



# ENERGY NORTHWEST

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December 21, 2010  
GO2-10-180

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

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397  
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION  
LICENSE RENEWAL APPLICATION**

- Reference:
- 1) Letter, GO2-10-11, dated January 19, 2010, WS Oxenford (Energy Northwest) to NRC, "License Renewal Application"
  - 2) Letter, GO2-10-117, dated August 19, 2010, SK Gambhir (Energy Northwest) to NRC, "Response to Request for Additional Information License Renewal Application"
  - 4) Letter, GO2-98-193, dated November 11, 1993, JV Parrish to NRC, "Response to Request for Information Related to Generic Letter 98-04"

Dear Sir or Madam:

By Reference 1, Energy Northwest requested the renewal of the Columbia Generating Station (Columbia) operating license. In Reference 2, Energy Northwest responded to a request for additional information (RAI) concerning the program for the monitoring and the maintenance of protective coatings at Columbia. Specifically, in RAI XI.S8-1 the Nuclear Regulatory Commission (NRC) staff questioned the Energy Northwest protective coating program and why the program was not credited for aging management. At the time of the response to this RAI, Energy Northwest did not credit the coatings program for aging management per the guidance of Generic Aging Lessons Learned (GALL) revision 1.

Subsequently, based on recent discussions with NRC staff, Energy Northwest has agreed to incorporate the Columbia Service Level 1 Protective Coatings Program into the License Renewal Application (LRA) to address GALL Revision 2 requirements. This change in the LRA does not change the scope of the coatings program or the need for the coatings to manage aging.

A143  
NRK

The changes to the LRA are provided in the enclosure to this letter, as Amendment 14. The new commitment is shown in Table A-1, as item 62.

If you have any questions or require additional information, please contact Abbas Mostala at (509) 377-4197.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the date of this letter.

Respectfully,



SK Gambhir  
Vice President, Engineering

Enclosures License Renewal Application, Amendment 14

cc: NRC Region IV Administrator  
NRC NRR Project Manager  
NRC Senior Resident Inspector/988C  
BE Holian - NRC NRR  
EFSEC Manager

RN Sherman – BPA/1399  
WA Horin - Winston & Strawn  
EH Gettys - NRC NRR (w/a)  
RR Cowley - WDOH

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION  
LICENSE RENEWAL APPLICATION**

Enclosure

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LRA Section 3.5.2.1.1

- Concrete
  - Elastomer
  - Galvanized Steel
  - Stainless Steel
- ← Add "Protective Coating"

Materials for bulk commodity components are addressed in Section 3.5.2.1.13.

### Environments

Primary Containment structural components subject to AMR are exposed to the following environments:

- Concrete
- Air-indoor
- Treated water
- Raw water

Environments for bulk commodity components are addressed in Section 3.5.2.1.13.

### Aging Effects Requiring Management

The following aging effect associated with the Primary Containment structural components requires management:

- Loss of material
- ← Add "Loss of coating integrity"

Aging effects requiring management for bulk commodity components are addressed in Section 3.5.2.1.13.

### Aging Management Programs

The following programs are credited for managing the effects of aging on the Primary Containment structural components:

- Inservice Inspection (ISI) Program – IWE
  - Inservice Inspection (ISI) Program – IWF
  - Appendix J Program
  - Structures Monitoring Program
  - BWR Water Chemistry Program
- ← Add "Service Level 1 Protective Coatings Program"

Aging management programs for bulk commodity components are addressed in Section 3.5.2.1.13.

