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August 29, 2017

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U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir/ Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
INSERVICE INSPECTION (ISI) OWNER'S ACTIVITY REPORT (OAR) FOR REFUELING OUTAGE 23

Attached is the Inservice Inspection (ISI) Owner's Activity Report (OAR) covering ISI activities associated with the third outage of the first period of the fourth ISI interval (Enclosure 1) and the first 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 Mr. Bruce Thompson at (803) 931-5042.

Very truly yours,

George A. Lippard

BAB/GAL/wk

Enclosures: 1) Inservice Inspection Owner's Activity Report for Refuel 23, Report Number 22
2) Containment Inservice Inspection - 2017 ASME Section XI, Subsections IWE and IWL Responsible Engineer Evaluation Report.

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VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1

ENCLOSURE 1

Inservice Inspection Owner's Activity Report
For Refuel Outage 23, Report Number 22

FORM OAR-1
OWNER'S ACTIVITY REPORT

As required by the provisions of the ASME Code Case N-532

Report Number: INSERVICE INSPECTION REPORT #22

Plant: VIRGIL C. SUMMER NUCLEAR STATION, PO BOX 88, JENKINSVILLE, SC 29065
(Name and Address of Plant)

Plant Unit: UNIT 1 Commercial Service Date: 1/1/1984 Refueling Outage Number: RF-23

Current Inspection Interval: ISI - 4th; IWE/IWL - 3rd

Current Inspection Period: ISI - 1st; IWE/IWL - 1st

Edition and Addenda of Section XI applicable to the Inspection Plan: 2007-2008a

Date / Revision of Inspection Plan: ISI - March 16, 2016 / Revision 0A; IWE/IWL - December 2, 2016 / Revision 3A

Edition and Addenda of ASME Section XI applicable to Repairs and Replacements, if different than the inspection plan N/A

Code Cases used: ISI N-729-1, N-770-1, N-532-5, N-663, N-460 , N-600 ; IWE/IWL None

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-23 (refueling outage number) conform to the requirements of Section XI.

Signed E M. Colie IV Edward M. Colie IV, PSE, ISI Engineer Date 8/29/2017
Owner or Owner's Designee, Title

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 and Insurance of Connecticut have inspected the items described in this Owner's Activity Report, during the period, 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 Section XI.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the repair/replacement activities and evaluation 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 a loss of any kind arising from or connected with this inspection.

Elkouri ELMOSTAFA ELKOURI Commissions NB#13930 SC#264 ANI
(Inspector's Signature) National Board, State, Province, and Endorsements

Date 08/29/2017

Table 1 Items with Flaws or Relevant Conditions That Required Evaluation for Continued Service		
Examination Category and Item Number	Item Description	Evaluation Description
There were no items with flaws or relevant conditions that required evaluation for continued service.		

