equipment. Confirm that the jacket water pumps are short-lived components and describe their method for periodic replacement.

#### **Response for RAI 2.3A.3.14-1**

Maintenance procedures specify that the IP2 emergency diesel generator jacket water pumps shown on drawing LRA-9321-2028 are replaced every sixteen years. In accordance with 10 CFR 54.21(a)(1)(ii), since these components are subject to replacement based on a specified time period, they are not subject to aging management review.

#### **RAI 2.3A.3.14-2**

License renewal drawings LRA-9321-2028-0 and LRA-9321-20283-0, for the Unit 2 and Unit 3 emergency diesel generator (EDG) jacket water cooling system, and LRA-9321-2030-0 and LRA-9321-20303-0, for the Unit 2 and Unit 3 EDG fuel oil system, identify multiple flexible piping connections as not long-lived components. In addition, LRA Section 2.1.2.1.3, "Mechanical System Drawings," states that flexible elastomer hoses/expansion joints are periodically replaced, i.e., not long-lived, and are indicated as such on the drawings.

"Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," NUREG-1800, Rev. 1, Table 2.1-3, "Specific Staff Guidance on Screening," identifies short-lived components as consumables. Further, the table states that short-lived components are periodically replaced. For the flexible connections identified above, describe the programs that manage their inspection and replacement.

#### **Response for RAI 2.3A.3.14-2**

Maintenance procedures specify that EDG flex hoses shown on drawings LRA-9321-2028 and LRA-9321-20283, for the Unit 2 and Unit 3 emergency diesel generator (EDG) jacket water cooling system, and LRA-9321-2030 and LRA-9321-20303, for the Unit 2 and Unit 3 EDG fuel oil system are replaced every eight years. In accordance with 10 CFR 54.21(a)(1)(ii), since these components are subject to replacement based on a specified time period, they are not subject to aging management review.

**RAI 2.3B.3.14-1**

License renewal drawing LRA-9321-20283-0 for the Unit 3 jacket water to diesel generators identifies that the jacket water pumps (at locations B-3, B-5, and B-7) for diesel engine no. 31, 32, and 33, respectively, are not subject to aging management review in accordance with 10 CFR 54.21(a) because they are “Not a Long Lived Component.”

NUREG-1800, Rev. 1, Table 2.3-2, “Examples of Mechanical Components Screening and Basis for Disposition,” provides examples of passive, long-lived components such as diesel engine jacket water, skid mounted equipment. Confirm that the jacket water pumps are short-lived components and describe their method for periodic replacement.

**Response for RAI 2.3B.3.14-1**

Maintenance procedures specify that the IP3 emergency diesel generator jacket water pumps shown on drawing LRA-9321-20283 are replaced every sixteen years. In accordance with 10 CFR 54.21(a)(1)(ii), since these components are subject to replacement based on a specified time period, they are not subject to aging management review.

**2.3.3.17 City Water System**

**RAI 2.3A.3.17-1**

License renewal drawing LRA-227551-0 shows a small portion of the piping, 2 inch city water (CW) Line #35 (location A-4), highlighted in purple, indicating it is within the scope of license renewal and subject to AMR for the city water system. The piping identified makes no reference to a continuation drawing. The Detail D area of the drawing references drawing 9321-F-2510, which was not provided to the staff.

This small section of piping implies a continuation onto another drawing that may contain additional components that should be within the scope of license renewal. Explain why drawing 9321-F-2510 is not listed on page 2.3-142 of the LRA under license renewal drawings for the city water system; or provide this and any other continuation drawings that contain components within the scope of license renewal.

**Response for RAI 2.3A.3.17-1**

Drawing 9321-F-2510 is an equipment general arrangement drawing which includes all of the components shown on drawing LRA-227551-0 (detail D). No additional components are shown on this drawing. The section of 2” city water line # 35 at A-4 is continued on drawing LRA-9321-2018-0 coordinates (C, 6) which shows the ghost image of valve FP-832 (shown on LRA-227551-0) connecting to the 2” city water line # 35.

### **RAI 2.3A.3.17-2**

License renewal drawing LRA-9321-4006-0 shows piping on the drawing highlighted in purple, indicating the piping is within the scope of license renewal and subject to AMR for the city water system. At valve FP-1134 (C-1), FP-338 (E-2), FP-880 (H-3), and FP-1264 (H-3), the system designation changes from the city water system to the fire protection system. At valve FP-1227 (D-1), the system designation changes from the city water system to the auxiliary feedwater system.

For these changes in system designations identified above, the highlighting remains purple, indicating components subject to AMR under the scope of the city water system. In order to ensure that there are no omissions, explain how the color coding applies to the multiple systems identified above.

### **Response for RAI 2.3A.3.17-2**

The fire protection (FP) system is a high pressure water system that serves structures and strategically located hydrants and is highlighted in green. The city water (CYW) system is a low pressure system that provides backup to the high pressure system and includes the low pressure hydrants and is highlighted in purple. Components in both systems are used for fire protection. When performing scoping and screening of components for license renewal, components that were part of the low pressure CYW system flow path and required to accomplish CYW system functions were included in the CYW system regardless of their component ID or the system designator shown on the drawing. Components that were part of the high pressure FP system flow path and required to accomplish FP system functions were included in the FP system regardless of their component ID or the system designator shown on the drawing. The system designators shown on the LRA drawings were not used to define system boundaries. This ensures that all components required to accomplish system functions are included in the scope of license renewal.