**Table 3.5.1 Summary of Aging Management Programs for Structures and Component Supports  
 Evaluated in Chapters II and III of NUREG-1801**

Item Number	Component/Commodity	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-25	All Groups except Group 6: steel components: all structural steel	Loss of material due to corrosion	Structures Monitoring Program. If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include provisions to address protective coating monitoring and maintenance.	Yes, if not within the scope of the applicant's structures monitoring program	<p><del>Consistent with NUREG-1801.</del></p> <p><del>The Structures Monitoring Program is credited for aging management of this aging effect and mechanism. The effect of coating debris on ECCS pump suction strainers has been evaluated to have no safety impact on strainer operation (see FSAR Section 6.1.2). Containment coatings are subject to ongoing oversight that addresses their current status and will continue to address their status over the period of license renewal.</del></p> <p><del>Protective coatings are not relied upon to manage the effects of aging at Columbia.</del></p> <p><del>Refer to Section 3.5.2.2.2.1 for further information.</del></p>

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Consistent with NUREG-1801.

The Structures Monitoring Program is credited for aging management of this aging effect and mechanism.

Protective coatings are not relied upon to manage the effects of aging for structures at Columbia.

Coatings inside the Containment are credited to maintain coating integrity and to ensure the Design Basis Accident (DBA) analysis limits with regard to coatings will not be exceeded for the suction strainers. The Service Level 1 Protective Coatings Program is credited to manage coatings inside Containment.

Refer to Section 3.5.2.2.2.1 for further information.

**Table 3.5.2-1 Aging Management Review Results - Primary Containment**

Row No.	Component / Commodity	Intended Function <sup>1</sup>	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
33	Drywell Floor Support Columns	SSR	Concrete	Air - indoor	None	Structures Monitoring Program	N/A	N/A	I 0501
34	Drywell Floor Support Columns	SSR	Concrete	Treated water	None	Structures Monitoring Program	N/A	N/A	I 0501
35	Drywell Sumps	DF, FLB, SSR	Concrete	Air - indoor	None	Structures Monitoring Program	N/A	N/A	I 0501
36	Floor Trench	DF, SSR	Concrete	Air - indoor	None	Structures Monitoring Program	N/A	N/A	I 0501
37	Reactor Pedestal	SSR	Concrete	Air - indoor	None	Structures Monitoring Program	N/A	N/A	I 0501
38	Reactor Pedestal	SSR	Concrete	Treated water	None	Structures Monitoring Program	N/A	N/A	I 0501
39	Reinforced Concrete Lining Inside the Bottom Head of the Primary Containment Vessel	SSR	Concrete	Treated water	None	Structures Monitoring Program	N/A	N/A	I 0501
40	Sacrificial Shield Wall	EN, MB, SHD, SNS, SSR	Concrete	Air - indoor	None	Structures Monitoring Program	N/A	N/A	I 0501
41	Sand Filled Pocket Area	DF, FLB, SSR	Concrete (w/ Sand)	Air - indoor	None	Structures Monitoring Program	N/A	N/A	I 0501 0504
<p><sup>1</sup> Refer to Table 2.0-1 for intended function descriptions.</p>									

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Table 3.5.2-1 Aging Management Review Results – Primary Containment									
Row No.	Component / Commodity	Intended Function <sup>1</sup>	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
42	Service Level 1 Coatings	SNS, SSR	Protective Coating	Air - indoor	Loss of coating integrity	Service Level 1 Protective Coatings Program	N/A	N/A	J
43	Service Level 1 Coatings	SNS, SSR	Protective Coating	Treated water	Loss of coating integrity	Service Level 1 Protective Coatings Program	N/A	N/A	J



The Supplemental Piping/Tank Inspection is a new one-time inspection that will be implemented prior to the period of extended operation. The inspection activities will be conducted within the 10-year period prior to the period of extended operation.

#### **A.1.2.52 Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS) Program**

The Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will manage reduction of fracture toughness due to thermal aging and neutron irradiation embrittlement of CASS reactor vessel internals.

The program includes: (a) identification of susceptible components determined to be limiting from the standpoint of thermal aging or neutron irradiation embrittlement (neutron fluence), (b) a component-specific evaluation to determine each identified component's susceptibility to reduction of fracture toughness, and (c) a supplemental examination of any component not eliminated by the component-specific evaluation.

The program credits portions of the Inservice Inspection (ISI) Program and the BWR Vessel Internals Program.

The Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new aging management program that will be implemented prior to the period of extended operation.

