SCE&G®
A SCANA COMPANY

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

Serial No.19-042
VCS-LIC/BB R0
Docket No. 50-395
License No. NPF-12

**VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1**
**INSERVICE INSPECTION (ISI) OWNER'S ACTIVITY REPORT (OAR) FOR REFUELING OUTAGE 24**

Enclosed is the Inservice Inspection (ISI) Owner's Activity Report (OAR) covering ISI activities associated with the first outage of the second period of the fourth ISI interval (Enclosure 1) and the Containment Inservice Inspection (CISI) Responsible Engineer Evaluation Report associated with the second outage of the first period of the third Containment Inservice Inspection (CISI) interval (Enclosure 2).

This report is submitted pursuant to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (2007 Edition through 2008 Addenda), Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, Article IWA- 6000, Records and Reports, and ASME Code Case N-532-5, Repair/Replacement Activity Documentation Requirements and Inservice Summary Report Preparation and Submission, Section XI, Division 1.

Should you have any questions, please call Michael S. Moore at (803) 345-4752.

Sincerely,

Shaun Zarandi

Shaun Zarandi
General Manager-Nuclear Support Services
V.C. Summer Nuclear Station

Commitments contained in this letter: None

Enclosures: 1) Inservice Inspection Owner's Activity Report for Refuel 24, Report Number 23
2) Containment Inservice Inspection - 2018 ASME Section XI, Subsections IWE and IWL Responsible Engineer Evaluation Report.

cc: G. J. Lindamood - Santee Cooper
C. H. Haney – NRC Region II
S. A. Williams -NRC Project Mgr.
NRC Resident Inspector

# Enclosure 1

## Inservice Inspection Owner's Activity Report For Refuel Outage 24, Report Number 23

# FORM OAR-1 OWNER'S ACTIVITY REPORT

Report Number INSERVICE INSPECTION REPORT #23

Plant VC SUMMER NUCLEAR STATION, PO BOX 88, JENKINSVILLE, SC 29065

Unit No. UNIT 1 (if applicable) Commercial service date JANUARY 1, 1984 Refueling outage no. RF-24

Applicable inspection interval ISI - Interval 4; CISI - Interval 3 (1st, 2nd, 3rd, 4th, other)

Applicable inspection period ISI - Period 2; CISI - Period 1 (1st, 2nd, 3rd)

Edition and Addenda of Section XI applicable to the inspection plans 2007 Edition through 2008 Addenda

Date and revision of inspection plans ISI - July 17, 2017 Revision 1; CISI - April 4, 2018 Revision 3B

Edition and Addenda of Section XI applicable to repair/replacement activities, if different than the inspection plans

N/A

Code Cases used for inspection and evaluation: N-532-5, N-600, N-639, N-722-1, N-770-2 (if applicable)

## CERTIFICATE OF CONFORMANCE

I certify that (a) the statements made in this report are correct; (b) the examinations and tests meet the Inspection Plan as required by the ASME Code, Section XI; and (c) the repair/replacement activities and evaluations supporting the completion of RF-24 (refueling outage number) conform to the requirements of the ASME Code, Section XI.

Signed Marissa J. Post MARISSA J. POST, ISI PROGRAM OWNER (Owner or Owner's Designee, Title) Date 1/24/2019

G. G. Williams G. G. WILLIAMS PROGRAM ENGINEERING SUPERVISOR 1/24/19

## CERTIFICATE OF INSERVICE INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by HARTFORD STEAM BOILER INSPECTION & INSURANCE CO. of HARTFORD, CT have inspected the items described in this Owner's Activity Report and state that, to the best of my knowledge and belief, the Owner has performed all activities represented by this report in accordance with the requirements of the ASME Code, Section XI.

By signing this certificate, neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the repair/replacement activities and evaluations described in this report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this inspection.