Valves FP-1134, FP-338, FP-880, FP-1227 and FP-1264 were included as part of the CYW system with a pressure boundary intended function because they are fed by the low pressure CYW system and are required to accomplish CYW system functions identified in section 2.3.3.17 of the LRA.

### **RAI 2.3A.3.17-3**

In the upper left corner on the license renewal drawing, LRA-227552-0 shows pipe lines FP-6077-6" DH-2 and FP-6075-6" DH-2 highlighted in purple, indicating they are within the scope of license renewal and subject to the AMR for the city water system. With the "FP" designation, they may be construed to be part of the fire protection system.

In order to ensure that there are no omissions, explain why the two fire protection lines are shown in purple as being part of the city water system for license renewal instead of green for the fire protection water system.

**Response for RAI 2.3A.3.17-3**

The fire protection (FP) system is a high pressure water system that serves structures and strategically located hydrants and is highlighted in green. The city water (CYW) system is a low pressure system that provides backup to the high pressure system and includes the low pressure hydrants and is highlighted in purple. Components in both systems are used for fire protection. When performing scoping and screening of components for license renewal, components that were part of the low pressure CYW system flow path and required to accomplish CYW system functions were included in the CYW system regardless of their component ID or the system designator shown on the drawing. Components that were part of the high pressure FP system flow path and required to accomplish FP system functions were included in the FP system regardless of their component ID or the system designator shown on the drawing. The system designators shown on the LRA drawings were not used to define system boundaries. This ensures that all components required to accomplish system functions are included in the scope of license renewal.

Pipe lines FP-6077-6" DH-2 and FP-6075-6" DH-2 are required to accomplish CYW system functions and are highlighted as part of the CYW system.

**RAI 2.3A.3.17-4**

License renewal drawing LRA-227781-0 at location A-1 shows a short piece of piping on the drawing highlighted in purple, indicating it is within the scope of license renewal and subject to AMR for the city water system. This short piece of city water system piping makes reference to drawings 9321-F-2593 and 9321-F-2696 for upstream continuation piping. Since this short piece of city water system piping is within the scope of license renewal and continues on the upstream drawings 9321-F-2593 and 9321-F-2696, then these drawings should also have city water system piping within the scope of license renewal. These drawing are not listed on page 2.3-142 of the LRA, which are the license renewal drawings for the Unit 2 and Unit 3 city water system.

Explain why drawings 9321-F-2593 and 9321-F-2696 are not listed on page 2.3-142 of the LRA under license renewal drawings for the city water system.

**Response for RAI 2.3A.3.17-4**

Drawings 9321-F-2593 and 9321-F-2696 are not system flow diagrams. They are equipment general arrangement drawings which were not clear enough to use as LRA drawings. A review of these drawings was performed during the city water system aging management review to confirm that all components shown on these drawings that are required to accomplish city water system functions were included in scope and subject to aging management review. The only components shown on these drawings are piping and valves MW-875 / 876 / 877 / 878 / 879 / 880 / 881 / 882 / 887 / 889 / 890 which are in scope and subject to aging management review.

**RAI 2.3A.3.17-5**

On page 2.3-140 of the LRA for the city water system, it is stated that the Unit 2 city water system has the intended function for 10 CFR 54.4(a)(3) of providing a supply of water to fire protection system components, including the fire pumps, fire hydrants, hose reel stations inside containment, fire water tank, and various sprinkler and deluge systems. License renewal drawing LRA-9321-2018-0 at locations C-6 and D-6 shows piping highlighted in blue, indicating it is within the scope of license renewal and subject to AMR for the city water system that continues onto additional drawings. One example of this is city water system drawings that refer to drawings 9321-F-2678, 9321-F-2695 and 9321-F-2696 for downstream continuation piping, which are not listed on LRA page 2.3-142. These components would be necessary for the city water system to accomplish its intended function as identified above, (i.e., how the hose reel stations inside containment are supplied water from the Unit 2 city water system). Hence, there may be additional drawings showing city water system components that have not been identified in the LRA.

Provide drawings 9321-F-2678, 9321-F-2695, and 9321-F-2696 and other drawings, as necessary, showing the LRA scope of the Unit 2 city water system.

**Response for RAI 2.3A.3.17-5**

Drawings 9321-F-2678, 9321-F-2695, and 9321-F-2696 are not system flow diagrams. They are equipment general arrangement drawings which were not clear enough to use as LRA drawings. A review of these drawings was performed during the city water system aging management review to confirm that all components shown on these drawings that are required to accomplish city water system functions were included in scope and subject to aging management review. The only components shown on these drawings are piping and valves. The review of these drawings resulted in the inclusion of valves MW-867 / 868 / 869 / 870 / 871 / 872 / 873 / 874 / 875 / 876 / 877 / 878 / 879 / 880 / 881 / 882 / 887 / 889 / 890 which are in scope and subject to aging management review.