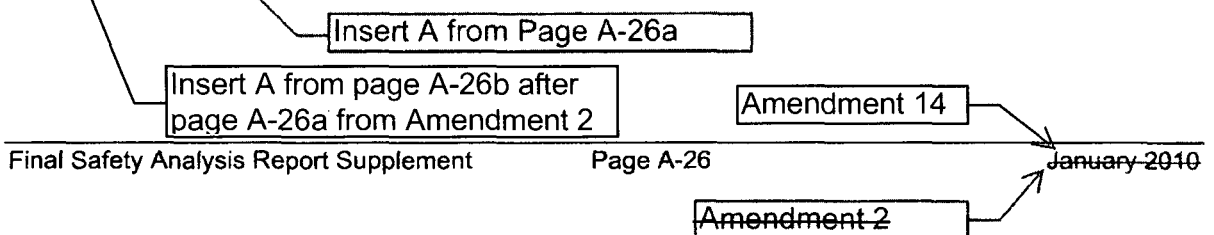
#### **A.1.2.53 Water Control Structures Inspection**

The Water Control Structures Inspection, implemented as part of the Structures Monitoring Program, consists of inspection activities to detect aging and age-related degradation. The Water Control Structures Inspection ensures the structural integrity and operational adequacy of the spray ponds, standby service water pump houses, circulating water pump house (including circulating water basin), makeup water pump house, cooling tower basins, and those structural components within the structures.

The Water Control Structures Inspection is an existing program that requires enhancement prior to the period of extended operation.

#### **A.1.3 Evaluation of Time-Limited Aging Analyses**

In accordance with 10 CFR 54.21(c), an application for a renewed operating license requires an evaluation of TLAAs for the period of extended operation. The following TLAAs have been identified and evaluated to meet this requirement.



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**A.1.2.55 Service Level 1 Protective Coatings Program**

The Service Level 1 Protective Coatings Program monitors the performance of Service Level 1 coatings inside containment through periodic coating examinations, condition assessments, and remedial actions including repair or testing. The program establishes roles, responsibilities, controls and deliverables for the Service Level 1 Protective Coatings Program. This program also ensures the Design Basis Accident (DBA) analysis limits with regard to coatings will not be exceeded for the suction strainers.

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<b>Table A-1 Columbia License Renewal Commitments</b>			
<b>Item Number</b>	<b>Commitment</b>	<b>FSAR Supplement Location (LRA App. A)</b>	<b>Enhancement or Implementation Schedule</b>
61) Boron Carbide Monitoring Program	The Boron Carbide Monitoring Program is an existing program that will be continued for the period of extended operation.	A.1.2.54	Ongoing

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Amendment 14

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<b>Item Number</b>	<b>Commitment</b>	<b>FSAR Supplement Location (LRA App. A)</b>	<b>Enhancement or Implementation Schedule</b>
62) Service Level 1 Protective Coatings Program	The Service Level 1 Protective Coatings Program is an existing program that will be continued for the period of extended operation.	A.1.2.55	Ongoing

**Table B-1**  
**Correlation of NUREG-1801 and Columbia Aging Management Programs**  
**(continued)**

Number	NUREG-1801 Program	Corresponding Columbia AMP
XI.S8	<del>Protective Coating Monitoring and Maintenance Program</del>	<del>Not credited for aging management. Columbia does not credit coatings inside the containment to manage the effects of aging for structures and components or to ensure that the intended functions of coated structures and components are maintained. Therefore, these coatings do not have an intended function and do not require aging management for license renewal.</del>
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements Program See Section B.2.19.
XI.E2	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits Program See Section B.2.20.
XI.E3	Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements Program See Section B.2.32.
XI.E4	Metal-Enclosed Bus	Metal-Enclosed Bus Program See Section B.2.40.