Table 2
Abstract of Repair/Replacement Activities Required for Continued Service

Code Class	Item Description	Description of Work	Date Complete	Repair / Replacement Plan Number
3	XRS-002B, Service Water (SW) Traveling Screen	XRS-002B Service water Traveling Screen Replacement.Ref. CR-15-03476 & CR-15-03574	4-28-16	1508250/1507925
3	SWH-5034, (SW) Pipe strap	SWH-5034 Pipe strap Removal/ Reinstallation Ref. CR-16-00992	3/1/16	1604373
3	XHX0001A, Chilled Water (VU) HVAC System Mechanical Chiller A	Hvac Mech. Chiller XHX0001A Replace nuts and Bolts. Ref. CR-16-00992	4/14/16	1604373
1	MK-RCH-0298, Reactor Coolant (RC) System Snubber	Replace snubber MK-RCH-0298 Ref.CR-17-02617	5/19/17	1606262-004
2	XVM-02801C-MS, Main Steam (MS) Header C Isolation Valve (MSIV)	XVM-02801C-MS MSIV Bonnet Stuffing Box Repair. Ref. CR-17-02206	5/14/17	1704824
1	MK-CSH-0947, Chemical and Volume Control (CS) System Snubber	Replaced Snubber MK-CSH-0947 Ref, CR-17-02200	5/2/17	1605915
2	XVT-08389-CS (CS) Seal Injection Header Flow Bypass Valve	XVT-08389-CS Valve Replacement Ref. CR-14-02075	5/3/17	1404556
3	(SW) Piping adjacent to XVB-03124A-SW	Service Water Piping Replacement adjacent to XVB-03124A-SW. Ref. CR-17-01506	4/9/17	1703793
3	(SW) Piping downstream of XPS-0103B	Service water Piping Replacement downstream of XPS-0103B. Ref. CR-16-00262	4/16/16	1600729
2	FCV00122-CS, (CS) Charging Header Flow Control Vavle	FCV00122-CS REPLACE TRIM ASSEMBLY Ref. CR-12-05659,05886	3/27/17	1602560
3	SWH-0245, (SW) Rigid Pipe Support	SWH-0245 Pipe Support Rework Ref.CR-16-04621	3/17/17	1613458
3	XVB-03121A-SW, (SW) Diesel Generator Cooler A SW Return Valve	XVB-03121A-SW Outlet flange Replacement Ref. CR-17-00198	2/15/17	1700748
3	SWH-265, (SW) Pipe Lug	(SW) SWH-265 Pipe Lug Replacement Ref. CR-17-01120	3/14/17	1702833
1	XPP0030B, (RC) Reactor Coolant Pump B	XPP0030B Reactor coolant pump seal Replacement Ref. CR-17-02630	5/13/17	1705790
1	XRE00001, (RC) Reactor Vessel Closure Head	XRE00001 Reactor Vessel Head Replacement Ref. ECR-50897	4/21/17	1615726
3	IFV02030-MS, (MS) Emergency Feedwater Pump Turbine Steam Supply Flow Control Valve	replaced valve assembly trim	4/11/17	1603682
3	IFV03531-EF, Emergency Feedwater (EF) System Steam Generator A Motor Driven Emergency Feedwater Pump Flow Control Valve	replaced plug and stem assembly	11/22/15	1513005
3	RDH-1008, (SW) Pipe Support	Pipe support realignment CR-15-06219	5/21/17	1513663

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1

ENCLOSURE 2

Containment Inservice Inspection-2017 ASME Section XI, Subsections IWE and IWL Responsible Engineer Evaluation Report

CONTAINMENT INSERVICE INSPECTION - 2017
ASME SECTION XI, SUBSECTIONS IWE AND IWL

VIRGIL C. SUMMER NUCLEAR STATION

RESPONSIBLE ENGINEER EVALUATION REPORT

August 8, 2017

Prepared By: Dale D. Krause

Dale D. Krause, P.E.
IWE/IWL Responsible Engineer

CONTAINMENT INSERVICE INSPECTION - 2017
ASME SECTION XI, SUBSECTIONS IWE AND IWL
RESPONSIBLE ENGINEER EVALUATION REPORT

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CONTAINMENT INSERVICE INSPECTION - 2017
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 April-May, 2017.

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 in EPRI's Containment Inspection Program Guide, (ASME Section XI, Subsections IWE and IWL, 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; these terms should not be equated with components and items that are designed per ASME Section III, Class MC and Class CC rules. Typically, the scope of components and items subject to ASME Section III rules 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 Tables 4.1.2.4-1 and 4.2.2.4-1 in ISE-4.

This report includes Period 1 IWE and IWL Inspections performed during the Planned Outage for RF-23 during the spring of 2017.

The scope of inspections was in accordance with the ISE-4 RF-23 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:

- Entire Accessible Steel Cylinder and Dome Liner
- Moisture Barrier at 412' Basement slab perimeter concrete to steel liner.(Augmented)
- Concrete Tendon Access Gallery (General and Augmented)
- Valve Chambers and Guard Pipes for "A" and "B" RHR and Spray (Augmented)
- Penetrations and Hatches

The Surveillance Test Procedure STP-803.006, IWE and IWL Visual Examination defined the requirements for the Visual Examinations as defined in 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 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

Detailed inspections were conducted by or under the supervision of Quality Control (QC) Lead Personnel and the Responsible Engineer. Each inspector has been qualified to meet the requirements of the VCSNS CISI Program Plan ISE-4.