**RAI 2.3A.3.17-6**

LRA drawing LRA-9321-4006-0, for the city water system, at locations C-1 and E-2 shows a fire hydrant highlighted in purple, indicating it is within the scope of license renewal and subject to AMR because it supports an intended function in accordance with 10 CFR 54.4(a). LRA Table 2.3.3-19-7-IP2, for city water system does not include the component type "hydrant."

10 CFR 54.21(a)(1) requires the applicant to identify and list those components subject to AMR. Identify where the hydrants in the Unit 2 city water system are evaluated for aging management.

**Response for RAI 2.3A.3.17-6**

The hydrants in the IP2 city water system are identified in the IPEC site component database as valves and were maintained as such during the aging management review process. They are included as component type "valve body" in LRA table 2.3.3-17-IP2 with aging management review results provided in LRA table 3.3.2-17-IP2.

### **RAI 2.3B.3.17-1**

On page 2.3-141, the LRA states that the Unit 3 city water system (also called city water makeup system) has the intended function for 10 CFR 54.4(a)(3) of providing water supply to the fire protection tanks. On license renewal drawing LRA-9321-20343-002-0, for the city water system, the portion of the city water system piping connecting to fire water storage tanks 1 and 2 beyond the isolation valves 84, PCV-1603, 96, 94, 80, PCV-1602, 93, and PCV-1612 is highlighted in purple, indicating it is within the scope of license renewal and subject to AMR. Upstream of these isolation valves, the city water system connects to the 16-inch main for the Village of Buchanan, which contains piping required to provide the water supply function.

Explain why all the city water system piping from the 16-inch main for the Village of Buchanan to the fire water storage tanks is not highlighted in purple, indicating it is within the scope of license renewal for 10 CFR 54.4(a)(3) and subject to AMR.

### **Response for RAI 2.3B.3.17-1**

The 16 inch water line from the Village of Buchanan is a source of makeup for the city water system. City water is the normal source of makeup water to the two fire water storage tanks. This source is not required to support any fire scenarios or Appendix R events since each of the storage tanks have a 350,000 gallon capacity with 300,000 gallons reserved for fire fighting that handles all fire scenarios without makeup. The function of the city water system to provide a water supply to the fire water tanks is not a license renewal intended function since makeup is not required for 10 CFR 50.48 fire scenarios or Appendix R events. As a result, LRA section 2.3.3.17 page 2.3-141 is changed to delete the intended function bullet item "provide water supply to the fire protection tanks for (10 CFR 50.48)" as an (a)(3) function.

### **RAI 2.3B.3.17-2**

On page 2.3-141, the LRA for the city water system states that the Unit 3 city water system has no intended functions for 10 CFR 54.4(a)(1). However, on license renewal drawing LRA-9321-20343-001-0, for the city water system there is a general note, which states under the heading Class I piping: (1) above ground city water make-up to closed cooling water system - expansion tank in control room and diesel generator jacket water expansion tank and (2) City water from Unit 1 tie into auxiliary feedwater pumps suction. Also, under the heading Class III piping in the general notes it is stated: (1) above ground city water make-up to closed cooling water system - head tank in turbine building, and (2) above ground city water supply to nuclear services.

In addition, on license renewal drawing LRA-9321-20183-001-0 for the condensate & boiler feed pump suction system, there is a small portion of the city water system piping shown on the drawing in area H-6. This portion of city water system piping is highlighted in purple indicating it is within the scope of license renewal and subject to AMR. On the drawing, this portion of city water system piping is identified as Class I. By definition, all Class I and Class III piping should have intended functions in accordance with 10 CFR 54.4(a)(1).

- a. Explain why the Class I and Class III piping for the city water system on drawings LRA-9321-20343-001-0 and LRA-9321-20183-0 do not have a 10 CFR 54.4(a)(1) intended function.

- b. Explain why the city water piping up to the closed cooling water system expansion tank, diesel generator jacket water expansion tank, closed cooling water system head tank and nuclear services on license renewal drawing LRA-9321-20343-001-0 is not highlighted in purple indicating it is within the scope of license renewal and subject to AMR.
- c. Explain why the city water system piping that continues from license renewal drawing LRA-9321-20343-001-0 onto drawing 9321-H-20283 for supplying the 40-gallon diesel generator jacket water expansion tanks is also not highlighted in purple as within the scope of license renewal and subject to AMR.