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Number	NUREG-1801 Program	Corresponding Columbia AMP
XI.S8	Protective Coating Monitoring and Maintenance Program	Not credited for aging management of structures. Coatings inside the Containment are credited to maintain coating integrity and to ensure the Design Basis Accident (DBA) analysis limits with regard to coatings will not be exceeded for the suction strainers. The plant-specific Service Level 1 Protective Coatings Program is credited for managing coatings inside Containment. See Section B.2.55.

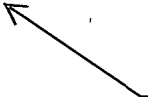
**Table B-1**  
**Correlation of NUREG-1801 and Columbia Aging Management Programs**  
**(continued)**

Number	NUREG-1801 Program	Corresponding Columbia AMP
N/A	Plant-Specific Program	High-Voltage Porcelain Insulators Aging Management Program See Section B.2.31.
N/A	Plant-Specific Program	Potable Water Monitoring Program See Section B.2.43.
N/A	Plant-Specific Program	Preventive Maintenance – RCIC Turbine Casing See Section B.2.44.

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page B-18a from Amendment 2



Amendment 14

Amendment 2



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Number	NUREG-1801 Program	Corresponding Columbia AMP
N/A	Plant-Specific Program	Service Level 1 Protective Coatings Program See Section B.2.55.



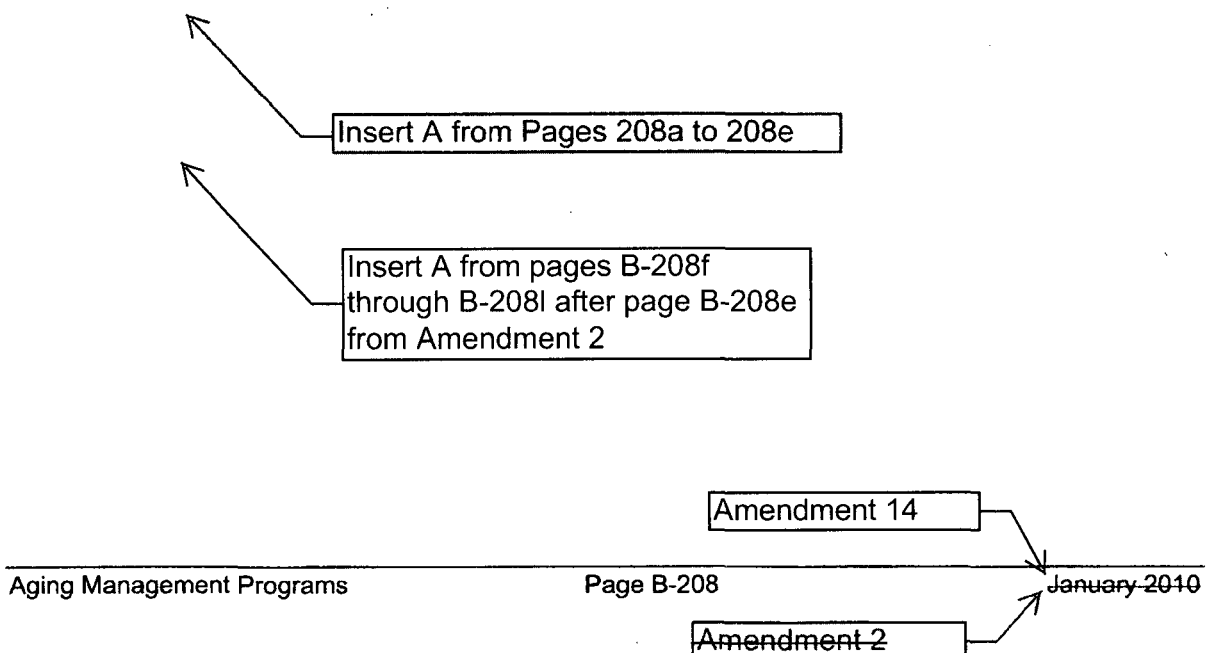
minor cracking of concrete damwork around the intake bays. No condition was deemed to require immediate or long-term resolution. Minor "cosmetic" imperfections with the concrete (blemishes, cure voids, surface cracks, etc.) were noted. These minor imperfections will continue to be monitored, but they currently pose no concern to the structural condition of the area.

