

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

August 11, 2015

Mr. Ronald A. Jones
Vice President, New Nuclear Operations
South Carolina Electric and Gas
P.O. Box 88 (Mail Code P40)
Jenkinsville, SC 29065-0088

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3 – NRC
INTEGRATED INSPECTION REPORTS 05200027/2015002,
05200028/2015002

Dear Mr. Jones:

On June 30, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Virgil C. Summer Nuclear Station Units 2 and 3. The enclosed inspection report documents the inspection results, which the inspectors discussed on July 9, 2015, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Two NRC-identified findings of very low safety significance (Green) were identified during this inspection. These findings were determined to involve a violation of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as non-cited violations (NCV) in accordance with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector office at the Virgil C. Summer Nuclear Station Units 2 and 3.

If you disagree with the cross-cutting aspects assigned to either finding, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector office at the VC Summer Units 2 and 3.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA/

Michael Ernstes, Branch Chief
Construction Projects Branch 4
Division of Construction Projects

Docket Nos.: 5200027, 5200028

License Nos.: NPF-93 (Unit 2), NPF-94 (Unit 3)

Enclosure: NRC Inspection Report 05200027/2015002
and 05200028/2015002
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

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NAME	J. Kent	G. Khouri	P. Donnelly	A. Ponko	C. Oelstrom	A. Artayet	K. Steddenbenz
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cc w/ encls:

Document Control and Records Management
P.O. Box 88
Mail Code 846
Jenkinsville, SC 29065

Mr. Jeffrey B. Archie
Sr. Vice President, Nuclear Operations
South Carolina Electric & Gas Company
MC D304
220 Operation Way
Cayce, SC 29033-3172

Gregrey Ginyard
366 Lakeview Drive
Jenkinsville, SC 29065

Ms. Gidget Stanley-Banks
Director
Allendale County EPA
426 Mullberry Street
Allendale, SC 29810

Email

abynum@scana.com (Al Bynum)
amonroe@scana.com (Amy Monroe)
andy.barbee@scana.com (Andy Barbee)
April.Rice@scana.com (April Rice)
arice@scana.com (April R. Rice)
awc@nei.org (Anne W. Cottingham)
bedforbj@westinghouse.com (Brian Bedford)
Bill.Jacobs@gdsassociates.com (Bill Jacobs)
charles.baucom@cbi.com (Charles T. Baucom)
christina.barnett@scana.com (Christina Barnett)
collinlj@westinghouse.com (Leslie Collins)
CumminWE@Westinghouse.com (Edward W. Cummins)
cwaltman@roe.com (C. Waltman)
david.lewis@pillsburylaw.com (David Lewis)
DCRM-EDMS@SCANA.COM
delongra@westinghouse.com (Rich DeLong)
dgriffin@scana.com (Donna S. Griffin)
ed.burns@earthlink.net (Ed Burns)
ewingja@westinghouse.com (Jerrod Ewing)
fbelser@regstaff.sc.gov
gary@jonespartners.net (Gary Jones)
George_Stramback@Charter.net (George Stramback)
gsoult@regstaff.sc.gov (Gene G. Soult)
jarchie@scana.com (Jeffrey B. Archie)
jenkinse@dhec.sc.gov (Susan Jenkins)
jflitter@regstaff.sc.gov
Joseph_Hegner@dom.com (Joseph Hegner)
karlg@att.net (Karl Gross)
kinneyrw@dhec.sc.gov (Ronald Kinney)
kroberts@southernco.com (Kelli Roberts)
KSutton@morganlewis.com (Kathryn M. Sutton)
kwaugh@impact-net.org (Kenneth O. Waugh)
lchandler@morganlewis.com (Lawrence J. Chandler)
majames@regstaff.sc.gov (Anthony James)
maria.webb@pillsburylaw.com (Maria Webb)
mcintyba@westinghouse.com (Brian McIntyre)
media@nei.org (Scott Peterson)
MSF@nei.org (Marvin Fertel)
nirsnet@nirs.org (Michael Mariotte)
Nuclaw@mindspring.com (Robert Temple)
patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.mothena@scana.com (Paul Mothena)
Paul@beyondnuclear.org (Paul Gunter)
pbessette@morganlewis.com (Paul Bessette)
porterhj@dhec.sc.gov (Henry Porter)

sbyrne@scana.com (Stephen A. Byrne)
sfrantz@morganlewis.com (Stephen P. Frantz)
shudson@regstaff.sc.gov (Shannon Hudson)
solleyda@dhec.sc.gov (David Solley)
stephan.moen@ge.com (Stephan Moen)
TGATLIN@scana.com (Thomas Gatlin)
threatsj@dhec.sc.gov (Sandra Threath)
tom.miller@hq.doe.gov (Tom Miller)
TomClements329@cs.com (Tom Clements)
Vanessa.quinn@dhs.gov (Vanessa Quinn)
vcsnrc@scana.com (NRC Senior Resident Inspector
Wanda.K.Marshall@dom.com (Wanda K. Marshall)
weave1dw@westinghouse.com (Doug Weaver)
William.Cherry@scana.com (William Cherry)
wmcherry@santeecooper.com (Marion Cherry)

Letter to R. Jones from Michael E. Ernstes dated August 11, 2015

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION UNITS 2 AND 3
NRC INTEGRATED INSPECTION REPORTS 05200027/2015002
AND 05200028/2015002

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ConE_Resouce@nrc.gov

NRO_cROPResource@nrc.gov

Summer_Construction_Support@nrc.gov

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U.S. NUCLEAR REGULATORY COMMISSION
Region II

Docket Numbers: 5200027
5200028

License Numbers: NPF-93
NPF-94

Report Numbers: 05200027/2015002
05200028/2015002

Licensee: South Carolina Electric & Gas

Facility: Virgil C. Summer Nuclear Station Unit 2
Virgil C. Summer Nuclear Station Unit 3

Location: Jenkinsville, SC

Inspection Dates: April 1, 2015 through June 30, 2015

Inspectors: A. Artayet, Senior Construction Inspector, DCI
T. Chandler, Resident Inspector, DCP
P. Donnelly, Resident Inspector, DCP
T. Fredette, Reactor Operations Engineer, NRO
J. Hoellman, General Engineer, NRO
N. Karlovich, Resident Inspector, DCP
C. Oelstrom, Construction Inspector, DCI
A. Ponko, Senior Construction Inspector, DCI
C. Smith, Construction Inspector, DCI
K. Steddenbenz, Construction Inspector, DCI
J. Vasquez, Construction Inspector, DCI

Approved by: Michael Ernstes,
Branch Chief
Construction Projects Branch 4
Division of Construction Projects

Enclosure

SUMMARY

Inspection Report (IR) 05200027/2015002, 05200028/2015002; 04/01/2015 through 06/30/2015; Virgil C. Summer Nuclear Station Unit 2, Virgil C. Summer Nuclear Station Unit 3, routine integrated inspection report.