The IWL concrete examinations in the tendon access gallery were performed by the Responsible Engineer D. Krause supported by Structural Engineer J. Ruff, and the QC IWE/IWL program lead J. Hamilton.

The IWE/IWL Responsible Engineer or his representative participated interactively with the QC supervision and inspection personnel. The Responsible Engineer, Dale D. Krause has a BS Degree in Civil Engineering from Lehigh University, with over 15 years of experience in the design, modification, and inspection of Virgil C. Summer Nuclear Station and over 30 years structural engineering experience in the field of nuclear power plants including nuclear containment design. The Responsible Engineer is a Registered Professional

Engineer in the State of Pennsylvania (PE-020392-E) and is the Principal Civil Engineer at Virgil C. Summer Nuclear Station.

4.0 IWE / IWL INSPECTIONS

The 2017 IWE and IWL inspections were conducted as an ongoing assessment of the condition of the containment structure. The IWE/IWL inspections were started in April and completed in May 2017.

The IWE inspections included both General Visual and VT-1 examinations performed by qualified QC inspectors. Inspections were performed for all accessible containment liner surface areas using direct line of sight from permanent vantage points. The QC inspector walk downs were used for all containment liner surfaces (including penetrations) as well as the containment liner surfaces in the dome above the spring line. QC inspections were also made on the containment isolation valve containers and guard pipes for the RHR and Reactor Building Spray Systems which are defined as extensions of containment and are located in the Auxiliary Building at Elevation 397'.

It is noted that the exterior surfaces of the carbon steel guard pipes within the penetration sleeves were prepared and recoated during RF 20. The surface of the guard pipes was visually inspected by borescope prior to and after recoating, during RF 21, RF 22, and during the current RF 23 inspection in 2017 as designated Augmented Inspections.

5.0 INSPECTION PHILOSOPHY

The 2017 inspection is an ongoing inspection and assessment program in compliance with ASME Section XI Subsections IWE and IWL. Previous examinations had identified areas for augmented examination. The augmented examinations were conducted to determine whether continued degradation had occurred, the extent of the continued degradation, 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 during RF-23, no degraded conditions have been identified by the Responsible Engineer evaluation which are considered to be abnormal degradation or of structural function significance. Additionally, no new conditions which exceeded the STP-803.006 threshold

criteria (i.e. are likely to experience accelerated degradation or aging) were identified during the inspections.

6.1 IWE Evaluation

For the IWE inspections, accessible areas are defined as visible using direct line of sight from permanent vantage points. On the inside of containment there were containment liner surface areas which were previously determined to be inaccessible either due to high radiation or obscured by direct line of sight from permanent vantage points. These inaccessible areas are a small fraction of the total surface area inspected and are also subject to the same environmental and/or service conditions as the much larger representative areas that were inspected.

6.1.1 IWE Augmented Inspections

Augmented inspections of the following components have been conducted since damage/degradation was identified during the baseline inspection done in 2000 and were performed again during RF-23.

- Moisture Barrier Integrity
- RHR and RB Spray Penetration Guard Pipes

6.1.1.1 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 RF 23. The Containment 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 a local areas of the RB liner plate typically where the sealant loses adhesion to the liner. The Moisture Barrier seal 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 plants. None of the inspection findings documented below reduced the design basis thickness of the RB liner plate nor reduced the capability of the liner to perform the required design basis containment function under the required loads and conditions. The Moisture Barrier examination was

in accordance with the ISE-4 plan and specifically the ASME Code for IWE, Table IWE-2500-1 in the 2007 Edition with the 2008 Addenda.

The Augmented Inspection of the moisture barrier seal performed during RF-23 identified one location where the sealant detail had separated from the adjacent concrete floor slab for about a 3 inch length at about the 85 degree location. This location was identified by CR 17-01976. In general the moisture barrier sealant was in good condition and performing its function as required. The location was reworked under Work Order 1704896 and reinspected.

