Thomas D. Gatlin
Vice President, Nuclear Operations
803.345.4342

SCE&G®
A SCANA COMPANY

August 28, 2014

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

Dear Sir/Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
TWENTY-FIRST REFUELING INSERVICE INSPECTION (ISI) REPORTS

Attached is the Virgil C. Summer Nuclear Station Refueling Outage 21 Inservice Inspection Reports required by Subsection IWA-6200 of the ASME Boiler and Pressure Vessel Code. The attached reports summarize the inspections of plant piping, components and supports performed during the interval from the end of Refueling Outage 20 to June 2014. Report #19 covers items applied to the extended third interval, and Report #20 addresses the inspections associated with the fourth interval. Document reviews, approvals, and certifications that were not completed by the end of the reporting period will be reported either by amendment or will be included in the next report.

The fourth interval report #20 contains the required Form NIS-1 (Owner's Data Report for Inservice Inspection) and a summary of the ASME Inservice Examination activities. The examination and repair activities are provided in the following tabbed sections:

Tab A - Inservice Examination Summary
Tab B - IWE/IWL Containment Inspection Report
Tab C - Steam Generator Eddy Current Summary
Tab D - Reactor Vessel Head Examination Summary
Tab E - SG Nozzle-Safe End DM Weld Exam Summary
Tab F - Repair and Replacement Summary

Should you have any questions concerning the details of this report, please call Mr. Kirk Weir, Manager of Plant Support Engineering, at (803) 345-4399; Mr. Gil Williams, Supervisor of Plant Support Engineering, at (803) 345-4159; or Mr. Edward Colie IV, ISI Coordinator, at (803) 345-4154.

Very truly yours,

Thomas D. Gatlin

WLT/TDG/ts
Attachment

c: (Without Attachments unless noted)
K. B. Marsh
S. A. Byrne
J. B. Archie
N. S. Carns
J. H. Hamilton
J. W. Williams
W. M. Cherry
V. M. McCree (w/att.)

S. A. Williams
NRC Resident Inspector
K. M. Sutton
NSRC
RTS (LTD-323)
File (810.19-3, RR 5300)
PRSF (RC-14-0145) (w/att.)

A047
NRR

INSERVICE INSPECTION REPORT # 19
Interval 3, Period 3, Outage 3 (Refuel 21)
Extended Interval

FOR

VIRGIL C. SUMMER NUCLEAR STATION (Unit #1)
P.O. Box 88
Jenkinsville, S. C. 29065

SOUTH CAROLINA ELECTRIC & GAS COMPANY
Cayce, S.C. 29033

Commercial Service Date 01-01-1984
Report Completion Date 08-20-2014

FORM NIS-1 OWNERS' DATA REPORT FOR INSERVICE INSPECTIONS
As required by the Provisions of the ASME Code Rules

1. Owner South Carolina Electric & Gas Company - Columbia, S. C. 29218
(Name and Address of Owner)

2. Plant V. C. Summer Station - P. O. Box 88 - Jenkinsville, S. C. 29065
(Name and Address of Plant)

3. Plant Unit 1 4. Owner Certificate of Authorization N/A

5. Commercial Service Date 01/01/1984 6. National Board Number for Unit N/A

7. Components Inspected:

Component or Appurtenance	Manufacturer or Installer	Manufacturer or Installer Serial No.	State or Province No.	National Board No.
REACTOR COOLANT	DCC	RC	N/A	N/A

FORM NIS-1 (back)

8. Examination Dates 3-2013 to 6-2014

9. Inspection Period Identification: 3

10. Inspection Interval Identification: I I I

11. Applicable Edition of Section XI 1998 Addenda 2000

12. Date/Revision of Inspection Plan ISE-5, Dated 7-29-2013, Revision 5

13. Abstract of Examination and Tests. Include a list of examinations and tests and a statement concerning status of work required for the Inspection Plan.

See Page 4 of 13 of Summary Report # 19

14. Abstract of Results of Examination and Tests.

See Page 5 of 13 of Summary Report # 19

15. Abstract of Corrective Measures

See Page 5 of 13 of Summary Report # 19

We 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) corrective measures taken conform to the rules of the ASME Code Section XI.

Certificate of Authorization No. (if applicable) N/A Expiration Date N/A

Date 8/26/14 Signed S. C. E. & G. By _____
Owner

CERTIFICATE OF INSERVICE INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and the State or Province of SC and employed by HSBCT Company of HARTFORD, CONNECTICUT have inspected the components described in this Owner's Report during the period March 2013 to June 2014 and state that to the best of my knowledge and belief, the Owner has performed examinations and tests and taken corrective measures described in this Owner's Report in accordance with the Inspection Plan and as required by the ASME Code, Section XI.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the examinations, tests, and corrective measures described in this Owner's 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.

MOSTAFA ELMOUDI Commissions NB 13930 SC 864 ANII
Inspector's Signature National Board, State, Province, and Endorsements

Date 08/28/, 2014

ABSTRACT

This report presents the results of the Inservice Inspection for the twenty-first refueling outage, the third outage of the third period in the extended third interval at the Virgil C. Summer Nuclear Station. Examinations of piping welds, piping system components, bolting and component supports were conducted in accordance with ASME Section XI. Repair and replacement efforts included maintenance component items along with planned modifications. Pressure testing of ASME code systems and their associated components was performed in accordance with the requirements of ASME Section XI, IWA-5000, IWB-5000 and IWC-5000. No flaws which exceeded the acceptance criteria established by ASME Section XI were accepted for continued operation during the scheduled preservice or inservice examinations of pressure retaining components during this reporting period. The interval was extended to include Refuel 21. No credit has been taken towards the fourth interval for the exams credited to close out the third interval.

1.0 INTRODUCTION

The Inservice Inspection of the twenty-first refueling outage at the Virgil C. Summer Nuclear Station, Unit 1 was conducted in accordance with the site Technical Specifications and the Final Safety Analysis Report. These documents describe the extent to which the American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section XI, 1998 Edition 2000 Addenda applies to the Virgil C. Summer Nuclear Station. The results of the exams performed by South Carolina Electric and Gas Company personnel and their approved vendors for credit towards the third interval close out are listed in Tab A of Inservice Inspection Report #20 (attached) with a note that these are for the third interval. Examination reports, sketches and data sheets for the Class 1 and Class 2 system component inspections, visual examination data, examination limitations, consumable testing materials, personnel qualifications and calibration standard design criteria are retained by South Carolina Electric and Gas Company for archival review. Information for the following categories may be obtained through the South Carolina Electric and Gas Company, Virgil C. Summer Station, plant record system.

1. Personnel Certification
2. Examination Procedures
3. Consumable Certification
4. Inservice Inspection Drawings
5. Corrective Action Reports
6. Pressure Test Documentation
7. Examination Data Reports
8. Ultrasonic Calibration Block Material Certification
9. Repair & Replacement Records

2.0 INSERVICE EXAMINATION EVALUATION

2.1 The twenty-first Inservice Examination (ISE) outage, identified as Interval 3 (extended), Period 3, Refueling Outage 21 for the South Carolina Electric and Gas Company (SCE&G) and the Virgil C. Summer Nuclear Station, Unit 1, was performed in accordance with the Inservice Inspection Program prepared by SCE&G. The program manual and procedures (Manual ISE-5, Procedures QSP-210 and QSP-211) detail the description of examination areas, extent of examination, frequency of examination, percentages of components selected for examination and code specified category relative to each. All Inservice Examinations performed were conducted by the use of site-approved procedures and documented on procedural data reports. Each data report details the component or system examined, examination method employed, the procedure used to perform the test and all pertinent equipment settings or examination conditions. Recordable indications were documented and evaluated on the individual examination data reports. The reports are retained by the Virgil C. Summer Nuclear Station permanent records system for retrieval and review for the life of the component. A summary of examinations, attached herein, contains listings of the examinations performed detailing the component identification, code category, code item number, work document, program type (PSI or ISI), examination result and other amplifying information.

2.2 The ultrasonic examinations performed revealed no flaw indications exceeding the acceptance criteria of ASME Section XI, 1998 Edition 2000 Addenda that apply to the Virgil C. Summer Nuclear Station.

2.3 Visual or surface examinations which revealed indications requiring evaluation have been dispositioned, repaired or replaced and reinspected to insure those components have been returned to their design condition.

2.4 The results of examinations performed at the Virgil C. Summer Nuclear Station during the twenty-first refueling outage have been classified in one of the following manner:

A. No Recordable Indications, *NRI*
B. Procedurally recordable but Code acceptable indications, *RI*
C. Indications evaluated and repaired or dispositioned, *RI&E*

2.5 The attached NDE Summaries itemize the components examined for the Virgil C. Summer Nuclear Station, Unit 1, Interval 3, Period 3, Refuel 21. The following is a brief explanation of the type of information included in the NDE Summaries. These summaries are included with the summary in Tab A of ISI Report #20, attached to this report.

A. **Isometric/Drawing Number** - Station drawing used to specify the component location.

B. **Weld/Component ID** - Component identification number as detailed in the SCE&G Inservice Examination Program for the third interval. Component identifications with an asterisk (*) are listed to show the component has multiple examination categories being credited. Where the examination method is the same for a specific component with multiple categories, only one examination report may be referenced.

C. **System/Major Component** - Piping system designation or plant equipment identification number for major components.

D. **Code Category** - ASME Section XI, IWX-2500 component category.

E. **Code Item** - ASME Section XI, IWX-2500 component item number.

F. **NDE Type** - The required non destructive examination listed from the ASME Section XI, IWX-2500 tables.

G. **Work Document** - Station work document used to schedule and implement examinations.

H. **Results** – Individual results of the examination.

I. **Remarks** - Amplifying information about the performance of the examination.

2.6 Status of the Current Interval

The scheduling of examinations for the third period of the third interval is in accordance with the guidelines established in ASME Section XI, Table IWX-2412-1. The current percentage of completed NDE examinations for Interval 3 is listed by code category and tabulated for reference on pages 11-12 of this report. Some code categories which have small populations of components may have deviated from the established values shown in Table IWX-2412-1 of the code until the final outage of the interval. The scheduling for these limited population categories has been optimized to perform an equal number of examinations each period, to the extent practical.

3.0 REPAIR AND REPLACEMENT PROGRAM

3.1 There were no repair and replacement items credited for the extended period of the 3rd interval

4.0 REACTOR CONTAINMENT BUILDING EXAMINATION PROGRAM

The Containment Inservice Inspections for Refuel 21 are included in Report #20, the first report of the 4th Inservice Inspection interval.

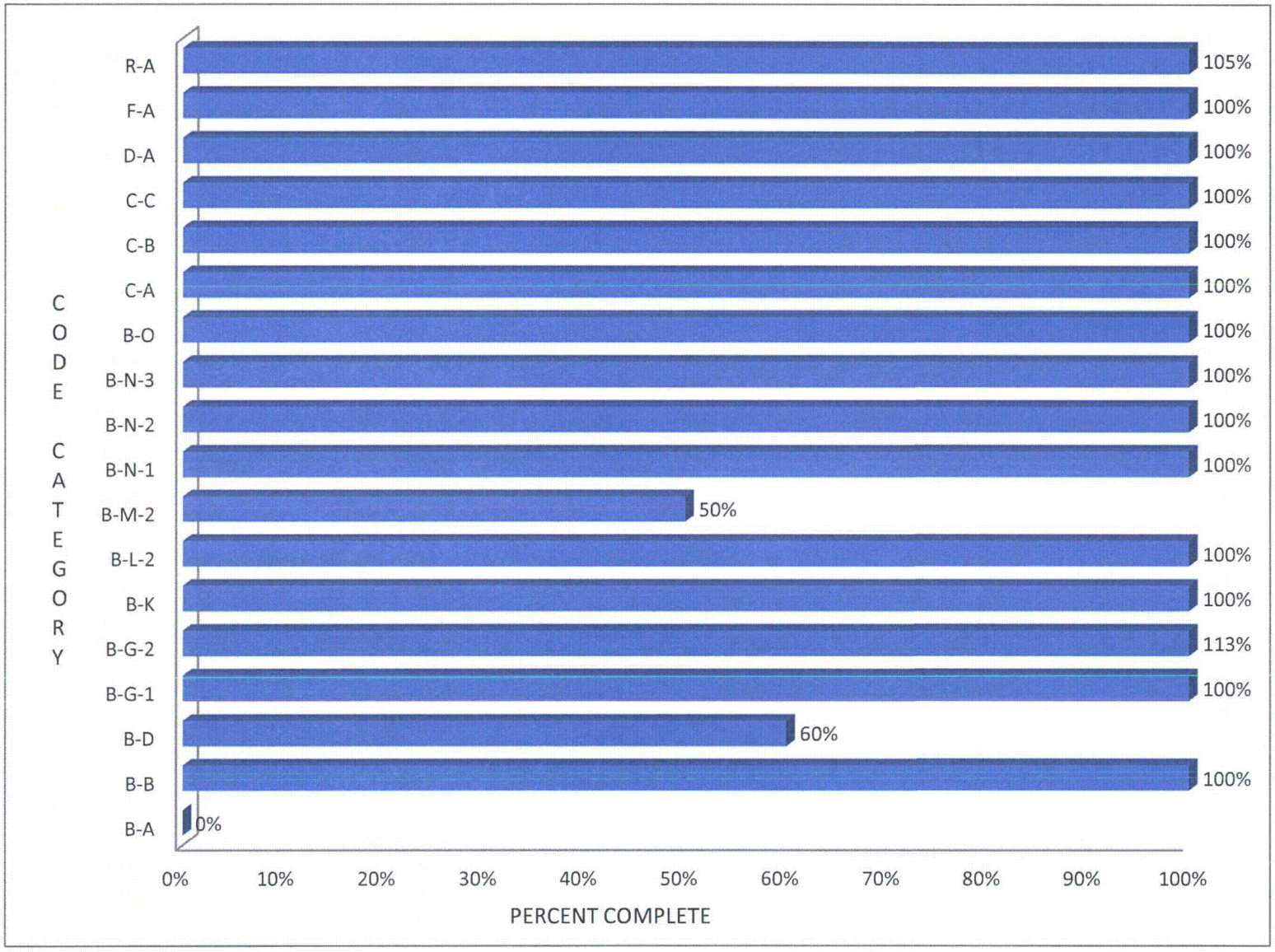
5.0 REFUEL 21 HYDRO/LEAK TEST SUMMARY

Leak test inspections were performed in accordance with ASME Section XI, plant technical specifications and station procedure SAP-145, "Containment Leakage Rate and Inservice Testing Programs". Performance of system and component pressure test is in accordance with station procedure GTP-304, "Inservice Inspection System Pressure Testing, Third Ten Year Interval". Also included within GTP-304 are the relief requests utilized in the conduct of the credited pressure tests.

The leak test inspections for Refuel 21 are included in Report #20 for the 4th Inservice Inspection interval.

6.0 AUGMENTED EXAMINATION PROGRAM

No augmented exams were performed as part of the extended 3rd Inservice Inspection interval.


CODE CATEGORY
R-A
F-A
D-A
C-C
C-B
C-A
B-O
B-N-3
B-N-2
B-N-1
B-M-2
B-L-2
B-K
B-G-2
B-G-1
B-D
B-B
B-A
105%
100%
100%
100%
100%
100%
100%
100%
100%
100%
50%
100%
100%
113%
100%
60%
100%
0%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PERCENT COMPLETE

ASME SECTION XI INTERVAL III COMPLETION STATUS

		BREAKER OPEN DATE		4/12/2005	10/14/2006	4/25/2008	10/17/2009	4/15/2011	10/13/2012			
		BREAKER CLOSED DATE		6/1/2005	11/22/2006	6/14/2008	12/10/2009	5/31/2011	12/7/2012			
			TOTAL	SP 2005	Fall 2006	SP 2008	Fall 2009	SP 2011	Fall 2012			
		% COMPLETE	SELECTED	RF-15	RF-16	RF-17	RF-18	RF-19	RF-20	Cycle 21	# DONE	# LEFT
RX VESSEL	B-A	0%	18	0	0	0	0	0	0		0	18
OTHER VESSELS	B-B	100%	5	2	0	0	1	2	0		5	0
NOZZLE/SHELL	B-D	60%	30	5	0	0	11	0	2		18	12
> 2" BOLTS	B-G-1	100%	82	0	0	24	0	0	58		82	0
≤ 2" BOLTS	B-G-2	113%	244	92	0	0	68	30	86		276	-32
INTEGRAL (CC 509)	B-K	100%	2	0	1	0	0	0	1		2	0
PUMP CASING	B-L-2	100%	1	1	0	0	0	0	0		1	0
VALVE BODY	B-M-2	50%	8	2	1	0	0	0	1	1	4	4
RX INTERIOR	B-N-1	100%	3	0	1	0	1	0	1		3	0
RX ATTACHMENTS	B-N-2	100%	1	0	0	0	1	0	0		1	0
CORE SUPPORTS	B-N-3	100%	1	0	0	0	1	0	0		1	0
CRDM WELDS	B-O	100%	3	0	0	0	0	0	3		3	0
VESSELS	C-A	100%	6	0	2	0	2	0	2		6	0
NOZZLES	C-B	100%	5	0	2	0	1	0	2		5	0
INTEGRAL	C-C	100%	17	4	2	4	1	2	4		17	0
INTEGRAL	D-A	100%	11	3	0	0	4	2	2		11	0
SUPPORTS	F-A	100%	203	32	32	32	35	33	39		203	0
RISK PIPING	R-A	112%	98	16	18	31	7	18	13	7	110	-12
			738	157	59	91	133	87	214		748	
											101.4%	

*B-A, B-D percentages were impacted by RR-III-07 for Rx Vessel inspection extension to 20 years

*RF20 B-N-1 item is of the inside of the Upper Head on the stand

*RF-20 B-G-1 number of 58 = 58 B6.10, 58 B6.30, 58 B6.40, 58 B6.50 - actually 232 individual code items

*B-G-2 extra done to correct for valve type requirement

*B-M-2 *Only required if valve is disassembled - Only 50% have been disassembled*

INSERVICE INSPECTION REPORT #19
Extended Third Interval Closeout

REFUEL 21

INDEX OF EXAMINATIONS

PLEASE SEE THE ACCOMPANYING INSERVICE INSPECTION REPORT #20, TAB A, FOR THE INSERVICE INSPECTION SUMMARY FOR REFUEL 21. THE 3RD INTERVAL EXAMS ARE NOTED AS SUCH, AND ARE:

COMPONENT ID

1-4501-8010C
1-1100-XRE1 (INTERIOR)
1-4100A-31(DM)
1-4100A-32(DM)
1-4200A-28(DM)
1-4200A-29(DM)
1-4300A-29(DM)
1-4300A-30(DM)
MK-RVS-1
MK-RVS-2
MK-RVS-3
MK-RVS-4
MK-RVS-5
MK-RVS-6

INSERVICE INSPECTION REPORT # 20
Interval 4, Period 1, Outage 1 (Refuel 21)

FOR

VIRGIL C. SUMMER NUCLEAR STATION (Unit #1)
P.O. Box 88
Jenkinsville, S. C. 29065

SOUTH CAROLINA ELECTRIC & GAS COMPANY
Cayce, S.C. 29033

Commercial Service Date 01-01-1984
Report Completion Date 08-20-2014

FORM NIS-1 OWNERS' DATA REPORT FOR INSERVICE INSPECTIONS
As required by the Provisions of the ASME Code Rules

1. Owner South Carolina Electric & Gas Company - Cayce, S. C. 29033
(Name and Address of Owner)

2. Plant V. C. Summer Station - P. O. Box 88 - Jenkinsville, S. C. 29065
(Name and Address of Plant)

3. Plant Unit 1 4. Owner Certificate of Authorization N/A

5. Commercial Service Date 01/01/1984 6. National Board Number for Unit N/A

7. Components Inspected:

Component or Appurtenance	Manufacturer or Installer	Manufacturer or Installer Serial No.	State or Province No.	National Board No.
COMPONENT COOLING	DCC	CC	N/A	N/A
FEEDWATER	DCC	FW	N/A	N/A
REACTOR COOLANT	DCC	RC	N/A	N/A
RESIDUAL HEAT REMOVAL	DCC	RH	N/A	N/A
SAFETY INJECTION	DCC	SI	N/A	N/A
REACTOR BUILDING SPRAY	DCC	SP	N/A	N/A
SERVICE WATER	DCC	SW	N/A	N/A
CHILLED WATER	DCC	VU	N/A	N/A

FORM NIS-1 (back)

8. Examination Dates 3-2013 to 6-2014

9. Inspection Period Identification: 1

10. Inspection Interval Identification: 4

11. Applicable Edition of Section XI 2007 Addenda 2008

12. Date/Revision of Inspection Plan ISE-7, Dated 03-31-2014, Revision 0

13. Abstract of Examination and Tests. Include a list of examinations and tests and a statement concerning status of work required for the Inspection Plan.

See Page 4 of 13 of Summary Report # 20

14. Abstract of Results of Examination and Tests.

See Page 5 of 13 of Summary Report # 20

15. Abstract of Corrective Measures

See Page 5 of 13 of Summary Report # 20

We 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) corrective measures taken conform to the rules of the ASME Code Section XI.

Certificate of Authorization No. (if applicable) N/A Expiration Date N/A

Date 8/26/14 Signed S. C. E. & G. By _____
Owner

CERTIFICATE OF INSERVICE INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and the State or Province of South Carolina and employed by HSBCT Company of HARTFORD, CONNECTICUT have inspected the components described in this Owner's Report during the period March 2013 to June 2014 and state that to the best of my knowledge and belief, the Owner has performed examinations and tests and taken corrective measures described in this Owner's Report in accordance with the Inspection Plan and as required by the ASME Code, Section XI.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the examinations, tests, and corrective measures described in this Owner's 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.

_____ Commissions NB13930 SC 264 ANII
Inspector's Signature National Board, State, Province, and Endorsements

Date 08/28/, 2014

ABSTRACT

This report presents the results of the Inservice Inspection for the twenty-first refueling outage, the first outage of the first period in the fourth interval at the Virgil C. Summer Nuclear Station, Unit 1. Examinations of piping welds, piping system components, bolting and component supports were conducted in accordance with ASME Section XI. Repair and replacement efforts included maintenance component items along with planned modifications. The inspection of the Reactor Building Containment structure was performed in accordance with the IWE/IWL program manual, ISE-4. Pressure testing of ASME code systems and their associated components was performed in accordance with the requirements of ASME Section XI, IWA-5000, IWB-5000 and IWC-5000. No flaws which exceeded the acceptance criteria established by ASME Section XI were accepted for continued operation during the scheduled preservice or inservice examinations of pressure retaining components during this reporting period.

1.0 INTRODUCTION

The Inservice Inspection of the twenty-first refueling outage at the Virgil C. Summer Nuclear Station, Unit 1 was conducted in accordance with the site Technical Specifications and the Final Safety Analysis Report. These documents describe the extent to which the American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section XI, 2007 Edition 2008 Addenda applies to the Virgil C. Summer Nuclear Station. This report contains a detailed item-by-item summary of examination results performed by South Carolina Electric and Gas Company personnel and their approved vendors since the last reporting of refuel twenty. Examination reports, sketches and data sheets for the Class 1 and Class 2 system component inspections, visual examination data, examination limitations, consumable testing materials, personnel qualifications and calibration standard design criteria are retained by South Carolina Electric and Gas Company for archival review. Information for the following categories may be obtained through the South Carolina Electric and Gas Company, Virgil C. Summer Station, plant record system.

1. Personnel Certification
2. Examination Procedures
3. Consumable Certification
4. Inservice Inspection Drawings
5. Corrective Action Reports
6. Pressure Test Documentation
7. Examination Data Reports
8. Ultrasonic Calibration Block Material Certification
9. Repair & Replacement Records

2.0 INSERVICE EXAMINATION EVALUATION

2.1 The twenty-first Inservice Examination (ISE) outage, identified as Interval 4, Period 1, Refueling Outage 21 for the South Carolina Electric and Gas Company (SCE&G) and the Virgil C. Summer Nuclear Station, Unit 1, was performed in accordance with the Inservice Inspection Program prepared by SCE&G. The program manual and procedures (Manual ISE-7, Procedures SAP-1294, ES-439, QSP-210 and QSP-211) detail the description of examination areas, extent of examination, frequency of examination, percentages of components selected for examination and code specified category relative to each. All Inservice Examinations performed were conducted by the use of site-approved procedures and documented on procedural data reports. Each data report details the component or system examined, examination method employed, the procedure used to perform the test and all pertinent equipment settings or examination conditions. Recordable indications were documented and evaluated on the individual examination data reports. The reports are retained by the Virgil C. Summer Nuclear Station permanent records system for retrieval and review for the life of the component. A summary of examinations, attached herein, contains listings of the examinations performed detailing the component identification, code class, code category, code item number, exam or test method, work document, program type (PSI or ISI), examination result and other amplifying information.

2.2 The ultrasonic examinations performed revealed flaws requiring repair in 5 reactor vessel head-to-control rod drive mechanism penetration j-groove welds. These repairs were carried out by Engineering Change Request 50846 in accordance with the requirements stipulated in request for alternative RR-4-05 under 10CFR50.55a(g)(6)(ii)(D). These repairs were based on the NRC approved Westinghouse repair process in WCAP-15987-P-A, as modified by the approved relief request [ML14107A332]. No other ultrasonic examinations performed revealed flaw indications exceeding the acceptance criteria of ASME Section XI, 2007 Edition 2008 Addenda that apply to the Virgil C. Summer Nuclear Station.

2.3 Visual or surface examinations which revealed indications requiring evaluation have been dispositioned, repaired or replaced and re-inspected in accordance with the associated Code requirements to ensure those components have been returned to their design condition.

2.4 The results of examinations performed at the Virgil C. Summer Nuclear Station during the twenty-first refueling outage have been classified in one of the following manner:

A. No Recordable Indications, *NRI*
B. Procedurally recordable but Code acceptable indications, *RI*
C. Indications evaluated and repaired or dispositioned, *RI&E*

2.5 The attached ISI Examination Summary itemizes the components examined for the Virgil C. Summer Nuclear Station, Unit 1, Interval 4, Period 1, Refuel 21. The following is a brief explanation of the type of information included in the ISI Examination Summary.

A. **Component Description** - Brief description of the type exam performed.

B. **Weld/Component ID** - Component identification number for components examined or tested as detailed in the SCE&G Inservice Examination Program for the fourth interval. Component identifications with an asterisk (*) are listed to show the component has multiple examination categories being credited. Where the examination method is the same for a specific component with multiple categories, only one examination report may be referenced.