Paul D. Eales (Inspector's Signature) Commission NB#13104 AI-IS CINR (National Board Number and Endorsement)

Date 02-27-2019

## Table 1
## Items With Flaws or Relevant Conditions That Required Evaluation for Continued Service

| Examination Category and Item Number | Item and Flaw or Relevant Condition Description | Evaluation Description |
|---|---|---|
| F-A<br>F1.10B | Rigid Support MK-RCH-0318<br>Critical angle out of tolerance | Analysis of the predicted pipe movement indicated that the critical angle was within tolerance in the hot condition. CR-18-04606 |
| F-A<br>F1.10B | Rigid Support MK-CSH-0875<br>Loose jam nut | Loose jam nuts do not affect the strut's capability to perform its intended design function. Strut reworked. CR-18-04749 |
| F-A<br>F1.10B | Rigid Support MK-SIH-0143<br>Box guide gap out of tolerance | The box guide was within tolerance per GAI Erection Standards. CR-18-04706 |
| F-A<br>F1.20C | Spring Can MK-RHH-0025A<br>Loose lock nuts (2) | Loose lock nuts do not affect the spring can's capability to perform its intended design function. Spring Can reworked. CR-18-04811 |
| F-A<br>F1.30B | Rigid Support MK-CCH-0081<br>Loose jam nut,<br>thread engagement not visible | Loose jam nuts do not affect the strut's capability to perform its intended design function. Strut reworked. Thread engagement visible during QC walkdown. CR-18-04812 |
| F-A<br>F1.30B | Rigid Support MK-SWH-0150<br>Broken cotter pin | Broken cotter pins do not affect the strut's capability to perform its intended design function. Strut reworked. CR-18-04851 |

## Table 2
## Abstract of Repair/Replacement Activities Required For Continued Service

| Code Class | Item Description | Description of Work | Date Completed | Repair/Replacement Plan Number |
|---|---|---|---|---|
| 1 | XSG0002A<br>A Steam Generator | Plugged (mechanical plugs) both ends of seven (7) A Steam Generator tubes.<br>CR-18-04766 | 10/26/18 | 1711767 |
| 1 | XSG0002B<br>B Steam Generator | Plugged (mechanical plugs) both ends of one (1) B Steam Generator tube.<br>CR-18-04780 | 10/26/18 | 1711768 |
| 1 | XSG0002C<br>C Steam Generator | Plugged (mechanical plugs) both ends of two (2) C Steam Generator tubes.<br>CR-18-04786 | 10/27/18 | 1711769 |
| 1 | MK-SIH-0465<br>SI Snubber | Replaced MK-SIH-0465.<br>CR-18-04647 | 10/29/18 | 1713568 |
| 1 | MK-CSH-0972<br>CS Snubber | Replaced MK-CSH-0972.<br>CR-18-04590 | 10/30/18 | 1713538 |
| 2 | XVT-08350A-CS<br>RCP A Seal Supply Header Isolation Valve | Replaced XVT-08350A-CS.<br>CR-17-01840 | 10/31/18 | 1704591 |
| 2 | MK-EFH-119<br>EF Pipe Support | Reworked MK-EFH-119.<br>CR-18-04828 | 11/5/18 | 1818154 |
| 2 | MK-SIH-1348<br>SI Snubber | Replaced MK-SIH-1348.<br>CR-18-04864 | 11/1/18 | 1713692 |
| 2 | MK-FWH-0383<br>FW Snubber | Replaced MK-FWH-0383.<br>CR-18-04498 | 11/4/18 | 1713619 |
| 2 | MK-CSH-4011<br>CS Snubber | Replaced MK-CSH-4011.<br>CR-18-04690 | 11/1/18 | 1714131 |
| 2 | MK-BDH-0036<br>BD Snubber | Replaced MK-BDH-0036.<br>CR-18-04802 | 10/31/18 | 1713602 |
| 3 | XVB-03121A-SW<br>Diesel Generator Cooler A SW Return Valve | Repaired valve body.<br>CR-18-04572 | 10/24/18 | 1817781 |
| 3 | XVB-03121B-SW<br>Diesel Generator Cooler B SW Return Valve | Replaced flange and piping downstream of valve.<br>CR-18-03296 | 11/1/18 | 1814841 |