It is noted that CER 04-1517,CR 08-01993, CR 09-04879, CR 12-05160, CR 14-02363, and CR 15-04864 documented similar observations found during previous IWE Inspections of the moisture barrier seal and the actions that were taken to perform the maintenance to rework the identified locations to meet design requirements.

Augmented Inspections will continue during each refueling outage to ensure the moisture barrier seal integrity is maintained to fulfill its design function to protect the liner from potential corrosion in areas inaccessible to direct visual examination.

6.1.1.2 RHR & Spray Guard Pipes

The Augmented Inspection of the RHR and RB Spray Guard Pipes continues to monitor the issues identified previously during the initial IWE / IWL inspections (Fall 2000). The interspace between the penetration guard pipes and the surrounding sleeve pipe has been subject to groundwater in leakage with corrosion on the exterior of the carbon steel guard pipes. The completion of the implementation of ECR-50560, "Dewatering System Design and Installation" since the Augmented Inspection during RF 17 has reduced to some extent the groundwater in leakage at the guard pipes. The reduction in groundwater in leakage facilitated the rework to prepare and recoat the guard pipes during RF18.

The following historical information is noted. Subsequent, to the early RF-18 Augmented Inspection of the guard pipes, the non-conformance CR-06-03337 Actions 7 and 9 were implemented during RF-18 to perform coating maintenance rework on the exterior surface of the guard pipes. The surface of the guard pipes within the penetration sleeves was prepared by removing existing coatings and corrosion. CR-06-03337 Actions 10 performed inspection to ensure the pipe thickness both locally and in general met the acceptance criteria established in the design basis calculations. The inspection consisted of 100% visual examination of the surface using a borescope. Local spots of pitting were identified and the thickness determined using measurements taken with a

mechanical pit gauge. In addition accessible and representative locations on each guard pipe were identified and thickness measured by Ultrasonic Testing Method (UT) at representative general locations. The Responsible Engineers Technical Work Record attached to CR06-03337 Action 10, documents the UT measurements of wall thickness for the guard pipes and compares the measurements to the minimum required thickness. In all cases there is a good margin between the measured wall thickness and the required wall thickness.

The inspections performed during RF 19 including direct visual followed by remote visual using borescope and camera found that groundwater in leakage was still occurring resulting in conditions that were found to be supporting corrosion of the guard pipes at some of the newly coated areas from RF 18. The condition was evaluated under CR 11-03206. The evaluation determined that the guard pipe wall thickness measurements from ultrasonic examination after the hydrolazing prior to recoating during RF 18 indicated thickness with adequate margin to meet design requirements until the next Augmented Inspection during RF 20 taking into consideration of the rate of corrosion that has been observed over a period of many years on the guard pipes. The proposed corrective actions from CR 11-03206 included performing maintenance work to prepare and recoat the pipe during RF 20. The remote borescope inspection of the guard pipes during the initial part of RF 20 identified that the guard pipes recoating to be done during RF 20 had not been completed. The condition was identified and evaluated by CR 12-05536. Subsequently, during RF 20 the guard pipes were prepared, recoated, and reinspected with a borescope with acceptable conditions observed.

During RF 21 the guard pipes were again inspected as Augmented Inspections. The condition of the guard pipes was essentially the same as previously left after RF 20 recoating. Some groundwater in leakage continued with indications of ongoing corrosion. The condition was reviewed and considered to be acceptable until the next Augmented Inspection during RF 22.

RF 22 IWE Augmented Examination identified conditions similar to those observed during the RF 21 Augmented Examination. In leakage of ground water continues via the seismic rattle space separation joint between the exterior face of the Auxiliary Building wall and Reactor Building foundation mat onto the exterior surface of the guard pipes which pass across this separation joint. The in leakage runs downward into the Auxiliary Building along the bottom surface of the guard pipe or along the embedded sleeve pipe which surrounds the guard pipe. The amount of in leakage appears to vary somewhat. Two of the penetrations were relatively dry at the time of inspection but with staining indicating that in leakage is occurring intermittently. The conditions resulted in corrosion which continues particularly at the exterior guard pipe surface at the