The Water Control Structures Inspection, implemented as part of the Structures Monitoring Program, provides reasonable assurance that aging effects are being managed for Columbia's water control structures. This has been demonstrated through inspection reports, program health reports, and the corrective action program.

The site corrective action program and ongoing review of industry operating experience will be used to ensure that the program continues to be effective in managing the identified aging effects.

### Conclusion

The Water Control Structures Inspection with enhancements, as part of the Structures Monitoring Program, will be capable of detecting and managing aging effects for structures within the scope of license renewal. The continued implementation of the Water Control Structures Inspection, with the required enhancements, provides reasonable assurance that the effects of aging will be managed so that components subject to aging management review will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.



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## **B.2.55 Service Level 1 Protective Coatings Program**

### **Program Description**

The Service Level 1 Protective Coatings Program is an existing plant-specific aging management program that monitors the performance of Service Level 1 coatings inside containment through periodic coating examinations, condition assessments, and remedial actions including repair or testing. The program establishes roles, responsibilities, controls and deliverables for the Service Level 1 Protective Coatings Program. Service Level 1 coatings are subject to the requirements of ANSI N101.2-1972, ANSI N101.4-1972, applicable sections of ANSI N5.12, and programmatic controls. This program also ensures the Design Basis Accident (DBA) analysis limits with regard to coatings will not be exceeded for the suction strainers. Current FSAR limits allows for 5,000 square feet of unqualified coating in the drywell and 4,000 square feet of unqualified coating in the suppression pool (wetwell). The program is implemented as described in the Columbia's response to NRC Generic Letter 98-04 approved by the NRC. The Service Level 1 Protective Coatings Program provides reasonable assurance that potentially detrimental aging effects will be adequately detected such that Service Level 1 protective coatings are maintained consistent with the current licensing basis for the period of extended operation.

### **NUREG-1801 Consistency**

The Service Level 1 Protective Coatings Program is an existing Columbia program that is plant-specific.

### **Aging Management Program Elements**

The results of an evaluation of each program element are provided below.

- **Scope of Program**

The Service Level 1 Protective Coatings Program monitors the performance of Service Level 1 coatings inside containment through periodic coating examinations, condition assessments, and remedial actions including repair or testing. The Service Level 1 Protective Coatings Program ensures that Columbia does not exceed the licensing limit of 5,000 square feet of unqualified coatings in the drywell and 4,000 square feet of unqualified coatings in the wetwell per response to GL 98-04.

The program consists of periodic visual inspections of the Service Level 1 coatings looking for any visible defects, such as blistering, cracking, flaking, peeling, delamination, or rusting. The program was established in accordance with the guidance provided in ASTM D 5163 "Standard Guide for Establishing Procedures to

Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant.”

The qualification testing of Service Level 1 coatings used for new applications or used as maintenance coatings for repair and replacement activities inside containment meets the applicable requirements contained in ANSI N101.4 “Quality Assurance for Protective Coatings Applied to Nuclear Facilities,” ANSI N 45.2 “Quality Assurance Program Requirements for Nuclear Power Plants,” and Regulatory Guide (RG) 1.54 Rev. 0, “Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants.” Protective coatings have also been evaluated to meet the testing standards of ANSI N 101.2 “Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities” and ASTM D 3911, “Standard Method for Evaluating Coatings used in Light-Water Nuclear Power Plants at Simulated Design Basis Accident (DBA) Conditions.”

- Preventive Actions

The Service Level 1 Protective Coatings Program is a condition monitoring program that does not include preventive actions. No actions are taken as part of the Service Level 1 Protective Coatings Program to prevent aging effects or mitigate age-related degradation

- Parameters Monitored or Inspected

The Service Level 1 Protective Coatings Program monitors Service Level 1 coating in accordance with ASTM D 5163, “Standard Guide for Establishing Procedures to Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant” and ASTM D 714, “Standard Test method for Evaluating Degree of Blistering of Paints.” For Service Level 1 Coating applications, inspection are verified and documented by Quality Control (QC), in accordance with ANSI N 101.4 commitment and the Columbia QC Inspection Planning Report.