C. **System** - Major piping system designation or plant equipment identification number for the component examined.

D. **Code Class** - Component ASME Code Classification.

E. **Code Category** - ASME Section XI, IWX-2500 component category. Augmented inservice examination programs required by 10CFR50.55a(g)(6)(ii)(D,E,F) are AUG-06, and those for thermal fatigue requirements are listed as AUG-07.

F. **Code Item** - ASME Section XI, IWX-2500 component item number. AUG-06 Code Item is the designation per Table 1 of ASME Section XI Code Cases N-722-1, N-729-1 or N-770-1.

G. **NDE Type** - The required non destructive examination listed from the ASME Section XI, IWX-2500 tables, Code Case Table 1, regulatory requirement, or industry commitment document.

H. **Work Document** - Station work document used to schedule and implement examinations.

I. **Results** – Individual results of the examination.

J. **Remarks** - Amplifying information about the performance of the examination.

2.6 Status of the Current Interval

The scheduling of examinations for the first period of the fourth interval is in accordance with the guidelines established in ASME Section XI, Table IWX-2412-1. The current percentage of completed NDE examinations for Interval 4 is listed by code category and tabulated for reference on pages 11-12 of this report. Some code categories which have small populations of components may deviate from the established values shown in Table IWX-2412-1 of the code due to relief requests, or component availability in accordance with code requirements. Refuel 21 was the first outage of the 4th interval.

3.0 REPAIR AND REPLACEMENT PROGRAM

3.1 The Virgil C. Summer Nuclear Station repair and replacement program for the period beginning March 2013 through June 30, 2014 involved corrective maintenance replacements and scheduled engineering design changes.

3.2 The work documents for those components affected by the repair and replacement program undergo extensive evaluation and review by station organizations and the Authorized Nuclear Inservice Inspection Agency. Work package information included within this summary report are those which have completed all required reviews, final engineering approval and the required "ANII" NIS-2 certification prior to the close of the reporting period specified in ASME Section XI, IWA-6230 and the ISE program Manual ISE-7. The station has established July 1, 2014 as the end of the reporting period for Refuel 21 and the document closing date for this reporting period. Work evolutions performed during the twenty-first refueling outage whose document review, approval and certification process which was not finalized by the established closing date shall be reported either by an amendment to this original Refuel 21 NIS-2 summary or shall be included in the next report for Refuel 22 within the guidelines of ASME Section XI, IWA-6230.

3.3 The enclosed repair and replacement summary and the attached original ASME Section XI, NIS-2 forms detail the system, component, component description, work document and a description of the work activity. Complete repair and replacement documentation for the specific component is maintained at the Virgil C. Summer Nuclear Station permanent records facility and is retrievable through the work document package.

4.0 REACTOR CONTAINMENT BUILDING EXAMINATION PROGRAM

A Containment Inservice Inspection (CISI) Program Plan (ISE-4) was developed for the Virgil C. Summer Nuclear Station (VCSNS) Unit1 which details the requirements for the examination and testing of ASME Section XI Class MC and Class CC components. This Program Plan was developed in accordance with the requirements of the 2001 Edition (with Addenda through 2003) of the ASME Boiler and Pressure Vessel Code, Section XI, Division 1, Subsections IWE and IWL, as modified by NRC final rulemaking to 10CFR50.55a published in the Federal Register on October 1, 2004. This Program Plan was developed using the guidance in EPRI's Containment Inspection Program Guide, (ASME Section XI, Subsections IWE and IWL), GC-110698. Implementation of the CISI Program Plan was conducted in accordance with Quality Services Procedure STP-803.006, IWE and IWL Visual Examination.

The inspections performed during the Refuel 21 cycle included field inspections and engineering evaluation of the Containment structure to include the post-tensioning system, Class MC pressure retaining components and Class CC reinforced concrete containment.

The engineering report detailing the inspection activities performed and the responsible engineering evaluation is contained in this report for reference.

5.0 REFUEL 21 HYDRO/LEAK TEST SUMMARY

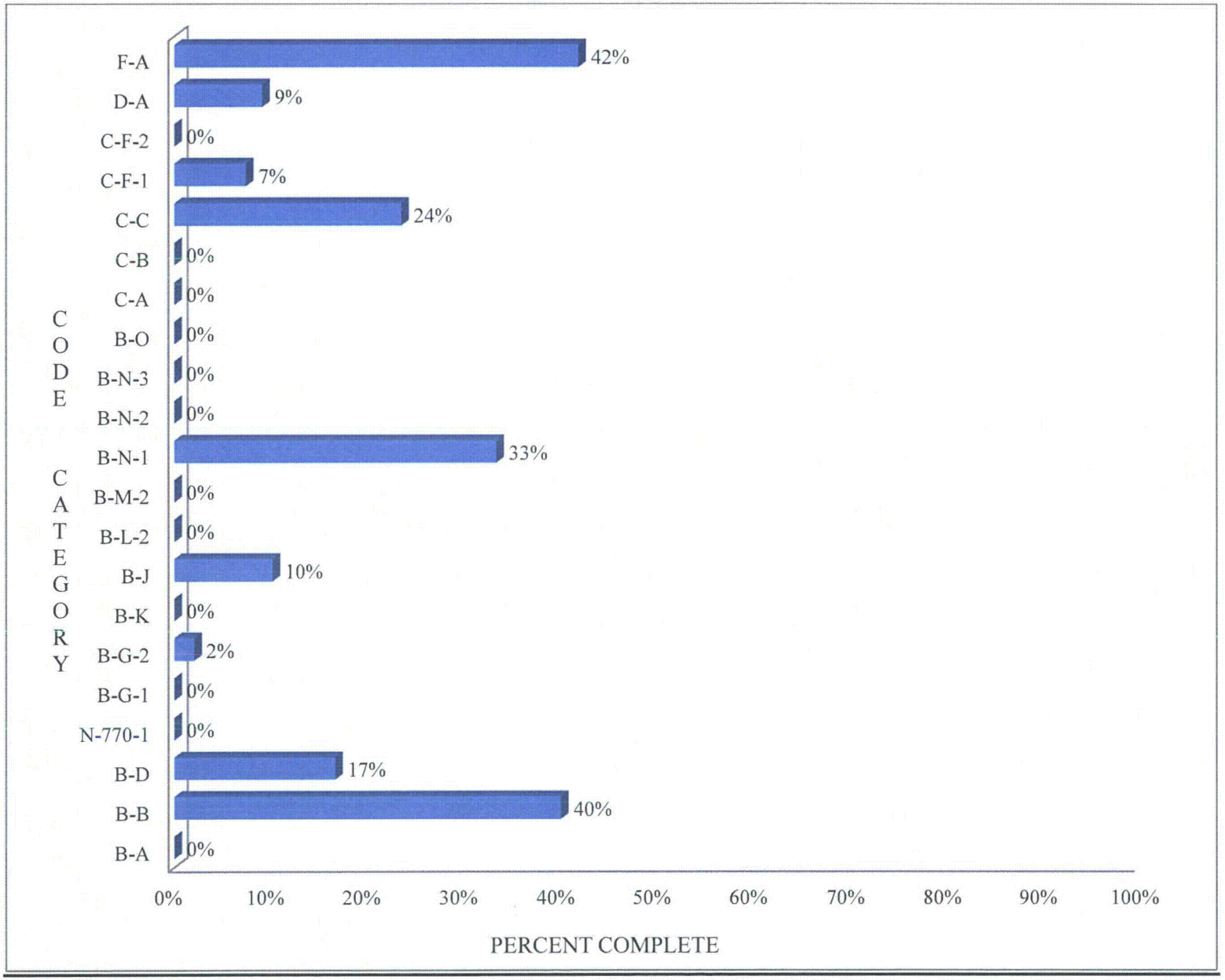
Leak test inspections were performed in accordance with ASME Section XI, plant technical specifications and station procedure SAP-145, "Containment Leakage Rate and Inservice Testing Programs". Performance of system and component pressure test is in accordance with station procedure GTP-304, "Inservice Inspection System Pressure Testing, Fourth Ten Year Interval". Also included within GTP-304 are the relief requests utilized in the conduct of the credited pressure tests. The table below lists those tests performed since the last summary report of Refuel 20.

SYSTEM	SYSTEM DESCRIPTION	CODE CLASS	PROCEDURE	WORK DOCUMENT
CVCS	Chem. Volume Control Sys.	2	GTP-304	1404821
SP	RB Spray.	2	GTP-304	1308682
BD	Nuclear Blowdown	2	GTP-304	1405094
SW	Service Water Sys.	2 / 3	GTP-304	1312857
MS	Main Steam	3	GTP-304	1302878
RC	Reactor Coolant	1/ 2	STP-250.001A	1302154
SI	Safety Injection	2	STP-250.003A	1302156
CC	Component Cooling Water	2 / 3	STP-250.005A	1302050
SW	Service Water (Outside RB)	3	STP-250.007	1302158
DG	Emergency Diesel Generator	3	STP-250.008	1301900
DG	Emergency Diesel Generator	3	STP-250.009	1307967
FW	Feedwater	2	STP-250.011	1301910
SW	RBCU	2 / 3	STP-250.014	1310783
SF	SFP and RWST	2 / 3	STP-250.015	1302159

6.0 AUGMENTED EXAMINATION PROGRAM

The Augmented Examination Program included in this summary document the inspections performed to satisfy regulatory documents other than ASME Section XI. During this reporting period, examinations were conducted in accordance with plant technical specifications, engineering documents and the Nuclear Regulatory Commission required examinations of the Reactor Vessel Upper Head volumetric and exterior for evidence of boric acid residue. These examinations and data reports are not subject to the interface review by the Authorized Nuclear Inservice Inspection Agency for compliance with ASME Section XI requirements for personnel and examination, as is required by 10CFR50.55a, or other industry commitments.

The Augmented exams are listed in Tab A on the Inservice Examination Summary. The examination summary reports for the Steam Generator Eddy Current examinations, the Reactor Vessel Upper Head volumetric and visual examinations, and the Steam Generator Inlet and Outlet Nozzle-to-Safe End Weld examinations are listed in Tabs C, D and E, respectively.


CODE CATEGORY
F-A
D-A
C-F-2
C-F-1
C-C
C-B
C-A
B-O
B-N-3
B-N-2
B-N-1
B-M-2
B-L-2
B-J
B-K
B-G-2
B-G-1
N-770-1
B-D
B-B
B-A
42%
9%
0%
7%
24%
0%
0%
0%
0%
0%
33%
0%
0%
10%
0%
2%
0%
0%
17%
40%
0%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
PERCENT COMPLETE

ASME SECTION XI INTERVAL IV COMPLETION STATUS

				PERIOD 1			PERIOD 2		PERIOD 3			
		BREAKER OPEN DATE		4/5/2014								
		BREAKER CLOSED DATE		6/1/2014								
			TOTAL	SP 2014	F 2015	SP 2017	F 2018	SP 2020	F 2021	SP 2023		
		% COMPLETE	SELECTED	RF21	RF22	RF23	RF24	RF25	RF26	RF27	# DONE	# LEFT
RX VESSEL	B-A	0%	18	0							0	18
OTHER VESSELS	B-B	40%	5	2							2	3
NOZZLE/SHELL	B-D	17%	30	5							5	25
DM WELDS	N-770-1	0%	18	0							0	18
> 2" BOLTS	B-G-1	0%	82	0							0	82
≤ 2" BOLTS	B-G-2	2%	244	5							5	239
INTEGRAL (CC 509)	B-K	0%	2	0							0	2
PIPING WELDS	B-J	10%	187	19							19	168
PUMP CASING	B-L-2	0%	1	0							0	1
VALVE BODY	B-M-2	0%	8	0							0	8
RX INTERIOR	B-N-1	33%	3	1							1	2
RX ATTACHMENTS	B-N-2	0%	1	0							0	1
CORE SUPPORTS	B-N-3	0%	1	0							0	1
CRDM WELDS	B-O	0%	3	0							0	3
VESSELS	C-A	0%	6	0							0	6
NOZZLES	C-B	0%	5	0							0	5
INTEGRAL	C-C	24%	17	4							4	13
SS PIPE WELDS	C-F-1	7%	54	4							4	50
CS PIPE WELDS	C-F-2	0%	28	0							0	28
INTEGRAL	D-A	9%	11	1							1	10
SUPPORTS	F-A	42%	311	130							130	181
			1035	171	0	0	0	0	0		171	
											16.5%	

*IN RF21, B-F, B-J, C-F-1, and C-F-2 components were examined with risk informed criteria

*B-F components examined per N-770-1 IAW 50.55a(g)(6)(ii)

*B-G-1 number of 58 = 58 B6.10, 58 B6.30, 58 B6.40, 58 B6.50 - actually 232 individual code items

*B-M-2 Only required if valve is disassembled

INSERVICE INSPECTION REPORT #20
Interval IV, Period 1, Outage 1

REFUEL 21

INDEX OF EXAMINATIONS

Document Control Desk
USNRC, Region II
RC-14-0145
Attachment

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

INSERVICE INSPECTION REPORT #20
REFUEL 21
TAB A
INSERVICE EXAMINATION SUMMARY

ISI Examination Summary

V. C. Summer Nuclear Station
Interval IV, Period 1, Outage 1
Refuel 21

Component Description	Weld Number or Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
UPPER HEAD & ALL PENETRATIONS	1-1100-XRE1	RC	1	AUG-06	B4.10	VE, N-729-1	RI&E	1310093	
UPPER HEAD TO CRDM TUBE, J GROOVE WELD	1-1100-XRE1	RC	1	AUG-06	B4.20	UT-PDI, N-729-1	RI&E	1304191	5 nozzle repairs per WCAP-15987-NP-2A; RR-4-05
UPPER HEAD, OVERLAY REPAIR PEN 52	1-1100- XRE1	RC	1	AUG-06	N/A	PT	NRI	1304191	
UPPER HEAD, OVERLAY REPAIR PEN 37	1-1100- XRE1	RC	1	AUG-06	N/A	PT	NRI	1304191	
UPPER HEAD, OVERLAY REPAIR PEN 31	1-1100- XRE1	RC	1	AUG-06	N/A	PT	NRI	1304191	
UPPER HEAD, OVERLAY REPAIR PEN 19	1-1100- XRE1	RC	1	AUG-06	N/A	PT	RI&E	1304191	
PIPE TO ELBOW AND ELBOW BASE METAL	1-4103A-14	SI	1	AUG-07	N/A	UT-PDI/88-08-2	NRI	1309893	
PIPE AND ELBOW AT WELD #3 PER MRP-146, 2.4.2.2	1-4308-3	CS	1	AUG-07	N/A	VT-2/BMV	NRI	1309893	MRP-146
PIPE BASE METAL AT WELD #3 PER MRP-146, CR-06-02167-005	1-4308-3	CS	1	AUG-07	N/A	UT/PDI/MRP-146	NRI	1309893	Scanned according to MRP-146.24.2.2
PIPE AND ELBOW AT WELD #4 PER MRP-146, 2.4.2.2	1-4308-4	CS	1	AUG-07	N/A	VT-2/BMV	NRI	1309893	MRP-146
PIPE BASE METAL AT WELD #4 PER MRP-146, CR-06-02167-005	1-4308-4	CS	1	AUG-07	N/A	UT/PDI/MRP-146	NRI	1309893	Scanned according to MRP-146.24.2.2
PRESSURIZER UPPER HEAD TO SHELL WELD	1-2100A- 4	RC	1	B-B	B 2.11	UT	NRI	1309891	
PRESSURIZER SHELL LONGITUDINAL WELD - UPPER	1-2100A- 7	RC	1	B-B	B 2.12	UT	NRI	1309891	

ISI Examination Summary

Component Description	Weld Number or Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
PRESSURIZER SPRAY LINE NOZZLE TO VESSEL WELD	1-2100B- 9	RC	1	B-D	B 3.110	UT	NRI	1309891	Limited Coverage Due To Nozzle- 70.2%
PRESSURIZER SAFETY LINE NOZZLE TO VESSEL WELD	1-2100B- 10	RC	1	B-D	B 3.110	UT	RI	1309891	Limited Coverage Due To Nozzle- 72.3%
PRESSURIZER SAFETY LINE NOZZLE TO VESSEL WELD	1-2100B- 11	RC	1	B-D	B 3.110	UT	NRI	1309891	Limited Coverage Due To Nozzle- 72.3%
PRESSURIZER SAFETY LINE NOZZLE TO VESSEL WELD	1-2100B- 12	RC	1	B-D	B 3.110	UT	NRI	1309891	Limited Coverage Due To Nozzle- 72.3%
PRESSURIZER RELIEF LINE NOZZLE TO VESSEL WELD	1-2100B- 13	RC	1	B-D	B 3.110	UT	NRI	1309891	Limited Coverage Due To Nozzle- 72.3%
PRESSURIZER MANWAY BOLTS - 16@	1-2100B-BOLT	RC	1	B-G-2	B 7. 20	VT-1	NRI	1304176	
'A' STEAM GENERATOR PRIMARY MANWAY STUDS (32),INLET & OUTLET	1-3100-BOLT-A	S/G 'A'	1	B-G-2	B 7. 30	VT-1	NRI	1301344	
'B' STEAM GENERATOR PRIMARY MANWAY STUDS (32),INLET & OUTLET	1-3100-BOLT-B	S/G 'B'	1	B-G-2	B 7. 30	VT-1	NRI	1301341	
'C' STEAM GENERATOR PRIMARY MANWAY STUDS (32),INLET & OUTLET	1-3100-BOLT-C	S/G 'C'	1	B-G-2	B 7. 30	VT-1	NRI	1301345	
SAFETY VALVE XVS-8010C INLET FLANGE BOLTING, 12 STUDS & 12 NUTS	1-4501-FLANGE 3	RC	1	B-G-2	B 7. 50	VT-1	NRI	1309893	
PIPE TO ELBOW	1-4103A-12	SI	1	B-J	B9.11	UT-PDI/88-08-2	NRI	1309893	
PIPE TO ELBOW	1-4103A-13	SI	1	B-J	B9.11	UT-PDI/88-08-2	NRI	1309893	

ISI Examination Summary

Component Description	Weld Number or Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
PIPE TO ELBOW AND ELBOW BASE METAL	1-4103A-15	SI	1	B-J	B9.11	UT-PDI/88-08-2	NRI	1309893	
PIPE TO VALVE (XVC-8998B),	1-4202A-15	SI	1	B-J	B9.11	UT-PDI	NRI	1309893	Single-Sided PDI
PIPE TO ELBOW	1-4202A-16	SI	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4202A-17	SI	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO VALVE (XVC-8998C)	1-4303- 15	SI	1	B-J	B9.11	UT-PDI	NRI	1309893	Single-Sided PDI
PIPE TO ELBOW	1-4303- 16	SI	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4303- 17	SI	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4304- 3	SI	1	B-J	B9.11	UT	NRI	1309893	
PIPE TO VALVE (XVC-8993C)	1-4304- 4	SI	1	B-J	B9.11	UT	NRI	1309893	Single-Sided PDI
PIPE TO ELBOW	1-4304-2	SI	1	B-J	B9.11	UT	NRI	1309893	
PIPE TO ELBOW	1-4501- 3	RC	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4501- 4	RC	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4501- 5	RC	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4501- 6	RC	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4501- 14	RC	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4501- 16	RC	1	B-J	B9.11	UT-PDI	NRI	1309893	
PIPE TO ELBOW	1-4501- 18	RC	1	B-J	B9.11	UT-PDI	NRI	1309893	

ISI Examination Summary

Component Description	Weld Number or Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
SAFETY VALVE INTERNALS	1-4501-8010C	RC	1	B-M-2	B12. 50	VT-3	NRI	1308676	3rd Interval Closeout
R.V. INTERIOR	1-1100- XRE1	RC	1	B-N-1	B13. 10	W/VT-3	NRI	0817847	3rd Interval, Performed & Documented RF18
R.V. INTERIOR, UPPER HEAD ON STAND	1-1100- XRE1	RC	1	B-N-1	B13.10	VT-3	NRI	1304191	RV Head Interior Surface
WELDED ATTACHMENT (RHH-0002 RIGID)	2-2520-WS- 1	RHR	2	C-C	C3.20	VT-1	NRI	1309894	
WELDED ATTACHMENT (SIH-0272 RIGID)	2-3007-WS- 1	SI	2	C-C	C3.20	VT-1	NRI	1309895	
WELDED ATTACHMENT (SIH-0374)	2-3007-WS- 2	SI	2	C-C	C3.20	VT-1	NRI	1309895	
INTEGRAL ATTACHMENTS 1WS. 2WS, 3WS, 4WS (CHARGING PUMP A)	XPP-0043A-WS	CS	2	C-C	C3.30	VT-1	NRI	1309909	
PIPE TO TEE - RHR MIXING TEE Per MRP-192	2-2523A- 13	RHR	2	C-F-1	C5.11-TW	UT-PDI	NRI	1309894	
PIPE TO ELBOW	2-2523A- 19	RHR	2	C-F-1	C5.11-TW	UT-PDI	NRI	1309894	
PIPE TO ELBOW	2-2523A- 20	RHR	2	C-F-1	C5.11-TW	UT-PDI	NRI	1309894	
PIPE TO ELBOW	2-2523A- 21	RHR	2	C-F-1	C5.11-TW	UT-PDI	NRI	1309894	
INTEGRAL ATTACHMENT (CHILLER C) 1MS-54-087-7 pc 41	XHX-0001C*	VU	3	D-A	D1.10	VT-1	NRI	1309907	
ANCHOR	RCH-0093	RC	1	F-A	F1.10A	VT-3	NRI	1309893	
RIGID	CSH-0884	CS	1	F-A	F1.10R	VT-3	NRI	1309900	

ISI Examination Summary

Component Description	Weld Number or Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
RIGID	SIH-0147	SI	1	F-A	F1.10R	VT-3	NRI	1309895	
RIGID	SIH-0148	SI	1	F-A	F1.10R	VT-3	NRI	1309895	
RIGID	SIH-0184	SI	1	F-A	F1.10R	VT-3	NRI	1309895	
RIGID	SIH-0212	SI	1	F-A	F1.10R	VT-3	NRI	1309895	
SPRING	CSH-0941	CS	1	F-A	F1.10SP	VT-3	NRI	1309900	
ANCHOR	SIH-0374	SI	2	F-A	F1.20A	VT-3	NRI	1309895	
RIGID	CSH-0080	CS	2	F-A	F1.20R	VT-3	NRI	1309900	
RIGID	CSH-0081	CS	2	F-A	F1.20R	VT-3	NRI	1309900	
RIGID	CSH-0107	CS	2	F-A	F1.20R	VT-3	NRI	1309900	
RIGID	EFH-0117	EF	2	F-A	F1.20R	VT-3	NRI	1309901	
RIGID	EFH-0134	EF	2	F-A	F1.20R	VT-3	NRI	1309901	3rd Interval closeout
RIGID	RHH-0002	RHR	2	F-A	F1.20R	VT-3	NRI	1309894	
RIGID	RHH-0071	RHR	2	F-A	F1.20R	VT-3	NRI	1309894	
RIGID	SIH-0002	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	SIH-0006	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	SIH-0054	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	SIH-0121	SI	2	F-A	F1.20R	VT-3	NRI	1309895	

ISI Examination Summary

Component Description	Weld Number or Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
RIGID	SIH-0272	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	SIH-0300	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	SIH-4007	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	SIH-4008	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	SIH-4022	SI	2	F-A	F1.20R	VT-3	NRI	1309895	
RIGID	CCH-0316	CC	3	F-A	F1.30R	VT-3	NRI	1309899	
RIGID	CCH-0317	CC	3	F-A	F1.30R	VT-3	NRI	1309899	
RIGID	CCH-0319	CC	3	F-A	F1.30R	VT-3	NRI	1309899	
RIGID	VUH-0013	VU	3	F-A	F1.30R	VT-3	NRI	1309906	
COMPONENT SUPPORT (CHILLER C)	XHX-0001C	VU	3	F-A	F1.40	VT-3	NRI	1309907	
COMPONENT SUPPORT (CHARGING PUMP A)	XPP-0043A	CS	2	F-A	F1.40	VT-3	NRI	1309909	
S/G INLET NOZZLE SAFE-END WELD, INLAYED, N-770-1	1-4100A- 31(DM)	RC	1	N-770-1	G (A-2)	ET/UT-PDI/N-770-1	NRI	1309896	3rd Interval Closeout
S/G INLET NOZZLE SAFE-END WELD, INLAYED, N-770-1	1-4200A- 28(DM)	RC	1	N-770-1	G (A-2)	ET/UT-PDI/N-770-1	NRI	1309897	3rd Interval Closeout
S/G INLET NOZZLE SAFE-END WELD,WCAP-16388-P-SW6	1-4300A- 29(DM)	RC	1	N-770-1	G (A-2)	ET/UT-PDI/N-770-1	NRI	1309898	3rd Interval Closeout
S/G OUTLET NOZZLE SAFE-END WELD, INLAYED, N-770-1	1-4100A- 32(DM)	RC	1	N-770-1	G (B)	ET/UT-PDI/N-770-1	NRI	1309896	3rd Interval Closeout

ISI Examination Summary

Component Description	Weld Number or Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
S/G OUTLET NOZZLE SAFE-END WELD, INLAYED, N-770-1	1-4200A- 29(DM)	RC	1	N-770-1	G (B)	ET/UT-PDI/N-770-1	NRI	1309897	3rd Interval Closeout
S/G OUTLET NOZZLE SAFE-END WELD,WCAP-16388-P-SW7	1-4300A- 30(DM)	RC	1	N-770-1	G (B)	ET/UT-PDI/N-770-1	NRI	1309898	3rd Interval Closeout

VC Summer Nuclear Station
Refuel/Cycle 21
Interval III extension, period 3, outage/cycle 3
ISI Examination Summary for RV Supports

Component Description	Component ID	System	Code Class	Code Category	Code Item	NDE Type	Results	Work Document	Remarks
RV Support Shoe - 335	MK-RVS-1	RC	1	F-A	F1.40	VT-3	RI&E	1306932	3rd Interval Closeout
RV Support Shoe - 25	MK-RVS-2	RC	1	F-A	F1.40	VT-3	RI&E	1306932	3rd Interval Closeout
RV Support Shoe - 95	MK-RVS-3	RC	1	F-A	F1.40	VT-3	RI&E	1306932	3rd Interval Closeout
RV Support Shoe - 145	MK-RVS-4	RC	1	F-A	F1.40	VT-3	RI&E	1306932	3rd Interval Closeout
RV Support Shoe - 215	MK-RVS-5	RC	1	F-A	F1.40	VT-3	RI&E	1306932	3rd Interval Closeout
RV Support Shoe - 265	MK-RVS-6	RC	1	F-A	F1.40	VT-3	RI&E	1306932	3rd Interval Closeout