seismic separation joint between the Reactor and Auxiliary Building. The corrosion follows along the bottom of the guard pipe exterior surface outward into the Auxiliary Building where the groundwater runs along the guard pipe into the building during cycles of wetting and drying. CR 15-05594 identified and evaluated the observed conditions. Ultrasonic Testing was performed at representative guard pipe corrosion areas to confirm that the minimum required guard pipe wall thickness was available and would be remain available taking into account the observed rate of corrosion until the next Augmented examination during RF 23. The minimum available wall thickness determined from the Ultrasonic Testing was found to have at least a margin of 35% greater than the minimum required design basis thickness.

The RF 23 Augmented Examination consisted of General Visual and VT-1 as well as remote borescope examination of the exterior surface of the guard pipes. As found previously during the RF 22 examination, two of the penetrations XRP0329 "A" RHR and XRP0327 "A" Spray were relatively dry at the time of inspection with minimal groundwater in leakage and minimal progress of corrosion observed.

The examination of the guard pipe for XRP0425 "B" RHR observed some moisture related to groundwater in leakage and ongoing deterioration of the coating with some active corrosion of the guard pipe surface. This condition was identified by CR17-02008. The examination of the guard pipe for XRP0328 "B" Spray observed the worst case among the four guard pipes of continuing groundwater intrusion as well as degradation of the coating with active corrosion. The condition for XRP0328 guard pipe was identified by CR17-02004. In particular the area along the bottom of the guard pipe where guard pipe exits the penetration sleeve had active corrosion with likely material loss.

Ultrasonic thickness measurements were taken by QC covering the area of worst corrosion. Thickness measurements were compared with the minimum required design basis thickness. The comparison and evaluation was documented in the ES-120 Operability Recommendation for CR17-02004 Action 1. The evaluation found that the margin between the wall thickness predicted for the next refueling outage in RF24 and the required minimum design basis thickness for the controlling case of XRP0328 is 68%. The pipe support spacing for XRP0328 and XRP0425 guard pipes is about the same so that the margin for XRP0425 is also at least 68%. The inspection of the guard pipes for the other two penetrations XRP0329 and XRP0327 did not indicate active progression of corrosion and therefore the previous review of those penetrations where a margin of at least 35% greater than the minimum required design basis thickness was determined is unchanged.

The corroded areas will be reworked again by suitable surface preparation and stabilization followed by the reapplication of a suitable coating system. Previous attempts to eliminate groundwater in leakage by lowering the groundwater via dewatering have not been entirely successful. Therefore, the plan is to rework/recoat the guard pipe exterior surfaces to the extent feasible to minimize Examinations to be done each Refueling outage on an 18 month cycle.

Summarizing, the guard pipes were found to be acceptable with the minimum measured thickness exceeding the minimum required wall design thickness by a reasonable margin and have been evaluated to remain acceptable until the next Augmented Inspection in 18 months.

6.1.2 IWE Other Inspection Results

There were no other IWE inspection findings that indicated actual or potential degradation of the components within the IWE inspection boundary scope

6.1.2.1 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.

The Responsible Engineers ISI Report dated February 21, 2013 for the RF 20 IWE/IWL inspections describes the permanent repair of the leak chase pressure test connections that were located in junction boxes at the basement El. 412' floor slab. These junction boxes housed the pressure test connections to the leak chases over the containment liner welds under the El. 412' concrete floor slab. CR 11-02834 identified that these pressure test connections which were sealed by threaded pipe plugs in the threaded half pipe coupling test connections could potentially serve as moisture barriers (IWE Examination Category E-A, Containment Surfaces, Item No. E1.30 Moisture Barriers) against casual water entering the junction boxes and getting into the liner leak chases. Therefore, these test connections within the junction boxes should have been included in the IWE inspection program. The RF 20 report describes the inspection and subsequent repair to all of these test connections that served as moisture barriers. The repair consisted of ensuring that the pipe plugs were installed securely on all of the test connections followed by preparing and completely filling the junction boxes with epoxy grout to seal off the pressure test connections from being exposed to any casual water that previously could pond unobserved within the junction boxes over the test connections.