## Table 2 (Cont'd)
## Abstract of Repair/Replacement Activities Required For Continued Service

| Code Class | Item Description | Description of Work | Date Completed | Repair/Replacement Plan Number |
|---|---|---|---|---|
| 3 | XVB-03123B-SW CC Heat Exchanger B SW Return Valve | Repaired SW tee gouge downstream of valve. CR-18-02718 | 10/31/18 | 1816254 |
| 3 | XVG-03113A-SW SW Screen Wash A Isolation Valve | Replaced valve disc. CR-17-05814 | 11/7/18 | 1706193 |
| 3 | XVG-03102A-SW SW Screen Wash A Man Isolation Valve | Replaced valve disc. CR-18-03901 | 10/20/18 | 1816298 |
| 3 | SW Screen Wash A Discharge piping | Replaced piping. CR-17-01507 | 11/9/17 | 1703794 |
| 3 | XVD-08523B-CS Mixed Bed Demin B Resin Fill Valve | Reinstalled valve following removal of temporary flange assembly. CR-17-06170 | 6/28/18 | 1718480 |
| 3 | SW Pump Motor B Recirculation piping | Replaced piping. CR-18-04914 | 11/9/18 | 1818524 |
| 3 | MK-SWH-1028 SW Pipe Support | Replaced MK-SWH-1028. CR-18-04914 | 11/9/18 | 1818524 |
| 3 | MK-SWH-1029 SW Pipe Support | Replaced MK-SWH-1029. CR-18-04914 | 11/9/18 | 1818524 |
| 3 | SW RBCU B Discharge piping | Replaced piping. CR-17-01542 | 11/1/18 | 1703967 |
| 3 | SW 3" piping | Replaced piping. CR-18-03445 | 9/21/18 | 1815075 |
| 3 | FW 18" pipe elbow | Replaced elbow. CR-17-01912 | 11/8/18 | 1704626 |
| 3 | MK-SWH-4021 SW Pipe Support | Reworked MK-SWH-4021. CR-18-02931 | 9/24/18 | 1813577 |
| 3 | XVC-08443-CS Boric Acid Blender Inlet Header Check Valve | Replaced valve disc assembly. | 10/19/17 | 1607387 |

# Enclosure 2

## Containment Inservice Inspection-2018 ASME Section XI, Subsections IWE and IWL Responsible Engineer Evaluation Report

# CONTAINMENT INSERVICE INSPECTION - 2018

# ASME SECTION XI, SUBSECTIONS IWE AND IWL

VIRGIL C. SUMMER NUCLEAR STATION

RESPONSIBLE ENGINEER EVALUATION REPORT

January 16, 2019

Prepared By:
Roy J. Russell, P.E.
IWE/ IWL Responsible Engineer

# CONTAINMENT INSERVICE INSPECTION - 2018
# ASME SECTION XI, SUBSECTIONS IWE AND IWL
# RESPONSIBLE ENGINEER EVALUATION REPORT

## TABLE OF CONTENTS

# CONTAINMENT INSERVICE INSPECTION - 2018
# ASME SECTION XI, SUBSECTIONS IWE AND IWL
# RESPONSIBLE ENGINEER EVALUATION REPORT

## 1.0 INTRODUCTION

This report evaluates the Containment In-service Inspections which were conducted in accordance with the requirements of 10CFR50.55a at the Virgil C. Summer Nuclear Station (VCSNS) during the period of October through November 2018.

## 2.0 SCOPE

The Containment In-service Inspection (CISI) Program Plan (ISE-4) details the requirements for the examination and testing of ASME Section XI Class MC and Class CC components at the VC Summer Nuclear Station (VCSNS). This Program Plan was developed in accordance with the requirements of the 2007 Edition (with Addenda through 2008) of the ASME Boiler and Pressure Vessel Code, Section XI, Division 1, Subsections IWE and IWL, as modified by NRC final rulemaking to 10 CFR 50.55a published in the Federal Register on November 5, 2014. This Program Plan was developed using the guidance of "Containment Inspection Program Guide, (ASME Section XI, Subsections IWE and IWL)", EPRI document GC-110698.

The components subject to ASME Section XI, Subsection IWE and IWL requirements are those that make up the containment structure, its leak-tight barrier (including integral attachments), and those that contribute to its structural integrity.

Specifically included are Class MC pressure retaining components and their integral attachments, (including metallic shell and penetration liners of Class CC pressure retaining components and their integral attachments), per IWE-1100; and Class CC reinforced concrete containments and post-tensioning systems, per IWL-1100.