RF21 Snubbers Visual Exams

Hangar Number	RF21 Sel	S/P	PIPE DIA	SYS	314'S	302	Class
MK-CSH-0766	Y	S	1.50	CS	314-671-10	672	1
MK-CSH-0921	Y	S	3.00	CS	314-671-7	673	1
MK-CSH-0922	Y	S	3.00	CS	314-671-7	673	1
MK-CSH-0924	Y	S	3.00	CS	314-671-7	673	1
MK-CSH-4034	Y	S	3.00	CS	314-671-2	601	1
MK-CSH-4035	Y	S	3.00	CS	314-671-2	601	1
MK-RCH-0041	Y	S	6.00	RC	314-601-1	602	1
MK-RCH-0044	Y	S	6.00	RC	314-601-1	602	1
MK-RCH-0221	Y	S	2.00	RC	314-731-1	601	1
MK-RCH-0301	Y	S	4.00	RC	314-601-28	602	1
MK-RCH-0370	Y	S	1.00	RC	314-601-29	601	1
MK-RCH-0371	Y	S	1.00	RC	314-601-29	601	1
MK-RCH-0372	Y	S	1.00	RC	314-601-29	601	1
MK-SIH-0183	Y	S	6.00	SI	314-691-9	691	1
MK-SIH-0320	Y	S	2.00	SI	314-691-19	691	1
MK-SIH-0385	Y	S	12.00	SI	314-691-8	692	1
MK-SIH-0388	Y	S	12.00	SI	314-691-6	692	1
MK-SIH-0391A	Y	S	12.00	SI	314-691-6	692	1
MK-SIH-0391B	Y	S	12.00	SI	314-691-6	692	1
MK-SIH-0414	Y	S	12.00	SI	314-691-7	692	1
MK-BDH-0001	Y	S	3.00	BD	314-781-1	781	2
MK-BDH-0004	Y	S	3.00	BD	314-781-1	781	2
MK-BDH-0005	Y	S	3.00	BD	314-781-1	781	2
MK-BDH-0006	Y	S	3.00	BD	314-781-1	781	2
MK-BDH-0008	Y	S	2.00	BD	314-781-1	781	2
MK-BDH-0010	Y	S	2.00	BD	314-781-1	781	2
MK-BDH-0011	Y	S	2.00	BD	314-781-1	781	2
MK-BDH-0013	Y	S	2.00	BD	314-781-1	781	2
MK-BDH-0014	Y	S	2.00	BD	314-781-2	781	2
MK-BDH-0015	Y	S	2.00	BD	314-781-2	781	2
MK-BDH-0017	Y	S	3.00	BD	314-781-2	781	2
MK-BDH-0018	Y	S	3.00	BD	314-781-2	781	2
MK-BDH-0022	Y	S	3.00	BD	314-781-2	781	2
MK-BDH-0023	Y	S	3.00	BD	314-781-2	781	2
MK-BDH-0025	Y	S	3.00	BD	314-781-3	781	2
MK-BDH-0026	Y	S	2.00	BD	314-781-3	781	2
MK-BDH-0029	Y	S	2.00	BD	314-781-3	781	2
MK-BDH-0031	Y	S	2.00	BD	314-781-3	781	2
MK-BDH-0042	Y	S	3.00	BD	314-781-3	781	2
MK-BDH-0045	Y	S	3.00	FW	314-781-5	781	2
MK-BDH-1001	Y	S	3.00	FW	IMS-22-566	781	2
MK-BDH-1054	Y	S	3.00	FW	IMS-22-566	781	2
MK-BDH-1057	Y	S	3.00	FW	314-781-5	781	2
MK-BDH-1058	Y	S	3.00	FW	314-781-5	781	2

RF21 Snubbers Visual Exams

MK-BDH-4000	Y	S	2.00	BD	314-781-2	781	2
MK-BDH-4001	Y	S	2.00	BD	314-781-2	781	2
MK-BDH-4004	Y	S	2.00	BD	314-781-3	781	2
MK-BDH-4007	Y	S	2.00	BD	314-781-2	781	2
MK-CCH-0082	Y	S	24.00	CC	314-611-16	611	2
MK-CCH-0121	Y	S	20.00	CC	314-611-16	611	2
MK-CCH-0293	Y	S	24.00	CC	314-611-18	611	2
MK-CCH-0294	Y	S	24.00	CC	314-611-18	611	2
MK-CCH-0305	Y	S	24.00	CC	314-611-12	611	2
MK-CCH-0394	Y	S	24.00	CC	314-611-16	611	2
MK-CCH-0397	Y	S	24.00	CC	314-611-16	611	2
MK-CCH-0767	Y	S	24.00	CC	314-611-9	611	2
MK-CSH-0086	Y	S	3.00	CS	314-671-25	675	2
MK-CSH-0280	Y	S	2.00	CS	1MS-22-114	672	2
MK-CSH-1132	Y	S	2.00	CS	1MS-22-114	672	2
MK-DGH-0011	Y	S	22.00	DG	1MS-22-695	353	2
MK-DGH-0014	Y	S	22.00	DG	1MS-22-695	353	2
MK-DGH-0020	Y	S	20.00	DG	1MS-22-699	353	2
MK-DGH-0021	Y	S	20.00	DG	1MS-22-696	353	2
MK-DGH-0025	Y	S	20.00	DG	1MS-22-696	353	2
MK-EFH-0175	Y	S	4.00	EF	314-085-1	085	2
MK-EFH-0176	Y	S	4.00	EF	314-085-3	085	2
MK-FWH-0211	Y	S	18.00	FW	314-081-30	083	2
MK-FWH-0352	Y	S	18.00	FW	314-081-30	083	2
MK-FWH-0354	Y	S	18.00	FW	314-081-32	083	2
MK-MSH-0002	Y	S	32.00	MS	314-011-1	011	2
MK-MSH-0012	Y	S	32.00	MS	314-011-3	011	2
MK-MSH-0058	Y	S	32.00	MS	314-011-20	011	2
MK-MSH-0157	Y	S	4.00	MS	314-011-20	011	2
MK-MSH-0169	Y	S	12.00	MS	314-011-14	011	2
MK-MSH-0175	Y	S	8.00	MS	314-011-15	011	2
MK-MSH-0202	Y	S	4.00	MS	314-011-8	011	2
MK-MSH-0206	Y	S	4.00	MS	314-011-8	011	2
MK-MSH-0218	Y	S	4.00	MS	314-011-8	011	2
MK-MSH-0309A	Y		32.00	MS	314-011-20	011	2
MK-MSH-0309B	Y		32.00	MS	314-011-20	011	2
MK-MSH-0320	Y	S	4.00	MS	314-011-8	011	2
MK-MSH-0326	Y	S	4.00	MS	314-011-8	011	2
MK-MSH-0338	Y	S	4.00	MS	314-011-8	011	2
MK-MSH-0352	Y	S	4.00	MS	314-011-8	011	2
MK-MSH-1029	Y	S	8.00	MS	1MS-22-3117	011	2
MK-RHH-0129	Y	S	10.00	RH	314-641-6	641	2
MK-RHH-0130	Y	S	10.00	RH	314-641-6	641	2
MK-RHH-0134	Y	S	10.00	RH	314-641-6	641	2
MK-RHH-0166	Y	S	10.00	RH	314-641-15	693	2
MK-RHH-0235	Y	S	10.00	RH	314-641-11	641	2

RF21 Snubbers Visual Exams

MK-RHH-4011	Y	S	12.00	RH	314-641-4	641	2
MK-RHH-4024	Y	S	14.00	RH	314-691-3	693	2
MK-SIH-0089	Y	S	10.00	RH	314-641-15	693	2
MK-SIH-0167	Y	S	6.00	SI	314-691-12	693	2
MK-SIH-0221	Y	S	6.00	SI	314-691-13	693	2
MK-SIH-1288	Y	S	0.75	SI	1MS-22-1824	812	2
MK-SIH-1309	Y	S	0.75	SI	1MS-22-1837	812	2
MK-SIH-4028	Y	S	2.00	SI	314-691-16	691	2
MK-SPH-0294	Y	S	12.00	SP	314-661-5	661	2
MK-SWH-0031	Y	S	16.00	SW	314-251-8	222	2
MK-EFH-0183	Y	S	4.00	EF	314-085-1	085	3
MK-CCH-0387	Y	S	24.00	CC	314-611-16	611	2,3

RF-21--Interval __4__
Approved By:_____
Date:_____
Revision _1_

System	Snubber No.	Size	Drawing	Location	Visual	Functional	Sample	Remarks
BD	MK-BDH-0001	1.5	314-781-01	RB 423 Gal.	1306951	1306969	RF21-SLM-TS	Handstroke
BD	MK-BDH-0004	6	314-781-01	RB 424 ALP	1306952	1306970	RF21-SLM-TS	Handstroke
BD	MK-BDH-0005	1.5	314-781-01	RB 436 ALP	1306953	1306971	RF21-SLM-TS	Handstroke
BD	MK-BDH-0006	1.5	314-781-01	RB 436 ALP	1306954	1306972	RF21-SLM-TS	Handstroke
BD	MK-BDH-0008	0.35	314-781-01	RB 437 ALP	1302221	1302234	RF21-SLM-TS	Handstroke
BD	MK-BDH-0010	0.65	314-781-01	RB 437 ALP	1302222	1302235	RF21-SLM-TS	Handstroke
BD	MK-BDH-0011	1.5	314-781-01	RB 437 ALP	1306955	1306987	RF21-TS-I	BENCH
BD	MK-BDH-0013	0.35	314-781-01	RB 437 ALP	1302223	1302236	RF21-SLM-TS	Handstroke
BD	MK-BDH-0014	1.5	314-781-02	RB 437 BLP	1306956	1306974	RF21-SLM-TS	Handstroke
BD	MK-BDH-0015	0.35	314-781-02	RB 437 BLP	1302224	1302237	RF21-SLM-TS	Handstroke
BD	MK-BDH-0017	1.5	314-781-02	RB 437 BLP	1302225	1302238	RF21-SLM-TS	Handstroke
BD	MK-BDH-0018	1.5	314-781-02	RB 437 BLP	1302226	1302239	RF21-SLM-TS	Handstroke
BD	MK-BDH-0022	1.5	314-781-02	RB 428 BLP	1306957	1306975	RF21-SLM-TS	Handstroke
BD	MK-BDH-0023	1.5	314-781-02	RB 428 BLP	1306958	1306976	RF21-SLM-TS	Handstroke
BD	MK-BDH-0025	0.65	314-781-03	RB 436 CLP	1306959	1306978 1404777	RF21-SLM-TS CR-14-02090	Handstroke / Bench
BD	MK-BDH-0026	0.35	314-781-03	RB 436 CLP	1306960	1306979	RF21-SLM-TS	Handstroke
BD	MK-BDH-0029	0.35	314-781-03	RB 437 CLP	1302227	1403842	RF21-SLM-TS	Bench
BD	MK-BDH-0031	0.65	314-781-03	RB 437 CLP	1302228	1302241	RF21-SLM-TS	Handstroke
BD	MK-BDH-0042	0.65	314-781-03	RB 425 Gal.	1306961	1306980	RF21-SLM-TS	Handstroke
BD	MK-BDH-0045	0.65	314-781-05	PAA 12-01	1306962	1306981	RF21-SLM-TS	Handstroke
BD	MK-BDH-1001	1.5	1MS-22-566	PAA 12-01	1306963	1306982	RF21-SLM-TS	Handstroke
BD	MK-BDH-1054	1.5	1MS-22-566	PAA 12-01	1306964	1306983	RF21-SLM-TS	Handstroke
BD	MK-BDH-1057	1.5	314-781-05	PAI 12-01	1306965	1306984	RF21-SLM-TS/Maint.	Handstroke/W.O. 1307316
BD	MK-BDH-1058	1.5	314-781-05	PAI 12-01	1306966	1306985	RF21-SLM-TS/Maint.	Handstroke/W.O. 1307316
BD	MK-BDH-4000	0.35	314-781-02	RB 437 BLP	1302229	1302242	RF21-SLM-TS	Handstroke
BD	MK-BDH-4001	0.35	314-781-02	RB 437 BLP	1302230	1302243	RF21-SLM-TS	Handstroke
BD	MK-BDH-4004	0.35	314-781-03	RB 437 CLP	1302231	1302244	RF21-SLM-TS	Handstroke
BD	MK-BDH-4007	0.35	314-781-02	RB 438 BLP	1302232	1403843	RF21-SLM-TS(ECR)	Bench (ECR50614)
CC	MK-CCH-0082	15	314-611-16	IB 12-02	1306967	1306986	RF21-SLM-TS	Handstroke

RF-21--Interval __4__
Approved By:_____
Date:_____
Revision _1_

System	Snubber No.	Size	Drawing	Location	Visual	Functional	Sample	Remarks
CC	MK-CCH-0121	6	314-611-16	AB 12-11	1306989	1307526	RF21-SLM-TS	Handstroke
CC	MK-CCH-0293	50	314-611-18	IB 12-02	1306990	1307541	RF21-SLM-TS	BENCH
CC	MK-CCH-0294	50	314-611-18	IB 12-02	1306991	1307542	RF21-SLM-TS	BENCH
CC	MK-CCH-0305	50	314-611-12	IB 12-02	1306992	1307543	RF21-SLM-TS	BENCH
CC	MK-CCH-0387	6	314-611-16	IB 12-02	1306993	1307527	RF21-SLM-TS	Handstroke
CC	MK-CCH-0394	6	314-611-16	IB 12-02	1306994	1307528	RF21-SLM-TS	Handstroke
CC	MK-CCH-0397	15	314-611-16	IB 12-02	1306995	1307529	RF21-SLM-TS	Handstroke
CC	MK-CCH-0767	15	314-611-09	IB 12-02	1306996	1307530	RF21-SLM-TS	Handstroke
CS	MK-CSH-0086	0.35	314-671-25	AB 00-01	1306997	1307531	RF21-SLM-TS	Handstroke
CS	MK-CSH-0146	1.5	314-671-02	RB 12-03	1305467	1305467	RF21-SLM-NTS	Handstroke
CS	MK-CSH-0280	0.35	1MS-22-114	PAA 12-01	1306998	1307532	RF21-SLM-TS	Handstroke
CS	MK-CSH-0478	1.5	314-671-08	RB 431 BLP	1405088	1405089	CR-14-02327	Handstroke
CS	MK-CSH-0500	0.35	314-671-03	RB 12-05	1305468	1305468	RF21-SLM-NTS	Handstroke
CS	MK-CSH-0766	0.35	314-671-10	RB 428 BLP	1306999	1307533	RF21-SLM-TS	Handstroke
CS	MK-CSH-0921	6	314-671-07	RB 433 ALP	1307000	1307534	RF21-SLM-TS	Handstroke
CS	MK-CSH-0922	6	314-671-07	RB 433 ALP	1307001	1307535	RF21-SLM-TS	Handstroke
CS	MK-CSH-0924	6	314-671-07	RB 421 ALP	1307002	1307536	RF21-SLM-TS	Handstroke
CS	MK-CSH-0965	0.65	314-641-9	AB 26-02W	1305469	1305469	RF21-SLM-NTS	Handstroke
CS	MK-CSH-1132	1.5	1MS-22-114	PAI 12-01	1307003	1307537	RF21-SLM-TS	Handstroke
CS	MK-CSH-4034	1.5	314-671-02	RB 418 ALP	1307004	1307544	RF21-TS-I	BENCH
CS	MK-CSH-4035	1.5	314-671-02	RB 418 ALP	1307005	1307545	RF21-TS-I	BENCH
CS	MK-CSH-4039	0.65	314-671-2	RB 12-03	1305470	1305470	RF21-SLM-NTS	Handstroke
CS	MK-CSH-4042	1.5	314-641-09	AB 26-02W	1305471	1305471	RF21-SLM-NTS	Handstroke
DG	MK-DGH-0011	15	1MS-22-695	DG 36-04	1307006	1307546	RF21-TS-I	BENCH
DG	MK-DGH-0014	15	1MS-22-695	DG 36-03	1307007	1307538	RF21-SLM-TS	Handstroke
DG	MK-DGH-0020	15	1MS-22-699	DG 36-03	1307008	1307539	RF21-SLM-TS	Handstroke
DG	MK-DGH-0021	15	1MS-22-696	DG 36-04	1307009	1307540	RF21-SLM-TS	Handstroke
DG	MK-DGH-0025	15	1MS-22-696	DG 36-04	1307010	1307547	RF21-TS-I	BENCH
EF	MK-EFH-0175	1.5	314-085-01	IB 236-01	1307011	1307548	RF21-TS-I	BENCH
EF	MK-EFH-0176	1.5	314-085-03	IB 236-01	1307012	1307549	RF21-TS-I	BENCH

RF-21--Interval __4__
Approved By:_____
Date:_____
Revision _1_

System	Snubber No.	Size	Drawing	Location	Visual	Functional	Sample	Remarks
EF	MK-EFH-0182	1.5	314-085-01	IB 236-01	1406321	1406323	CR-14-03039	Handstroke
EF	MK-EFH-0183	1.5	314-085-01	IB 236-01	1307013 1406322	1307550 1406324	RF21-TS-I CR-14-03039	BENCH Handstroke
FW	MK-FWH-0143A	15	314-081-30	IB 36-02	1305472	1305472	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0143B	15	314-081-30	IB 36-02	1305473	1305473	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0211	15	314-081-30	IB 36-02	1307014	1307551	RF21-TS-I	BENCH
FW	MK-FWH-0221	6	314-081-21	IB 36-02	1305474	1305474	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0222	6	314-081-21	IB 36-02	1305475	1305475	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0225	6	314-081-21	IB 36-02	1305476	1305476	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0227	6	314-081-21	IB 36-02	1305477	1305477	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0320	1.5	314-081-13	TB 12-03	1305478	1305478	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0352	50	314-081-30	PAI 36-02	1307015	1307552	RF21-TS-I	BENCH
FW	MK-FWH-0354	15	314-081-32	PAI 36-02	1307016	1307553	RF21-TS-I/Maint.	BENCH/Maint. WO 1302609
FW	MK-FWH-0356	6	314-081-21	IB 36-02	1306094	1306094	Maintenance(NTS)	Handstroke W.O. 1302580
FW	MK-FWH-0357	6	314-081-21	IB 36-02	1306095	1306095	Maintenance(NTS)	Handstroke W.O. 1302580
FW	MK-FWH-0359	1.5	314-081-21	IB 36-02	1302623	1302624	RF21-SLM-NTS	Handstroke
FW	MK-FWH-0363	50	314-081-32	IB 36-02	1305479	1305479	RF21-SLM-NTS	BENCH
FW	MK-FWH-0366	50	314-081-29	IB 36-02	1305480	1305480	RF21-SLM-NTS	BENCH
FW	MK-FWH-0375	50	314-081-31	IB 36-02	1305481	1305481	RF21-SLM-NTS	BENCH
FW	MK-FWH-0379	50	314-081-31	IB 36-02	1305482	1305482	RF21-SLM-NTS	BENCH
FW	MK-FWH-0394	50	314-081-18	TB 36-02E	1305483	1305483	RF21-SLM-NTS	BENCH
FW	MK-FWH-0395	120	314-081-18	TB 36-02E	1305484	1305484	RF21-SLM-NTS	BENCH
MB	MK-MBH-0035	6	314-031-02	TB 12-02	1302700	1302714	RF21-SLM-NTS	Handstroke
MS	MK-MSH-0012	50	314-011-03	RB 484 Gal.	1307018	1307555	RF21-SLM-TS	BENCH
MS	MK-MSH-0058	120	314-011-20	PAA 36-01	1307019	1307556	RF21-TS-I	BENCH
MS	MK-MSH-0085	50	314-011-21	IB 36 -02	1404578	1404579	CR-14-01925	BENCH
MS	MK-MSH-0151	50	314-011-21	IB 36-02	1307020	1307557	RF21-TS-I	BENCH
MS	MK-MSH-0157	6	314-011-20	IB 36-02	1307021	1307559	RF21-SLM-TS	Handstroke
MS	MK-MSH-0169	6	314-011-14	PAA 36-01	1307022	1307560	RF21-SLM-TS	Handstroke
MS	MK-MSH-0175	15	314-011-15	IB 36-02	1307023	1307558	RF21-TS-I	BENCH

RF-21--Interval __4__
Approved By:_____
Date:_____
Revision _1_

System	Snubber No.	Size	Drawing	Location	Visual	Functional	Sample	Remarks
MS	MK-MSH-0201	1.5	314-011-08	PAI 12-01	1405677	1405674	CR-14-01713	Handstroke
MS	MK-MSH-0202	0.65	314-011-08	PAI 12-01	1307024	1307562 1404093	RF21-SLM-TS CR-14-01713	Handstroke BENCH
MS	MK-MSH-0206	1.5	314-011-08	PAI 12-01	1307025	1307571	RF21-TS-I	BENCH
MS	MK-MSH-0218	0.35	314-011-08	IB 236-01	1307026	1307572	RF21-TS-I	BENCH
MS	MK-MSH-0286	6	314-011-21	IB 36-02	1315587	1315620	Maintenance (TS)	Handstroke W.O. 1308898
MS	MK-MSH-0287	6	314-011-21	IB-36-02	1315588	1315621	Maintenance (TS)	Handstroke W.O. 1308898
MS	MK-MSH-0289	1.5	314-011-08	IB 12-10	1307027	1307563	Maintenance (TS)	Handstroke W.O. 1302878
MS	MK-MSH-0290	1.5	314-011-08	IB 12-10	1307028	1307564	Maintenance (TS)	Handstroke W.O. 1302878
MS	MK-MSH-0309A	50	314-011-20	PAA 36-01	1307029	1307573	RF21-SLM-TS	BENCH
MS	MK-MSH-0309B	50	314-011-20	PAA 36-01	1307030	1307574	RF21-TS-I	BENCH
MS	MK-MSH-0320	0.65	314-011-08	IB 36-01	1307031	1307575	RF21-TS-I	BENCH
MS	MK-MSH-0324	0.65	314-011-08	PAI 36-02	1405665	1405667	CR-14-01713	Handstroke
MS	MK-MSH-0325	0.35	314-011-08	PAI 12-01	1405678	1405674	CR-14-01713	Handstroke
MS	MK-MSH-0326	0.35	314-011-08	IB 12-02	1307032	1307565	RF21-SLM-TS	Handstroke
MS	MK-MSH-0338	1.5	314-011-08	IB 12-10	1307033	1307576	RF21-TS-I	BENCH
MS	MK-MSH-0352	0.65	314-011-08	IB 12-02	1307034	1307577	RF21-TS-I	BENCH
MS	MK-MSH-1029	0.35	1MS-22-3117	PAA 36-01	1307035	1307578	RF21-TS-I	BENCH
RC	MK-RCH-0041	6	314-601-01	RB 483 Press.	1307036	1307566	RF21-SLM-TS	Handstroke
RC	MK-RCH-0044	6	314-601-01	RB 482 Press.	1307037	1307567	RF21-SLM-TS	Handstroke
RC	MK-RCH-0056	6	314-601-01	RB 477 Press.	1307038	1307579	RF21-TS-I	BENCH
RC	MK-RCH-0057	15	314-601-01	RB 37-01	1305486	1305486	RF21-SLM-NTS	Handstroke
RC	MK-RCH-0066	15	314-601-01	RB 472 Press.	1307039	1307568	RF21-SLM-TS	Handstroke
RC	MK-RCH-0067	6	314-601-01	RB 472 Press.	1305487	1305487	RF21-SLM-NTS	Handstroke
RC	MK-RCH-0069	15	314-601-01	RB 472 Press.	1307040	1307569	RF21-SLM-TS	Handstroke
RC	MK-RCH-0078	50	314-601-02	RB 37-01	1305488	1305488	RF21-SLM-NTS	BENCH
RC	MK-RCH-0085	15	314-601-02	RB 472 Press.	1307041	1307570	RF21-SLM-TS	Handstroke
RC	MK-RCH-0088	6	314-601-02	RB 467 Press.	1307042	1307580	RF21-TS-I	BENCH
RC	MK-RCH-0221	1.5	314-731-01	RB 418 BLP	1307043	1307581	RF21-TS-I	BENCH
RC	MK-RCH-0301	6	314-601-28	RB 466 Press.	1307044	1307582	RF21-TS-I	BENCH

RF-21--Interval __4__
Approved By:_____
Date:_____
Revision _1_

System	Snubber No.	Size	Drawing	Location	Visual	Functional	Sample	Remarks
RC	MK-RCH-0370	1.5	314-601-29	RB 476 ALP	1307045	1307583	RF21-TS-I	BENCH
RC	MK-RCH-0371	1.5	314-601-29	RB 476 ALP	1307046	1307584	RF21-TS-I	BENCH
RC	MK-RCH-0372	6	314-601-29	RB 476 ALP	1307047	1307585	RF21-TS-I	BENCH
RC	MK-RCH-0398	15	314-601-01	RB 472 Press.	1307048	1307586	RF21-TS-I	BENCH
RH	MK-RHH-0129	6	314-641-06	AB 74-16	1307049	1307587	RF21-TS-I	BENCH
RH	MK-RHH-0130	15	314-641-06	AB 74-16	1307056	1307588	RF21-TS-I	BENCH
RH	MK-RHH-0134	6	314-641-06	AB 97-02	1307057	1307589	RF21-TS-I	BENCH
RH	MK-RHH-0166	6	314-641-15	PAA 12-01	1307058	1307590	RF21-TS-I	BENCH
RH	MK-RHH-0235	6	314-641-11	AB 12-06	1307059	1307591	RF21-TS-I	BENCH
RH	MK-RHH-4011	1.5	314-641-04	PAA 12-01	1307060	1307592	RF21-TS-I	BENCH
RH	MK-RHH-4024	6	314-691-03	AB 97-02	1307061	1307593	RF21-TS-I	BENCH
SI	MK-SIH-0068	50	314-691-02	AB 97-02	1404580	1404581	CR-14-01925	BENCH
SI	MK-SIH-0089	6	314-641-15	PAA 12-01	1307062	1307594	RF21-TS-I	BENCH
SI	MK-SIH-0167	6	314-691-12	RB 426 Gal.	1307063	1307595	RF21-TS-I	BENCH
SI	MK-SIH-0183	6	314-691-09	RB 429 ALP	1307064	1307596	RF21-TS-I	BENCH
SI	MK-SIH-0221	15	314-691-13	RB 421 Gal.	1307065	1307597	RF21-TS-I	BENCH
SI	MK-SIH-0320	0.65	314-691-19	RB 425 Gal.	1307066	1307598	RF21-TS-I	BENCH
SI	MK-SIH-0385	15	314-691-08	RB 446 CLP	1307067	1307599	RF21-TS-I	BENCH
SI	MK-SIH-0388	50	314-691-06	RB 433 ALP	1307068	1307600	RF21-TS-I	BENCH
SI	MK-SIH-0391A	15	314-691-06	RB 429 ALP	1307069	1307607	RF21-SLM-TS	Handstroke
SI	MK-SIH-0391B	15	314-691-06	RB 429 ALP	1307070	1307608	RF21-SLM-TS	Handstroke
SI	MK-SIH-0414	50	314-691-13	RB 434 BLP	1307071	1307601	RF21-TS-I	BENCH
SI	MK-SIH-1288	0.65	1MS-22-1824	RB 420 Gal	1307072	1307602	RF21-TS-I	BENCH
SI	MK-SIH-1309	0.35	1MS-22-1837	RB 426 Gal.	1307073	1307603	RF21-TS-I	BENCH
SI	MK-SIH-4028	0.35	314-691-16	RB 424 Gal	1307074	1307604	RF21-TS-I	BENCH
SP	MK-SPH-0294	6	314-661-05	AB 74-17	1307075	1307605	RF21-TS-I	BENCH
SW	MK-SWH-0031	6	314-251-08	FH 63-01S	1307076	1307606	RF21-TS-I	BENCH

Document Control Desk
USNRC, Region II
RC-14-0145
Attachment

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

INSERVICE INSPECTION REPORT #20
REFUEL 21
TAB B
IWE/IWL CONTAINMENT INSPECTION REPORT

CONTAINMENT INSERVICE INSPECTION - 2014
ASME SECTION XI, SUBSECTIONS IWE AND IWL

VIRGIL C. SUMMER NUCLEAR STATION

RESPONSIBLE ENGINEER EVALUATION REPORT

July 3, 2014

Prepared By: Dale D. Krause

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

CONTAINMENT INSERVICE INSPECTION - 2014
ASME SECTION XI, SUBSECTIONS IWE AND IWL
RESPONSIBLE ENGINEER EVALUATION REPORT

TABLE OF CONTENTS

CONTAINMENT INSERVICE INSPECTION - 2014
ASME SECTION XI, SUBSECTIONS IWE AND IWL
RESPONSIBLE ENGINEER EVALUATION REPORT

1.0 INTRODUCTION

This report evaluates the Containment Inservice 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, 2014.