During the RF 23 inspection, CR-17-02023 identified the concern whether the test connections located about 4 inches above the El. 412' slab surface on vertical liner leak chases around the perimeter of the building were inspected in accord with Item E1.30 Moisture Barriers to ensure the threaded test connection plug closures were installed.

The inspections were performed by QC. A total of 56 vertical leak chase test connections were found around the perimeter. One pipe plug closure was found to be missing for the test zone #79 connection. The condition was identified by CR-17-02421. It was recognized that all of the pipe plug closures are within the containment liner ISI inspection boundary of 3 inches from the liner surface and were therefore included in the Examination Category E-A, Containment Surfaces examinations for Item E1.11 Accessible Surface Areas. Item E1.11 Accessible Surface Areas has the same extent and frequency examination as for Item No. E1.30 Moisture Barriers.

Corrective action for Zone #79 included remote examination through the pressure test connection of the inaccessible space within the leak chase by borescope with video camera. No evidence of corrosion was observed within the leak chase on the liner or liner seam weld. The leak chase was found to be completely dry. A new threaded pipe plug closure was installed by Work Order 1705564. Corrective action also includes revising the ISE-4 inspection plan and STP-803.006 test procedure as well as the associated ISI drawings to define clearly the exterior exposed leak chase surfaces within the 3 inch inspection boundary and in particular the threaded pipe plug test connection closures for IWE inspection by General Visual examination performed at extent of 100% during each Inspection Period.

CR-17-02023 extent of condition inspection also included the test connections for the six leak test zones in the Incore Instrumentation Pit. CR-17-02816 identified the condition of a missing pipe plug closure from the test connection for Zone 6 in the Incore Pit. This test connection is located in the ceiling of the Incore Pit tunnel about 8 feet above the floor surface. Work Order 1706298 was written to install a new pipe plug in the test connection during the next refueling outage RF 24. The condition of the missing plug was reviewed under CR-17-02816 and found to be acceptable due to its elevated location 8 feet above the floor and because it is not part of the containment leak tight pressure boundary. The missing plug for Zone 6 is scheduled to be replaced during RF 24.

Summarizing, none of the conditions described above found during inspection of certain liner leak chase pressure test connections indicate degradation of any part of the containment liner leak tight pressure boundary.

6.1.3 IWE Reportable Conditions

There are no IWE Reportable Conditions as a result of the RF-23 year 2017 inspections.

6.1.4 IWE Reportable Conditions Requiring Augmented Inspections

None of the results of the IWE 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 surveillance in approximately 18 months during RF-24 (Fall 2018).

6.2 IWL Evaluation

6.2.1 IWL Augmented Inspections

Augmented Inspection of the Containment Tendon Access Gallery (TAG) has been conducted during each inspection following its identification for Augmented Inspection during the baseline inspection in 2000. The inspection included previously identified issues from the IWE / IWL inspections (Fall 2000) and subsequent Augmented Inspections (2002, 2003, 2005, 2008, 2009, 2011, 2012, 2014, 2015, and 2017).

The following were examined:

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

The corrosion build-up was inspected by VT-1 examination and determined to be comparable with the results of the last inspection during RF 22 in 2015 with little or no change from the previous inspections. The condition is local and limited to the one location. The condition is due to groundwater in seepage at a shrinkage crack in the tendon gallery retaining wall and embedded metal corrosion, potentially a reinforcing bar. The impact of this local corrosion on the capability of the retaining wall to perform its structural design function is not significant. It is noted that the retaining wall is not a part of the Containment structure but has been included at V.C. Summer Station in the IWL inspection scope boundary. The tendon gallery inspection found no other indications of similar corrosion.

The entire TAG was inspected by General Visual examination during RF 23 for housekeeping and for any changes in the amount of concrete leaching. The amount of groundwater in leakage remained minimal and additional accumulation of leaching materials was determined to be about the same as observed during previous inspections. Sumps remained clear of debris to allow for drainage if required.