**Response for RAI 2.3B.3.17-2**

- a. Class I and Class III refer to seismic classification; not to ASME safety class. Class I components include safety-related equipment. Class I systems, structures and components also include components that do NOT perform a safety function. Class III is the designation for structures, systems and components which are not directly related to reactor operation and containment, and which do not have to maintain structural integrity during or following a SSE. When defining the city water system components required to support 10 CFR 54.4(a)(1) system intended functions for license renewal, the seismic classification boundaries were not used since they do not accurately reflect the portions of the system required to meet system intended functions. All components needed to accomplish system intended functions were included in scope regardless of the class breaks on the drawings.
- b. The LRA drawings only reflect portions of systems in scope and subject to aging management review for 10 CFR 54.4(a)(1) or (a)(3). The city water piping up to the closed cooling water system expansion tank, diesel generator jacket water expansion tank, closed cooling water system head tank, and nuclear services on drawing LRA-9321-20343-001 is not required to meet any system intended functions described in 10 CFR 54.4(a)(1) or (a)(3) and therefore is not highlighted. However, this piping and valves are in scope for 10 CFR 54.4(a)(2) due to the potential for spatial interaction. They are included in LRA tables 2.3.3-19-13-IP3 and 3.3.2-19-13-IP3.
- c. The LRA drawings only reflect portions of systems in scope and subject to aging management review for 10 CFR 54.4(a)(1) or (a)(3). The city water piping up to the diesel generator jacket water expansion tank on drawings LRA-9321-20343-001 and 9321-H-20283 is not required to meet any system intended functions described in 10 CFR 54.4(a)(1) or (a)(3) and therefore is not highlighted. However, this piping and valves are in scope for 10 CFR 54.4(a)(2) due to the potential for spatial interaction. They are included in LRA tables 2.3.3-19-13-IP3 and 3.3.2-19-13-IP3.

City water is the source of makeup water to the 40-gallon diesel generator jacket water expansion tanks. Makeup water is not required for the EDGs to perform their intended function.

### **2.3.4.1 Main Steam System**

#### **RAI 2.3A.4.1-1**

License renewal drawings LRA-9321-2017-0 and LRA-227780-0, for the Unit 2 main steam system, show the following valves within the scope of license renewal and subject to aging management review: on LRA-9321-2017-0: PCV-1134 (D-4), PCV-1135 (D-5), PCV-1136 (D-3), PCV-1137 (D-3), MS-1-21 (E-4), MS-1-22 (E-6), MS-1-23 (E-3), MS-1-24 (E-2), and on LRA-9321-227780-0: PCV-1120 (C-5), PCV-1121 (C-4), PCV-1122 (A-4), PCV-1123 (A-4), PCV-1124 (F-5), PCV-1125 (F-5), PCV-1126 (C-4), PCV-1127 (C-4), PCV-1128 (H-5), PCV-1129 (H-4), PCV-1130 (F-4), PCV-1131 (F-4). This list is intended to be a representation; additional valves about which this RAI applies may exist.

These valves are air operated and have associated air cylinders and air tubing that have been excluded from the scope of license renewal. Explain why the instrument air system, their tubing, and associated solenoid operated valves (SOVs) to these valves are not within the scope of license renewal in accordance with 10 CFR 54.4(a).

#### **Response for RAI 2.3A.4.1-1**

The air operators (cylinders) are active components and therefore not subject to aging management review in accordance with 10 CFR 54.21(a)(1)(i) and Appendix B, page B-15, of NEI 95-10. The SOVs and air tubing associated with air-operated valves in the Unit 2 main steam system are within the scope of license renewal, but are not subject to aging management review. The majority of air-operated valves shown as within the scope of license renewal on LRA drawings LRA-9321-2017 and LRA-227780 fail to the position required for accident mitigation upon loss of air such that maintaining air supply pressure boundary is not required. Therefore, the solenoid valves as well as connecting tubing do not have a pressure boundary component intended function for license renewal and are not subject to aging management review. An exception to this is the atmospheric dump valves (PCV-1134, 1135, 1136 and 1137 located at coordinates (E-2, 3, 4, 5 on drawing LRA-9321-2017) and main steam isolation valves (MS-1-21, 22, 23, 24 located at D-2, 3, 4, 5 on drawing LRA-9321-2017) that close upon loss of air, but are credited with being re-opened as necessary in an accident scenario using standby nitrogen in bottles or compressed air stored in accumulators. The nitrogen bottles are replaced based on a specified time period and therefore in accordance with 10 CFR 54.21(a)(1)(ii) are not subject to aging management review. The components used to reopen the main steam isolation valves (accumulator tanks, valves and tubing) were included in the compressed air system aging management review. The aging management review results for these tanks, tubing and valves are included in LRA table 3.3.2-4-IP2.

#### **RAI 2.3B.4.1-1**

LRA Drawing LRA-9321-20173-0, for the Unit 3 main steam system, shows the following valves within the scope of license renewal and subject to aging management review: PCV-1120 (G-4), PCV-1121 (G-4), PCV-1122 (E-5), PCV-1123 (E-5), PCV-1124 (G-3), PCV-1125 (F-3), PCV-1126 (D-4), PCV-1127 (E-4), PCV-1128 (G-1), PCV-1129 (F-1), PCV-1130 (E-3), PCV-1131 (E-3), PCV-1134 (F-7), PCV-1135 (G-7), PCV-1136 (E-7), PCV-1137 (D-7), MS-1-31 (F-7), MS-1-32 (G-7), MS-1-33 (E-7), MS-1-34 (D-7). This list is intended to be a representation; additional valves about which this RAI applies may exist.