The terms "Class MC" and "Class CC" are used in Section XI to identify components which meet the functional definitions in IWE-1100 and IWL-1100; however, these terms should not be equated with components and items that are designed per ASME Section III, Class MC and Class CC requirements. Typically, the scope of components and items subject to ASME Section III for Class MC containment vessels and Class CC pre-stressed and reinforced concrete containments extends beyond that of ASME Section XI, Subsections IWE and IWL.

This Program Plan is effective from January 1, 2017 to December 31, 2026 for Subsection IWE and Subsection IWL activities. IWE and IWL inspections will be performed according to the schedules shown on Table 4.1.2.4-1 and Table 4.2.2.4-1 of ISE-4, respectively.

This report includes Period 1 IWE and IWL Inspections performed during the planned refueling outage (RF24) in the fall of 2018.

The scope of inspection was in accordance with the ISE-4 RF24 Outage Plan for Interval 3, Period 1 and included the following component inspections identified in ISE-4 and shown on the ISI drawings listed in ISE-4, Appendix A:

- Containment Liner, Penetrations, and Sumps
- Hatches, Transfer Tube, and Airlocks
- Containment Moisture Barrier at EL. 412' Reactor Building (Augmented)
- Valve Chambers and Guard Pipes for "A" and "B" RHR and RB Spray at EL. 397' Auxiliary Building (Augmented)
- Concrete Tendon Access Gallery (General and Augmented)

## CONTAINMENT INSERVICE INSPECTION - 2018
## ASME SECTION XI, SUBSECTIONS IWE AND IWL
## RESPONSIBLE ENGINEER EVALUATION REPORT

The Surveillance Test Procedure STP-803.006, "IWE and IWL Visual Examination" defines the requirements for the Visual Examinations in accordance with ASME Section XI for IWE and IWL.

Design Guideline ST-07, "Containment In-service Inspection Evaluation Criteria", was also developed to support this program and provides Engineering Services personnel the inspection criteria used to identify degradation mechanisms requiring documentation as "Recordable Indications". Also included are descriptions of suspect conditions which require evaluation and resolution by the Responsible Engineer.

### 3.0 INSPECTION PERSONNEL

IWE inspections were conducted by or under the supervision of the Quality Control (QC) IWE/ IWL Program Lead, J. Hamilton. Each inspector has been qualified to the requirements of the VCSNS CISI Program Plan, ISE-4.

IWL concrete inspections in the tendon access gallery were performed by the IWE/ IWL Responsible Engineer, with assistance from QC personnel.

The IWE/ IWL Responsible Engineer, Roy J. Russell has a BS Degree in Civil Engineering from Clarkson University, with over 15 years of experience in the design, modification, and inspection of Virgil C. Summer Nuclear Station and over 35 years engineering experience in the nuclear power industry. The Responsible Engineer is a Registered Professional Engineer in the State of Michigan (License No. 6201043342) and is the Principal Civil/ Structural Engineer at the Virgil C. Summer Nuclear Station.

### 4.0 IWE / IWL INSPECTIONS

The 2018 IWE and IWL inspections were conducted as an ongoing assessment of the condition of the Reactor Building (i.e. containment) structure. The RF24 IWE/ IWL inspections were started in October 2018 and completed in November 2018.

### 5.0 INSPECTION PHILOSOPHY

The 2018 inspections are an ongoing assessment of VCSNS programs which ensure compliance with ASME Section XI Subsections IWE and IWL. Previous inspections have identified areas for augmented examination. The augmented examinations were conducted to determine whether continued degradation had occurred, the extent of the continued degradation, and/ or if the degradation had stabilized relative to the results of the previous inspection.

### 6.0 RESPONSIBLE ENGINEER EVALUATION

Based on the inspections and examinations performed during RF24, no conditions have been identified by the Responsible Engineer evaluation which are considered to be abnormal degradation or of significance to structural function. Additionally, no new conditions which exceeded the STP-803.006 threshold criteria (i.e. likely to experience accelerated degradation or aging) were identified during this evaluation.

### 6.1 IWE Evaluation

Visual examinations of scheduled IWE components are performed, either directly or remotely, by line of site from available permanent vantage points. Remote viewing equipment (binoculars, cameras, etc.) are utilized where appropriate.

RF24 IWE inspections include both General Visual and VT-1 examinations performed by qualified

QC Inspectors under the direction of QC IWE/ IWL Program Lead, J. Hamilton.