Parameters monitored or inspected by the Service Level 1 Protective Coatings Program include any visible defects, such as blistering, cracking, flaking, peeling, delamination and rusting. Any area identified as degrading is noted and identified for future inspections. Physically identifying the current area of degradation facilitates evaluation of degradation rate.

- Detection of Aging Effects

A visual containment inspection is performed for evidence of degraded qualified coatings during each refueling outage (approximately every two years) in accordance with the guidance in ASTM D 5163 “Standard Guide for Establishing Procedures to Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant.” The containment inspection includes a walkdown of the accessible drywell area. For the wetwell, the inspection consists of a scuba dive examination of the submerged Service Level 1 Coatings. A qualified diver (Level II Coating Inspector) is required for the inspection. Wetwell inspections require the supervision of a Level III Inspection Team Leader. Once the inspection has been performed, the coating inspector and coating engineer review the inspection

evaluation and identify any emergent work areas. Areas of degradation are documented with a condition report and work requests initiated, repairs are made as necessary prior to start-up. Inspection data sheet contains unsatisfactory and general coating condition (blisters, cracks, thickness data, peeling, rusting, estimated ft<sup>2</sup>, test data, degradation rate, etc.)

The individuals who perform coating inspections maintain a Level II or Level III Qualification per ANSI N45.2.6, "Qualifications of Inspection, Examination and Testing Personnel for Nuclear Power Plants."

- **Monitoring and Trending**

The Service Level 1 Protective Coatings Program incorporates guidance from ASTM D 5163 "Standard Guide for Establishing Procedures to Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant." The qualified coating engineer develops and manages the Service Level 1 Protective Coatings Program. Inspection results are reviewed and corrective action is taken, including repair, testing, or evaluation for any identified degradation. The inspection report provides a prioritization list of the repair areas required during the same outage and next outage. Degradation that is not repaired or removed is evaluated in accordance with the plant's corrective action process, and degraded coating that is left in place in an area is added to the Unqualified Coatings Log and evaluated.

- **Acceptance Criteria**

Any coating that is found to be damaged or degraded is either repaired, replaced, or evaluated to determine whether it can remain in service. Any damaged or degraded coating that is left in service is entered into the Unqualified Coatings Log and evaluated against the established acceptance criteria and previous assessment results to ensure the total area of coatings postulated to fail during a LOCA is less than the design limits.

The Service Level 1 Protective Coatings Program characterizes, documents, and tests defective or deficient coatings in accordance with ASTM D 5163, "Standard Guide for Establishing Procedures to Monitor the Performance of Safety Related Coatings in an Operating Nuclear Power Plant." Coated surfaces are characterized as exhibiting blisters, cracking, flaking, peeling, delamination and rusting. Coating tests are employed for areas where the qualification is in question. Acceptance criteria are specific to the coating remaining in service until the next refueling outage when further evaluation and/or repairs can be made. The Coating Engineer and Inspector evaluate the containment inspection according to the following criteria:

- **Blistering - Signs of an acceptable blister (otherwise unacceptable):**
  - Blister is intact
  - Medium density
  - Blister has burst but no signs of corrosion product
  - Blister has burst but coating around blister still adhering to the surface

- Cracking - Signs of acceptable cracking (otherwise unacceptable):
  - No signs of corrosion product around cracking
  - Cracking area does not exceed 10 square feet (per location). The 10 square feet plant specific acceptance criteria is a 10% limit from a plant calculation that justified 100 square feet as the maximum allowable value of unqualified, cracked or peeling coatings that can be used in the Service Level 1 Protective Coatings Program.
    - Immediate repairs are required if the area at one location exceeds 10 square feet
  - Coating is adhering to the wall
- Flaking, peeling, delamination - All signs of flaking, peeling, and/or delamination are unacceptable.
  - Schedule these areas for repair during the next outage, unless the area exceeds 10 square feet. An area of this size requires immediate repairs (prior to start-up). The 10 square feet plant specific acceptance criteria is a 10% limit from a plant calculation that justified 100 square feet as the maximum allowable value of unqualified, cracked or peeling coatings that can be used in the Service Level 1 Protective Coatings Program.
- Rusting - Repair all areas of rusting (through a degraded coating) prior to startup or during the next outage.
  - Repair areas of rust exceeding 10 square feet prior to start-up