These valves are air operated and have associated SOVs and air tubing that have been excluded from the scope of license renewal. Explain why the instrument air system to these valves are not within the scope of license renewal in accordance with 10 CFR 54.4(a).

#### **Response for RAI 2.3B.4.1-1**

The air operators (cylinders) are active components and therefore not subject to aging management review in accordance with 10 CFR 54.21(a)(1)(i) and Appendix B, page B-15, of NEI 95-10. The SOVs and air tubing associated with air-operated valves in the Unit 3 main steam system are within the scope of license renewal, but are not subject to aging management review. The majority of air-operated valves shown as within the scope of license renewal on LRA drawings LRA-9321-20173-0 fail to the position required for accident mitigation upon loss of air such that maintaining air supply pressure boundary is not required. Therefore, the solenoid valves as well as connecting tubing do not have a pressure boundary intended function for license renewal and are not subject to aging management review. An exception to this is the atmospheric dump valves (PCV-1134, 1135, 1136 and 1137 located at 7-D, E, F, H on drawing LRA-9321-20173-0) and main steam isolation valves (MS-1-31, 32, 33, 34 located at 7-D, E, F, H on drawing LRA-9321-20173-0) that close upon loss of air, but are credited with being re-opened as necessary in an accident scenario using standby nitrogen in bottles or compressed air stored in accumulator tanks. The nitrogen bottles are replaced based on a specified time period and therefore in accordance with 10 CFR 54.21(a)(1)(ii) are not subject to aging management review. The components used to re-open the main steam isolation valves (accumulator tanks, tubing and valves) were included in the compressed air system and have been highlighted on LRA-9321-F-70093. The aging management review results for these tanks, tubing and valves are included in LRA Table 3.3.2-4-IP3.

#### **2.3.4.2 Main Feedwater System**

##### **RAI 2.3A.4.2-1**

License renewal drawing LRA-9321-2019-0 identifies that valves FCV-417-L, FCV-417, FCV-427-L, FCV-427, FCV-437-L, FCV-437, FCV-447-L, FCV-447, BF2-21, and BF2-22, for the Unit 2 main feedwater system, are within the system evaluation boundary.

Although the aforementioned valves are passive and long-lived, they are not highlighted indicating that they are not subject to aging management in accordance with 10 CFR 54.21(a). Explain the valves' exclusion from aging management.

##### **Response for RAI 2.3A.4.2-1**

The LRA drawings indicate components that are included in the scope of license renewal for 10CFR54.4(a)(1) or (a)(3) and subject to aging management review. The subject FW system valves, which are located upstream of the containment isolation check valves in nonsafety-related piping, are classified as safety-related because of their active function to provide feedwater isolation. They have no passive intended function for 54.4(a)(1) or (a)(3) since their failure would accomplish the safety function of preventing feedwater flow to the steam generators. These valves perform their function with moving parts and in accordance with

10CFR54.21(a)(1)(i) are not subject to aging management review and are therefore not highlighted on the drawing. However these components are included in scope for 54.4(a)(2) due to their potential for spatial interaction with safety-related equipment and the aging management review results are presented in Table 3.3.2-19-12-IP2.

#### **RAI 2.3B.4.2-1**

License renewal drawing LRA-9321-20193-0 identifies that valves FCV-417-L, FCV-417, FCV-427-L, FCV-427, FCV-437-L, FCV-437, FCV-447-L, FCV-447, BF2-31, and BF2-32, for the Unit 3 main feedwater system are within the system evaluation boundary.

Although the aforementioned valves are passive and long-lived, they are not highlighted indicating that they are not subject to aging management in accordance with 10 CFR 54.21(a). Explain the valves' exclusion from aging management.

#### **Response for RAI 2.3B.4.2-1**

The LRA drawings indicate components that are included in the scope of license renewal for 10CFR54.4(a)(1) or (a)(3) and subject to aging management review. The subject FW system valves, which are located upstream of the containment isolation check valves in nonsafety-related piping, are classified as safety-related because of their active function to provide feedwater isolation. They have no passive intended function for 54.4(a)(1) or (a)(3) since their failure would accomplish the safety function of preventing feedwater flow to the steam generators. These valves perform their function with moving parts and in accordance with 10CFR54.21(a)(1)(i) are not subject to aging management review and are therefore not highlighted on the drawing. However these components are included in scope for 54.4(a)(2) due to their potential for spatial interaction with safety-related equipment and the aging management review results are presented in Table 3.3.2-19-12-IP3.