### 6.1.1 IWE Augmented Examinations

Augmented Examination of the following components have been conducted since damage/ degradation was identified during the IWE baseline inspections of 2000 (RF12). The RF24 Augmented Examinations included issues identified during previous IWE inspections, specifically:

- Containment Moisture Barrier Integrity
- RHR and Reactor Building Spray Penetration Guard Pipes

Containment Moisture Barrier Integrity

All accessible areas of the Containment Moisture Barrier, between the perimeter of the basement floor slab at Elevation 412' and the Containment Liner, were examined by VT-1 during RF24. The moisture barrier seals the small gap between the perimeter of the concrete floor slab and the containment steel liner plate. This sealant joint has been subject to inspections and maintenance over the years because it has been observed that minor degradation has occurred at the sealant detail along with some light rusting in localized areas of the RB liner plate (typically where the sealant loses adhesion to the liner).

Additionally, the Containment Moisture Barrier has been the subject of NRC Information Notice 2004-09, "Corrosion of Steel Containment and Containment Liner", because typical minor degradation in the sealant and minor rusting on the adjacent liner has been identified at a number of operating nuclear facilities.

None of the inspection findings documented at VCSNS have reduced the design basis thickness of the RB liner plate or reduced the capability of the liner to perform the required design basis function under required loads and conditions. Containment Moisture Barrier examinations are performed in accordance with the ISE-4 plan and specifically the ASME Code for IWE, Table IWE-2500-1.

The Augmented Examination of the Containment Moisture Barrier performed during RF24 identified seven locations where the seal had failed. At five locations, the sealant had separated from the adjacent containment steel liner plate (one 8-inches in length, while all others were 2 inches or less). Two locations where discovered where the sealant had separated from the adjacent concrete floor slab (each approximately 2-inches in length). All examinations were performed under Work Order 1713146, with degradation documented in CR-18-04657. The noted locations were reworked under Work Order 1818059 and re-inspected.

Note that CER-04-1517, CR-08-01993, CR-09-04879, CR-12-05160, CR-14-02363, CR-15-04864, and CR-17-01976 have documented similar observations during previous IWE inspections of the Containment Moisture Barrier. In each case, necessary maintenance actions were taken to rework the seal and return the identified locations to design requirements.

Augmented Examinations will continue during future refueling outages to monitor the Containment Moisture Barrier integrity and ensure fulfillment of its design function; protecting the liner from potential corrosion in areas inaccessible to direct visual examination.

RHR and Reactor Building Spray Guard Pipes

The Augmented Examination of the RHR and RB Spray Guard Pipes continues to monitor the issue first identified during the IWE baseline inspections of 2000 (RF12). Groundwater leaks into the annulus space between the sump guard piping and the surrounding concrete wall pipe sleeve, resulting in degradation of the guard pipe coating and subsequently the exterior carbon steel

surface.

Since 2008, the operation of a site Dewatering System has reduced the rate of groundwater intrusion, however in-leakage continues to adversely impact the subject piping.

It is noted that the exterior surface of the four carbon steel guard pipes within each penetration sleeve were cleaned, prepared, and recoated most recently during RF20 (2012). The degraded surface of each guard pipe was visually inspected by borescope prior to and after recoating. Borescope inspections were performed during subsequent RF21, RF22, and RF23 outages.

During RF24, the Augmented Examination of the RHR and RB Spray guard pipes found that the "B" Train RHR and RB Spray sump penetrations (XRP0425, XRP0328) exhibited the greatest quantity of groundwater in-leakage and therefore an elevated degree of coating degradation and observable corrosion. Penetrations associated with the "A" Train RHR and RB Spray piping (XRP0329, XRP0327) were relatively dry with minimal areas of observable corrosion.

Condition Report CR-18-05192 was generated to document rust, pitting, and mineral deposits observed on inaccessible areas of the "B" RHR (XPR0425) guard pipe. Pipe wall thickness readings were obtained using Ultrasonic Testing on the subject carbon steel pipe to support the ES-120 Operability Recommendation. Reference Simpson/Russell TWR dated 11/17/2018 which evaluates the current XRP0425 guard pipe wall thickness and the projected thickness at the end of the next operating cycle.