This report covers a three month period of inspection by resident and regional inspectors, and announced Inspections, Tests, Analysis, and Inspection Criteria (ITAAC) inspections by regional inspectors. Two Green non-cited violations associated with the Construction/Installation cornerstone were identified consistent with the NRC Enforcement Policy, Section 2.3 and the temporary enforcement guidance outlined in enforcement guidance memorandum number EGM-11 006. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter (IMC) 2519, "Construction Significance Determination Process." Construction Cross Cutting Aspects are determined using IMC 0613, "Power Reactor Construction Inspection Reports." The Nuclear Regulatory Commission's (NRC's) program for overseeing the construction of commercial nuclear power reactors is described in IMC 2506, "Construction Reactor Oversight Process General Guidance and Basis Document."

A. NRC-Identified and Self Revealed Findings

Cornerstone: Construction/Installation

- Green. The inspectors identified an ITAAC finding of very low safety significance (Green) and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control" for a potential unanalyzed structural defect as a result for a failure by South Carolina Electric and Gas' (SCE&G) through their contractor Chicago Bridge and Iron (CB&I) Power, to incorporate the appropriate grout compressive strength acceptance limits into the testing of grout used for post-installed anchors. No immediate corrective actions were necessary to address safety or security concerns. The licensee entered this issue into their corrective action program as CR-NND-15-00763.

The finding was associated with the Construction/Installation cornerstone. The inspectors determined the performance deficiency was more than minor following the guidance in IMC 0613, "Power Reactor Construction Inspection Reports," Appendix E, Example 11. The inspectors evaluated the finding using the construction significance determination process and determined the finding was of very low safety significance (Green) because it was associated with a portion of a structure assigned to the intermediate risk importance column of the construction significance determination matrix. The finding was determined to be an ITAAC finding because it was material to the acceptance criteria of Unit 2 ITAACs 760 (3.3.00.02a.i.a) and 763 (3.3.00.02a.i.d). The acceptance criteria of these ITAACs requires that a reconciliation report is completed that concludes the "as-built" construction conforms to the approved design. This finding is associated with deviations from design requirements that would not have been reconciled by the licensee as required by the ITAACs.

The inspectors screened the finding for a possible construction safety focus component aspect in accordance with Appendix F, "Construction Safety Focus Components and Aspects," of IMC 0613, "Power Reactor Construction Inspection Reports."

This finding has a cross-cutting aspect in the area of Human Performance, Procedure Adherence Aspect, because the licensee failed to follow the processes, procedures, and work instructions contained in the applicable engineering documents. [H.8]. (Section 1A03)

Cornerstone: Construction/Installation

- Green. The inspectors identified a construction finding of very low safety significance (Green) and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," for SCE&G's failure through their contractor CB&I Power, to accomplish safety-related, required quality control inspections. The inspections were required by CB&I QC inspection plans F-S561-007, "AWS D1.1 - Visual Weld Inspection - Carbon Steel" and F-S561-008, "AWS D1.6 - Visual Weld Inspection - Stainless Steel." The licensee entered this issue into their corrective action program as CR-NND-15-00927.

The finding was associated with the Construction/Installation cornerstone. The inspectors determined the performance deficiency was more than minor following the guidance in IMC 0613, "Power Reactor Construction Inspection Reports," Appendix E, because the issue represented a substantive failure to implement an adequate quality oversight function. Specifically, routine welding inspections were not performed by the licensee's contractor for a seven month period.

The inspectors screened the finding for a possible construction cross-cutting aspect in accordance with Appendix F, "Construction Cross-Cutting Components and Aspects" of IMC 0613. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, because the licensee failed to ensure that effective corrective action was taken on CAR 2014-0025 "Documentation of Fit-Up and In-Process Weld Inspections". [P.3] (Section 1P03)

B. Licensee-Identified Violations

No findings were identified.

REPORT DETAILS

Summary of Plant Construction Status

During this inspection period the licensee continued constructing the auxiliary building walls up to elevation 100' in Units 2 and 3. Fabrication of floors continued in the non-radiological area of the auxiliary building at the 82'6" level and began in the radiologically controlled area at the 82'6" level. Rebar and embed plates were installed inside containment up to the 83' level in preparation for concrete. Seam welding was completed on Unit 2 CA01, the module that will make up the steam generator rooms, pressurizer room and fuel transfer canal. Finally, fabrication was completed on the Unit 3 CA04 module, the reactor vessel cavity, and it was placed inside the containment vessel at the 71'6" elevation.

1. CONSTRUCTION REACTOR SAFETY

Cornerstones: Design/Engineering, Procurement/Fabrication, Construction/Installation, Inspection/Testing

IMC 2503, ITAAC-Related Work Inspections

1A01 (Unit 2) ITAAC Number 2.1.03.03 (72) / Family 05F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 2.1.03.03 (72):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
3. The components identified in Table 2.1.3-1 as ASME Code Section III are designed and constructed in accordance with ASME Code Section III requirements.	Inspection will be conducted of the as-built components as documented in the ASME design reports.	The ASME Code Section III design reports exist for the as-built components identified in Table 2.1.3-1 as ASME Code Section III.

The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.05-02.07 - Records Review
- 65001.05-02.08 - Problem Identification and Resolution
- 65001.F-02.01 - Design Document Review
- 65001.F-02.02 - Fabrication Records Review
- 65001.F-02.04 - General QA Review

The inspectors reviewed Doosan Heavy Industries & Construction Company (Doosan) fabrication, material, and examination documents associated with the assembly of the V.C. Summer Unit 2 reactor pressure vessel to verify that applicable codes, standards, and specifications were met, proper reviews and approvals were documented,

nondestructive examination (NDE) results were acceptable, and material traceability was maintained in accordance with the requirements of the following:

- Westinghouse Electric Company (WEC), APP-MV01-Z0-101, Design Specification for the AP1000 Reactor Vessel, Rev. 12;
- American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NB, Class 1 Components, 1998 Edition through 2000 Addenda; and
- Unit 2 Updated Final Safety Analysis Report (UFSAR) with documents referencing applicability to 10 CFR Part 50, Appendix B, and 10 CFR 21.