The General Visual examination of the Tendon Access Gallery performed during RF 23 by the Responsible Engineer for IWE/IWL examinations and the Quality Control lead Inspector for IWE/IWL examinations identified several areas of leaching and discoloration but with no observable increase compared to the previous inspection during RF 22. Therefore, the condition of leaching that has been evaluated previously is found to be unchanged and acceptable. There were no indications of active vertical tendon corrosion protection grease leakage from the end caps. The tendon system had been inspected during the previous RF 22 inspection. Only minor traces of grease seepage were observed coming across the gasket at a few vertical tendon end caps. The quantity was insignificant and did not represent any degradation of the tendon corrosion protection system.

Summarizing, the Tendon Access Gallery area housekeeping was found to be acceptable. The corrosion near tendon V-15 on the outer wall will remain on the list for Augmented Inspection by VT-1. The overall General Visual Examination of the entire north and south parts of the Tendon Access Gallery area shall continue to be performed during each refueling outage. This General Visual Examination is important not only to confirm conditions of the reinforced concrete, but also to check that there is no excessive unexpected leaking of the corrosion protection grease from any of the vertical tendon end caps and gaskets. The General Visual examinations of the TAG 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.

6.2.2 IWL Reportable Conditions

No reportable items or items indicative of abnormal degradation were identified by the IWL inspections for:

(1) Augmented Inspection of the Tendon Access Gallery.

6.2.3 IWL Reportable Conditions Requiring Augmented Inspections

None.

7.0 SUMMARY AND CONCLUSIONS

The ASME Section XI IWE/IWL inspections performed for VCSNS during period April-May 2017 concurrent with RF 23 are the continuation of the ongoing required inspection of the containment structure. These inspections provide the necessary basis for comparison with future surveillance results.

All recordable indications 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 Containment Building to meet its required license basis design functions.

Minor areas and evidence of groundwater in leakage and some concrete leaching formation that have been observed during previous inspections were observed during the current General Visual examination of the Tendon Access Gallery. These conditions were unchanged compared to the previous examination during RF 22. None of these observations impact the design function of the reinforced concrete containment structures. The Tendon Access Gallery will continue to be inspected by General Visual Examination and also by Augmented Inspection using VT-1 for the local corrosion buildup previously identified in 2000 on the outer TAG wall near tendon V-15.

The Augmented Inspection performed during RF 23 found the Moisture Barrier seal required rework at one location identified by CR 17-01976. This local condition was similar to previous inspection observations of local spots where the sealant debonded from the perimeter of the concrete floor.

The RF 23 inspection found two missing threaded pipe plug closures for liner leak chase test zones #79 and #6. Zone # 79 is a vertical leak chase located on the liner sidewall below the top of the Reactor Building basement floor at El. 412'.The interior of Zone #79 was examined by borescope. No evidence of water or corrosion on the liner or liner weld surfaces was observed and a new pipe plug closure was installed. Leak chase Zone #6 is located in the ceiling of the Incore Instrumentation Pit tunnel about 8 feet above the Incore Pit floor. There is no possibility of casual water intrusion through the test connection into the leak chase at that location. The closure plug for Zone #6 is planned be reinstalled during RF 24 when the Incore Pit is reopened as evaluated by CR17-02816.

The guard pipes for the two RHR and two Containment Spray penetrations will remain as Augmented Examinations to be performed every 18 months during each Refuel Outage. Some groundwater in leakage continues at these penetrations and was observed along with active corrosion at XRP0328 and XRP0425. Ultrasonic thickness measurements confirmed that a good margin is available between the required minimum design thickness and the measured

thickness. Therefore, the guard pipes are acceptable. The guard pipe surfaces are planned to be prepped and recoated with a suitable coating system that is effective for the conditions of groundwater in leakage.

The following areas shall remain on the Augmented Inspection list:

- IWE - Moisture Barrier Integrity
- IWE - Guard Pipes Corrosion at Auxiliary Building Elevation 397'
- IWL - Tendon Access Gallery Corrosion

These Augmented Inspections shall be inspected during each refueling outage to ensure that any structural degradation should it occur during the period between inspections will continue to be examined and evaluated to ensure compliance with the design basis.