The guard piping associated with the RHR and RB Spray sump penetrations continue to be susceptible to corrosion, exacerbated by the in-leakage of site groundwater. To address potential impact on future plant operation, Work Order 1605575 has been generated to hydrolaze, prepare, and then recoat the degraded guard piping surfaces. This effort is scheduled in conjunction with, or prior to, RF25 refueling outage and involves construction of a mock-up to confirm preparation and application methods for applying two coats of PPG Amerlock 400 (reference attachment to CR-15-05594).

Note that CR-06-03337, CR-11-03206, CR-12-05536, CR-14-02439, CR-15-05594, and CR-17-02004 have documented similar observations during previous IWE inspections of the RHR and RB Spray guard piping.

Augmented Examinations will continue during future refueling outages to monitor the condition of the guard piping and ensure fulfillment of design function; providing containment integrity under required loads and conditions.

### 6.1.2 Other IWE Inspection Results

Degraded Coatings

Although there were several inspection findings that identified coating issues on IWE components, there were no findings that indicated actual, or potential, component degradation within the scope of the IWE inspection boundary.

IWE components with degraded coatings are identified below (via component number and condition report) along with a conservative of coating degradation. These items have been added to a running list of Reactor Building areas not meeting the requirements of Coating Service Level 1 (CSL 1). This tabulation is controlled by the ES-425 Cumulative Effects Program, which ensures that the quantity of unqualified RB coatings is within the evaluated design margin. Rework of these items is scheduled for RF25.

| *IWE Component* | *Condition Report* | *Degraded Coating* |
|---|---|---|
| XPR0224 | CR-18-5195 | 1.50 SF |
| XPR0312 | CR-18-5196 | 1.50 SF |
| XPR0330 | CR-18-5197 | 1.50 SF |
| XPR0428 | CR-18-5198 | 1.50 SF |

Pressure Test Connections to Liner Leak Chases

During plant construction leak chase test canopies (consisting of channels or angle sections) were installed over containment liner plate seam welds that would be inaccessible to inspection following construction. The leak chases were used during construction to pressure test the welds for leaks during plant construction.

As discussed in the previous (RF23) IWE Inspection Report, the CR-17-02023 extent of condition inspection included the test connections for the six leak test zones in the Incore Instrumentation Chase. CR-17-02816 identified a missing pipe closure plug from the test connection for Incore Zone 6. Located in the ceiling and about 8 feet above the Incore pit floor, a new pipe plug was scheduled to be installed during the next refueling outage (RF24).

Replacement of the Zone 6 Leak Chase closure plug was completed during the RF23 refueling outage, via WO 1706298. No work was required during RF24.

### 6.1.3 IWE Reportable Conditions

In accordance with evaluation criteria provided in STP-803.006, no Recordable Indications of flaws or areas of abnormal degradation were identified during the RF24 (2018) IWE Inspections.

### 6.1.4 IWE Reportable Conditions Requiring Augmented Examination

None of the results of the IWE inspections were found to exceed the evaluation criteria of STP-803.006 or determined to be of concern that could potentially progress to an unacceptable structural condition prior to the next regularly scheduled IWE surveillance.

## 6.2 IWL Evaluation

Visual examinations of scheduled IWL concrete components are performed directly or remotely, with adequate illumination, by qualified personnel with visual acuity sufficient to detect evidence of degradation. Remote viewing equipment (binoculars, borescopes, cameras, etc.) are utilized where appropriate.

RF24 IWL inspections include both General Visual and Detailed Visual examinations performed by Responsible Engineer R. Russell, with assistance from VCSNS Quality Control personnel.

### 6.2.1 IWL Augmented Examination

Augmented Examination of the Tendon Access Gallery (TAG) has been conducted since flaws/ degradation was identified during the IWL baseline inspections of 2000 (RF12). The RF24 Augmented Examinations included issues identified during previous IWL inspections, specifically:

- Corrosion build-up and leaching on the outer TAG wall near the location of Tendon V-15 (Ref. STTS 1610235-002).
- Concrete leaching at several locations within the TAG (Ref. STTS 1610235- 001).