Specifically, the inspectors reviewed ASME Code Data Report Forms N-1 and N-2 to verify the following parts were traceable and hydrostatically tested at a pressure of 3125 psia, as well as approved by an Authorized Nuclear Inspector:

- Transition Ring;
- Lower Shell;
- Upper Shell;
- Outlet Nozzle at Location A;
- Outlet Nozzle Safe End at Location A;
- Closure Head;
- QuickLoc Instrument Nozzles (QIN) at Locations A5 and A8; and
- Control Rod Drive Mechanism (CRDM) Latch Housings, Rod Travel Housings, and Nozzles at Locations 1(H8), 11(K6), 28(E5), 40(N7), 46(M12), 56(C11), and 69(F14).

The inspectors reviewed nine base metal and eight weld filler metal Certified Material Test Reports (CMTRs) associated with the above parts to determine whether the applicable dimensions, chemical compositions, mechanical properties (tensile and yield strength, elongation and reduction of area, and Charpy V-notch and drop weight impact testing), heat treatments, and nondestructive examinations were in accordance with the applicable requirements of ASME Section II and III as well as the following WEC and Doosan material specifications:

- Westinghouse Specification No. APP-VW40-Z0-050, "AP1000 Filler Material Specification: SFA-5.5 Low Alloy Steel Electrodes for SMAW of ASME Section III Applications," Rev. 1;
- Westinghouse Specification No. APP-VW40-Z0-230, "AP1000 Filler Material Specification: SFA-5.23 Low Alloy Steel Material for SAW of ASME Section III Applications," Rev. 1;
- Westinghouse Specification No. APP-VW30-Z0-110, "AP1000 Filler Material Specification: SFA-5.11 ENiCrFe-7 (UNS W86152) Nickel Alloy Electrodes for SMAW of ASME Section III Applications," Rev. 0;
- Westinghouse Specification No. APP-VW30-Z0-140, "AP1000 Filler Material Specification: SFA-5.14 ERNiCrFe-7 (UNS N06052) and ERNiCrFe-7A (UNS N06054) Bare Nickel Alloy Filler Metal for GTAW, PAW, or GMAW of ASME Section III Applications," Rev. 1;
- Westinghouse Specification No. APP-VW30-Z0-141, "AP1000 Filler Material Specification: SFA-5.14 ER/EQNiCrFe-7 (UNS N06052) and ER/EQNiCrFe-7A

(UNS N06054) Bare Nickel Alloy Filler Metal for SAW of ASME Section III Applications,” Rev. 0;

- Doosan Specification No. AP-MPS21-065, “Material Purchase Specification for SA-508 Grade 3 Class 1 Forging (to be used for the Reactor Vessel Lower Head),” Rev. 4;
- Doosan Specification No. EPS-M03-137, “Material Purchase Specification for E8016-G Low Alloy Steel Covered Electrodes,” Rev. G; and
- Doosan Specification No. EPS-A03-126, “Material Purchase Specification for Mn-Mo Alloy Steel Wire and Flux for Submerged Arc Welding,” Rev. E.

The inspectors reviewed two Doosan Welding Procedure Specifications (WPSs) with supporting Procedure Qualification Records (PQRs) used for corrosion-resistant weld metal overlay cladding on the internal surfaces of the reactor vessel, specifically the closure head flange keyway, to determine whether the essential and nonessential variables for each welding process were in accordance with the ASME Section IX, Article II, Welding Procedure Qualifications. The inspectors also reviewed five CMTRs for the cladding material, seven liquid penetrant examination reports, one magnetic particle examination report, and two ultrasonic examination reports to verify applicable code and specification requirements were met.

The inspectors reviewed four CMTRs for the base metal and weld filler material associated with the three lifting lugs welded to the closure head, as well as ten magnetic particle examination reports, to verify they met the applicable requirements of ASME Section II and III as well as the following WEC and Doosan material specifications:

- Westinghouse Specification No. APP-VL51-Z0-003, AP1000 Reactor Vessel Material Specification for SA-508/SA-508M Grade 3 Class 1 Non-Core Region Forgings, Rev. 3 and
- Doosan Specification No. AP-MPS21-069, Material Purchase Specification for SA-508 Grade 3 Class 1 Forging (to be used for RV Lift Lug, Seal Ledge, Support Block), Rev. 2.

The inspectors reviewed two Doosan nonconformance reports (NCRs) associated with weld repairs in the weld seams between the transition ring and lower shell assembly (Weld No. 101-40) as well as outlet nozzle to upper shell assembly (Weld No. 102-21A) to verify:

- adequate disposition and technical justification, if applicable, for use-as-is, repair, rework, or reject;
- repair welding was performed in accordance with a welding defect notices (WDN) Repair Traveler;
- welds were re-examined through nondestructive examination in accordance with applicable procedures and the original acceptance criteria and found acceptable; and
- reportability screening and evaluations under 10 CFR Part 21 and 10 CFR 50.55(e) were performed.

b. Findings

No findings were identified.

1A02 (Unit 2) ITAAC Number 2.1.03.04 (73) / Family 05B

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 2.1.03.04 (73):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
4. Pressure boundary welds in components identified in Table 2.1.3-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of as-built pressure boundary welds will be performed in accordance with the ASME Code Section III.	A report exists and concludes that the ASME Code Section III requirements are met for non-destructive examination of pressure boundary welds.

The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.05-02.07 - Records Review
- 65001.05-02.08 - Problem Identification and Resolution
- 65001.B-02.01 - Program and Procedures Review
- 65001.B-02.02 - Welding Procedure Qualification
- 65001.B-02.03 - Welder Qualification
- 65001.B-02.04 - Production Controls
- 65001.B-02.06 - Records

The inspectors reviewed Doosan records associated with the Unit 2 reactor pressure vessel to verify that applicable codes, standards, specifications, and procedure requirements were met, proper reviews and approvals were documented, and traceability of materials, welders, and welding operators was provided for welding activities. Specifically, the inspectors reviewed a variation of weld maps, CMTRs, WPSs, welder and welding operator qualifications, NDE reports, and welding defect notices to verify the records were in accordance with the requirements of ASME Sections II and III, as well as the design specification, for the following pressure boundary welds:

- Girth weld between the lower shell assembly and transition ring (Weld No. 101-40);
- Girth weld between the upper shell assembly and lower shell assembly (Weld No. 101-51);
- Weld between the outlet nozzle and upper shell assembly (Weld No. 102-21A);
- Dissimilar weld between the safe-end and outlet nozzle (Weld No. 301-20A);
- Buttering weld for the outlet nozzle (Weld No. 103-25A);
- Welds between the closure head and these QuickLoc nozzles: A5 and A8 (Weld Nos. 101-10E and 101-10H); and
- Welds between the closure head and these CRDM Nozzles: H8, K6, E5, N7, M12, C11, F14 (Weld Nos. 103-10-01, 103-10-11, 103-10-28, 103-10-40, 103-10-46, 103-10-56, 103-10-69).