Coating tests are performed as needed and under the direction of the Coating Engineer. Testing includes adhesion tests performed to determine coating system strength (pull test, knife test or tape test) or dry film thickness readings obtained in various locations. A failure analysis of failed coatings is performed and included in the inspection report. Failure analysis identifies likely source of the coating failure and precursors to prevent future coating failures.

The final inspection reports includes a summary that lists all the areas with evident deterioration, a prioritization list of the repair areas required during the same outage and subsequent outage, inspection data sheets and photographic/video documentation. Any areas of degradation are documented with a Condition Report (CR). The Unqualified Coatings Log is updated to ensure DBA Limits of 5,000 sq. ft. in the drywell and 4,000 sq. ft. in the wetwell are not exceeded.

- Corrective Actions  
This element is common to Columbia programs and activities that are credited with aging management during the period of extended operation and is discussed in Section B.1.3.

- **Confirmation Process**  
This element is common to Columbia programs and activities that are credited with aging management during the period of extended operation and is discussed in Section B.1.3.
- **Administrative Controls**  
This element is common to Columbia programs and activities that are credited with aging management during the period of extended operation and is discussed in Section B.1.3.
- **Operating Experience**  
A review of operating experience indicates that the Service Level 1 Protective Coatings Program has been effective in monitoring coatings inside containment by identifying degraded conditions, performing evaluations and corrective actions ensuring the Design Basis Accident (DBA) analysis limits debris loading will not be exceeded for the suction strainers.

Industry operating experience is documented in NRC Regulatory Guide 1.54 and several NRC Generic Communications including Information Notice 97-13, Generic Letter 98-04, Bulletin 2003-01 and Generic Letter 2004-02 for boiling-water reactors and pressurized-water reactors. The industry experience cited in these publications deals principally with debris that could block emergency recirculation during a design basis accident.

In 2009, the coating report for Refueling Outage RFO-19 identified several instances of coating defects within the containment. All of the identified defects are slated to be repaired or any loose coating be removed during the next Refueling Outage RFO-20. Conditions reported were as follows:

Primary Containment Sacrificial Shield: The coating condition of the drywell epoxy coated steel vessel appears to be in generally good condition, with no evidence of current or incipient general coating failure. As identified in RFO-18 Inspection Report small localized areas of mechanical damage were identified primarily at the 501' elevation in the workers travel path areas due to impacts and scrapes from the movements of equipment and wear from foot traffic as identified in earlier outage reports. There is a greenish blue staining on the coating of the containment vessel concentrated in the areas of the spray nozzles starting above the 501' elevation up to approximately the 570' elevation 360 degrees around the coated steel vessel. This staining was identified in earlier outage reports and does not appear to have any evidence of current or incipient general coating failure. These areas were identified and reported in the RFO-18 Inspection Report. Coatings defects identified were:

- One area of localized mud cracking/delaminated epoxy coating (epoxy coating is peeling away from the substrate) was identified at azimuth 195° elevation 501', this area is just below the flange on a 12" to 14" diameter

pipe that is penetrating through the down comer missile shield on the outboard side of the catwalk.

- One area of rusting (rust grade 0<sup>F</sup> approximately 100% surface rusted per ASTM 0610) was identified on an embed plate attached to the vessel wall at azimuth 265° elevation 501'. The rusting appears to be concentrated to the weld area at the steel vessel/hanger plate interface and the embed plate. It appears that this hanger plate was welded to the steel vessel and not re-coated.