2.0 SCOPE

The Containment Inservice 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 2001 Edition (with Addenda through 2003) 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 October 1, 2004. 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, 2007 to December 31, 2016 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 3 IWE and IWL Inspections performed during the Planned Outage for RF-21 during the Spring of 2014.

The scope of inspections is in accordance with the ISE-4 RF-21 Outage Plan for Interval 2, Period 3 included the following component inspections:

- 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

Design Guideline ST-07, Containment Inservice Inspection Evaluation Criteria, was 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 or an equivalent vendor program.

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 experience in structural engineering 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 2014 IWE and IWL inspections were conducted as an ongoing assessment of the condition of the containment structure. The IWE/IWL inspections and tests were started in April and completed in May 2014.

The **IWE inspections** included a combination of General Visual, VT-1, and VT-3 examinations performed by the qualified QC inspector. Inspections were made of all accessible containment liner surface areas using direct line of sight from permanent vantage points. The QC inspector walkdowns 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 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 boroscope prior to and after recoating and reinspected during RF 21.

A minimum of two coats were applied following the hydrolazing surface preparation. In addition to the required visual Augmented Inspections of the RHR and Containment Spray Penetrations, the augmented inspection of the recoated guard pipe surfaces during RF 20 included visual examination by boroscope of the recoated guard pipes within the penetration sleeves. These areas were reinspected by boroscope during RF 21.

5.0 INSPECTION PHILOSOPHY

The 2014 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 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-21, 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 ST-07 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 their identification during the baseline inspection done in 2000 and were performed again during RF-21.

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

Augmented inspections of the following components were not performed during RF 21 because these items had been deleted previously from the Augmented Inspection list prior to the IWE inspection during RF 20:

- Liner Plate Bulges (Deleted from Augmented Inspection list after RF 17 Inspection because no change in the condition since first observed in 2000.
- Liner Plate Dome Coatings (Deleted from Augmented Inspection list after RF 18 Inspection because no change in the condition since first observed in 2000.)

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 during RF 21. 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 few local areas of the RB liner plate typically where the sealant loses adhesion to the liner. This location 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 examination was in accordance with the ISE-4 plan and specifically the ASME Code for IWE, Table 2500-1 in the 2001 Edition with the 2003 Addenda.

The Augmented Inspection of the moisture barrier seal performed during RF-21 (Ref. STTS 1308007-001) identified three locations where the sealant detail had debonded from the liner required maintenance rework to ensure continued performance to meet the design function. The three locations were approximately 18 inches long, 6 inches long, and 6 feet long and are typical of the type of degradation seen during previous inspections which are typically reworked during the RF when they are observed. The local spots were reworked to the acceptable design condition as described in CR 14-02363.

It is noted that CER 04-1517,CR08-01993, CR 09-04879, and CR 12-05160 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 condition is maintained so that it serves its design function to protect the liner from corrosion.

6.1.1.2 RHR & Spray Guard Pipes

During the previous RF-19 outage, the Augmented Inspection of the RHR and RB Spray Guard Pipes was performed by Quality Control and Design Engineering. The purpose of the inspection was to continue to monitor issues previously identified during the initial IWE / IWL inspections (Fall 2000). The interspace between the penetration Guard Pipes and the surrounding sleeve pipe has exhibited groundwater in leakage with some corrosion on the exterior of the carbon steel Guard pipes. It was confirmed that the guard pipe thickness met the minimum required design thickness. The completion of the implementation of ECR-50560, "Dewatering System Design and Installation" since the Augmented

Inspection during RF 17 had reduced to some extent the groundwater in leakage at the guard pipes which facilitated the rework to prepare and recoat the guard pipes during RF18.

The inspections performed during RF 19 including direct visual and remote visual by boroscope 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. This 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 in 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 include performing maintenance work to prepare and recoat the pipe during RF 20. The QC boroscopic 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 boroscope 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 inleakage was still observed with indications of ongoing corrosion. The condition was reviewed and considered to be acceptable until the next Augmented Inspection during RF 22.

There were no observable changes to the condition of the containment isolation valve containers compared to the previous inspection.

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 boroscope. 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 CR 12-05536 evaluation from RF 20 found the guard pipe thickness to be acceptable and also provides the basis for acceptance of the RF 21 inspection.

6.1.2 Pressure Test Connections to Leak Chases on Inaccessible Bottom Liner Plate

During RF 19 it was determined that the IWE program did not include, and that there had never previously been, a General Visual examination of any of the pressure test connections to the bottom liner leak chases since they had been installed during plant construction over 30 years ago. This condition was identified and evaluated under CR11-02834. A full description of this issue is contained in the RF 19 and RF 20 IWE/IWL Responsible Engineers Reports.

During RF 20 all 51 junction boxes were permanently filled with epoxy grout. New stainless steel cover plates were permanently epoxy bonded to the surface of the epoxy grout fill in each box. In this fully repaired configuration with each box filled to the top and the pressure test connection with pipe plug fully encased within the epoxy grout fill there is no possibility for any unobserved water to inadvertently get into the boxes. The cover plates are fully bonded to the underlying fill and are no longer removable. All of the above inspections and repairs were performed under NC/CR11-02834

It is noted that the pressure test connections and junction boxes were not within the defined code boundary of the ASME Section XI examinations. However, the inspections described above and testing were performed under the Section XI program by the qualified Section XI QC inspectors including the inspections of all of the 51 repairs. The ISE-4 program plan was revised during the cycle between RF 20 and RF 21 to delete the Position Statement and related information (refer to ISE-4 para. 3.1.4) regarding the inspections and repair of the 51 junction boxes because that permanent repair had been completed during RF 20. Therefore, no further inspections during RF 21 nor in the future of the pressure test connections within the junction boxes were required because the pressure test connections were no longer accessible nor a source of potential water getting to the base liner.

6.1.3 IWE Other Inspection Results

During the inspection of the Personnel Access Airlock (Ref. WOs 1308005-007 and 1308006-012) wear indications were observed on the machined steel bearing blocks for the airlock doors on both the Reactor Building and the Auxiliary Building doors where the camrols engage and roll up onto the machined

groove in the bearing blocks to engage the door into a tightly closed leaktight position. There are three of these blocks per door and all three showed some indications of permanent deformations in the machined groove whre the camrols roll up and bear as the door is being tightly closed. The indications were evaluated by CR14-02713. The indications are not part of the containment pressure boundary but are part of the door closure design to ensure the doors are tightly closed into position where the double door seals are compressed and can perform their leaktight design function. The review found that the wear patterns in the machine grooves on the bearing blocks had been present for years and do not impact the leaktight function of the door seals. The double door seals are locally tested for leaktightness as a part of the maintenance procedure for the airlocks prior to entry into Mode 4. If the wear in the machine grooves impacted the test such that the test acceptance criteria could not be met, then the machine blocks would be reworked. Once the camrols roll up on the bearing blocks along the machined groove track in the bearing blocks, the camrols reach a closure position on the bearing blocks which is not affected by the wear in the machined bearing blocks. Therefore, the condition was found to be acceptable.

The general visual examination of the Fuel Transfer Tube (Ref. 1308006-003) found a number of wear indications such as minor dents on the mating surface of the bolt flange. The condition was identified and evaluated by CR-14-02871. Based on discussion with Mechanical Maintenance who is responsible to remove and reinstall the blind flange closure plate for the Fuel Transfer Tube on the end inside containment during each refueling outage, the indications have been known for years and have resulted from normal wear and tear of handling the heavy blind flange plate. The evaluation determined that none of the indications impact the required design strength or leak tight function of the two Quad ring seals which are seated in machined grooves in the blind flange and are compressed and seal against the bolt flange.

During the general visual examination of XRP0101(Ref. STTS 1308006-011) an approximately 8 inch long crack was observed in the coating located over the ¼" fillet weld connecting an 8 inch x ½" diameter support attachment plate to the thickened liner insert plate around the Reactor Building Purge Exhaust Penetration XRP0101. The fillet weld is not part of the containment pressure boundary but serves to connect the attachment plate to the thickened penetration insert plate which is part of the containment pressure boundary. The condition was identified and evaluated under CR-14-02439 and found to have no impact on the containment function. The defective coating was removed, the affected area prepared and Liquid Dye Penetrant Exam performed on the weld which was found to be acceptable with no indications. The local area was prepped and recoated with Qualified Coatings.

6.1.4 IWE Reportable Conditions

There are no IWE Reportable Conditions as a result of the RF-21 year 2014 inspections.

6.1.5 IWE Reportable Conditions Requiring Augmented Inspections

None of the results of the IWE inspection were found to exceed the evaluation criteria of Design Guide ST-07 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-22 (Fall 2015).

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. Prior to the current inspection performed during RF 21, the Augmented Inspection of the Containment Tendon Access Gallery was performed by Quality Control and Design Engineering during RF 20 in 2012. The inspection included previously identified issues from the IWE / IWL inspections (Fall 2000) and subsequent Augmented Inspections (2002, 2003, 2005, 2008, and 2009). The following were examined:

- Corrosion build-up and leaching on the outer TAG wall near Tendon V-15 (Ref. STTS 1302246-001)
- Concrete leaching at several locations within the TAG (Ref. STTS 1302246-002)

The corrosion build-up was inspected and determined to be continuing but comparable to that observed during the prior 2000-2013 inspections.

The entire TAG was inspected for any changes in the amount of concrete leaching. The amount of groundwater inflow 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 examinations shall continue during each refueling outage under the ASME Section XI IWE/IWL program but will not be performed as Augmented Inspections. using VT-1 examination.

Augmented Inspection by VT-1 of the Tendon Access Gallery performed immediately prior to RF 20 by Quality Control and Design Engineering identified several areas of leaching and discoloration but with none or minor increase from the previous inspection during RF 19. The inspection included the 3 small active leaks observed during RF 19 and observed no change. Therefore, the condition of leaching that has been evaluated previously is unchanged and acceptable. Only minor traces of grease seepage were observed coming across the gasket at a few 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 was found to be acceptable. Only 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 for any of the vertical tendons.

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 inspections performed for VCSNS during period April-May 2014 concurrent with RF 21 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 design functions.

Minor areas of groundwater inflow leakage and some concrete leaching formation that have been observed during previous inspections were observed during the General Visual examination of the Tendon Access Gallery. These conditions were unchanged compared to the previous examination during RF 20. None of these observations impact the design function of the reinforced concrete structures. The Tendon Access Gallery will continue to be reinspected 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 21 found the Moisture Barrier seal required some rework to restore it to required condition in three relatively small local areas. The condition was evaluated and reworked under CR14-02363. The observations and reworked locations were typical and comparable to previous inspection observations identified by CRs in the past. The observations included local spots of debonding of the sealant from the steel liner and concrete floor .

The following areas shall remain on the Augmented Inspection list:

Moisture Barrier Integrity
Guard Pipe Containment Boundary at Auxiliary Building Elevation 397'
Tendon Access Gallery Corrosion

Each of the Augmented Inspection areas shall be inspected during each refueling outage (at approximately 18 month intervals) to ensure that any structural degradation should it occur during the period between inspections will be examined and evaluated.

Document Control Desk
USNRC, Region II
RC-14-0145
Attachment

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

INSERVICE INSPECTION REPORT #20
REFUEL 21
TAB C
STEAM GENERATOR EDDY CURRENT SUMMARY

Westinghouse Non-Proprietary Class 3

SG-SGMP-14-15
Rev. 0

May 2014

V. C. Summer Unit 1 Steam Generator Cycle 21 Condition Monitoring and Cycles 22, 23 and 24 Operational Assessment

SG-SGMP-14-15
Rev. 0

V. C. Summer Unit 1 Steam Generator Cycle 21 Condition Monitoring and Cycles 22, 23 and 24 Operational Assessment

Prepared for:
SCANA

Author's Name: William R. LaMantia SG Management Programs	Signature / Date *Electronically Approved*	
Verifier's Name: David J. Ayres SG Management Programs	Signature / Date *Electronically Approved*	
Manager's Name: William J. Bedont Manager, SG Management Programs	Signature / Date *Electronically Approved*	
Reviewer's Name: C. J. Speas SG NDE Level III (IQDA)	Signature / Date Christ J Speas	05/20/2014
Reviewer's Name: S. H. White SG Program Engineer, SCANA	Signature / Date S H White	5/21/2014
Approver's Name: D. K. Weir Manager, Plant Support Engineering SCANA	Signature / Date DKW	5/21/14
Approver's Name: W. D. Stuart General Manager, Engineering Services SCANA	Signature / Date WDS	6/2/14 5/21/14

** Electronically Approved Records are Authenticated in the Electronic Document Management System*

Record of Revisions

Revision	Date	Revision Description
0	5/2014	Original Issue

Table of Contents

List of Tables

List of Figures

Executive Summary

This report provides the Condition Monitoring and Operational Assessment results based on the replacement steam generator (RSG) inspections, identification of loose parts, and engineering evaluation performed during the V. C. Summer Nuclear Station (VCSNS) Unit 1 21st refueling outage (1RF21) inspections. The assessments conducted are in accordance with the requirements of NEI 97-06, Rev. 3 (Reference 1), the EPRI Steam Generator (SG) Integrity Assessment Guidelines (Reference 2), and the EPRI PWR SG Examination Guidelines, Revision 7 (Reference 3).

According to the plant technical specifications, as modified by TSTF-510 Revision 2, and the Electric Power Research Institute (EPRI) Pressurized Water Reactor (PWR) SG Examination Guidelines, Revision 7, a sequential inspection period governs the inspection program and 100% of the tubes must be inspected during each inspection period for each existing and potential degradation mechanism. For SGs utilizing thermally treated Alloy 690 (A690TT) tubing, the length of the first sequential period is 144 effective full power months (EFPM) and the length of the second sequential period is 120 EFPMs. For VCSNS Unit 1, the 1RF21 outage is the first of two planned inspections during the second sequential period.

Wear due to loose parts was considered as a "potential degradation mechanism" for the V. C. Summer RSGs within the 1RF21 Degradation Assessment (Reference 5). Two (2) tubes in SG C hot leg exhibited wear at the flow distribution baffle due to the presence of a transient loose part. Maximum observed wear was 10%. Examination of the area near the indication showed no loose parts in the area, so the part that caused the wear is presumed to be removed from the RSG.

All new and existing Potential Loose Part (PLP) calls were resolved with no issues being identified. No challenges to tube integrity were suggested by the results of the 1RF21 eddy current (EC) inspection, and no tube leakage was observed during Cycle 21 operation; thus the Condition Monitoring requirements were met.

Wear at the anti-vibration bars (AVB), was identified as an existing degradation mechanism. No new AVB wear was observed during 1RF21. Minor AVB wear was observed during 1RF21. The level of AVB wear observed during 1RF21 will not have an impact on future SG inspection scopes nor limit the planned 3 cycles of operation prior to the next scheduled inspection in 1RF24.

Minor Tube Support Plate (TSP) and Flow Distribution Baffle (FDB) wear was observed during 1RF21. The level of TSP and FDB wear observed during 1RF21 will not have an impact on future SG inspection scopes nor limit the planned 3 cycles of operation prior to the next scheduled inspection in 1RF24.

Included in the 1RF21 steam generator services, an extensive in bundle top of tubesheet (TTS) inspection and foreign object search and retrieval (FOSAR) was performed for all SGs. A total of 28 foreign objects were identified during the TTS secondary side visual inspections. A total of 22 foreign objects were retrieved during the 1RF21 efforts. The 6 unretrievable parts were mapped and an engineering evaluation was performed by SG Engineering (Reference 9) which justified continued operation with the objects present on the SG secondary side.

Sludge lancing on all three steam generators was performed with results consistent with prior V. C. Summer RSGs experience. No anomalies were noted during the upper steam drum, or 9th tube support plate secondary side inspections.

During installation of the secondary side manways, the studs were found to be elongated further than specifications permit. An engineering analysis (Reference 8) was performed by Westinghouse permitting a lower torque specification for manway installation.

No inspection results were obtained that challenged tube integrity during the previous operating period; thus all technical specification performance criteria and the Condition Monitoring requirements were satisfied. In addition, based on the results of the 1RF21 SG inspection efforts, the operational assessment structural and leakage integrity requirements are predicted to be satisfied through EOC-24; thus all Operational Assessment requirements are satisfied.

1. Introduction

V. C. Summer Unit 1 is a three-loop plant with Delta 75 RSGs each equipped with 6307 thermally treated Alloy 690 (A690TT) tubes, with 11/16 inch diameter and 0.040 inch wall thickness. There are nine tube support plates, which are 1.125 inch thick and fabricated from Type 405 stainless steel with trefoil broached holes. The flow distribution baffle is fabricated from Type 405 stainless steel, 0.75 inch thick with nanofoil broached holes in a triangular pitch array. There are four sets of anti-vibration bars (AVBs), made of Type 405 stainless steel. The tube-to-tubesheet joints in the RSGs are formed by a full depth hydraulic expansion and a weld to the primary cladding on the tubesheet.

This document provides:

- A summary of the NDE findings
- A summary of the secondary side inspection results
- Condition Monitoring for Cycle 21
- Operational Assessment of the tube structural and leakage integrity for Cycles 22, 23 and 24

NEI 97-06 Revision 3 "Steam Generator Program Guidelines", the industry requirement for steam generator maintenance programs, requires that Condition Monitoring (CM) be performed following each inspection to show that the structural and leakage integrity requirements for the steam generator (SG) tubes have been met since the previous inspection based on the current inspection results. An Operational Assessment (OA) is also required within 90 days following plant entering Mode 4. The OA is the forward-looking evaluation that compares the current, as-found, SG tube eddy current results against structural and leakage integrity limits to ensure that structural and leakage integrity are maintained until the next scheduled inspection. The structural and leakage limits are included in the Degradation Assessment (Reference 5) that was issued prior to the inspection.

This document is the Condition Monitoring Assessment and Final Operational Assessment for V. C. Summer 1RF21, prepared in accordance with the requirements of the Steam Generator Integrity Assessment Guidelines, Rev. 3 (Reference 2).

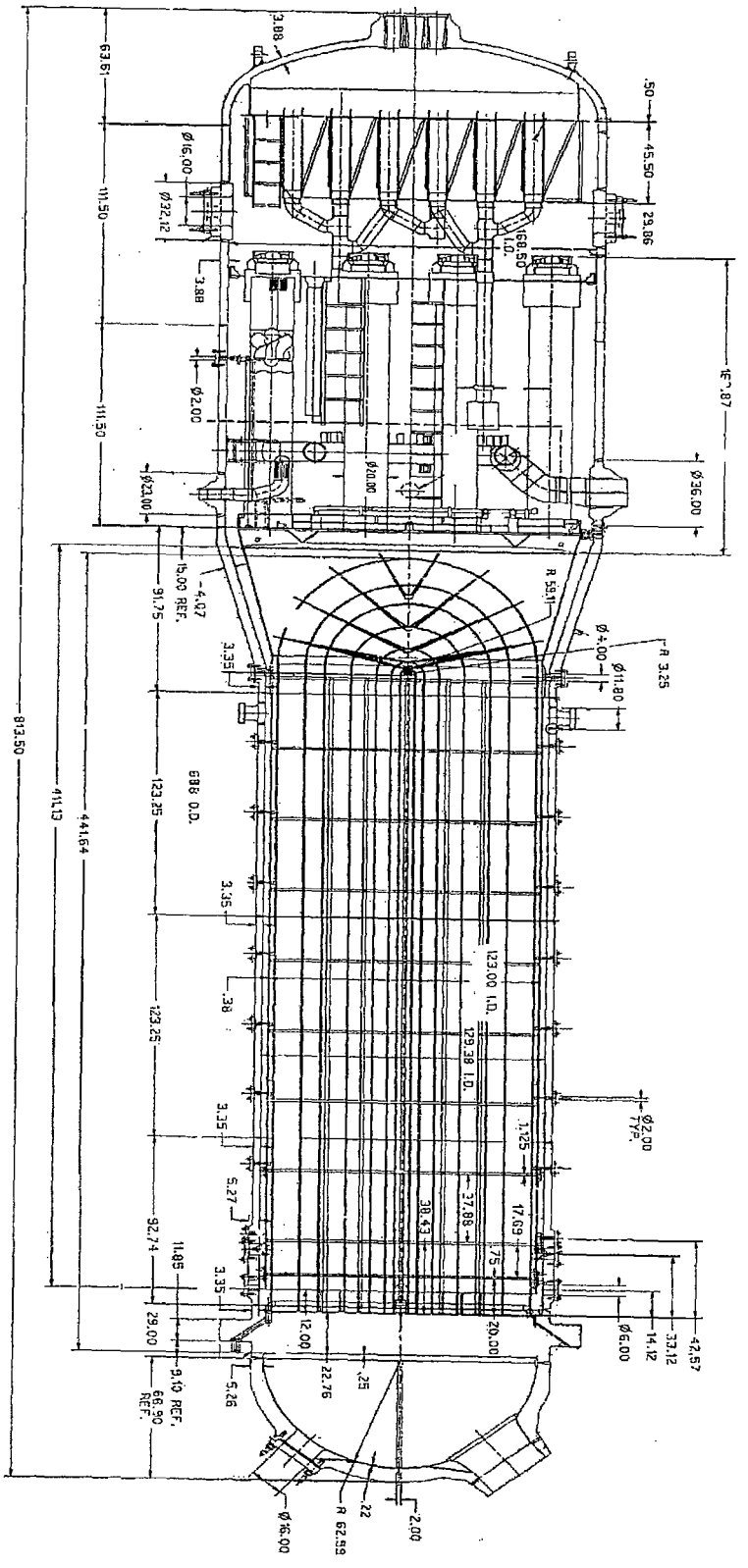


Figure 1-1. Schematic of Delta 75 Steam Generator

2. Inspection Program and Indication Summary

2.1 VCSNS 1RF21 Base Scope Inspection Program

The inspection program, as required by the EPRI PWR SG Examination Guidelines (Reference 3), addressed the potential degradation mechanisms for V. C. Summer Unit 1. The defined scope implemented during 1RF21, as specified in Reference 5, included the following:

1) 55% (plus tubes with prior indications) full length bobbin inspection
2) U-bend +**Point**™[1] probe inspection of tubes that a bobbin probe would not pass through
3) 100% +**Point** probe inspection of peripheral tubes and at the tube lane (two tubes closest to the boundary in both cases) in the hot leg (HL) and cold leg (CL) from 3inches above to 3 inches below TTS
4) 20% +**Point** probe inspection of non-peripheral tubes in HL from 3inches above to 3inches below TTS
5) 50% +**Point** probe inspection of all dents/dings ≥ 5 volts
6) +**Point** probe inspection of legacy loose parts
7) Special interest rotating pancake coil (RPC) (freespan signals without historical resolution, bobbin I-code indications, etc.)
8) 100% tube plug video inspection in HL and CL (8 tubes each)
9) Video scan of channel head bowl in HL and CL as recommended by Westinghouse Nuclear Safety Advisory Letter (NSAL) 12-1 (Reference 6)
10) Top of tubesheet secondary side video inspection including FOSAR
11) Upper bundle video inspection in one SG
12) Steam drum inspection

2.2 Inspection Expansion Requirements

There were no nondestructive examination (NDE) inspection scope expansions required during V. C. Summer 1RF21.

2.3 Inspection Results

Table 2-1 presents a filtered summary of the tube NDE indication results based on data relevant to evaluating tube integrity. The files generated by the STMax database and used to create this table are listed below the table.

[1] +Point™ is a trademark of Zetec, Inc.