Specifically, the inspectors reviewed five weld maps to verify traceability between the weld numbers, base metals and filler materials, and WPSs used during production. The inspectors reviewed 22 CMTRs associated with those base and filler metals to verify the applicable dimension, chemical composition, mechanical property, heat treatment, and nondestructive examination requirements were met. The inspectors reviewed 17 WPSs to verify they had adequate supporting PQRs and were up to date, accurate, and in conformance with the ASME Code requirements.

The inspectors reviewed eighteen welder and welding operator qualifications to verify:

- each welder was assigned a unique identification number and demonstrated their skill by performing specific performance qualification tests;
- the qualification testing conditions and qualification limits were fully documented;
- the appropriate number of acceptable test results was achieved; and
- the welder was properly re-qualified at the required duration.

The inspectors reviewed final NDE reports to verify NDE was performed and found acceptable by the proper certification level of NDE personnel and in accordance with the applicable sections of the ASME Code. Specifically, the inspectors reviewed 37 liquid penetrant examination reports to verify there were no recordable defects on the surface of the weld. The inspectors reviewed 10 magnetic particle examination reports to verify the proper yoke lifting power, visible light source, and surface temperature requirements were met to ensure adequate performance of the test. The inspectors reviewed 11 ultrasonic examination reports to verify adequate angles and frequencies were used to examine the welds. The inspectors reviewed eight radiography examination reports and a sample of the associated film to verify the density and sensitivity measurements were within the allowable ranges and there were no rejectable indications in the welds. The inspectors also review two ferrite inspection reports for the outlet nozzle buttering weld to verify the iron and cobalt chemical compositions met the allowed tolerances.

The inspectors reviewed two nonconformance reports and two WDNs associated with weld defects in the girth seams and outlet nozzle to verify:

- adequate disposition of use-as-is, repair, rework, or reject was identified, and, if applicable, technical justification was given;
- welds repairs were re-examined through nondestructive examination in accordance with applicable procedures and the original acceptance criteria and found acceptable; and
- reportability screening under 10 CFR Part 21 was performed.

b. Findings

No findings were identified.

1A03 (Unit 2) ITAAC Number 3.3.00.02a.i.a (760) / Family 01F
(Unit 2) ITAAC Number 3.3.00.02a.i.d (763) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.a (760) and 3.3.00.02a.i.d (763):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
2.a) The nuclear island structures, including the critical sections listed in Table 3.3-7, are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions.	i) An inspection of the nuclear island structures will be performed. Deviations from the design due to as-built conditions will be analyzed for the design basis loads.	i.a) A report exists which reconciles deviations during construction and concludes that the as-built containment internal structures, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
2.a) The nuclear island structures, including the critical sections listed in Table 3.3-7, are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions.	i) An inspection of the nuclear island structures will be performed. Deviations from the design due to as-built conditions will be analyzed for the design basis loads.	i.d) A report exists which reconciles deviations during construction and concludes that the as-built structures in the radiologically controlled area of the auxiliary building, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.

The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.06 - Record Review
- 65001.02-02.07 - Problem Identification and Resolution

At VC Summer Unit 2, the licensee has been using post-installed rebar as a repair method for relocating rebar dowels and missing dowels in previously installed concrete. This repair method has been used in the radiological controlled area of the auxiliary building and inside the containment vessel bottom head. The inspectors reviewed the installation of post-installed rebar, the Engineering Test Plan (developed to meet the requirements of American Concrete Institute (ACI) 349-01), and applicable engineering documents to determine whether structural post-installed rebar repair work were being performed in accordance with design specifications and approved procedures. Specifically, the inspectors evaluated whether:

- post-installed rebar design and construction was accomplished under controlled conditions and in accordance with applicable procedures, specifications, drawings, and approved procedures using qualified personnel;
- materials satisfied design specifications, requirements, and relevant ITAAC;
- deviations from the design due to as-built conditions were identified and documented appropriately;
- records reflected that completed work met design specifications and acceptance criteria; and
- post-installed rebar installation was controlled and performed in accordance with the applicable specifications, codes, drawings, and procedures.

In addition, inspectors reviewed applicable Nonconformance and Disposition (N&D) reports associated with the post-installed rebar to determine whether:

- the licensee was identifying problems at an appropriate threshold and entering them into the corrective action program;
- nonconforming material was adequately identified; and
- deviations from requirements were effectively resolved.

b. Findings

Introduction

An ITAAC finding of very low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," was identified by the NRC. The licensee, SCE&G, failed to incorporate the grout compressive strength acceptance limits contained in the post-installed anchor test plan and nonconformance and disposition reports into the compressive strength testing of grout used in the installation of post installed rebar in the nuclear island.

Description

On August 5, 2013, N&D VS2-CR01-GNR-000062 was created because vertical wall dowels were missing along Column Line 4 at elevation 66'-6". The missing dowels were discovered after the basemat had been poured to this elevation. In the N&D, the recommended repair was to install the missing dowels by post-installing #10 rebar by coring into the concrete and grouting these dowels in-place. To meet the requirements of ACI 349-01, Section B.12.5, Engineering Test Plan VSG-CR01-VTR-800000 was developed to determine the depth required to achieve sufficient bond strength at the

grout-concrete interface and the grout-dowel interface and demonstrate that the proposed repair configuration will not fail under applied pull-out loads.

The Engineering Test Plan utilized #10 rebar dowels and Five Star's Fluid Grout 100. The Engineering Test Plan stated the Five Star's Fluid Grout 100 f'c (specified compressive strength of grout) is 8,000 psi. The Five Star's Fluid Grout 100 data sheet and instructions were included in the Engineering Test Plan and stated the 28-day compressive strength of the grout was 8,000 psi. Also, the Engineering Test Plan, Section 7.4 stated, "the mixing and testing shall be in accordance with the Manufacturer's recommendations."