Primary Containment Pedestal: The coating condition of the drywell epoxy coated concrete pedestal appears to be in generally good condition, with no evidence of current or incipient general coating failure. There were several areas of localized mud cracking of the epoxy coating to the concrete substrate and mechanical impact damage. These areas are concentrated between elevation 501' and 512' and were identified and reported in the RFO-18 Inspection Report. One area of localized mud cracking/delaminated epoxy coating (epoxy coating is peeling away from the substrate) was identified at azimuth 0° elevation 501'. This area is just above an unused support brace embed on the containment pedestal wall.

Drywell General Coating Condition: The piping systems and component equipment appears to be in generally good condition, with no evidence of current or incipient general coating failure. There were several areas of rusting (rust grade 0<sup>F</sup> approximately 100% surface rusted per ASTM 0610) on the chiller piping, flanges, valve handles and flange bolting hardware. One area of rusting was identified on a weld interface area on a 18" diameter epoxy coated carbon steel pipe and 1" diameter stainless steel pipe penetration at azimuth 90° elevation 522'.

Undervessel Containment Pedestal: The coating condition of the undervessel epoxy coated concrete pedestal exhibits mud cracking over approximately 60% of the epoxy coated surfaces. Approximately seventy five (75) of these areas exhibit the epoxy coating delaminated and peeling away from the concrete substrate. The majority of these areas are concentrated to 2' to 3' above and below the catwalk. It was recommended that these areas of loose coating be removed so as not to fall into the sump pit below.

A corrective action effectiveness review evaluated completed RFO-19 work packages for application of level 1 coatings to validate appropriate level of detail exists to document operability of level 1 coatings has been performed. The effectiveness review was based on issues identified during RFO-18. The condition report noted that all essential data was not documented by the painters and QC Inspectors in records of completed work packages for qualified Level 1 Coatings application. Work package records did not consistently contain specific information that can be reviewed and validated to ensure the Level 1 Coatings application meet ASTM qualification requirements to support operability of the drywell and wetwell. The Apparent Cause was determined to be, less than adequate procedure guidance

to ensure appropriate data is captured. Reliance on "standard practices" by the painters and QC Inspectors permitted procedure quality issues to exist. Corrective action taken was to add attachments from the plant procedure to the work package with documented information. The corrective action effectiveness review did not identify documentation issues on RFO-19 coating inspection work packages.

In 2005 a condition report identified wetwell coating repair issues including observed cracks in the concrete that were estimated as being between 1/16 and 1/32 in. wide. During subsequent coating inspections it was noted that the cracks had grown in width, but not length, and the coating appears to be peeling away from the concrete creating a wider crack. Corrective action taken was to repair the coating in the subject area. This coating repair was then re-inspected during the next refueling outage in 2007 and neither the crack nor the repaired coating could be found or distinguished from the coatings of the surrounding area of the slab per discussions with coating inspectors.

The health of the Service Level 1 Protective Coatings Program is green for the 1st period of 2010. Program health is reported periodically in terms of performance indicators. No concerns were noted from the review of 2009 and 2010 program health reports.

There is sufficient confidence that the Service Level 1 Protective Coatings Program will effectively identify degradation prior to failure. Appropriate guidance for re-evaluation and repair is provided for locations where degradation is found. Assessments of the Service Level 1 Protective Coatings Program are performed to identify the areas that need improvement to maintain the quality performance of the program. The site corrective action program and ongoing review of industry operating experience provide assurance that the condition of coatings inside containment will be managed effectively during the period of extended operation.

### **Required Enhancements**

None.

### **Conclusion**

The Service Level 1 Protective Coatings Program is an existing program that has successfully monitored the performance of coatings inside containment. Proper maintenance of protective coatings has ensured that the quantities of unqualified and degraded qualified coatings inside containment are maintained below the acceptance limits. The Service Level 1 Protective Coatings Program will provide reasonable assurance that Service Level 1 protective coatings are maintained consistent with the current licensing basis for the period of extended operation.