Table 2-1: V. C. Summer 1RF21 SG Eddy Current Inspection – Final Indication Summary

Indications/Signals	Condition	SG A	SG B	SG C
BLG	Apparent Diameter Increase	4	3	1
DDI	Distorted Dent or Ding Indication	0	1	0
DNG	Freespan Tube Ding ≥ 2 Volts	218	174	319
DNT	Apparent Tube Dent ≥ 2 Volts	1	0	0
DSI	Distorted Support Indication	6	11	10
NDF	Degradation Not Found	63	65	37
NQI	Non-Quantifiable Indication	1	0	3
PCT	Percent Indication	19	41	20
PLP	Possible Loose Part	3	4	0
WAR	MRPC Code Denoting Wear	4	11	8

- **SG A:** 20140401_CGE_A_FINALDATA_042514_1354.MDB **Final Data Set**
- **SG B:** 20140401_CGE_B_FINALDATA_042514_1304.MDB **Final Data Set**
- **SG C:** 20140401_CGE_C_FINALDATA_042514_1211.MDB **Final Data Set**

2.4 Tube Plugging

There were no tubes plugged during the V. C. Summer 1RF21 outage SG inspections.

2.5 Plug Inspection

The currently installed plugs were inspected for evidence of leakage as characterized by Boron "star" patterns. The borated plugs were categorized in accordance with Westinghouse Procedure MRS 2.4.2 GEN-44, Revision 1; "Visual Inspection of Plugs" (Reference 7). No dripping plugs were identified; all plugs were classified as Category 1 and were found to be dry.

2.6 Channelhead Visual Inspection

Reference 6 (NSAL-12-1) recommended visual inspection of the channelhead near the bowl drain line to determine if degradation of the cladding and potential degradation of the channelhead base material had occurred. The observed condition is still consistent with the manufacturing process and does not exhibit any degradation. It was concluded that a condition similar to that documented in NSAL-12-1 does not exist at V. C. Summer Unit 1.

3. Condition Monitoring

Condition Monitoring (CM) is the assessment performed on observed indications of tube degradation to confirm that the SG Integrity Performance Criteria embodied in the CM limits have not been violated. It is essentially a backward-looking evaluation. This is contrasted with the Operational Assessment (OA), which seeks to determine whether the tube integrity performance criteria will not be exceeded during subsequent operation of the SGs until the next inspection. The CM limits, derived from the structural limits in accordance with the EPRI SG Integrity Assessment Guidelines (Reference 2), are provided in the outage DA (Reference 5).

3.1 Existing Degradation Mechanisms

Existing degradation mechanisms are those mechanical or corrosive processes previously and/or currently observed in a SG. Based on this definition of existing degradation mechanisms and prior inspection results of the RSGs at VCSNS Unit 1, there are two existing degradation mechanisms for the 1RF21 inspection.

3.1.1 Tube Wear at AVBs

Wear related to tube interaction with AVB supports results from flow-induced vibration in the upper bundle. This mechanical process is related to the tightness of the upper bundle assembly as expressed in the distribution of tube-to-AVB gaps.

In general at plants with similar support structures, AVB wear indications are slow to progress and do not represent a challenge to structural or leakage integrity standards between inspections, but may require plugging should observed indication depths exceed the Technical Specification plugging criterion of 40% through-wall (TW).

Indications of AVB wear in the RSGs were first reported during RF12. Very few AVB wear indications were reported in the subsequent inspections during RF15 and RF18. No new AVB wear indications were reported in 1RF21. The deepest wear indication during 1RF21 was 10% through-wall depth (TWD). To date, no tubes have been plugged for this mechanism. Thus, tube wear at AVBs continues to be an existing degradation mechanism.

Table 3-1 summarizes the current inspection results for AVB wear.

Table 3-1
V. C. Summer Unit 1 1RF21 AVB Wear

Steam Generator	Number of Indications	Number Indications ≥40% TW	New Indications[1]		New Tubes[2]
			Number	Max Depth (%TW)	
SG-A	3	0	0	n/a	0
SG-B	0	0	0	n/a	0
SG-C	1	0	0	n/a	0

1. Includes indications on tubes without prior indications
2. New tubes are tubes reported with AVB wear indications that had no prior history of AVB indications.

The maximum AVB wear indication from the current inspection (1RF21) was 10% TWD. This observed wear is well within the predicted wear from the operating assessment performed at RF18 (approximated to be 21% TWD).

Examination Technique Specification Sheet (ETSS) 96004.1, Rev 13 was utilized for sizing AVB wear. The ETSS correlation for true depth to indicated depth is:

$T = 0.98*I + 2.89$, where T is predicted depth and I is the indicated depth from EC.

From this correlation, the predicted depth of the maximum indicated wear (10%) is 12.69%.

The standard deviation for the correlation, σ, = 4.19. The multiplier on the standard deviation to achieve a 95% probability for a normal distribution is 1.645. Therefore, at 95% probability, the sizing uncertainty is 6.89% (1.645x4.19).

Reference 2 specifies a factor of 1.12 to adjust for analyst uncertainty; thus, the total uncertainty, U_t, for sizing at 95% probability is:

$$U_t = 1.12 * 6.89\% = 7.72\%$$

The potential maximum depth of the indication at a confidence level > 95/50 is:

Maximum Predicted Indication	12.69% TWD
NDE Sizing Uncertainty (95/50 CL)	7.72% TWD
Total (>95/50)	20.41% TWD
Structural Limit for AVB Wear	72% TWD

Since the maximum observed AVB wear indication of 20.41% TWD at 95% probability and 50% confidence is less than the structural limit of 72% TWD, the requirements for condition monitoring are met for AVB wear.

3.1.2 Tube Wear at TSPs and FDB

Flow-induced vibration that causes tube wear at TSPs and the FDB is governed primarily by secondary side thermal hydraulic characteristics and the geometry (sizes of the tube-to-support gaps, TSP spacing, etc.). This suggests that wear rates are subject to specific conditions and will vary between plants and between SGs at a specific plant. Only very few indications of tube wear at TSPs have been reported in Westinghouse-designed SGs.

Tube wear at TSPs was first reported in the RSGs during RF15. The deepest TSP wear reported during 1RF21 was 29% TW. One indication of tube wear at FDB was reported during RF18. The FDB wear reported during 1RF21 was 16% TW. Both wear mechanisms are located and sized using identical eddy current testing (ECT) techniques. With TSP wear being significantly deeper than FDB wear, TSP wear bounds the analysis results for FDB wear. To date, no tubes have been plugged for this mechanism. Thus, tube wear at TSPs and the FDB is an existing degradation mechanism.

Table 3-2 summarizes the current inspection results for TSP and FDB wear.

Table 3-2
V. C. Summer Unit 1 1RF21 TSP and FDB Wear

Steam Generator	Number of Indications	Number Indications ≥40% TW	New Indications[1]		New Tubes[2]
			Number	Max Depth (%TW)[3]	
SG-A	16	0	4	14	4
SG-B	41	0	11	16	8
SG-C	19	0	8	20	8

1. Includes indications on tubes without prior indications
2. New tubes are tubes reported with wear indications that had no prior history of indications.
3. The maximum TSP and FDB wear indication observed during 1RF21 was 29% TW.

The maximum TSP and FDB wear indication from the current inspection (1RF21) was 29% TWD and 16% TWD, respectively. This observed wear is well within the predicted wear from the operating assessment performed at RF18 (approximated to be 40% TWD and 24% TWD, respectively).

ETSS 96004.1, Rev. 13 was utilized for sizing TSP and FDB wear. The ETSS correlation for true depth to indicated depth is:

$T = 0.98*I + 2.89$, where T is predicted depth and I is the indicated depth from EC.

From this correlation, the predicted depth of the maximum indicated wear (29%) is 31.31%

The standard deviation for the correlation, σ, = 4.19. The multiplier on the standard deviation to achieve a 95% probability for a normal distribution is 1.645. Therefore, at 95% probability, the sizing uncertainty is 6.89% (1.645 x 4.19).

Reference 2 specifies a factor of 1.12 to adjust for analyst uncertainty; thus, the total uncertainty, U_t, for sizing at 95% probability is:

$$U_t = 1.12 * 6.89\% = 7.72\%$$

The potential maximum depth of the indication at a confidence level > 95/50 is:

Maximum Predicted Indication	31.31% TWD
NDE Sizing Uncertainty (95/50 CL)	7.72% TWD
Total (>95/50)	39.03% TWD
Structural Limit for TSP and FDB Wear	66% TWD

Since the maximum observed TSP and FDB wear indication of 39.03% TWD at 95% probability and 50% confidence is less than the structural limit of 66% TWD, the requirements for condition monitoring are met for TSP and FDB wear.

3.2 Potential Degradation Mechanisms

Potential degradation mechanisms are those mechanical and corrosive processes that have not been reported in prior inspections in the SGs but are judged to have a potential to occur in the current inspection period based on industry experience and/or laboratory data. Based on the assessment of industry experience and laboratory data, the tube wear due to loose parts was identified as a potential degradation mechanism for VCSNS 1RF21.

The overall performance of A690TT tubing with respect to corrosion resistance in relevant SG environments indicates that the service experience should represent an improvement over previous material selections. The increased resistance of the A690TT utilized in the VCSNS Unit 1 RSGs to these corrosion degradation mechanisms extends the mean time to potential observation.

3.2.1 Tube Wear Due to Foreign Objects

Foreign objects may enter the SG through the feedwater stream and may cause tube wear. During the bobbin probe base scope inspection program, an indication was noted at the top of the hot leg baffle plate in 2 tubes - row 32, column 89 and row 35, column 92. When these locations were tested with a rotating coil probe, small indications indicative of wear were noted above the baffle plate, although initially reported as DSI (Distorted Support Indication) indications these indications did not appear to have been caused by the baffle plate itself. It was surmised that the wear was caused by a transient loose part. EPRI ETSS 27903.3 was selected to size these indications. The tube at row 32, column 89 was sized at 7% TWD and the tube at row 35, column 92 was sized at 10% TWD. A review of the eddy current data from surrounding tubes was conducted with no additional indications discovered. Due to the lack of similar indications reported during the inspection and the shallow nature of the indications, examination expansion was deemed unnecessary. No loose parts associated with this wear were found in the vicinity of these indications during FOSAR activities so it is believed that the loose part no longer remains in the SG.

No tubes were plugged for this mechanism. Based on the definition of existing degradation mechanisms, any degradation mechanism which has been observed at V. C. Summer Unit 1, wear due to foreign objects is now defined as an existing degradation mechanism.

Table 3-3 lists the data record for the eddy current wear signals corresponding to a possible loose part (PLP) indication or a foreign object indication.

Table 3-3
V. C. Summer Unit 1 1RF21 Possible Loose Part Indications (PLPs)

SGID	Row	Col	Volts	Deg	Ind	Chn	Locn	Inch1	BegT	EndT	PDia	PType	Cal
C	32	89	0.48	140	DSI	P1	BPH	0.47	TEH	TEC	0.560	NBAZ1	8
C	35	92	0.39	130	DSI	P1	BPH	0.45	TEH	TEC	0.560	NBAZ1	8

The maximum foreign object wear indication from 1RF21 was 10% TWD.

ETSS 27903.3, Rev. 1 was utilized for sizing foreign object wear. The ETSS correlation for true depth to indicated depth is:

T = 1.21*I + 26.3, where T is predicted depth and I is the indicated depth from EC.

From this correlation, the predicted depth of the maximum indicated wear (10%) is 38.4%

The standard deviation for the correlation, σ, = 4.99. The multiplier on the standard deviation to achieve a 95% probability for a normal distribution is 1.645. Therefore, at 95% probability, the sizing uncertainty is 8.21% (1.645x4.99)

Reference 2 specifies a factor of 1.12 to adjust for analyst uncertainty; thus, the total uncertainty, U_t, for sizing at 95% probability is:

$$U_t = 1.12 * 8.21\% = 9.19\%$$

The potential maximum depth of the indication at a confidence level > 95/50 is:

Maximum Predicted Indication	38.4% TWD
NDE Sizing Uncertainty (95/50 CL)	9.19% TWD
Total (>95/50)	47.6% TWD
Structural Limit for Foreign Object Wear	65% TWD

Since the maximum observed foreign object wear indication of 47.6% TWD at 95% probability and 50% confidence is less than the structural limit of 65% TWD, the requirements for condition monitoring are met for foreign object wear.

3.3 Secondary Side Activities

Steam Drum Inspection, secondary side sludge lancing, and foreign object search and retrieval (FOSAR) was performed in each SG during 1RF21. The amount of material removed from the steam generators during sludge lancing operations was not significantly higher than the amount normally removed during sludge lancing operations.

No anomalous conditions adverse to structural integrity were reported from the video inspection. The FOSAR operation was performed over the tubesheet. The two (2) possible loose part (PLP) indications reported (in SG C) slightly above the baffle plate location were subjected to FOSAR. No loose parts were found in the region where the PLPs were reported by eddy current analysts. Wear was found at these two locations. The wear is discussed in detail in Section 3.2.1. It was determined that the wear due to this transient loose part did not threaten condition monitoring requirements.

PLPs were reported by eddy current in the area around R1C124 in SG B. The cause of the PLPs was determined to be a washer. The washer was removed and no wear associated with this part was located. Additional objects identified during the video inspection were judged as sludge/scale remnants and fibrous strands not detrimental to tube integrity and not warranting retrieval efforts. There was no wear degradation associated with any of the PLP indications or the foreign objects.

Included in the 1RF21 steam generator services, an extensive in-bundle top of tubesheet (TTS) inspection and foreign object search and retrieval (FOSAR) was performed for all SGs. A total of 28 foreign objects were identified during the TTS secondary side visual inspections. A total of 22 foreign objects were retrieved during the 1RF21 efforts. The 6 unretrievable parts (all in SG A) were mapped and an engineering evaluation performed by SG Engineering (Reference 9) which justified continued operation with the object present on the SG secondary side.

During installation of secondary side manways, the studs were found to be elongated further than specifications permit. An engineering analysis (Reference 8) was performed by Westinghouse permitting a lower torque specification for manway installation.

3.4 Condition Monitoring Conclusions

Based on the inspection data, no tubes exhibited degradation that required in situ pressure testing to demonstrate structural integrity. There was no reported primary-to-secondary leakage prior to the end of the V. C. Summer Unit 1 RSG inspection interval. Although minor wear attributed to a transient loose part was identified during ECT, no secondary side tube degradation attributable to foreign objects has been identified from the FOSAR and visual inspections. The SG performance criteria for operating leakage and structural integrity were satisfied for the preceding V. C. Summer Unit 1 RSG three cycle operating interval.

4. Operational Assessment

NEI 97-06 requires that an Operational Assessment be performed to assess if the tubing, considering the degradation mechanisms observed in the steam generators of a plant, will continue to meet tube structural and leakage integrity requirements at the end of the upcoming cycle. The next inspection is planned for 1RF24 which is three fuel cycles.

4.1 AVB Wear

The next planned inspection of the V. C. Summer SGs is at 1RF24. The estimated cycle length to Cycle 24 is 1443.6 EFPD. The cycle length from Cycle 18 to Cycle 21 was 1448.1 EFPD.

The maximum depth of AVB wear measured by the bobbin probe was 10%TW. The maximum wear rate observed at 1RF21, based on the difference between the depths at 1RF21 and RF18 inspections (2% TW) divided by the Effective Full Power Years (EFPY) between those inspections (4 EFPY), was 0.5%TW / EFPY which is very small in comparison to wear rates observed at other plants. Due to the small number of indications, for this operational assessment the largest observed historical wear rate, 0.75%TW / EFPY (growth rate observed at RF18), is conservatively assumed for operation until cycle 1RF24.

ETSS 96004.1, Rev 13 was utilized for sizing AVB wear. The ETSS correlation for true depth to indicated depth is:

$T = 0.98*I + 2.89$, where T is predicted depth and I is the indicated depth from EC.

From this correlation, the predicted depth of the maximum indicated wear (10%) is 12.69%

The standard deviation for the correlation, σ, = 4.19. The multiplier on the standard deviation to achieve a 95% probability for a normal distribution is 1.645. Therefore, at 95% probability, the sizing uncertainty is 6.89% (1.645x4.19).

Reference 2 specifies a factor of 1.12 to adjust for analyst uncertainty; thus, the total uncertainty, U_t, for sizing at 95% probability is:

$$U_t = 1.12 * 6.89\% = 7.72\%$$

Therefore, the predicted maximum indication left in service may be 12.69% TWD. The predicted AVB wear depth at 1RF24 is:

Max indication left in service	12.69% TWD
95% probability NDE uncertainty	7.72% TWD
Maximum Historical Growth (for 4 EFPY)	3.0% TWD
1RF24 Predicted Depth	23.41% TWD

The conservative structural limit identified for AVB wear is 72% TW at 0.5 inches length from Table 5-1 of the Degradation Assessment (Reference 5). Therefore, since the conservatively projected depth is less than the structural limit, AVB wear meets the performance requirements for continued operation until at least 1RF24.

4.2 TSP and FDB Wear

The next planned inspection of the V. C. Summer SGs is at 1RF24. The estimated cycle length to Cycle 24 is 1443.6 EFPD. The cycle length from Cycle 18 to Cycle 21 was 1448.1 EFPD.

The maximum depth of TSP and FDB wear measured by the bobbin probe was 29%TW. The maximum wear rate observed at 1RF21, based on the difference between the depths at 1RF21 and RF18 inspections (7% TW) divided by the EFPY between those inspections (4 EFPY), was 1.75%TW / EFPY which is very small in comparison to wear rates observed at other plants. Due to the small number of indications, for this operational assessment the largest observed historical wear rate, 1.75%TW / EFPY (growth rate observed at 1RF21), is conservatively assumed for operation until cycle 1RF24.

The maximum TSP and FDB wear indication from the current inspection (1RF21) was 29% TWD.

ETSS 96004.1, Rev 13 was utilized for sizing TSP and FDB wear. The ETSS correlation for true depth to indicated depth is:

$T = 0.98*I + 2.89$, where T is predicted depth and I is the indicated depth from EC.

From this correlation, the predicted depth of the maximum indicated wear (29%) is 31.31%

The standard deviation for the correlation, $\sigma_s = 4.19$. The multiplier on the standard deviation to achieve a 95% probability for a normal distribution is 1.645. Therefore, at 95% probability, the sizing uncertainty is 6.89% (1.645 x 4.19).

Reference 2 specifies a factor of 1.12 to adjust for analyst uncertainty; thus, the total uncertainty, U_t, for sizing at 95% probability is:

$$U_t = 1.12 * 6.89\% = 7.72\%$$

Therefore, the predicted maximum indication left in service may be 39.03% TWD. The predicted TSP and FDB wear depth at 1RF24 is:

Max indication left in service	31.31% TWD
95% probability NDE uncertainty	7.72% TWD
100% probability growth (for 4 EFPY)	7.00% TWD
1RF24 Predicted Depth	46.03% TWD

The conservative structural limit identified for TSP and FDB wear is 66% TW at 1.2 inches length from Table 5-1 of the Degradation Assessment (Reference 5). Therefore, since the conservatively projected depth is less than the structural limit, TSP and FDB wear meets the performance requirements for continued operation until at least 1RF24.

4.3 Foreign Object Wear

The following statements can be made about foreign object wear associated with the 1RF21 results:

- Two (2) tubes (R32C89 and R35C92) in SG C Hot Leg exhibited wear caused by a transient loose part. No parts were located in the vicinity of the wear and no additional wear was found.
- A loose part, a washer, was located during the course of ECT evaluation. The part was found and recovered. No wear was associated with that loose part.
- The remaining foreign objects have been in the steam generator for many cycles previous to the 1RF21 outage inspection, have caused no wear, and will not cause a violation of the tube integrity criteria. Structural and leakage limits are expected to be satisfied for the next three operation cycles.

The wear located at 2 tubes (R32C89 and R35C92) were sized using ETSS 27903.3. The tube at row 32, column 89 was sized at 7% TWD and the tube at row 35, column 92 was sized at 10% TWD. Both of these indications were well within condition monitoring limits. Examination of area in the vicinity of these 2 tubes show the loose part that caused the wear is no longer at these two tubes and therefore does not present an issue to operation until at least 1RF24.

Since all known, potentially damaging foreign objects in the SGs are fixed in place and the foreign objects that caused wear are presumed to be removed from the SG, the performance criteria for operational assessment are satisfied and operation of the SGs until the next inspection at 1RF24 is justified. Sludge rocks are not considered to have the potential to damage the tubes.

It is recommended that future inspections monitor the wear at R32C89 and R35C92 to ensure that wear growth is arrested.

4.4 Secondary Side Activities

No tube degradation due to foreign objects was observed in the visual inspection programs conducted during 1RF21, but 2 locations of tube wear due to a transient loose part were observed during 1RF21. Section 3.2.1 talks about this foreign object wear in detail. The parts that caused this wear were not found during visual inspections, so this wear is not believed to be continuing. Therefore the wear at these locations does not present an issue to operation until at least 1RF24.

For the objects remaining in the SG secondary side following 1RF21, the analysis performed in Reference 9 supports a three cycle scheduled operating interval between visual inspections before the object with greatest potential for tube degradation could potentially exceed the structural limit of 65% through-wall (TW) for a 1.5 inch wear scar. The Reference 9 analysis establishes that the V. C. Summer RSGs are not expected to encounter degradation exceeding the tube structural limit during a three cycle inspection interval attributable to the foreign objects analyzed, and therefore, no challenge to the structural integrity performance criteria for an upcoming operating period of three cycles is presented.

4.5 Leakage Integrity

It is necessary to calculate the accident induced leakage for degradation that has the potential for leakage. To date, no leakage has been reported at V. C. Summer Unit 1. Furthermore, no degradation mechanism found at V. C. SummerUnit 1 challenges the leakage criteria.

4.6 Operational Assessment Conclusions

An operational assessment is performed to assess whether degradation mechanisms observed in a plant will continue to meet the SG tube structural and leakage integrity performance criteria at the next planned inspection. The foreign objects retained on the SG secondary side have been evaluated to satisfy the Reference 1 requirements. Based on conservative wear rate analysis, there is no challenge to tube integrity in the upcoming three operating cycles until eddy current is performed again in 1R24. Operational assessment requirements for the projected 48.1 EFPM of operation until the next eddy current inspection of the RSGs, i.e., Cycles 22, 23 and 24, without violating the performance criteria are satisfied for all degradation mechanisms.

5. References

1. "Steam Generator Program Guidelines," NEI 97-06, Revision 3, January 2011.
2. *Steam Generator Management Program: Steam Generator Integrity Assessment Guidelines, Revision 3.* EPRI, Palo Alto, CA, 1019038, November 2009.
3. *Steam Generator Management Program: Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 7*, EPRI, Palo Alto, CA, 1013706, October 2007.
4. *EPRI Steam Generator In Situ Pressure Test Guidelines, Revision 4*, EPRI, Palo Alto, CA, 1025132, October 2012.
5. SG-SGMP-14-1, Rev. 2, "V. C. Summer 1RF21 (April 2014) Steam Generator Degradation Assessment," April 2014.
6. "Steam Generator Channel Head Degradation," Westinghouse Nuclear Safety Advisory Letter, NSAL-12-1, January 5, 2012.
7. MRS 2.4.2 GEN-44, Revision 1, "Visual Inspection of Plugs," September 1999.
8. LTR-SGDA-14-28, Rev. 1 "Westinghouse Justification for the Use of Lower Torque Values for Installation of the V. C. Summer Unit 1 Replacement Steam Generator Secondary Manway Covers," April 2014.
9. LTR-SGMMP-14-22, "Evaluation of Secondary Side Loose Parts at V. C. Summer during Spring 2014 Outage," May 2014.

Document Control Desk
USNRC, Region II
RC-14-0145
Attachment

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

INSERVICE INSPECTION REPORT #20
REFUEL 21
TAB D
REACTOR VESSEL HEAD EXAMINATION SUMMARY

V. C. Summer Outage – 1R21 Reactor Vessel Head Penetration Examination

April - May 2014

NDE Report Summary

WDI-PJF-1310485-FSR-001 Rev.0

Westinghouse Electric Company
Nuclear Services
Waltz Mill Service Center
P.O. Box 158
Madison, Pennsylvania 15663
USA

1.0 INTRODUCTION

During the V. C. Summer Unit 1,1R21 outage in April 2014, WesDyne International performed nondestructive examinations (NDE) of the reactor vessel head CRDM penetration tubes, the reactor vessel head vent tube, vent line j-weld, bare metal visual and reactor vessel head dye penetrant support.

The CRDM penetrations were examined utilizing procedures and personnel qualified in accordance with the EPRI Performance Demonstration Program by the implementation of 10CFR50.55a and were applied in accordance with code case N-729-1 as amended by 10CFR50.55a(g)(6)(ii)(D). A demonstrated volumetric leak path assessment was performed on all 65 of the CRDM penetrations in accordance with the requirements of 10CFR50.55a (g)(6)(ii)(D) and meeting the requirements of all applicable relief requests for V. C. Summer Unit 1, 1R21 outage.

Head vent line penetration eddy current examinations were applied in accordance with N-729-1.

The reactor vessel head at V. C. Summer Unit 1 is a Westinghouse design that was manufactured by Chicago Bridge & Iron (CBI). The head contains 65 alloy 600 penetration tubes that are shrunk fit in the reactor vessel head and attached with alloy 182/82 partial penetration J-groove welds. The head also contains one alloy 600 vent tube, attached to the vessel head with an alloy 182/82 partial penetration J-groove weld.