SCE&G, through their contractor Chicago Bridge and Iron (CB&I), failed to incorporate the appropriate acceptance limit of 8,000 psi, specified in the Engineering Test Plan, into the Engineering Test Plan testing and field repair installation. Specifically, in the execution of the Engineering Test Plan, the Grout Field and Compression Record specified a required 28-day compressive strength of 6,000 psi, not the required 8,000 psi as stated in the Engineering Test Plan. The actual 28-day compressive strength of the grout achieved the 8,000 psi required by the Engineering Test Plan. Based on these test results, N&D VS2-CR01-GNR-000062 was dispositioned to use the post-installed rebar repair with the justification based on the 8,000 psi compressive strength.

For the actual repair work for N&D VS2-CR01-GNR-000062, a 28-day compressive strength of 6,000 psi was specified on the Grout Field and Compression Record. Subsequent to this repair, three more N&Ds were dispositioned to use post installed rebar for repairs at various locations inside the containment vessel bottom head. These N&D dispositions were justified using the approved Engineering Test Plan and Five Star Fluid 100 grout with a compressive strength of 8,000 psi. Again, a 28-day compressive strength of 6,000 psi was specified on the Grout Field and Compression Record for each repair.

The 28-day compressive strengths for the grout used in the repairs achieved the 6,000 psi stated on Grout Field and Compression Records for all tests except for one grout average compression strength. However, only one grout average compressive strength achieved the required 8,000 psi, as stated in the Engineering Test Plan, Manufacturer's Instructions, and dispositioned in the N&Ds. As a result, a material nonconformance was not recognized for the test results between 6,000 psi and 8,000 psi, because the incorrect compressive strength was achieved as incorrectly specified on the Grout Field and Compression Record. Therefore, the grouted dowels in the field contained unanalyzed structural deviations from the original design and deviated from ACI-349-01 requirements for investigation of low-strength test results.

Analysis

The inspectors determined that the performance deficiency was the failure to incorporate the requirements and acceptance limits contained in applicable engineering documents to the test results of grout strength used to post-install safety-related rebar in the nuclear island as required by 10 CFR Part 50, Appendix B, Criterion XI. The performance deficiency was more than minor following the guidance in IMC 0613, "Power Reactor Construction Inspection Reports," Appendix E, Example 11. Specifically, CB&I failed to incorporate the appropriate acceptance limit for the grout compressive strength specified in the Engineering Test Plan during field repair installation, thereby rendering the

structures, where the post-installed rebar was installed, potentially unacceptable or indeterminate. The finding was determined to be an ITAAC finding because it was material to the acceptance criteria of Unit 2 ITAACs 760 (3.3.00.02a.i.a) and 763 (3.3.00.02a.i.d). The acceptance criteria of these ITAAC requires that a reconciliation report, concluding the “as-built” construction conforms to the approved design, be completed for the areas associated with the ITAAC. The grouted dowels impacted by this deficiency are included within the scope of ITAAC 760 and 763, and the low grout compressive strengths would not have been reconciled by the licensee as required by the ITAAC.

The inspectors concluded this finding was associated with the Construction/Installation Cornerstone. The inspectors evaluated the finding using the construction SDP in accordance with IMC 2519, "Construction Significance Determination Process," Appendix A, "AP 1000 Construction Significance Determination Process." They determined that the finding was of very low safety significance (Green) because it was associated with a portion of a structure assigned to the intermediate risk importance column (containment and auxiliary building) and Row 2 of the construction significance determination matrix because the finding was associated with a portion of the structure such that reasonable assurance had not yet been provided that shows the portion of the structure can meet its design function.

The inspectors screened the finding for a possible construction cross-cutting aspect in accordance with Appendix F, “Construction Cross-Cutting Components and Aspects” of IMC 0613. This finding has a cross-cutting aspect in the area of Human Performance, Procedure Adherence Aspect, because the licensee failed to follow the processes, procedures, and work instructions contained in the applicable engineering documents. [H.8].

Enforcement

10 CFR Part 50, Appendix B, Criterion XI “Test Control”, requires, in part, that a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components (SSCs) will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.

Contrary to the above, the licensee, through their contractor CB&I, failed to assure that grout compressive strength records for post-installed rebar incorporated the acceptance limits contained in the Engineering Test Plan and subsequent engineering documents. Specifically, during field repair dowel installation, a lower grout compressive strength was designated than was originally specified for acceptance testing. Grout compressive strengths of the field repairs met the lower designated strength but failed to meet the required grout compressive strength stated in the engineering documents. Because the grout met the designated strength no N&D was initiated to evaluate the grout compressive strengths. As a result, the dowels were potentially installed with an unapproved, unanalyzed, and unreconciled structural non-conformance. If left uncorrected, these unanalyzed and unreconciled defects had the potential safety consequence of preventing the Nuclear Island structures from meeting their intended design function per the UFSAR, Tier 1, Section 3.3.2.a. Corrective actions taken by the licensee, to date of this report, include opening N&D VSG-CR01-GNR-000007 to disposition the lower strength grout.

This violation was entered into the corrective action program as SCE&G Condition Report CR-NND- 2015-00763, WEC CAPL DI 100179204, and CB&I CARs 2015-1412, and 2015-1265. Because this violation was of very low safety significance (Green) and it was entered into the corrective action program, this violation is being treated as a non-cited violation (NCV 05200027/2015002-01), Failure to Incorporate Grout Strength Acceptance Limits from Engineering Documents, consistent with Section 2.3.2 of the NRC Enforcement Policy and EGM 11-006.

Since the corrective actions have not been fully implemented, this NCV will remain open until the NRC can review the corrective actions to verify that the issue would no longer impact the acceptance criteria of Unit 2 ITAACs 760, and 763.

1A04 (Unit 2) ITAAC Number 3.3.00.02a.i.a (760) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.a (760) using the following NRC inspection procedures/sections:

- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.F-02.02 - Fabrication Records Review
- 65001.F-02.03 - Observation of Fabrication Activities
- 65001.A.02.01 - Observation of in-Process Installation Activities
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.F-02.01 - Design Document Review

The inspectors performed a field inspection of containment internal reinforcing steel of the shield wall between the reactor vessel cavity and the reactor coolant drain tank (RCDT) room E-W wall parallel with column line 7 from elevation 80'-6" to 83'-0". The inspectors reviewed applicable design drawings, design specifications, and interviewed licensee personnel to determine whether structural concrete work and related licensee quality control activities were being performed in accordance with design specifications and approved procedures. Specifically, the inspectors verified:

- structural concrete design and construction was accomplished under controlled conditions and in accordance with applicable procedures, specifications, drawings, and approved procedures using qualified personnel;
- key building critical dimensions and materials satisfied design specifications, requirements, and relevant ITAAC;
- deviations from the design due to as-built conditions were identified and documented appropriately;
- records reflected that completed work met design specifications and acceptance criteria;
- reinforcing steel installation was controlled and performed in accordance with the applicable specifications, codes, drawings, and procedures; and
- reinforcing steel was located properly in the structures, secured, free of excess rust, and had proper clearances.