#### **2.3.4.5 IP2 AFW Pump Room Fire Event**

##### **RAI 2.3A.4.5-1**

In Section 2.3.4.5, the LRA states that water treatment plant components are credited for the auxiliary feedwater (AFW) pump fire event to support safe shutdown in the event of a fire in the Unit 2 AFW pump room. The source of water is the Indian Point Unit 1 (IP1) condensate storage tanks, which makes up to the Indian Point Unit 2 hotwell dump and condensate transfer pump. These components have an intended function for 10 CFR 54.4(a)(3) to support safe shutdown in the event of a fire, and for 10 CFR 54.4(a)(2) for physical interaction. License renewal drawings do not identify the flow path or the associated components. LRA Section 3.4.2, "Results," describes the applicant's approach to exclude these components from aging management review based upon the premise that the components in the systems required to supply feedwater to the steam generators during the short duration of the fire event are in service at the time the event occurs or their availability is checked daily. Therefore, integrity of the systems and components required to perform post-fire intended functions for at least one hour is continuously confirmed by normal plant operation.

By concluding that this flow path integrity is continually verified during normal plant operation, the applicant is stating no aging management program is required to assure the post-accident intended function. However, the IP1 condensate storage tanks are only subject to intermittent service; they are not normally in service as a normal flow path. Hence, the approach to exclude the components on this flow path is not consistent with the suggested methodology.

The components in this flow path that are long lived and have an intended function, are required to be within the scope of license renewal and subject to aging management according to 10 CFR 54.21(a)(1). Describe the components in this flow path and how they will be included in the aging management review.

**Response for RAI 2.3A.4.5-1**

The levels in the IP1 CSTs are verified on a daily basis. However, portions of the flow path from the IP1 CSTs to the IP2 condensers are only subject to intermittent and not continual service as are the other components discussed in section 2.3.4.5. The majority of the components in this flow path are included in scope and subject to aging management review for 10 CFR 54.4(a)(2) as part of the water treatment plant system. However, a few outdoor components (tanks, piping and valves) are not included in this section and will be included to provide further assurance that their intended function can be performed. Therefore, LRA table 3.3.2-19-43-IP2 is revised to add the following line items which were not previously included.

Piping	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	External surfaces monitoring	VII.I-9 (A-78)	3.3.1-58	A
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.E-34 (S-10)	3.4.1-4	A, 314
Tank	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	Aboveground Steel Tanks	VIII.E-39(S-31)	3.4.1-20	A
Tank	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Aboveground Steel Tanks	VIII.E-40(S-13)	3.4.1-6	A
Tank	Pressure boundary	Carbon steel	Concrete (ext)	Loss of material	Aboveground Steel Tanks	--	--	G
Valve body	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water Chemistry Control – Primary and Secondary	VIII.E-34(S-10)	3.4.1-4	A, 314
Valve body	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	External surfaces monitoring	VII.I-9 (A-78)	3.3.1-58	A

In addition, LRA section 3.3.2.1.19, Environment, is revised to add air – outdoor and concrete and LRA section 3.3.2.1.19, Aging Management Programs, is revised to add reference to the Above Ground Steel Tanks Program.



Entergy Nuclear Northeast  
Indian Point Energy Center  
450 Broadway, GSB  
P.O. Box 249  
Buchanan, NY 10511-0249  
Tel 914 788 2055

Fred Dacimo  
Vice President  
License Renewal

January 4, 2008

Re: Indian Point Units 2 & 3  
Docket Nos. 50-247 & 50-286

NL-08-004

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

SUBJECT: **Reply to Request for Additional Information  
Regarding License Renewal Application –  
(Steam Generator Tube Integrity and Chemistry)**

Reference: NRC letter dated December 7, 2007; "Requests for Additional Information for the Review of the Indian Point Nuclear Generating Unit Nos. 2 and 3, License Renewal Application"

Dear Sir or Madam:

Entergy Nuclear Operations, Inc is providing, in Attachment I, the additional information requested in the referenced letter pertaining to NRC review of the License Renewal Application for Indian Point 2 and Indian Point 3. The additional information provided in this transmittal addresses staff questions regarding Steam Generator Tube Integrity and Chemistry.

There are no new commitments identified in this submittal. If you have any questions or require additional information, please contact Mr. R. Walpole, Manager, Licensing at (914) 734-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 1-4-08.

Sincerely,

*Fred R. Dacimo*  
Fred R. Dacimo *per telecon*  
Vice President  
License Renewal

cc: next page

cc: Mr. Bo M. Pham, NRC Environmental Project Manager  
Ms. Kimberly Green, NRC Safety Project Manager  
Mr. John P. Boska, NRC NRR Senior Project Manager  
Mr. Samuel J. Collins, Regional Administrator, NRC Region I  
Mr. Sherwin E. Turk, NRC Office of General Counsel, Special Counsel  
Mr. Mark Cox, NRC Senior Resident Inspector, IP2  
Mr. Paul Cataldo, NRC Senior Resident Inspector, IP3  
Mr. Paul D. Tonko, President, NYSERDA  
Mr. Paul Eddy, New York State Dept. of Public Service

**ATTACHMENT I TO NL-08-004**

**REPLY TO NRC REQUEST FOR ADDITIONAL INFORMATION  
REGARDING  
LICENSE RENEWAL APPLICATION  
(Steam Generator Tube Integrity and Chemistry)**

**ENTERGY NUCLEAR OPERATIONS, INC  
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 and 3  
DOCKETS 50-247 and 50-286**

INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3  
LICENSE RENEWAL APPLICATION (LRA)  
REQUESTS FOR ADDITIONAL INFORMATION (RAI)

The U.S. Nuclear Regulatory Commission (NRC or staff) has reviewed the information related to Steam Generator Tube Integrity and Chemistry provided by the applicant in the Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3) LRA. The staff has identified that additional information is needed to complete the review as addressed below.