There are a variety of configurations for the 65 penetration tubes, each configuration requiring special consideration for examination. The penetration tubes measure 4.00" on the OD and have an ID dimension of 2.75". The nominal wall thickness is 0.625". The penetration tube configurations are as follows:

- 9 open penetration tubes
    - 4 Thermocouple columns (without guide funnels)
    - 1 Open housing (RVLIS)
    - 3 Spare penetrations
    - 1 Penetration (18) with removed Part-Length and Sleeve removed
- 52 penetration tubes with thermal sleeves installed
- 4 Part-Length style penetrations with Part-Length thermal sleeves
- One (1) 1.00" - schedule 160, ID vent tube

All inspections were performed in accordance with the following WesDyne field service nondestructive examination procedures and field change notices (FCN):

- WDI- CAL-002, Rev. 10
  "Pulser/Receiver Linearity Procedure"

- WDI-ET-002, Rev. 17
  "IntraSpect Eddy Current Inspection of Vessel Head Penetration J-Groove Welds and Tube OD Surfaces"

- WDI-ET-004, Rev. 18
  "IntraSpect Eddy Current Analysis Guidelines"

- WDI-STD-101, Rev. 11
  "RVHI Vent Tube J-Weld Eddy Current Examination"

- WDI-STD-114, Rev. 13
  "RVHI Vent Tube ID & CS Wastage Eddy Current Examination"

- WDI-STD-1040, Rev. 11
  "Procedure for Ultrasonic Examination of Reactor Vessel Head Penetrations"

- WDI-STD-1041, Rev. 10
  "Reactor Vessel Head Penetration Ultrasonic Examination Analysis"

- WDI-STD-1042, Rev. 4
  "Procedure for Eddy Current Examination of Reactor Vessel Head Penetrations"

- WDI-SSP-1218, Rev. 2, FCN-001
  "Reactor Vessel Head Penetration and Bare Metal Remote Visual Inspection for V. C. Summer"

Dye penetrant Code inspections were performed on the 4 RF20 (2012) repairs using the following PCI procedure:

- GQP-9.7, Rev. 16
  "Solvent Removable Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials, and Cladding"

Confirmatory dye penetrant inspections were performed on the "Special Interest" penetrations using the following South Carolina Electric & Gas Company procedure:

- QSP-501, Rev. 6
  "Solvent Removable Liquid Penetrant"

The vessel head penetration data results were dispositioned based on an assessment of results from the nondestructive examinations presented herein.

2.0 SCOPE OF WORK

The reactor vessel head penetration nondestructive examination scope at V. C. Summer Unit 1, 1R21 included all 65 CRDM penetration tubes and the reactor vessel head vent. Note that during the examination, the penetration 18 part length thermal sleeve was removed.

The examinations of the CRDM penetration tubes were performed from the inside diameter (ID) surfaces using two examination systems. The system selected for each penetration was dependent upon the penetration tube configuration and penetration-specific conditions:

1) Nine (9) open penetration tubes (including penetration 18) were examined from the ID using the WesDyne 7010 Open Housing Scanner which performs; 1) axial shooting TOFD ultrasonic examinations, 2) circumferential shooting TOFD ultrasonic examinations, 3) 0° straight beam examinations to identify evidence of a leak path in the shrink fit area, and 4) an informational eddy current examination.

2) Fifty-six (56) penetration tubes containing thermal sleeves were inspected from the ID using the WesDyne Gap Scanner and "Combo 2" blade probe which performs; 1) axial shooting TOFD ultrasonic examinations, 2) circumferential shooting TOFD ultrasonic examinations, 3) 0° straight beam examinations to identify evidence of a leak path in the shrink fit areas.

3) The vent line tube and J-groove weld surface were manually inspected from the ID with; 1) a 16 coil array of plus point coils operated in a differential mode and a low frequency bobbin coil operated in both absolute and differential modes for the vent line ID, 2) a 28 coil array of plus point coils operated in a differential mode for the J-groove weld surface.

The delivery system used for the CRDM examinations at V. C. Summer Unit 1, 1R21 was the WesDyne DERI 700 manipulator.

The DERI 700 is a multi-purpose robot that can access all head penetrations and provides a common platform for all CRDM examination end effectors. The manipulator consists of a central leg, mounted on a carriage, which in turn is mounted onto a guide rail. The manipulator arm, with elbow and removable wrist, is mounted onto the carriage, which travels vertically along the manipulator leg.

The DERI 700 was used to deliver 1) the WesDyne 7010 Open Housing Scanner for ultrasonic examinations of penetration locations without thermal sleeves, 2) the WesDyne Gap Scanner end effector for penetration locations containing thermal sleeves.

The WesDyne 7010 Open Housing Scanner delivers an examination wand containing ultrasonic transducers to the ID surface of open reactor vessel head penetrations. The scanning motion is in a vertical direction moving from a specified height above the weld, in this case at least 2.0" above the uppermost elevation of the weld, to the ID chamfer at the bottom of each penetration. The probe is indexed in the circumferential direction. With the Open Housing Scanner, four examinations are conducted simultaneously. These include:

1) Time-of-flight diffraction ultrasonic examination optimized for identification of circumferentially oriented degradation on the penetration tube ID/OD surfaces

2) Time-of-flight diffraction ultrasonic examination optimized for identification of axially oriented degradation on the penetration tube ID/OD surfaces

3) Straight beam ultrasonic examination to identify variations in the penetration tube-to-reactor vessel head shrink fit area that might indicate a leak path

4) Supplementary eddy current examination for identification of circumferential and axial degradation on the ID surfaces of the penetration tubes (optional)

The Gap Scanner end effector delivers the "Combo 2" blade probes which include an axial shooting TOFD UT transducer pair and circumferential shooting TOFD UT transducer pair and a 0° ultrasonic transducer into the annulus between the ID surface of the reactor vessel head penetration tube and the OD surface of the thermal sleeve. The typical annulus gap size is 0.125". The blade probe design utilizes a flexible metal "blade" on which ultrasonic probes are mounted in a spring configuration that enables the probes to ride on the ID surface of the penetration tubes. The scanning motion is in a vertical direction moving from a specified height above the weld, in this case at least 2.0" above the uppermost elevation of the weld, to the chamfer at the bottom of each penetration. The probes are indexed in the circumferential direction. The Gap Scanner end effector also has a probe tilt and drive unit to advance and reverse the probe in the tube/thermal sleeve annulus, a turntable to rotate the probe drive around the axis of the penetration, a lifting cylinder to raise and lower the tilt and drive unit and a centering device consisting of two clamping arms. With the Gap Scanner, three examinations are conducted simultaneously. These include:

1) Time-of-flight diffraction ultrasonic examination optimized for identification of axial oriented degradation on the penetration tube ID/OD surfaces

2) Time-of-flight diffraction ultrasonic examination optimized for identification of circumferentially oriented degradation on the penetration tube ID/OD surfaces

3) Straight beam ultrasonic examination to identify variations in the penetration tube-to-reactor vessel head shrink fit area that might indicate a leak path

The vent line tube tooling is also delivered manually beneath the head and applies an array of Plus-Point eddy current coils and a low frequency bobbin probe to the inside diameter surface of the vent tube.

The vent line weld tooling is delivered manually beneath the head and applies an array of Plus-Point eddy current coils to the vent tube J-weld surface. The entire weld is examined with two 360 degree scans.

2.1 7010 Open Housing Scanner Ultrasonic Examinations

7010 Open Housing Scanner examinations were conducted on nine (9) reactor vessel head penetrations without thermal sleeves.

These examinations were performed in accordance with:

1) WDI-STD-1040, Rev. 11 - " Procedure for Ultrasonic Examination of Reactor Vessel Head Penetrations"

2) WDI-STD-1041, Rev. 10, - " Reactor Vessel Head Penetration Ultrasonic Examination Analysis"

2.2 Gap Scanner Penetration Tube Examinations using Combo 2 Blade Probe

Examinations were performed with the Gap Scanner end effector using a "Combo 2" blade probe from the penetration ID surfaces on 56 penetration tubes containing thermal sleeves.

These examinations were performed in accordance with:

1) WDI-STD-1040, Rev. 11 - " Procedure for Ultrasonic Examination of Reactor Vessel Head Penetrations"

2) WDI-STD-1041, Rev. 10 - " Reactor Vessel Head Penetration Ultrasonic Examination Analysis"

2.3 Vent Line and Vent Line J-Weld Eddy Current Examination

The manual vent line tube and J-groove weld eddy current examinations were performed in accordance with:

1) WDI-STD-114, Rev. 13 - "RVHI Vent Tube ID & CS Wastage Eddy Current Examination"

2) WDI-STD-101, Rev. 11, "RVHI Vent Tube J-Weld Eddy Current Examination"

2.4 RPVH Bare Metal Visual Examination

The RPVH Bare Metal Visual Examination was performed by CORE VIS in accordance with:

1) WDI-SSP-1218, Rev. 2, FCN 001 - "Reactor Vessel Head Penetration and Bare Metal Visual Inspection for V.C. Summer"

2.5 Reactor Vessel Head Dye Penetrant Examination Support

The Reactor Vessel Head Dye Penetrant Examination Support was performed in accordance with site procedure QSP-501 or PCI procedure GQP-9.7.

3.0 EXAMINATION RESULTS

3.1 The 7010 Open Housing Scanner Ultrasonic Examinations

The following table provides a summary of all 7010 Open Housing Scanner RVHP nondestructive examinations performed at V. C. Summer Unit 1during the 1R21 Spring 2014 refueling outage.

A total of nine (9) open penetrations; #14, #15, #16, #17, #18, #47, #49, #51 and 53, were inspected from the ID using the WesDyne Open Housing Scanner. The final disposition of the examination results is provided in the table 3.1.1.

Table 3.1.1 Open Housing Scanner Penetrations

Penetration #	Circ Shooting TOFD Channel 1	Axial Shooting TOFD Channel 2	0°(2.25 MHz) Channel 3	Exam Extent	
				Lower (Inches)	Upper (Inches)
*14	NDD	PTI/CBH/NDD	NDD	1.44	3.08
15	NDD	PTI/SI	NDD	1.68	3.00
16	NDD	PTI/CBH/NDD	NDD	1.84	3.24
17	NDD	PTI/CBH/NDD	NDD	1.60	3.52
*18	NDD	PTI/CBH/NDD	NDD	1.04	3.52
47	NDD	PTI/CBH/NDD	NDD	1.40	2.76
49	NDD	PTI/CBH/NDD	NDD	1.60	2.60
51	PTI/SI	PTI/CBH/NDD	NDD	1.12	2.92
53	NDD	PTI/CBH/NDD	NDD	1.16	2.56

Note: Lower Exam Extent distance established in 1R20 (scan starts at end of penetration)
(See Legend on page 9 of 12)

Open Penetrations 15 and 51 were classified as "Special Interest" during the 1R21 RVHI examination. A confirmatory dye penetrant inspection was performed to confirm if there was surface connectivity. Penetrations 15 and 51 are confirmed to be surface connected. A weld repair was performed and a post ultrasonic examination to confirm any additional flaw growth.

All nine open housing penetrations had no leak paths indications identified in the shrink fit area with the 0° UT probe.

All penetrations were inspected from a minimum of 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to the top of the thread relief near the bottom of the CRDM.

The lower weld exam extents listed in the tables were transferred from the1R20 examination and the upper examination extents are from the 1R21 examination.

3.2 Gap Scanner Penetration Tube Combo 2 Blade Probe Examinations

The following table provides a summary of all Gap Scanner examinations performed at V. C. Summer Unit 1, during the 1R21 Spring 2014 refueling outage.

56 penetration tubes containing thermal sleeves; penetrations #1 through #13, #19 through #46, #48, #50, #52, and #54 through #65 were inspected from the ID using the Westinghouse Gap Scanner and "Combo 2" blade probe.

The final disposition of the examination results is provided in the table 3.2.1.

Table 3.2.1 Thermal Sleeve Penetrations

Penetration #	Circ Shooting TOFD Channel 1	0° (2.25 MHz) Channel 2	Axial Shooting TOFD Channel 4	Exam Extent Lower (Inches)	Exam Extent Upper (Inches)
1	NDD	NDD	PT/CBH/NDD	1.92	2.48
2	NDD	NDD	NDD	1.76	2.88
3	NDD	NDD	PTI/CBH/NDD	1.76	2.52
4	NDD	NDD	NDD	1.64	2.68
5	NDD	NDD	PTI/CBH/NDD	1.72	2.72
6	NDD	NDD	PTI/CBH/NDD	1.60	3.36
7	NDD	NDD	NDD	1.60	3.28
8	NDD	NDD	PTI/CBH/NDD	1.68	3.36
9	PTI/SI	NDD	NDD	1.64	3.20
10	NDD	NDD	PTI/CBH/NDD	1.60	3.00
11	NDD	NDD	NDD	1.56	3.12
12	NDD	NDD	NDD	1.52	2.92
*13	NDD	NDD	NDD	1.44	3.00
19	PTI/SI	NDD	PTI/SI	1.72	2.75
20	NDD	NDD	PTI/CBH/NDD	1.60	2.68
21	NDD	NDD	PTI/CBH/NDD	1.68	2.72
22	PTI/SI	NDD	PTI/SI	1.68	2.64
23	PTI/CBH/NDD	NDD	PTI/CBH/NDD	1.64	2.36
*24	NDD	NDD	PTI/CBH/NDD	1.16	2.64
*25	NDD	NDD	PTI/SSS/CBH/NDD	1.36	2.68
26	NDD	NDD	PTI/CBH/NDD	1.48	2.80
27	NDD	NDD	PTI/SI/CBH/NDD	1.56	3.00
28	NDD	NDD	PTI/CBH/NDD	1.68	2.88
29	NDD	NDD	PTI/CBH/NDD	1.28	2.88
30	NDD	NDD	PTI/CBH/NDD	1.36	3.08
31	PTI/CBHNDD	NDD	NDD	1.16	3.28
32	NDD	NDD	PTI/CBH/NDD	1.16	2.92
33	PTI/CBHNDD	NDD	PTI/CBH/NDD	1.64	2.96
34	NDD	NDD	PTI/CBH/NDD	1.16	2.64
35	NDD	NDD	PTI/CBH/NDD	1.56	3.48
36	NDD	NDD	PTI/CBH/NDD	1.36	3.69
37	NDD	NDD	PTI/CBH/NDD	1.80	2.84
38	NDD	NDD	PTI/CBH/NDD	1.32	2.92
39	NDD	NDD	PTI/CBH/NDD	1.16	3.16
40	NDD	NDD	PTI/CBH/NDD	1.85	3.72
41	NDD	NDD	PTI/CBH/NDD	1.60	3.89
42	NDD	NDD	PTI/CBH/NDD	1.16	3.17
43	NDD	NDD	PTI/SI	1.48	2.96
**44	NDD	NDD	PTI/CBH/NDD	0.84	3.57
45	NDD	NDD	PTI/CBH/NDD	1.00	3.52
46	NDD	NDD	PTI/CBH/NDD	1.60	3.00
48	NDD	NDD	PTI/SSS/CBH/NDD	1.40	3.12
**50	NDD	NDD	PTI/CBH/NDD	0.92	2.48

Penetration #	Circ Shooting TOFD Channel 1	0° (2.25 MHz) Channel 2	Axial Shooting TOFD Channel 4	Exam Extent Lower (Inches)	Exam Extent Upper (Inches)
52	NDD	NDD	PTI/CBH/NDD	1.00	3.04
**54	NDD	NDD	PTI/CBH/NDD	0.64	2.85
55	NDD	NDD	PTI/CBH/NDD	1.32	3.35
56	NDD	NDD	PTI/CBH/NDD	1.52	2.28
57	PTI/CBH/NDD	NDD	PTI/CBH/NDD	1.28	3.28
**58	NDD	NDD	PTI/CBH/NDD	0.84	3.68
59	NDD	NDD	PTI/CBH/NDD	1.80	3.52
60	NDD	NDD	PTI/CBH/NDD	2.08	2.89
61	PTI/CBH/NDD	NDD	PTI/CBH/NDD	1.36	3.28
62	NDD	NDD	PTI/CBH/NDD	1.76	3.24
63	NDD	NDD	PTI/CBH/NDD	1.64	4.16
64	NDD	NDD	PTI/SSS/CBH/NDD	1.76	3.08
**65	NDD	NDD	PTI/CBH/NDD	0.68	3.20

Note: Lower Exam Extent distance established in 1R20 (scan starts at end of penetration)

Legend:

NDD - No Detectable Defect
PTI - Penetration Tube Indication
CBH - Cleared By History
SGI - Surface Geometry Indication
SSS - Shallow Surface Signal
SI - Special Interest

* Penetrations 13, 14, 18, 24, and 25 were found to have limiting coverage below the weld as required in Code Case N-729-1. These penetrations are required to have coverage of 1.5 inches below the weld when the incidence angle is ≤ 30 degrees or to the end tube, whichever is less.

** Penetrations 44, 50, 54, 58, and 65 were found to have limiting coverage below the weld as required in Code Case N-729-1. These penetrations are required to have coverage of 1.0 inch below the weld when the incidence angle is > 30 degrees or to the end tube, whichever is less.

WCAP-17645-P dated October 2012 "Structural Integrity Evaluation of Reactor Vessel Upper Head Penetrations to Support Continued Operation: V. C. Summer Unit 1" was supplied by SCE&G to address the Code Case N-729-1 coverage.

Penetrations 9, 22 and 43 were classified as "Special Interest" during the 1R21 RVHI examination. A confirmatory dye penetrant inspection was performed to determine if there was surface connectivity. Penetrations 9, 22 and 43 are confirmed to be surface connected. A weld repair was performed and a post ultrasonic examination to detect any additional flaw growth.

Penetration 27 was identified as 'Special Interest" due to a new flaw that had developed during the last fuel cycle. A confirmatory dye penetrant inspection was performed to detect any surface connectivity. The confirmatory inspection was negative. This indication was than reclassified as NDD and placed on the priority list for the 1R22 examination.

Penetration 19 (previously repaired) was identified as 'Special Interest" due to apparent flaw growth that had developed during the last fuel cycle. A dye penetrant inspection was performed to confirm any surface connectivity. The confirmatory inspection was negative. Engineering

evaluation of this indication was performed. Penetration 19 was than reclassified as NDD and placed on the priority list for the 1R22 examination.

There were no indications of leak paths in the shrink fit areas examined with the 0° UT probe.

All penetrations were inspected from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to the thread relief at the top of the threaded section near the bottom of the CRDM.

3.3 Vent Line and Vent Line J-Weld Eddy Current Examination

Eddy current examinations were conducted on the vent line J-groove weld and on the ID of the vent line tube. These examinations are designed to identify the presence of primary water stress corrosion cracking on the surfaces of the weld and tube that are exposed to primary coolant. Results of these examinations are summarized in the table below.

Table 3.3.1 Vent Line Tube and J-weld

Penetration #	ECT Results
Vent Line Tube	NDD
Vent Line J-Weld	NDD

Legend:
NDD -No Detectable Defect

No detectable degradation was identified during the eddy current examination of the vent line J-groove weld or the vent line tube.

3.4 RPVH Bare Metal Visual Examination

Bare Metal Visual Examinations were conducted on the outside surface of the reactor vessel head. These examinations are designed to identify the presence of boric acid residue. No source of boric acid leakage was identified. Minor discoloration and some evidence of leakage from above the reactor head was observed. Minor debris was also noted during the inspection.

3.5 Reactor Vessel Head Dye Penetrant Examination Support

Under head dye penetrant examinations were conducted on penetrations identified as "Special Interest" during the ultrasonic examination of the reactor vessel head penetrations. The dye penetrant examination confirmed a path from at the ID surface of the J-groove weld that may be source of contact with the primary coolant. Surface indications were found on Penetrations 9, 15, 22, 43, and 51. The "special interest" indication in penetration 27 did not yield a recordable indication. This penetration will be monitored ultrasonically in future examinations.

Dye penetrant examination of 1R20 repairs was completed by PCI and documented as part of their inspection report.

4.0 EXAMINATION COVERAGE

The configuration of a sleeved V. C. Summer CRDM penetration tube is illustrated in Figure 4-1. This figure represents the tube-to-head geometry at the penetration 0° azimuth, or "downhill" side of the tube. The bottom ends of all penetration tubes are threaded on the OD surface and have a chamfer on the ID surface. The threads extend from the bottom of the tube to an elevation of approximately 1.00" where a thread relief is machined. The top of the thread relief is 1.13" above the bottom of the tube. The distance from the top of the thread relief to the bottom of the fillet of the J-groove weld, identified as "A", varies based on location of the penetration in the head. These distances are generally longer for penetrations at "inboard" locations and become progressively shorter for penetrations located further away from the center of the head. The ID surface chamfers are machined at a 20° angle from the bottom of the tube to an elevation of 0.76".

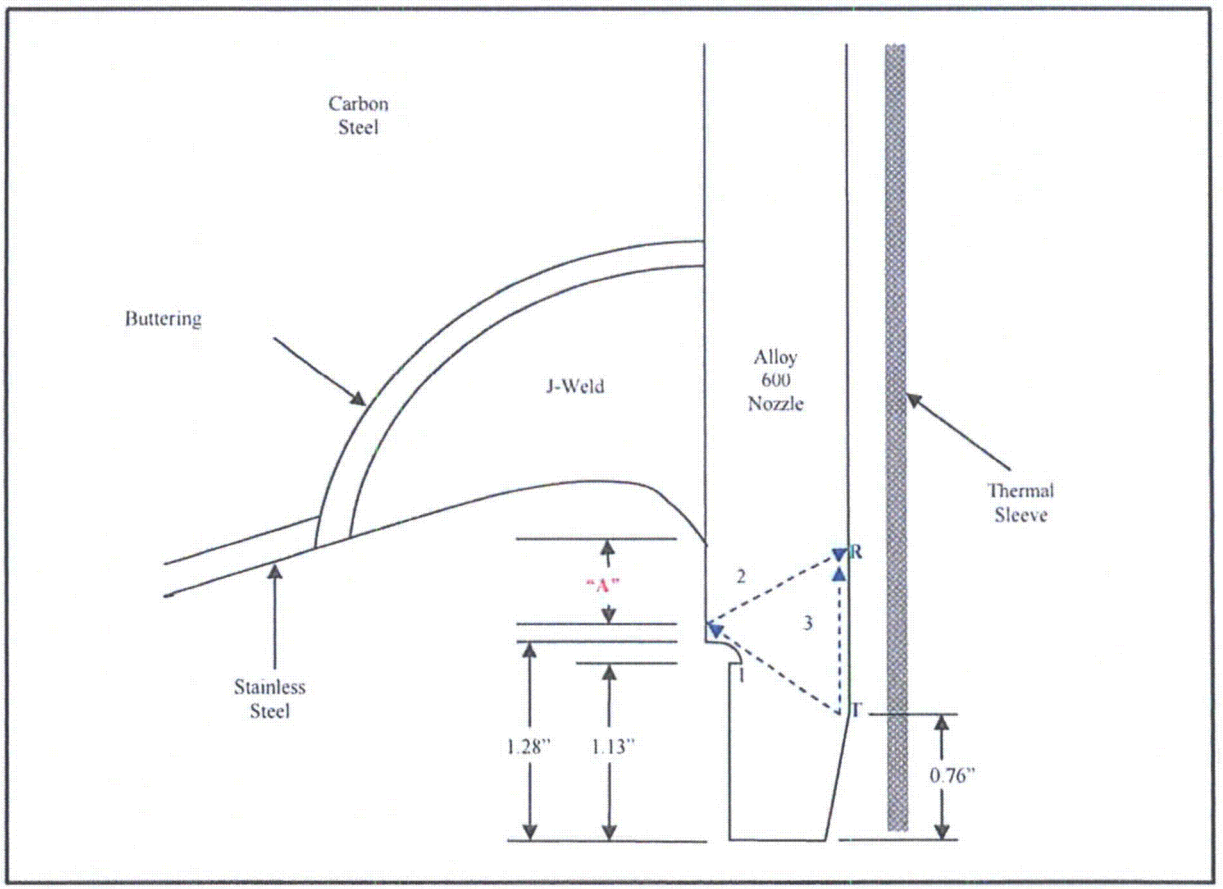


Figure 4-1: Illustration of Axially Oriented TOFD Examination Coverage on the V. C. Summer Unit 1 Penetration Geometry at 0° (Downhill Side)

The ultrasonic method, procedures and personnel were qualified in accordance with the EPRI Performance Demonstration Program and were applied in accordance with code case N-729-1 as amended by 10CFR50.55a(g)(6)(ii)(D). For the detection of circumferential and axial degradation on the OD and ID surfaces of CRDM penetration tubes, the time-of-flight diffraction (TOFD) ultrasonic technique is used. The TOFD technique is a "pitch/catch" ultrasonic method, where longitudinal waves are transmitted into the tube at an angle by a transmitter (T) and reflects off of

the OD surface of the tube to a receiver (R), as shown in path "1-2" in Figure 4-1 above. A lateral wave also travels on the tube ID surface between the transmitter and receiver as shown in path "3". The transmitting and receiving elements are mounted on a "shoe" with a probe center spacing of 0.95" for the axial shooting TOFD pair and 0.925" or 0.808" for the circumferential shooting TOFD pair. ID TOFD coverage is provided by the lateral wave to the elevation of the chamfer of the tube on the ID surface. With an axially oriented TOFD transducer pair in the Combo 2 Probe, OD coverage becomes completely effective at an elevation just above the top of the thread relief. The presence of the thread relief results in a slight masking of the ultrasound to the OD surface to an elevation conservatively estimated at 0.20" above the thread relief for the axial shooting TOFD pair. In this area, however, OD initiated degradation would be detected once the depth of the degradation exceeded the depth of the masked area. With the circumferentially shooting TOFD transducer pair, included in both the Open Housing Scanner and the Combo 2 blade probe, OD coverage is extended to the elevation of the top of the chamfer, approximately 0.233" above the bottom of the tube.

Examination coverage on the ID surfaces of the fifty-six penetration tubes examined with Combo 2 probes and the nine penetration tubes examined with the Open Housing Scanner extended from the top of the thread relief in each tube to at least 2.0" above the uppermost elevation of the weld.

Examination coverage on the OD surfaces for the fifty-six penetration tubes examined with the Combo 2 probes and the nine penetrations with the open housing wand, using the circumferential shooting TOFD pair, extended from the top of the thread relief in each penetration to at least 2.0" above the uppermost elevation of the weld. Examination coverage for the axial shooting TOFD pair extended from just above the elevation of the thread relief to at least 2.0" above the welds.

The extent of coverage was verified for each examination of each penetration by 1) confirmation that TOFD responses were evident from the thread relief and 2) direct measurements from the TOFD UT C-scans which demonstrated scan coverage elevations were in excess of 2.0" above the uppermost elevation of each weld.

Code Case N-729-1 determines the required inspection volume by the Incidence angle of the J-groove weld in the reactor head.

Table 4.1 Examination Volume (CC N-729-1, Figure 2)

Penetration Nozzle Number	Incidence Angle, θ (degrees)	Required Coverage, "a" (inches)
1 through 25	≤ 30	1.5
26 through 65	> 30	1.0

5.0 DISCUSSION OF RESULTS

All penetration tube ultrasonic examination data was analyzed in accordance with WDI-STD-1041, Rev. 10 – "Reactor Vessel Head Penetration Ultrasonic Examination Analysis". Eddy Current data was collected on the nine open housing penetrations for information only and was not analyzed.

Data sheets and printouts of the results of the examination performed on each penetration are found in Volume 2 of this report.