In addition, inspectors reviewed applicable Engineering and Design Coordination Reports (E&DCRs) and non-conformance reports associated with the rebar installation to determine whether:

- the licensee was identifying problems at an appropriate threshold and entering them into the corrective action program;
- nonconforming material was adequately identified and segregated; and
- deviations from requirements were effectively resolved.

b. Findings

No findings were identified.

1A05 (Unit 2) ITAAC Number 3.3.00.02a.i.a (760) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.a (760) using the following NRC inspection procedures/sections:

- 65001.01 - Inspection of ITAAC-Related Foundations & Buildings
- 65001.01 -02.05 - Steel Structures
- 65001.F - Inspection of the ITAAC-Related Design and Fabrication Requirements
- 65001.F-02.03 - Observation of Fabrication Activities
- 65001.B-02.01 - Program and Procedures Review
- 65001.B-02.02 - Welding Procedure Qualification
- 65001.B-02.03 - Welder Qualification
- 65001.B-02.04 - Production Controls
- 65001.B-02.05 - Inspection
- 65001.B-02.06 - Records
- 65001.A - As-Built Attributes for SSCs associated with ITAAC
- 65001.A.02.01 - Observation of in-Process Installation Activities
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.A.02.04 - Review As-built Deviations/Nonconformance

The inspectors reviewed weld data records associated with assembly of the Unit 2 containment internal structures (CIS) CA01 module to determine whether activities were conducted in accordance with approved procedures and specifications and met the requirements of the Updated Final Safety Analysis Report; 10 CFR Part 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants;" ANSI/AISC N690-94, "American National Standard Specification for the Design Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities;" and, as applicable, American Welding Society (AWS) D1.1-2000 "Structural Welding Code – Steel" or AWS D1.6-1999 "Structural Welding Code – Stainless Steel." Specifically, weld data records for the following welds were reviewed:

- vertical seam weld joining CA01-34 to CA01-46 (FW-4634-03) which form part of the north wall of the west steam generator compartment;
- vertical seam weld joining CA01-16 to CA01-34 (FW-1634-03 and FW-1634-05) which form part of the north wall of the west steam generator compartment;
- vertical seam weld joining CA01-04 to CA01-05 (FW-0504-03 and weld repair FW-0504-RW01) which form part of the south wall of the east steam generator compartment;
- vertical seam weld joining CA01-20 to CA01-21 (FW-2021-06) which form part of the west refueling cavity wall; and
- miscellaneous fillet weld lap joints (FW-SP-A1-002 and FW-SP-A1-014) on CA01-01 sub-module which forms part of the south and west refueling cavity walls.

The inspectors reviewed weld data records associated with installation and, as applicable, removal of temporary and permanent attachments to the Unit 2 CIS CA01 module to determine whether activities were conducted in accordance with the aforementioned requirements. Specifically, the following weld data records were reviewed:

- VS2-CA01-S4W-03001-01 and VS2-CA01-S4W-04001-01 addressing welding and removal of thirty-eight temporary carbon steel fit-up tools adjacent to carbon steel butt joint seam welds of the CA01 module and
- VS2-CA01-S4W-04001 addressing welding of sixty-six minor permanent stainless steel nuts used as fit-up aids on three leak chases #3, #5, and #6 for subassembly 4 of the CA01 module.

The inspectors reviewed four Lincoln Electric weld filler metal CMTR for electrode classifications E7018 (lot-no. 1164R), E8018-C1 (lot-no. 1182N), ER2209 (DSS heat-no. 1063T), and ER80S-Ni1 (heat-no. 1063N) to verify traceability of weld filler metals to each field weld. Additionally, the inspectors verified that the chemical analysis and mechanical/impact testing results were in accordance with the requirements of CB&I FMC-1 "Filler Metal Control" and the following AWS specifications:

- AWS A5.1, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding (SMAW);
- AWS A5.5, Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding;
- AWS A5.9, Specification for Bare Stainless Steel Welding Electrodes and Rods; and
- AWS A5.28, Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding, respectively.

The inspectors reviewed various welder performance qualification records (WPQRs) to verify traceability of welders to each field weld, and to determine whether the limitations of essential variables and results of testing were in accordance with the requirements of the applicable AWS D1.1-2000 or D1.6-1999 codes, and CB&I procedure QS 09.31 "Welder/Welding Operator Qualifications".

The inspectors reviewed NDE reports for magnetic particle testing (MT) and ultrasonic testing (UT) of welds and weld repairs, and the Mistras 100-UT-310 procedure to

determine whether inspection methods, techniques, and results for no relevant indications were performed in accordance with the requirements of AISC N690-1994 and AWS D1.1-2000 for statically loaded structures. Specifically, the inspectors reviewed NDE-UT reports for straight and angle beam scanning of full-penetration butt welds to determine whether calibration, frequency, transducer size, wedge angle, sensitivity, for 10% examination of butt welds and a secondary 10% sample for a weld repair were performed in accordance with the requirements of AISC N690-1994 paragraphs Q1.26.2.1 and Q1.26.2.3, respectively, and AWS D1.1:2000 code requirements.

Additionally, the inspectors reviewed a sample of design output documents and E&DCRs associated with structural modules to verify that AISC N690-94, AWS D1.1-2000, AWS D1.6-1999, and UFSAR welding requirements were being adequately implemented. The inspectors also reviewed a sample of N&D reports associated with structural modules to verify that nonconforming conditions were being appropriately identified, evaluated, and dispositioned according to approved procedures and processes meeting the requirements of 10 CFR 50, Appendix B.

b. Findings

No findings were identified.