Corrosion Build-Up

Corrosion build-up near Tendon V-15 was inspected by VT-1 examination and determined to be comparable with previous observations made during the RF23 (2017) inspection. This type of corrosion remains limited to a single location. It is thought that the corrosion is due to groundwater in-leakage through a shrinkage crack in the tendon gallery exterior retaining wall causing corrosion of embedded metal (potentially a reinforcing bar).

The impact of this localized corrosion on the capability of the retaining wall to perform its structural design function is insignificant. It should be noted that the retaining wall is not a part of the containment structure but has been conservatively included in the IWL inspection scope boundary.

Concrete Leaching

During RF24, the entire Tendon Access Gallery was inspected for groundwater in-leakage and concrete leaching. Water intrusion remains minimal, with no indication of active water flow and only a few areas exhibiting a wet surface. This observation would imply that the extent of concrete leaching is comparable to previous inspections and evaluated as acceptable per CR-00-00988, CR-09-03667, and CR-12-04283.

Other observations from the TAG General Visual Examination included:

- Only minor traces of grease seepage were observed from a few vertical tendon end caps. The quantity was insignificant and did not represent any degradation of the tendon corrosion protection system.
- Housekeeping was found to be acceptable. Minor accumulations of concrete debris were noted on the TAG floor.
- Floor sumps were clear of any debris which could impede drainage.

### 6.2.2 Other IWL Inspection Results

No additional IWL Inspections were performed during RF24.

### 6.2.3 IWL Reportable Conditions

In accordance with evaluation criteria provided in STP-803.006, no Recordable Indications of concrete deterioration or distress, such as described in ACI 201.1 and ACI 349.3R, were identified during the RF24 (2018) IWL Inspections of the Tendon Access Gallery.

### 6.2.4 IWL Reportable Conditions Requiring Augmented Examination

None of the results of the IWL inspection were found to exceed the evaluation criteria of STP-803.006 or determined to be of concern that could potentially progress to an unacceptable structural condition prior to the next regularly scheduled IWL surveillance.

## 7.0 SUMMARY AND CONCLUSIONS

The ASME Section XI IWE/ IWL inspections performed concurrent with RF24 (October-November 2018) are the continuation of the ongoing required inspections of the containment structure. These inspections provide the necessary basis for comparison with future surveillance results.

All reportable IWE findings identified as meeting or potentially exceeding acceptance criteria were evaluated by the Responsible Engineer and found to be acceptable with no impact on the

capability of the Reactor Building to meet its required license basis design functions.

Localized concrete surfaces of the Tendon Access Gallery displayed evidence of groundwater in-leakage and efflorescence. These conditions were essentially unchanged, when compared to the previous RF23 observations. Some concrete debris was noted on the TAG floor, but these fragments were the result of existing spalls which had subsequently become detached. None of the IWL observed concrete conditions were judged to adversely impact performance or design function.

The RF24 Augmented Examination of the Containment Moisture Barrier identified seven locations where the sealant had separated from the adjacent structure. CR-18-04657 documents this degradation, which is similar to that found in previous barrier inspections. Localized sections of the sealant were reworked/ inspected to restore the design function of the Containment Moisture Barrier.

Guard piping associated with the RHR and Reactor Building Spray sump penetrations continue to be susceptible to corrosion, exacerbated by the in-leakage of groundwater. The RF24 Augmented Examination resulted in CR-18-05192 documenting rust, pitting, and mineral deposits on inaccessible areas of the "B" RHR (XPR0425) guard pipe. Wall thickness readings of the subject carbon steel pipe were obtained to justify the ES-120 Operability Recommendation. Work Order 1605575 has been generated to hydrolaze, prepare, and recoat degraded surfaces on all four guard pipes associated with the RHR and RB Spray sumps. This work is to be performed in concurrence with preparations for the upcoming RF25 refueling outage.

The following areas shall remain on the STP-803.006 Augmented Examination list, for performance during subsequent refueling outages to ensure that any structural degradation will continue to be examined and evaluated in compliance with the plant design basis.

- IWE - Containment Moisture Barrier Integrity
- IWE - Guard Pipes Corrosion
- IWL - Tendon Access Gallery Corrosion

In addition, the inspection of the Tendon Access Gallery for concrete leaching and general housekeeping will continue as General Visual Examinations under the ASME Section XI IWE/ IWL program to be performed along with the Augmented Examination during each Refueling Outage.