Results from the TOFD ultrasonic of the sixty-five reactor vessel head penetrations, showed 6 penetrations with indications characteristic of PWSCC. Penetrations 9, 15, 22, 43, and 51 have PWSCC type flaws. Penetrations 31, 37, and 52 that were repaired in 1R20 outage show no growth. Previously repaired penetration 19 showed signs of growth and engineering evaluation has determined that the indication is acceptable (Westinghouse Engineering Letter: LTR-PAFM-14-45, Revision 0)

The straight beam ultrasonic examinations of the shrink-fit regions of sixty-five penetrations tubes showed no evidence of leak paths. In addition, a bare metal visual examination was performed on the reactor vessel head which resulted in a NDD status.

Eddy current examinations of the vent line tube and vent line weld identified no indications characteristic of PWSCC.

Penetrations 9, 15, 22, 43, and 51 were repaired during the 1RF21 outage. Penetrations 9, 15, 22, and 43 that were repaired show no growth. Repaired penetration 51 showed signs of growth and engineering evaluation has determined that the indication is acceptable (Westinghouse Engineering Letter: LTR-PAFM-14-53, Revision 0).

Six penetrations with flaws in suspect areas or showing slight growth are being identified as priority for early inspection in the 1R22 Exam:

19, 26, 27, 33, 35, 51

Conrad S. Wyffels
WesDyne International
NDE Level III

Date: May 30, 2014

Document Control Desk
USNRC, Region II
RC-14-0145
Attachment

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

INSERVICE INSPECTION REPORT #20
REFUEL 21
TAB E
SG NOZZLE-SAFE END DM WELD EXAM SUMMARY

AUTOMATED ULTRASONIC EXAMINATION OF THE STEAM GENERATOR INLET & OUTLET NOZZLE DISSIMILAR METAL WELDS AT V.C. SUMMER NUCLEAR STATION, UNIT 1

April 2014

FINAL REPORT
WITH APPENDICES AND FIELD DATA

IHI Project 13-1107

Prepared for:

South Carolina Electric and Gas Company
Virgil C. Summer Nuclear Station Unit 1
Jenkinsville, South Carolina 29065

Prepared by:

IHI Southwest Technologies, Inc.

Written by:

Steven J. Todd
IHI Project Manager

Reviewed by:

Jesse Delgado
IHI Level III

Reviewed by:

L III 5/2/2014
SCE&G Representative

Reviewed by:

ELMOSTAFA AKOUM ANII 05/03/14

FINAL REPORT WITH APPENDICES
TABLE OF CONTENTS

FIELD DATA

Steam Generator - Class 1 Components:

Inlet Safe End-to-Nozzle Welds:

1-4100A-31 (DM)	Safe End-to-"A" S/G Inlet Nozzle (Hot Leg)
1-4200A-28 (DM)	Safe End-to-"B" S/G Inlet Nozzle (Hot Leg)
1-4300A-29 (DM)	Safe End-to-"C" S/G Inlet Nozzle (Hot Leg)

Outlet Nozzle-to-Safe End Welds:

1-4100A-32 (DM)	"A" S/G Outlet Nozzle-to-Safe End (Cold Leg)
1-4200A-29 (DM)	"B" S/G Outlet Nozzle-to-Safe End (Cold Leg)
1-4300A-30 (DM)	"C" S/G Outlet Nozzle-to-Safe End (Cold Leg)

Nozzle Inside Radius Section:

1-3100-12IR-A	"A" S/G Inlet Hot Leg Nozzle IRS
1-3100-12IR-B	"B" S/G Inlet Hot Leg Nozzle IRS
1-3100-12IR-C	"C" S/G Inlet Hot Leg Nozzle IRS
1-3100-13IR-A	"A" S/G Outlet Cold Leg Nozzle IRS
1-3100-13IR-B	"B" S/G Outlet Cold Leg Nozzle IRS
1-3100-13IR-C	"C" S/G Outlet Cold Leg Nozzle IRS

LIST OF FIGURES

LIST OF ABBREVIATIONS

ASME	-	The American Society of Mechanical Engineers
AUT	-	Automated Ultrasonic Examination
CNF	-	Customer Notification Form
ECT	-	Eddy Current Testing
ID	-	Inside Surface
ISI	-	Inservice Examination
IHI	-	IHI Southwest Technologies, Inc.
NDE	-	Nondestructive Examination
OP	-	Operating Procedure
PDI	-	Performance Demonstration Initiative
QA	-	Quality Assurance
QAPM	-	Quality Assurance Program Manual
SCE&G	-	South Carolina Electric & Gas

1. INTRODUCTION

1.1 Services Covered

During the April 2014 refueling outage (RF-21) at the V.C. Summer Unit 1 Nuclear Station, IHI Southwest Technologies, Inc. (IHI) performed an inservice examination (ISI) of selected steam generator (S/G) nozzle dissimilar metal (DM) nozzle-to-safe end and safe end-to-nozzle welds. Visual examinations of inlet and outlet nozzle inner radius sections were also performed.

Figure 1. Virgil C. Summer Nuclear Station

1.2 Applicable Documents

The Steam Generator Nozzle examinations performed by IHI for South Carolina Electric & Gas (SCE&G) at the VC Summer Nuclear Station were conducted in accordance with the following documents:

(1) SCANA Services Purchase Order No. NU-02SR751813, dated November 21, 2013.

(2) ASME Boiler and Pressure Vessel Code Section XI, 2007 Edition through 2008 Addenda as modified by 10CFR50.55a, dated June 21, 2011

(3) ASME Code Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Withput Application of Listed Mitigation Activities, Section XI, Division 1"

(4) ASME Code Case N-619, "Alternative Requiements for Nozzle Inner Radius Inspections for Class 1 Pressurizer & Steam Generator Nozzles, Section XI, Div 1"

(5) IHI Quality Assurance Manual (QAM), Revision 0, Change 14

(6) IHI Project Plan & Exam Plan, "Automated Ultrasonic Examination of the Steam Generator Inlet & Outlet Nozzle Dissimilar Metal Welds and Nozzle Inner Radius"

(7) USNRC Regulatory Guide 1.147 Rev 16, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division I"

1.3 Workscope

IHI examined the following areas during the V.C. Summer Unit 1, R-21 outage in April 2014:

Steam Generator - Class 1 Components:

Inlet Safe End-to-Nozzle Welds:

1-4100A-31 (DM)	Safe End-to-"A" S/G Inlet Nozzle (Hot Leg)
1-4200A-28 (DM)	Safe End-to-"B" S/G Inlet Nozzle (Hot Leg)
1-4300A-29 (DM)	Safe End-to-"C" S/G Inlet Nozzle (Hot Leg)

Outlet Nozzle-to-Safe End Welds:

1-4100A-32 (DM)	"A" S/G Outlet Nozzle-to-Safe End (Cold Leg)
1-4200A-29 (DM)	"B" S/G Outlet Nozzle-to-Safe End (Cold Leg)
1-4300A-30 (DM)	"C" S/G Outlet Nozzle-to-Safe End (Cold Leg)

Nozzle Inside Radius Section:

1-3100-12IR-A	"A" S/G Inlet Hot Leg Nozzle IRS
1-3100-12IR-B	"B" S/G Inlet Hot Leg Nozzle IRS
1-3100-12IR-C	"C" S/G Inlet Hot Leg Nozzle IRS
1-3100-13IR-A	"A" S/G Outlet Cold Leg Nozzle IRS
1-3100-13IR-B	"B" S/G Outlet Cold Leg Nozzle IRS
1-3100-13IR-C	"C" S/G Outlet Cold Leg Nozzle IRS

2. EXAMINATION TECHNIQUES AND EQUIPMENT

2.1 Project Plan, Examination Plan, Procedures, and Personnel

A Project Plan and an Examination Plan were developed to provide the technical information required to perform the examinations. The Project Plan provided information concerning the technical approach taken including the procedures for the performance of the AUT and AET examinations. The Examination Plan provided the scanning parameters, scan sheets, scan path drawings, and device configurations for the nozzle examinations.

The NDE activities were performed using qualified, automated ultrasonic (AUT), automated eddy current (AET), and enhanced visual (EVT-1) examination procedures. These procedures were pre-approved by SCE&G prior to use by IHI personnel. Copies of these procedures are located in Section 5 (tab 5).

IHI examination personnel were certified in accordance with IHI NPOP 2.0-NDES-001, "Nondestructive Examination Personnel Qualification and Certification," which incorporates the guidelines of the ANSI / ASNT and ASME Section XI. A copy of each examiner's certifications is provided in Section 6 (tab 6) of this report.

2.2 Equipment

The AUT & AET examinations of the selected S/G Nozzle welds were performed utilizing IHI's Steam Generator Nozzle Inspection Tool (SG-NExT™) System and the Tomoscan III Phased Array UT and MS5800 ECT Data Acquisition Systems.

2.2.1 SG-NExT™ System

The Steam Generator Nozzle Inspection Tool (SG-NExT™) was developed specifically for the these examinations. It was inserted into the Steam Generator (S/G) through the man-way and operated without the requirement for a person to enter the S/G. Long handled poles were used to install both mechanically and pneumatically operated pins into the end of a steam generator tube at the tube sheet or at the nozzle dam ring. These pins supported pulleys and a guide pin that were used to raise the SG-NExT™ into the S/G bowl and then lower it into position on the nozzle dam ring. The SG-NExT™ was then pneumatically clamped to the ring.

The 3 support legs and search unit module arms are collapsed and oriented in a manner to allow insertion and retrieval through the man-way. These same support legs and search unit arms are changed to expanded mode when lowered onto the nozzle dam ring. Existing holes in the ring are used for registration and clamping the unit into place.

The SG-NExT™ has 2 axes of motion, axial and circumferential, and is designed primarily to support circumferential scanning and axial incrementing. The SG-NExT™ supported 4 phased array transducers at one time and 2 eddy current probes, sufficient to conduct the entire exam of the weld without requiring removal and reinsertion. A remote camera system was included to view the SG-NExT™ during and after the installation process and to perform the nozzle inner radius visual examinations.

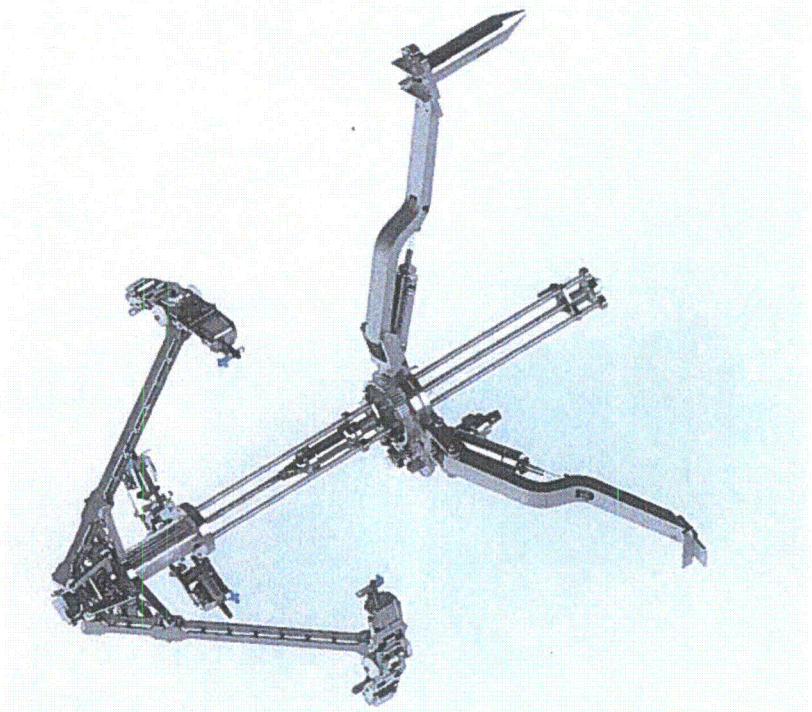


Figure 2. CAD Illustration of SG-NExT™

2.2.2 Tomoscan III/PA 32/128

For UT data acquisition and analysis IHI utilized the Zetec phased array system, the Tomoscan III PA 32/128 (T-III). This system is capable of handling up to 128 phased array channels. The system utilizes Ultravision acquisition and analysis software, which is Windows based and uses standard PC hardware for acquisition and analysis. The T-III unit contains the pulser/receiver boards and multiplexing-digitizing electronics. The package is small (approximately 24"x 24" x 20"), light (approximately 40 lbs), and can be easily hand-carried to the work area. Once digitized, the ultrasonic data is transmitted to the Tomoscan PC acquisition computer via ethernet cable. Data is stored on hard disk during the examination activity and can be archived to CD or another external drive, depending on data volume and user preference.

Once the system is setup and calibrated all of the UT parameter and scan parameter settings can be saved and then recalled for future use. This allows the use of operator personnel that need not be UT certified and also helps ensure consistency from one examination to another.

Data analysis is performed separately on another PC, with data access via ethernet connection with the acquisition computer. In field operations, the Ultravision software is used for both acquisition and analysis. A-scan, B-scan, end-, side-, and C- (top) views are

available as well as composite views and several other options that allow the analyst a broad selection of analysis tools.

2.2.3 MS5800 Eddy Current System

For automated eddy current examination of the inlet and outlet nozzle dissimilar metal butt welds, IHI used an Olympus MS5800 eddy current acquisition system. This system has two built-in encoder inputs to record probe position for accurate location of flaws. It was used to provide a surface examination and to complement the ultrasonic examination results by providing supplemental data to confirm or determine if any flaws are connected to the ID surface. Acquisition and analysis are both performed from a standard computer.

Figure 3. MS5800 Automated Eddy Current Instrument & T-III Phased Array UT Instrument

2.3 NDE Techniques

The ultrasonic examinations at V.C. Summer were performed using PDI qualified techniques. Brief descriptions of the inspection techniques are provided below.

2.3.1 UT Techniques

The examinations of the DM welds were conducted using techniques that are PDI qualified per Appendix VIII, Supplement 10. Since these procedures were originally qualified for submerged applications (RPV nozzle to safe end examinations) and since the examination approach for SG welds was not submerged, it was necessary to perform an equivalency demonstration at EPRI on PDI mockups. IHI completed this demonstration prior to the onsite examinations using an irrigated transducer module design in lieu of a submerged design.

The DM welds were ultrasonically examined from the inside surface using this PDI-qualified phased array procedure. The phased array techniques allow the use of multiple examination angles generated by a single search unit to improve both detection capability and efficiency at the same time. Examinations were performed in four directions for detection of flaws both parallel and transverse to the weld using a beam angle range from 60-88 degrees. The 1.5 MHz phased array probes and beam angle range were selected by IHI specifically for this application to allow efficient detection in the inner 1/3T examination volume of the weld.

2.3.2 Eddy Current Examinations

An eddy current testing (ET) technique was developed for detecting surface flaws and discriminating between surface and subsurface flaws in dissimilar metal (e.g. stainless steel-to-Inconel) welds. Two ET excitation frequencies (30 kHz and 80 kHz) were used. The high frequency produces a shallower penetration depth and thus is most sensitive to surface flaws, while the low frequency produces a greater penetration depth and is sensitive to surface and subsurface flaws. Tests were performed to verify performance of the technique using a weld mockup designed to replicate the materials and actual weld configuration. This mockup contained representative welds and geometry, as well as surface flaws that were manufactured to have a very tight opening. An ET procedure, (IHI Procedure No. IHI-AET3, "Automated Eddy Current Examination of Piping Welds from the Inside Surface,") was developed and applied during inspection of nozzle welds at V.C. Summer.

2.3.3 Nozzle Inner Radius Visual Examinations

Remote visual examinations were conducted on the nozzle inner radius sections using a remote camera system and a site supplied visual examination procedure. The remote VT system was capable of achieving a 1 mil wire resolution for EVT-1 examination of the nozzle inner radius.

3. EXAMINATION RESULTS

3.1 Examination Results

The examination results are listed in Table 1 below for each examination area. The data records for these examinations are located in Appendix E (tab 8). The actual ultrasonic, eddy current, and visual data was archived onto an external hard drive. This hard drive is provided as an attachment to this report.

Table 1. Examination Results

Weld No.	Weld Configuration Description	Examination Results	Exam Coverage
1-4100A-31	"A" SG Inlet Nozzle to SE	No Recordable Indications	92%
1-4100A-32	"A" SG Outlet Nozzle to SE	No Recordable Indications	92%
1-4200A-28	"B" SG Inlet Nozzle to SE	No Recordable Indications	92%
1-4200A-29	"B" SG Outlet Nozzle to SE	No Recordable Indications	92%
1-4300A-29	"C" SG Inlet Nozzle to SE	No Recordable Indications	91.5%
1-4300A-30	"C" SG Outlet Nozzle to SE	One (1) recordable eddy current indication that was located outside the exam area in the nozzle cladding and found to be acceptable	92%
1-3100-12IR-A	"A" SG Inlet Nozzle IRS	No Recordable Indications	100%
1-3100-13IR-A	"A" SG Outlet Nozzle IRS	No Recordable Indications	100%
1-3100-12IR-B	"B" SG Inlet Nozzle IRS	No Recordable Indications	100%
1-3100-13IR-B	"B" SG Outlet Nozzle IRS	No Recordable Indications	100%
1-3100-12IR-C	"C" SG Inlet Nozzle IRS	No Recordable Indications	100%
1-3100-13IR-C	"C" SG Outlet Nozzle IRS	No Recordable Indications	100%

3.2 Explanation of Field Data Records

The results of the NDE activities and calibrations performed by IHI personnel were recorded on standard IHI forms in addition to the examinations being automatically recorded as described in the previous section of this report. The automated field data records for each weld or area are often given a unique examination number and are assembled into a data package preceded by a Summary Sheet.

The unique examination number is often followed by other letters or numbers (i.e. RR) that may reflect that a rescan has occurred or additional data was collected.

The examination areas and Summary Sheet numbers correspond to those listed in the Summary Table. A general explanation of the individual field data forms is provided below to further clarify the information contained on the summary sheet.

- The instruments used in performing the AUT examinations are calibrated prior to use, then verified again at specified intervals during the examinations and upon completion of the examinations. The calibration parameters are recorded on the appropriate calibration record forms. The documented calibration and calibration verification assures the examinations were performed using properly calibrated instruments.

- The results of the AUT examinations are recorded on IHI Examination Record forms. The information documented on these forms describes the parameters associated with the examination. Figure 4 is an explanation of the Examination Record form.

- When indications are recorded, the analysis is documented on IHI Indication Resolution Record Sheets, which are then included as a part of a corresponding data package.

Automated Examination Record Explanation

1 Plant and Weld ID - Plant site and weld identification information.

2 Procedure, Device Drawing, Examination Date and Time - The NDE procedure number along with scanning device drawing numbers, and exam date and time are identified in this area.

3 Data Acquisition Examination Parameters - The planned examination parameters that were developed prior to the onsite examination activities from client supplied drawings are listed here along with the parameters that were actually performed. Examination parameters include the increment axis and scan axis upper and lower limits. The increment axis parameters refer to the positioning of the scanning device in order to accomplish the required scanning. The scan axis parameters refer to the area that the device is moved to accomplish the required examination. The actual examination parameters are recorded by the data acquisition operator.

4 Data Acquisition Positional Parameters – The search unit beam direction (which is up, down, cw, or ccw), transducer size, and scanning overlap (percent of transducer size) are provided. The device position is also listed (0, -90, +90, 180).

5 Data Acquisition Module Parameters – The UT instrument channel number and the corresponding search unit angles are listed in this area along with the module offset information (both scan and increment offset).

6 Data Acquisition Calibration Records - Ultrasonic calibration sheet numbers are identified for each UT channel (UT instrument) used.

7 Data Acquisition Examination Notes and Remarks – Examination notes are usually used to remind the acquisition operator of any limitations that might affect the examination and remarks

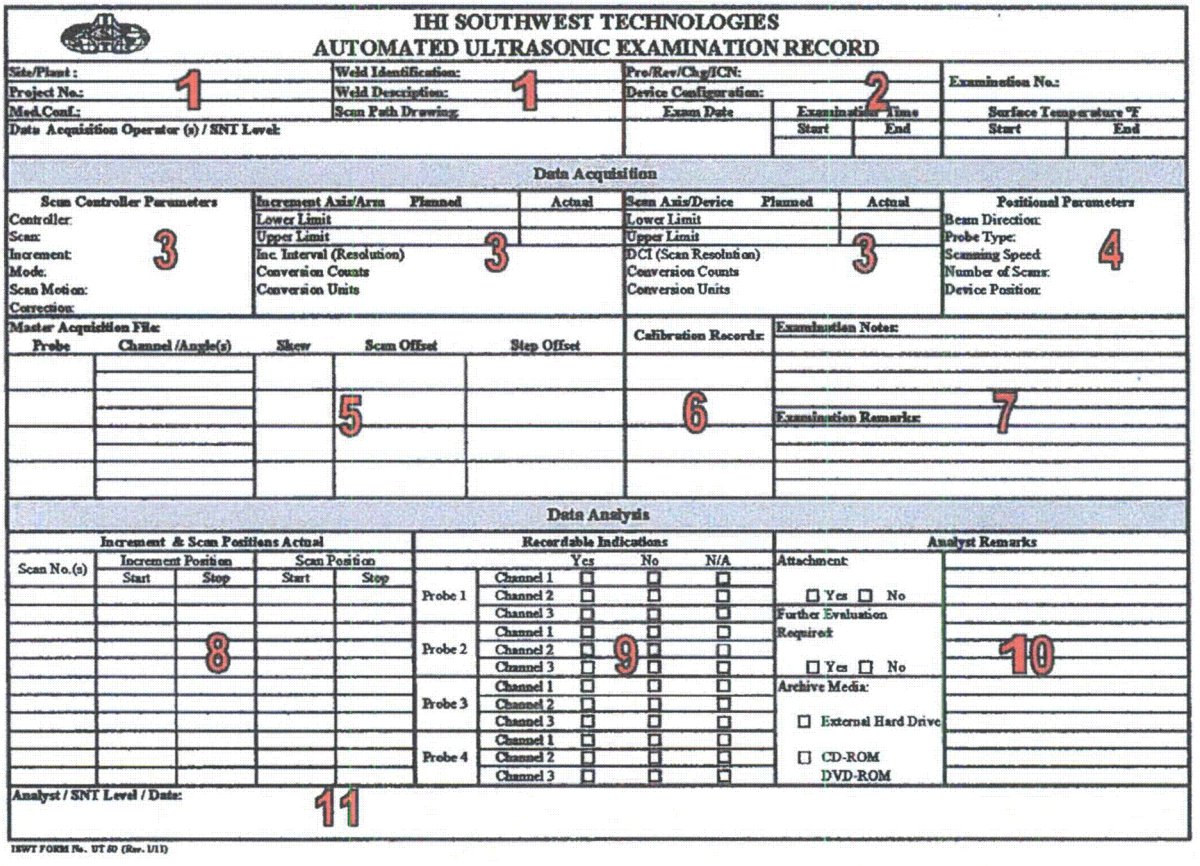
are used to provide additional information regarding actual conditions or any other information related to the examination.

8 Data Analysis Increment and Scan Position - The data analyst records the increment and scan positions that are indicated on the recorded examination data.

9 Data Analysis Recordable Indications - The data analyst indicates if indications were recorded.

10 Data Analyst Remarks - The Analyst will also indicate if further evaluation is required (sizing exams) and where the recorded data has been archived.

11 Data Analysis Signature - The data analyst signature and SNT level.



IHI SOUTHWEST TECHNOLOGIES
AUTOMATED ULTRASONIC EXAMINATION RECORD

Site/Plant:	Weld Identification:	Pre/Rev/Chg/ICN:		Examination No.:
Project No.: 1	Weld Description: 1	Device Configuration: 2		
Mod.Conf.:	Scan Path Drawing:	Exam Date	Examination Time Start / End	Surface Temperature °F Start / End
Data Acquisition Operator (s) / SNT Level:				

Data Acquisition

Scan Controller Parameters	Increment Axis/Arm Planned / Actual	Scan Axis/Device Planned / Actual	Positional Parameters
Controller:	Lower Limit	Lower Limit	Beam Direction:
Scan: 3	Upper Limit 3	Upper Limit 3	Probe Type:
Increment:	Inc. Interval (Resolution)	DCI (Scan Resolution)	Scanning Speed: 4
Mode:	Conversion Counts	Conversion Counts	Number of Scans:
Scan Motion:	Conversion Units	Conversion Units	Device Position:
Correction:			

Master Acquisition File: Probe	Channel /Angle(s)	Skew	Scan Offset	Step Offset	Calibration Records:	Examination Notes:
			5		6	Examination Remarks: 7

Data Analysis

Increment & Scan Positions Actual					Recordable Indications				Analyst Remarks
Scan No.(s)	Increment Position Start	Increment Position Stop	Scan Position Start	Scan Position Stop		Yes / No / N/A			Attachment: ☐ Yes ☐ No
					Probe 1	Channel 1 / 2 / 3			Further Evaluation Required: ☐ Yes ☐ No
		8			Probe 2	Channel 1 / 2 / 3	9		10
					Probe 3	Channel 1 / 2 / 3			Archive Media: ☐ External Hard Drive ☐ CD-ROM ☐ DVD-ROM
					Probe 4	Channel 1 / 2 / 3			

Analyst / SNT Level / Date: 11

IHWT FORM No. UT 80 (Rev. 1/11)

Figure 4: Explanation of Field Data Record

3.3 Examination Summary Table

The following Examination Summary Table provides information on the completed NDE activities performed by IHI during the examinations. (Figure 5 is an Explanation of the Summary Table Format.)