**RAI 3.1.2.2.14-1**

LRA Table 3.1.1, Item 3.1.1-32, and LRA Section 3.1.2.2.14 "Wall Thinning due to Flow Accelerated Corrosion" state that: "Wall thinning due to flow-accelerated corrosion could occur in steel feedwater inlet rings and supports and the Steam Generator Integrity Program manages loss of material due to flow-accelerated corrosion in the feedwater inlet ring using periodic visual inspections." LRA Section B.1.35 contains a description of the Steam Generator Integrity Program but does not mention monitoring flow accelerated corrosion (FAC) in the feedwater inlet ring.

- What is the frequency of these secondary side inspections of the feedwater inlet ring?
- When was the last inspection completed?
- What were the acceptance criteria?
- What were the results of the last inspection?

**Response for RAI 3.1.2.2.14-1**

As stated in the Steam Generator Integrity Program description, the program includes processes for monitoring and maintaining secondary side components. Visual inspections of feedwater rings are performed by qualified personnel using approved NDE processes and procedures. The inspection frequency is based on the results of degradation, condition monitoring and operational assessments. These assessments consider the age of the steam generators, prior inspection results and industry experience with comparable steam generators in determining the frequency and extent of steam generator inspections.

Feedwater ring inspections have not been performed in the IP2 steam generators (SG) since their replacement in 2000. Inspections are scheduled for two steam generators in 2010.

The feedwater rings were inspected in the IP3 SGs in 1992 (all 4), 1997 (34 SG), 1999 (33 SG), 2001 (32 SG) & 2007 (31 & 32 SGs). The inspections performed in 1997 through 2007 consisted of a visual exam of the OD of the ring and a fiberscope inspection of the ID of 5 selected J-nozzles (of 36 total) and the feedwater ring tee. The next feedwater ring inspection for IP3 is planned for two SGs in 2013.

The acceptance criterion for the inspection is the absence of any anomalous conditions. Any anomalous conditions require further evaluation.

No anomalies were noted in the inspections other than the appearance of minor washed out areas on the exterior of the feedwater ring beneath the outlets of the J-nozzles. The feedwater entering the steam generators exits the J-nozzles welded to the feedwater ring such that the discharge is directed downward towards the exterior of the feedwater ring. The feedwater ring is a carbon steel pipe that has a thin oxide film on the exterior surface. The flow from the J-nozzles prevents this oxide buildup giving the appearance of washed out areas where this feedwater impact occurs. Visual inspections of these washed out areas have not identified loss of material on the feedwater ring.

**RAI B.1.15-1**

LRA Table 3.1.2-4-IP2, the last component on page 3.1-152, is blowdown pipe connection (nozzle). The interior surface aging management program (AMP) credited for monitoring degradation is Water Chemistry Control-Primary and Secondary, and refers to NUREG-1801, Vol. 2, Rev. 1, "Generic Aging Lessons Learned (GALL) Report," Table IV, Item IV.D2-8.

- Since the component is a nozzle, explain why Item IV.D2-8. is cited here, rather than GALL Item IV.D2-7 which lists FAC as the AMP.
- Is the steam generator blowdown nozzle in the FAC program?

**Response for RAI B.1.15-1**

The blowdown system piping external to the steam generators is susceptible to loss of material due to flow accelerated corrosion and is managed by the Flow Accelerated Corrosion Program. The steam generator blowdown nozzles are part of the blowdown system piping and are included in the FAC program. The LRA is clarified to add the following line item to LRA tables 3.1.2-4-IP2 and 3.1.2-4-IP3.

Blowdown pipe connection (nozzle)	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Flow Accelerated Corrosion	IV.D2-7 (R-38)	3.1.1-59	C
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LRA Table 3.1.1, Item 3.1.1-59, Discussion column is revised to add the following sentence.

“The carbon steel steam generator blowdown pipe connection is susceptible to flow accelerated corrosion.”

**RAI B.1.15-2**

It is noted that both units have been approved for stretch power uprates within the past three years – Unit 2 in 2004 and Unit 3 in 2005.

- Provide details on any changes made to the FAC program to account for changes to process variables resulting from the power uprates.
- Which piping systems/components are the most susceptible to FAC?
- How accurately has the CHECWORKS™ model predicted changes in FAC wear rates for the top four most susceptible systems/components for each unit since the power uprates were implemented?