1A06 (Unit 2) ITAAC Number 3.3.00.02a.i.b (761) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.b (761):

2.a) The nuclear island structures, including the critical sections listed in Table 3.3-7, are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions.	i) An inspection of the nuclear island structures will be performed. Deviations from the design due to as-built conditions will be analyzed for the design basis loads.	i.b) A report exists which reconciles deviations during construction and concludes that the as-built shield building structures, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.
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The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.01 - Inspection of ITAAC-Related Foundations & Buildings
- 65001.01 - 02.05 - Steel Structures
- 65001.01-02.06 - Records
- 65001.01-02.07 - Identification and Resolution of Problem

- 65001.F - Inspection of the ITAAC-Related Design and Fabrication Requirements
- 65001.F-02.02 - Fabrication Records Review
- 65001.A - As-Built Attributes for SSCs associated with ITAAC
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.A.02.04 - Review As-built Deviations/Nonconformance

The inspectors performed a field inspection of construction activities associated with the Unit 2 shield building. The inspectors conducted field measurements, reviewed documents, and interviewed licensee personnel to assess the implementation of the portion of the quality assurance (QA) program specific to structural module design and fabrication activities. The inspectors reviewed various documents, such as design drawings, E&DCRs, N&D reports, specifications and receipt inspection documents, to verify:

- design and fabrication of structural modules was completed in accordance with applicable specifications, drawings, and approved procedures;
- key building critical dimensions, materials, and separation satisfied design specifications, requirements, and relevant ITAAC;
- the licensee confirmed that components inspected conformed to design drawings and that deviations were being addressed in accordance with procedure requirements;
- nonconforming conditions identified by the licensee were being appropriately resolved; and
- if the as-built configuration was in accordance with the final design of the facility and met the associated ITAAC.

The inspectors performed independent measurements on the following samples of steel concrete composite structural sub-modules for the Unit 2 shield building:

- vertical reinforced concrete (RC) to steel concrete composite (SC) connection panel 01H which is located approximately at azimuth 182 degrees along the interface with the reinforced concrete shield building wall between elevations 103'-4" and 125'-3";
- vertical RC/SC connection panel 01Q which is located approximately at azimuth 342 degrees along the interface with the reinforced concrete shield building wall between elevations 106'-6" and 117'-4 $\frac{1}{2}$ "; and
- steel concrete composite panels 09J and 09L which are located in the northwest quadrant of the cylindrical shield building wall between elevation 169'-6" and 179'-6".

Specifically, the inspectors measured the following sub-module components: headed stud spacing and dimensions; module plate thickness; gusset plate dimensions and locations; and tie-bar spacing and dimensions. The inspectors also observed reinforcing steel placement, general module assembly, and welds.

The inspectors reviewed various documents, such as sub-module design drawings and specifications, to verify:

- the shape, size, dimensions, type, and grade of material conformed to the approved specifications and design drawings;
- design documents associated with ITAAC adequately defined the design and arrangement of the sub-module fabrication;
- applicable construction specifications, installation specifications, shop and field drawings, and construction procedures correctly identified and documented sub-modules for review and approval by responsible engineering personnel;
- fit-up tolerances for length, depth, and straightness of structural members were as specified; and
- critical attributes of as-built SSC conform to the design.

b. Findings

No findings were identified.

1A07 (Unit 2) ITAAC Number 3.3.00.02a.i.b (761) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.b (761) using the following NRC inspection procedures/sections:

- 65001.01 - Inspection of ITAAC-Related Foundations & Buildings
- 65001.01-02.05 - Steel Structures
- 65001.F-02.02 - Fabrication Records Review
- 65001.B-02.01 - Program and Procedures Review
- 65001.B-02.02 - Welding Procedure Qualification
- 65001.B-02.03 - Welder Qualification
- 65001.B-02.04 - Production Controls
- 65001.B-02.05 - Inspection
- 65001.B-02.06 - Records

The inspectors reviewed weld data records associated with pre-assembly of the Unit 2 shield building steel concrete composite (SC) cylindrical wall panels to determine whether activities were conducted in accordance with approved procedures and specifications and met the requirements of the Updated Final Safety Analysis Report; 10 CFR Part 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants;" ANSI/AISC N690-94, "American National Standard Specification for the Design Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities;" and, as applicable, AWS D1.1-2000 "Structural Welding Code – Steel". Specifically, weld data records for the following welds were reviewed:

- exterior vertical seam welds joining SC panels 02H and 02J (FW-JH-001) which are located in the northwest quadrant of the shield building between elevations 103'-6" and 113'-6" and
- interior vertical seam welds joining SC panels 02H and 02J (FW-HJ-001) which are located in the northwest quadrant of the shield building between elevations 103'-6" and 113'-6".

The inspectors reviewed a Lincoln Electric certified mill test report CMTR for E71T-1M flux-cored wire lot number 1240M to verify traceability of weld filler metals to each weld. Additionally, the inspectors verified that the chemical analysis and mechanical/impact testing properties were in accordance with the requirements of AWS A5.20, Specification for Carbon Steel Electrodes for Flux Cored Arc Welding (FCAW).

The inspectors reviewed various WPQRs to verify traceability of welders to each field weld, and to determine whether the limitations of essential variables and results of testing were in accordance with the requirements of AWS D1.1-2000 and CB&I procedure QS 09.31 "Welder/Welding Operator Qualifications".

Additionally, the inspectors reviewed a sample of N&D reports associated with the SC panels to verify that nonconforming conditions were being appropriately identified, evaluated, and dispositioned according to approved procedures and processes meeting the requirements of 10 CFR 50, Appendix B.

b. Findings

No findings were identified.

1A08 (Unit 2) ITAAC Number 3.3.00.02a.i.c (762) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.c (762):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
2.a) The nuclear island structures, including the critical sections listed in Table 3.3-7, are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions.	i) An inspection of the nuclear island structures will be performed. Deviations from the design due to as-built conditions will be analyzed for the design basis loads.	i.c) A report exists which reconciles deviations during construction and concludes that the as-built structures in the non-radiologically controlled area of the auxiliary building, including the critical sections, conform to the approved design and will withstand the design basis loads specified in the Design Description without loss of structural integrity or the safety-related functions.

The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.01-02.06 - Records
- 65001.F-02.02 - Fabrication Records Review

- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.06 - Record Review
- 65001.02-02.07 - Problem Identification and Resolution

The inspectors observed and reviewed the installation of reinforcing steel from elevation 82'-6" to 100'-0" for Wall J in the Unit 2 non-radiological controlled area of the auxiliary building. The inspectors observed reinforcing steel placement and reviewed applicable design drawings and specifications to determine whether structural concrete work were being performed in accordance with design specifications and approved procedures. Specifically, the inspectors verified:

- structural concrete design and construction was accomplished under controlled conditions and in accordance with applicable procedures, specifications, drawings, and approved procedures using qualified personnel;
- key building critical dimensions and materials satisfied design specifications, requirements, and relevant ITAAC;
- deviations from the design due to as-built conditions were identified and documented appropriately;
- records reflected that completed work met design specifications and acceptance criteria;
- reinforcing steel installation was controlled and performed in accordance with the applicable specifications, codes, drawings, and procedures;
- reinforcing steel was located properly in the structures, secured, free of excess rust, and had proper clearances;
- the licensee was identifying problems at an appropriate threshold and entering them into the corrective action program; and
- deviations from requirements were effectively resolved.

b. Findings

No findings were identified.