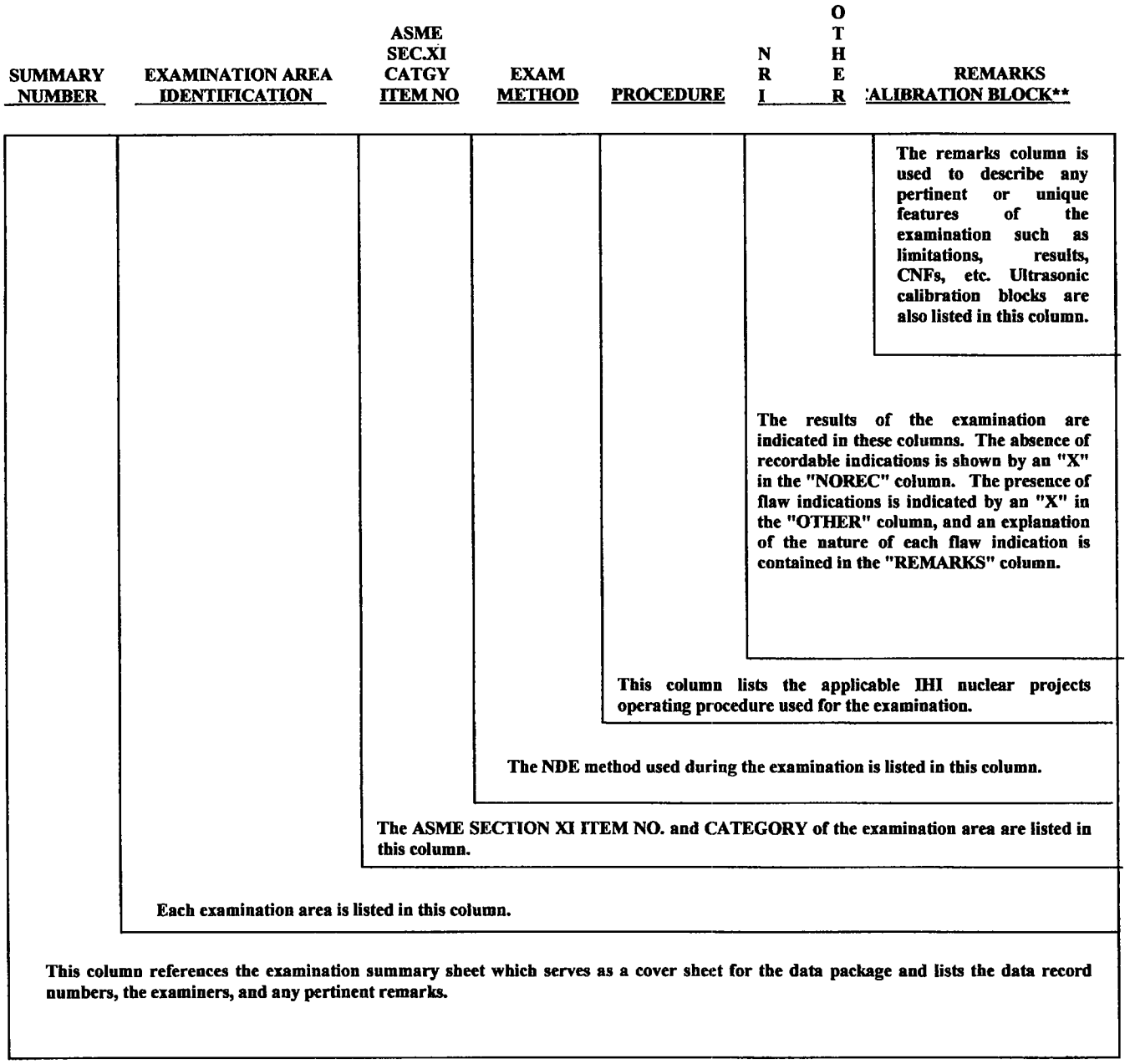


Figure 5. Explanation of the Summary Table Format

VIRGIL C. SUMMER UNIT 1 NUCLEAR STATION
Inservice Inspection Plan
Class 1 Scheduled Components

STEAM GENERATOR

Summary Number	Examination Area Identification	ASME Sec. XI Catgy Item No.	NDE Method	Procedure	NOREC	OTHER	Remarks
Nozzle to Safe End Welds							
000100	1-4100A-31 (DM) S/G 'A' Inlet Nozzle -to- Safe-End DM Weld (Hot Leg)	N-770-1 A-2	PA60-88 PA60-88T ECT	ISwT-PDI-AUT11 Rev 2, Chg 0 ISwT-AET3 Rev 2, Chg 0	X X X	- - -	
000200	1-4100A-32(DM) S/G 'A' Outlet Nozzle -to- Safe-End DM Weld (Cold Leg)	N-770-1 B	PA60-88 PA60-88T ECT	ISwT-PDI-AUT11 Rev 2, Chg 0 ISwT-AET3 Rev 2, Chg 0	X X X	- - -	
000300	1-4200A-28(DM) SG 'B' Inlet Nozzle -to- Safe-End DM Weld (Hot Leg)	N-770-1 A-2	PA60-88 PA60-88T ECT	ISwT-PDI-AUT11 Rev 2, Chg 0 ISwT-AET3 Rev 2, Chg 0	X X X	- - -	
000400	1-4200A-29(DM) SG 'B' Outlet Nozzle -to- Safe-End DM Weld (Cold Leg)	N-770-1 B	PA60-88 PA60-88T ECT	ISwT-PDI-AUT11 Rev 2, Chg 0 ISwT-AET3 Rev 2, Chg 0	X X X	- - -	
000500	1-4300A-29(DM) SG 'C' Inlet Nozzle -to- Safe-End DM Weld (Hot Leg)	N-770-1 A-2	PA60-88 PA60-88T ECT	ISwT-PDI-AUT11 Rev 2, Chg 0 ISwT-AET3 Rev 2, Chg 0	X X X	- - -	
000600	1-4300A-30(DM) SG 'C' Inlet Nozzle -to- Safe-End DM Weld (Cold Leg)	N-770-1 B	PA60-88 PA60-88T ECT	ISwT-PDI-AUT11 Rev 2, Chg 0 ISwT-AET3 Rev 2, Chg 0	X X -	- - X	One eddy current indication recorded and determined to be acceptable. This indication located outside exam area in nozzle cladding.
Nozzle Inside Radius Sections							
000700	1-3100-12IR-A A S/G Inlet Nozzle IRS	B-D B3.140	EVT-1	QSP-505 Rev11, Chg A	X	-	
000800	1-3100-13IR-A A S/G Outlet Nozzle IRS	B-D B3.140	EVT-1	QSP-505 Rev 11, Chg A	X	-	
000900	1-3100-12IR-B B S/G Inlet Nozzle IRS	B-D B3.140	EVT-1	QSP-505 Rev 11, Chg A	X	-	
001000	1-3100-13IR-B B S/G Outlet Nozzle IRS	B-D B3.140	EVT-1	QSP-505 Rev 11, Chg A	X	-	

VIRGIL C. SUMMER UNIT 1 NUCLEAR STATION
Inservice Inspection Plan
Class 1 Scheduled Components

STEAM GENERATOR

Summary Number	Examination Area Identification	ASME Sec. XI Catgy Item No.	NDE Method	Procedure	NOR EC	OTH ER	Remarks
Nozzle Inside Radius Sections continued:							
001100	1-3100-12IR-C C S/G Inlet Nozzle IRS	B-D B3.140	EVT-1	QSP-505 Rev 11, Chg A	X	-	
001200	1-3100-13IR-C C S/G Outlet Nozzle IRS	B-D B3.140	EVT-1	QSP-505 Rev 11, Chg A	X	-	

Document Control Desk
USNRC, Region II
RC-14-0145
Attachment

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS), UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

INSERVICE INSPECTION REPORT #20
REFUEL 21
TAB F
REPAIR AND REPLACEMENT SUMMARY

Repair Replacement, NIS-2 Summary

V.C. Summer Nuclear Station, Unit 1
Interval IV, Period 1, Outage 1

Plant System	Associated Component	Work Order	PSI, NDE Required	Description of Activity
Diesel Generator B	XHE0017B-HE1	1402806		Replaced tubes in heat exchanger
Main Steam	MK-MSH-0202	1404093		Replacement due to degraded snubber
Feedwater System	XSG-0002A	1212456	VT-2	Base metal repair next to Gamma port
Chemical and Volume Control	CSH-5006	1301025		Remove/reinstall box guide
Emergency Feedwater	XVK0102C	1302202	VT-2	Replaced disc due to defective seating surface
Diesel Generator B	XHE0017B-HE3	1402602		Replaced tubes in heat exchanger
Reactor Coolant (Vessel)	XRE0001	1404376	VT-2, PT, UT	Repair of RV Head Penetrations
Blowdown	MK-BDH-0025	1404777		Replacement due to degraded snubber
Blowdown	XVG00503C	1405073	VT-2	Valve Replacement
Blowdown	MK-MSH-0025	1405676		Replacement due to degraded snubber
Main Steam	IPV02010-MS	0906451	VT-2	Valve Repair
Safety Injection	SIH-1184	1005131		Remove/reinstall support
Component Cooling	XHE0002B	1006640	VT-2	Replaced Damaged Nut
Chemical and Volume Control	XVC08429-CS	1201494		Valve Repair
Service Water	XVB03125A-SW	1212238	VT-2	Valve Replacement
Service Water	XVC03137A-SW	1304072	VT-2	Tack Welds used as a locking device
	7040860			
Reactor Coolant (Vessel)	1-58	1304143		Replaced load cells on Hydra Nuts 1-58
Feedwater System	XSG-0002B	1304843	VT-2	Open SG Secondary Manways for inspection
Feedwater System	XSG-0002C	1304852	VT-2	Secondary Manway washer set replaced
Service Water	XVB03121A-SW	1305828		Weld Neck flange replacement
Chemical and Volume Control	XVT-08403-CS	1306590	VT-2	Valve Repair
	XPS0120A-SW			Class 3 piping replacement
Service Water	MK-SWH-1125	1309670	VT-2	Remove/reinstall support
Blowdown	MK-BDH-0020	0801782		pipe support modification per ECR50614

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1402806 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System Diesel Generator B

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Heat Exchanger Tubes	N/A	N/A	N/A	N/A		Removed	NO
Heat Exchanger Tubes	N/A	S7002060	N/A	Heat#TR28064		Installed	NO

7. Description of Work Replaced tubes in XHE0017B-HE1 Lube Oil Heat Exchanger..

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L Dedin for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/06/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Anastasia Elkoudi Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1404093 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (MS) Main Steam

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of *Component*	Name of *Manufacturer*	Manufacturer *Serial No.*	National Board *No.*	Other *Identification*	Year *Built*	Corrected, Removed, or *Installed*	ASME Code Stamped (Yes or No)
Snubber	PSA	7192	N/A	MK-MSH-0202		Removed	NO
Snubber	PSA	18190	N/A	MK-MSH-0202		Installed	NO

7. Description of Work Replacement due to Degraded Snubber.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8\frac{1}{2}$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-3 Performed

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L Oeder for MAINT. MGR. Date 8/28/2014
(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 HSBCT
of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/23/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

[illegible] Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1405073 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (BD) Blowdown

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Valve Gate XVG00503C	Anchor/Darling Valve	EA701-1-3	N/A	XVG00503C	1989	Removed	NO
Valve Gate XVG00503C	Anchor/Darling Valve	EB946-1-1	N/A	XVG00503C	1993	Installed	NO

7. Description of Work Valve Replacement.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-2 was performed and also a RT on the supply side weld was SAT.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L Dutra for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 06/20/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

MOSTAFA ELKOUSY Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1405676 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (BD) Blowdown

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Snubber	PSA	12812	N/A	MK-MSH-0025	1981	Removed	NO
Snubber	PSA	18157	N/A	MK-MSH-0025		Installed	NO

7. Description of Work Snubber Replacement due to snubber falling Handstroke and Bench test.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-3 was performed

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Yost for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 06/05/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

EHOSTAFA ElKouly Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 3

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 0906451 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (MS) Main Steam

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 1998
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Plug/Stem Assembly	N/A	N/A	N/A	IPV02010-MS		Removed	NO
Plug/Stem Assembly	264784-2A-2	N/A	N/A	IPV02010-MS		Installed	NO
Rod	N/A	N/A	N/A	N/A		Removed	NO
Rod	N/A	923504977	N/A	70-7548-0034-13		Installed	NO
Nut	N/A	N/A	N/A	N/A		Removed	NO

7. Description of Work IPV02010-MS Relief valve seat leakage

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name) — Date 08/24/2014
   COLUMBIA, SOUTH CAROLINA 29218 (Address) — Sheet 2 of 3
2. Plant V. C. SUMMER STATION (Name) — Unit #1
   P.O. BOX 88, JENKINSVILLE, SC 29065 (Address) — Work Order 0906451 (Repair/Replacement Organization P.O. No., Job No., etc.)
3. Work Performed by SCE&G (Name) — Type Code Smbol Stamp N/A
   COLUMBIA, SOUTH CAROLINA 29218 (Address) — Authorization No. N/A — Expiration Date
4. Identification of System ((MS) Main Steam
5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
   (b) Applicable Edition of Section XI Used for Repair/Replacement Activity 1998
   (c) Applicable Section XI Code Case(s) N/A
6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Nut	N/A	050701102828	N/A	58-6364-0611-13		Installed	NO

7. Description of Work IPV02010-MS Relief valve seat leakage

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Leak Test performed.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Lord for MAINT MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/03/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

ELMOSTAFA ELKOUHI Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1005131 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (SI)

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Angle Box Guide SHI-1184	N/A	N/A	N/A	SHI-1184		Removed	NO
Angle Box Guide SHI-1184	N/A	N/A	N/A	SHI-1184		Installed	NO

7. Description of Work SIH-1184 angle removal and reinstallation to support maintenance activities on XVT-08879C-SI .

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-3 was performed.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L. J. for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 08/12/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Christina Crouch Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Date 08/24/2014
   Sheet 1 of 2
2. Plant V. C. SUMMER STATION (Name)
   P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
   Unit #1
   Work Order 1006640 (Repair/Replacement Organization P.O. No., Job No., etc.)
3. Work Performed by SCE&G (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Type Code Smbol Stamp N/A
   Authorization No. N/A
   Expiration Date
4. Identification of System (CC) Component Cooling
5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
   (b) Applicable Edition of Section XI Used for Repair/Replacement Activity 1998
   (c) Applicable Section XI Code Case(s) N/A
6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Nuts	N/A	N/A	N/A	N/A		Removed	NO
Nuts	N/A	7015563	N/A	58-6364-0062-13		Insralled	NO

7. Description of Work Component Cooling Heat Exchanger (B) Nuts was replaced.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Leak Test performed.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Yost for MAINT. MGR. Date 8/28/2014
(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 South Carolina
of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/31/2011 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Thomas Elkouly Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1201494 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (CS) Chemical and volume control

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Valve Disc Assembly	N/A	N/A	N/A	N/A		Removed	NO
Valve Disc Assembly	N/A	26723-1-SN3	N/A	XVC08429-CS		Insralled	NO

7. Description of Work Check valve appears to be leaking by and replace soft seated valve disc.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8\frac{1}{2}$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Leak Test performed.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Ford - Sub for MAINT. MGR Date 8/28/2014
(Owner or Owner's Designee, Title) 8-28-14

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 HSBCT

of Hartford Connecticut have inspected the components described in this Owner's Report during the period 11/26/2013 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Agostino Errico Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Date 08/24/2014
   Sheet 1 of 2
2. Plant V. C. SUMMER STATION (Name)
   P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
   Unit #1
   Work Order 1212238 (Repair/Replacement Organization P.O. No., Job No., etc.)
3. Work Performed by SCE&G (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Type Code Smbol Stamp N/A
   Authorization No. N/A
   Expiration Date
4. Identification of System (SW) Service Water
5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
   (b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
   (c) Applicable Section XI Code Case(s) N/A
6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Butterfly Valve	N/A	D-0092-3-1	N/A	XVB03125A-SW		Removed	NO
Butterfly Valve	Henry Pratt Company	1580148DD-1-1	N/A	XVC08429-CS		Insralled	NO

7. Description of Work Replaced valve .

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed External Leakage Test.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed R Mahl for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/22/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

ELHOSTAFA EKLOUH Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1304072 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (SW) Service Water

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
XVC03137ASW Tack Welds	N/A	N/A	N/A	XVC03137ASW		Corrected	NO

7. Description of Work Tack welds used as a locking device.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed External LeakageTest.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L.D. for MAINT. MGR. Date 8/28/2014
(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 HSBCT
of Hartford Connecticut have inspected the components described in this Owner's Report during the period 06/19/2014 to 08/27/2014 , and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

EMOSTAFA ELKOUM Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)

Date 08/24/2014

Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)

Unit #1

Work Order 1304143 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)

Type Code Smbol Stamp N/A

Authorization No. N/A

Expiration Date

4. Identification of System Reactor Vessel

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Hydro Nuts Load Cell	Nova	7006658 1-58	N/A	N/A		Removed	NO
Hydro Nuts Load Cell	Nova	50424076 1-58	N/A	7040860 1-58		Installed	

7. Description of Work Replaced load cells on Hydro Nuts 1-58.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-1 was performed

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Y Dot for MPINT, MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 07/11/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Ehostafa Elyoum Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1304843 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System Steam Generator

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
B Steam Generator/Stud	N/A	N/A	N/A	N/A		Removed	NO
B Steam Generator/Stud	N/A	031026203134	N/A	10-8411-0041-13		Installed	NO

7. Description of Work Open manways for internal inspection on the secondary side.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed Leak Test.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Y Ostrander for MAINT. MGR. Date 8/28/2014
(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 HSBCT

of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/23/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Christina Brown Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1304852 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System Steam Generator

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Secondary Manway Washer Set	N/A	N/A	N/A	N/A		Removed	NO
Secondary Manway Washer Set	N/A	942651924	N/A	N/A		Installed	NO

7. Description of Work Secondary manway stud 16 washer set replaced.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8\frac{1}{2}$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed Leak Test

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Ouellette for MAINT. MGR. Date 8/28/2014
(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 HSBCT
of Hartford Connecticut have inspected the components described in this Owner's Report during the period 06/30/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

MOSTAFA ELROUH Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Date 08/24/2014
   Sheet 1 of 2
2. Plant V. C. SUMMER STATION (Name)
   P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
   Unit #1
   Work Order 1305828 (Repair/Replacement Organization P.O. No., Job No., etc.)
3. Work Performed by SCE&G (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Type Code Smbol Stamp N/A
   Authorization No. N/A
   Expiration Date
4. Identification of System (SW) Service Water
5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
   (b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
   (c) Applicable Section XI Code Case(s) N/A
6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Pipe Flange XVB-03121A	N/A	N/A	N/A			Removed	NO
Pipe Flange XVB-03121A	N/A	7038853	N/A	87-2790-2088-13		Installed	NO

7. Description of Work 8" Diameter Outlet side Weld Neck Flange Replacement

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8\frac{1}{2}$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

MT performed on root and final welds.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald York for mgmt. man. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/19/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Mostafa Elkouh Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1306590 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (CS) Chemical and Volume Control

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Globe Valve	Flowserve	2240AT800	N/A	XVT-08403-CS	2003	Removed	NO
Globe Valve	Flowserve	19AXE	N-1562	XVT-08403-CS	2003	Installed	NO
Pipe	N/A	N/A	N/A	N/A		Removed	NO
Pipe	N/A	06922125702	N/A	N/A		Installed	NO
Pipe Fittings	N/A	N/A	N/A	N/A		Installed	NO

7. Description of Work VT-2 was performed on work order

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-2 was performed on work order

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L Ostby for MAINT. MGR. Date 8/28/2014
(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 HSBCT
of Hartford Connecticut have inspected the components described in this Owner's Report during the period 04/09/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

ELMOSTAFA ELKOUNI Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)

Date 08/24/2014

Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)

Unit #1

Work Order 1403602 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)

Type Code Smbol Stamp N/A

Authorization No. N/A

Expiration Date

4. Identification of System Diesel Generator B

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Heat Exchanger Tubes	N/A	N/A	N/A	N/A		Removed	NO
Heat Exchanger Tubes	N/A	S7002060	N/A	Hea#TR28064		Installed	NO

7. Description of Work Replaced tubes in XHE0017B-HE3 Intercooler Heat Exchanger

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Dodge for MAINT. MGR. Date 8/28/2014
(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 HSBCT
of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/06/2014 to 08/27/2014 , and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

ELMOSTAFA ELKOUDY Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1404777 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (BD) Blowdown

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Snubber	PSA	18186	N/A	MK-BDH-0025		Removed	NO
Snubber	PSA	18222	N/A	MK-BDH-0025		Installed	NO
							NO
							NO

7. Description of Work Snubber Replacement due to snubber falling the initial drag test.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-3 performed.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Dyer for maintenance. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 06/03/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Mostafa Elkouh Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1302202 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (EF) Emergency Feed Water

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Disc Valve Disc	N/A	N/A	N/A	XVK0102C		Removed	NO
Disc Valve Disc	Anchor/Darling Valve Co.	S/N 7	N/A	XVK0102C		Installed	NO

7. Description of Work Replaced disc due to defective seating surface.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed External LeakageTest.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Dietz for MAINT. MGR. Date 8/28/2014
(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 HSBCT
of Hartford Connecticut have inspected the components described in this Owner's Report during the period 07/13/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Christian Elcock Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name) — Date 08/24/2014
   COLUMBIA, SOUTH CAROLINA 29218 (Address) — Sheet 1 of 2
2. Plant V. C. SUMMER STATION (Name) — Unit #1
   P.O. BOX 88, JENKINSVILLE, SC 29065 (Address) — Work Order 1404376/ECR50846D (Repair/Replacement Organization P.O. No., Job No., etc.)
3. Work Performed by SCE&G (Name) — Type Code Smbol Stamp N/A
   COLUMBIA, SOUTH CAROLINA 29218 (Address) — Authorization No. N/A
   Expiration Date
4. Identification of System Reactor Vessel
5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
   (b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
   (c) Applicable Section XI Code Case(s) N/A
6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
CRDM Penetration #9	N/A	7192	N/A	N/A		Corrected	NO
CRDM Penetration #22	N/A	18190	N/A	N/A		Corrected	NO
CRDM Penetration #15	N/A	N/A	N/A	N/A		Corrected	NO
CRDM Penetration #43	N/A	N/A	N/A	N/A		Corrected	NO
CRDM Penetration #51	N/A	N/A	N/A	N/A		Corrected	NO

7. Description of Work Repair of degraded Reactor Vessel Head Penetrations and J-Welds

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8\frac{1}{2}$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Leak Test was performed.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L Ordan for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/15/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

MOSTAFA ELKOUM Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/08/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1301025 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (CS) Chemical and Volume Control

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
CSH-5006	N/A	N/A	N/A	N/A		Removed	NO
CSH-5006	N/A	N/A	N/A	N/A		Installed	NO

7. Description of Work In support of XVD-07054-0-TR maintenance activities CSH-5006 box guide was removed and reinstalled..

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed a MT'S and VT-3 on CSH-5006.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Dot for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 06/11/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

ELHOSTAFA ELKOUK Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Date 08/24/2014
Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
Unit #1
Work Order 1212456 (Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)
Type Code Smbol Stamp N/A
Authorization No. N/A
Expiration Date

4. Identification of System (FW) Feedwater System

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 1998
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Gamma Plug BW-10	N/A	XSG-0002A	N/A	N/A		Corrected	NO

7. Description of Work Base metal repair next to Gamma Port.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☑ Exempt ☐ Other ☐

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed Leakage Test.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L Dutra for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 11/08/2012 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Ahossain Akond Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Date 08/24/2014
   Sheet 1 of 2
2. Plant V. C. SUMMER STATION (Name)
   P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)
   Unit #1
   Work Order 1309670 (Repair/Replacement Organization P.O. No., Job No., etc.)
3. Work Performed by SCE&G (Name)
   COLUMBIA, SOUTH CAROLINA 29218 (Address)
   Type Code Smbol Stamp N/A
   Authorization No. N/A
   Expiration Date
4. Identification of System (SW) Service Water
5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
   (b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
   (c) Applicable Section XI Code Case(s) N/A
6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Pipe	N/A	N/A	N/A	N/A		Removed	NO
Pipe	N/A	923258845	N/A	Heat# L22569		Installed	NO
Pipe Fittings	N/A	N/A	N/A	N/A		Removed	NO
Pipe Fittings	N/A	MM11106485	N/A	Heat# HILZ-4		Installed	NO

7. Description of Work 3" Diameter ASME Class-3 piping replacement.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

VT-3 was performed on work order

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald Ouellette for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 07/11/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

Ahosiaa Akoury Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014

FORM NIS-2 OWNER'S REPORT FOR REPAIR/REPLACEMENT ACTIVITY
As Required by the Provisions of the ASME Code Section XI

1. Owner SOUTH CAROLINA ELECTRIC AND GAS (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)

Date 08/24/2014

Sheet 1 of 2

2. Plant V. C. SUMMER STATION (Name)
P.O. BOX 88, JENKINSVILLE, SC 29065 (Address)

Unit #1

ECR-50614A-3 / Work Order 0801782
(Repair/Replacement Organization P.O. No., Job No., etc.)

3. Work Performed by SCE&G (Name)
COLUMBIA, SOUTH CAROLINA 29218 (Address)

Type Code Smbol Stamp N/A

Authorization No. N/A

Expiration Date

4. Identification of System (BD) Blow Down System

5. (a) Applicable Construction Code 1971 Edition, 1973 Addenda (if applicable), _____ Code Case
(b) Applicable Edition of Section XI Used for Repair/Replacement Activity 2007
(c) Applicable Section XI Code Case(s) N/A

6. Identification of Components

Name of Component	Name of Manufacturer	Manufacturer Serial No.	National Board No.	Other Identification	Year Built	Corrected, Removed, or Installed	ASME Code Stamped (Yes or No)
Pipe Support MK-BDH-020	N/A	N/A	N/A	N/A		Removed	NO
Pipe Support MK-BDH-020	N/A	N/A	N/A	N/A		Insralled	NO

7. Description of Work In support of ECR-50614A-3 MK- BDH-020 pipe support modification.

8. Tests Conducted: Hydrostatic ☐ Pneumatic ☐ System Leakage ☐ Exempt ☐ Other ☑

NOTE: Supplemental sheets in the form of lists, sketches, or drawings may be used, provided: (1) size is $8^1/_2$ in. × 11 in. (A4); (2) information in items 1 through 6 on this report is included on each sheet; and (3) each sheet is numbered and the number of sheets is recorded at the top of this form.

FORM NIS-2 (Back)

9. Remarks

Performed VT-3 on MK-BDH-020.

CERTIFICATE OF COMPLIANCE

I certify that the statements made in the report are correct and that this conforms to the requirements of the ASME Code, Section XI.

Type Code Symbol Stamp N/A

Certificate of Authorization No. N/A Expiration Date

Signed Ronald L Dutra for MAINT. MGR. Date 8/28/2014
(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 HSBCT of Hartford Connecticut have inspected the components described in this Owner's Report during the period 05/03/2014 to 08/27/2014, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owner's 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 examinations and corrective measures described in this Owner's 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.

AMOSTAFA ELKOUH Commission NB 13930, SC264 ANII
(Inspector's Signature) (National Board Number and Endorsement)

Date 08/28/2014