### **Response for RAI B.1.15-2**

- Inputs to the Flow Accelerated Corrosion Program include operating parameters such as flow rates and operating temperatures, in addition to the results of previous wall thickness measurements. The Unit 2 and Unit 3 programs were updated to reflect the changes to plant operating parameters due to the stretch power uprates (SPU). The revised programs determine inspection locations based on the SPU operating parameters.
- Many of the previously most susceptible locations have been replaced with FAC-resistant materials. The IP2 system most susceptible to FAC is the extraction steam system with the most susceptible component being the 3<sup>rd</sup> point extraction steam line from the LP turbine to the 23 feedwater heaters. This piping is non safety-related piping that is included in the scope of license renewal based on the criteria of 10 CFR 54.4(a)(2). The IP3 system most susceptible to FAC is the extraction steam system with the most susceptible component being the 5<sup>th</sup> point extraction steam line from the pre-separators to the 35 feedwater heaters. This piping is non safety-related piping that is included in the scope of license renewal based on the criteria of 10 CFR 54.4(a)(2).
- The input to the CHECWORKS modeling program includes plant operating parameters such as flow rates, operating temperatures and piping configuration, as well as measured wall thicknesses from FAC Program components. This input, in conjunction with the CHECWORKS predictive algorithm, is used to predict the rate of wall thinning and remaining service life on a component-by-component basis. The value of the model lies in its ability to predict wear rates based on changing parameters, such as flow rate, without having to have actual measured wall thickness values. The predictive algorithms built into CHECWORKS are based on available laboratory data and FAC data from many plants. CHECWORKS was designed, and has been shown, to handle large changes in chemistry, flow rate and or other operating conditions. In its use throughout the industry, the CHECWORKS model has been benchmarked against measurements of wall thinning for components operating over a wide range of flow rates. Consequently, the validity of the model does not depend on benchmarking against plant-specific measured wear rates of components operating under SPU conditions. In addition, by the time IPEC enters the period of extended operation (in the year 2013), inspection data under SPU conditions will have been obtained. These additional data sets, when added to the CHECWORKS database, will result in more refined wear rate predictions. Since the previously most susceptible locations have been replaced, wear rates are low. Due to the low wear rates, the small changes in operating parameters due to SPU, and the relatively short time since SPU, changes to wear rates since SPU will be very small. The accuracy of the model is not expected to change significantly due to the SPU.

### **RAI B.1.4-1**

LRA Section B.1.4 states that the Boron Surveillance Program acceptance criteria for measurements are as follows: Neutron attenuation testing and B-10 areal density is equal to or greater than the B-10 gm/cm<sup>2</sup> nominal density assumed in the criticality analysis.

- What was the subcritical margin used in the criticality analysis?
- How does this acceptance criterion account for potential degradation between surveillance periods?

- Please confirm that Indian Point Unit 3 has sufficient boral coupon samples to maintain the sampling frequency through the period of extended operation.

#### **Response for RAI B.1.4-1**

Keff <0.95 is the margin to criticality used in the criticality analyses.

Use of Keff <0.95 as the margin to criticality acceptance criteria is consistent with NUREG 0800. IP3 boral coupon surveillance results to date have not identified any loss of neutron absorption capability between surveillance periods such that the current criterion remains acceptable for use. This is consistent with industry experience.

IP3 has sufficient boral coupon samples to maintain the sampling frequency through the period of extended operation.

#### **RAI B.1.8-1**

LRA Section B.1.8, Containment Inservice Inspection Program, is the program credited for condition monitoring of protective coatings in containment. However, the description of this program only addresses the containment liner, integral attachments on the liner and the concrete surfaces. It does not address other steel surfaces in containment with protective coatings.

- How is the condition of the protective coatings on other metal surfaces, other than the containment liner, monitored?
- Describe the frequency and scope of the inspections, acceptance criteria, and the qualification of personnel who perform containment coatings inspections.

#### **Response for RAI B.1.8-1**

The condition of the protective coatings on metal surfaces at IP, other than the containment liner, is monitored by Structures Monitoring Program (SMP). The SMP governs monitoring the condition of structures or components of structures, including the condition of their protective coatings, as required by 10 CFR 50.65, the maintenance rule.

The structures are inspected every 5 years and normally inaccessible areas are inspected every 10 years.

Scope of the inspections includes visual inspection of the coated surfaces for signs of degradation (blistering, peeling, flaking, pinhole, rusting, splitting, and discoloration). The degradation observed during the inspections is evaluated to determine if the current condition is acceptable or further monitoring or corrective actions are necessary. Industry codes and standards including the maintenance rule, ASME section XI, and building codes are used to perform these evaluations and make determinations as to whether or not the structures are capable of performing their intended functions. A structure is classified as acceptable if it is capable of performing its structural functions, including protection or support of safety-related equipment.

The inspections are performed by inspection engineers (IR) under the direction of the responsible engineer (RE). The RE is a degreed civil/structural engineer with at least 10 years of related experience and a registered professional engineer. The RE and IR must be knowledgeable in the design, evaluation, and performance requirements of structures. The IR must be qualified to perform visual examination either directly or remotely to detect evidence of degradation.

Additionally, in response to Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on PWR Sump Performance", the Civil/Structural group visually inspects coatings in the vapor containment building during refueling outages. The frequency of the inspection will be at least once every two (2) years or every cycle during the refueling outage. Adverse conditions will be resolved or evaluated as acceptable prior to exiting the refueling outage.