1A09 (Unit 2) ITAAC Number 3.3.00.02a.i.d (763) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.d (763).

The inspectors used the following NRC inspection procedure/section to perform this inspection:

- 65001.B-02.03 - Welder Qualification

The inspectors reviewed weld data records associated with installation and, as applicable, removal of temporary and permanent attachments to the CA20 module located in the radiologically controlled area of the Unit 2 auxiliary building to determine whether activities were conducted in accordance with approved procedures and specifications and met the requirements of the Updated Final Safety Analysis Report; 10 CFR Part 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel

Reprocessing Plants;" ANSI/AISC N690-94, "American National Standard Specification for the Design Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities;" and as applicable AWS D1.1-2000 "Structural Welding Code – Steel" or AWS D1.6-1999 "Structural Welding Code – Stainless Steel." Specifically, the inspectors reviewed weld data records VS2-CA20-S4W-03210-011, VS2-CA20-S4W-03210-013, and VS2-CA20-S4W-03210-034 associated with the attachment and removal of twenty temporary stainless steel fit-up tools adjacent to stainless steel seam welds of the CA20 module.

Additionally, the inspectors reviewed a sample of nonconformance and disposition reports (N&Ds) associated with the CA20 module to verify that nonconforming conditions were being appropriately identified, evaluated, and dispositioned according to approved procedures and processes meeting the requirements of 10 CFR 50, Appendix B.

b. Findings

No findings were identified.

1A10 (Unit 2) ITAAC Number 3.3.00.02a.ii.a (764) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.ii.a (764):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
2.a) The nuclear island structures, including the critical sections listed in Table 3.3-7, are seismic Category I and are designed and constructed to withstand design basis loads as specified in the Design Description, without loss of structural integrity and the safety-related functions.	ii) An inspection of the as-built concrete thickness will be performed.	ii.a) A report exists that concludes that the containment internal structures as-built concrete thicknesses conform to the building sections defined in Table 3.3-1.

The inspectors used the following NRC inspection procedure/section to perform this inspection:

- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors independently measured the thickness of three walls associated with a structural module that was in the process of being assembled on-site in order to verify whether the walls met the acceptance criteria described in Tier 1, Table 3.3-1 of the FSAR. Specifically, the inspectors verified the thickness of the following submodules:

- CA01-21, part of the west refueling cavity wall N-S wall parallel with column line N from elevation 98'-0" to 135'-3";
- CA01-27, part of the south wall of west steam generator compartment from elevation 103'-0" to 153'-0"; and
- CA01-32, part of the north wall of pressurizer compartment from elevation 107'-2" to 160'-0".

b. Findings

No findings were identified.

1A11 (Unit 2) ITAAC Number 3.3.00.02a.ii.a (764) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.ii.a (764) using the following NRC inspection procedures/sections to perform this inspection:

- 65001.01-02.04 - Key Dimensions and Volumes
- 65001.01-02.06 - Records
- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors reviewed receipt inspection reports and independently measured the thickness of two submodules associated with structural module CA02, the north-east wall of the in-containment refueling water storage tank. Specifically, the inspectors sampled CA02-01 and CA02-02 to verify the concrete thickness met the acceptance criteria listed in Table 3.3-1, "Definition of Wall Thicknesses for Nuclear Island Buildings, Turbine Building, and Annex Building," of the V.C. Summer Unit 2 UFSAR.

b. Findings

No findings were identified.

1A12 (Unit 2) ITAAC Number 3.3.00.03c (779) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.03c (779):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
3. Walls and floors of the nuclear island structures as defined on Table 3.3-1 except for designed openings or penetrations provide shielding during normal operations.	Inspection of the as-built nuclear island structures wall and floor thicknesses will be performed.	c) A report exists and concludes that the shield walls and floors of the non-radiologically controlled area of the auxiliary building as defined in Table 3.3-1 except for designed openings or penetrations are consistent with the concrete wall thicknesses provided in Table 3.3-1.

The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.A.02.02 - Installation Records Review

The inspectors reviewed records associated with the placement and thickness of concrete walls from the non-radiation area of the auxiliary building. Specifically, the inspectors reviewed concrete density records, survey reports, and concrete testing reports for column line 7.3 wall from column line I to the shield building from elevation 66'-6" to 82'-6", column line K wall from column line 7.3 to 11 from elevation 66'-6" to 82'-6", and column line L wall from the shield building wall to 11 from elevation 66'-6" to 82'-6" to verify that:

- the wall thicknesses were within the allowable tolerances listed on Tier 1, Table 3.3-1 of the VC Summer Unit 2 UFSAR;
- field data was properly translated into permanent records;
- the concrete density was greater than that required in the design specification documents; and
- the walls met the radiation shielding requirements.

b. Findings

No findings were identified.

1A13 (Unit 2) ITAAC Number 3.3.00.03d (780) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.03d (780):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
3. Walls and floors of the nuclear island structures as defined on Table 3.3-1 except for designed openings or penetrations provide shielding during normal operations.	Inspection of the as-built nuclear island structures wall and floor thicknesses will be performed.	d) A report exists and concludes that the shield walls and floors of the radiologically controlled area of the auxiliary building as defined in Table 3.3-1 except for designed openings or penetrations are consistent with the concrete wall thicknesses provided in Table 3.3-1.

The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.A.02.02 - Installation Records Review

The inspectors reviewed records associated with the placement and thickness of concrete walls from the radiation area of the auxiliary building. Specifically, the inspectors reviewed concrete density records, survey reports, and concrete testing reports for column line 2 wall from column line I to K-2 from elevation 66'-6" to 82'-6" and column line 4 wall from column line I to J-1 from elevation 66'-6" to 82'-6" to verify that:

- the wall thicknesses were within the allowable tolerances listed on Tier 1, Table 3.3-1 of the VC Summer Unit 2 UFSAR;
- field data was properly translated into permanent records;
- the concrete density was greater than that required in the design specification documents; and
- the walls met the radiation shielding requirements.

b. Findings

No findings were identified.

1A14 (Unit 3) ITAAC Number 2.2.03.08c.vi.02 (190) / Family 06A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 2.2.03.08c.vi.02 (190):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
8.c) The PXS provides RCS makeup, boration, and safety injection during design basis events.	vi) Inspections of each of the following tanks will be conducted: 2. Accumulators	vi) The calculated volume of each of the following tanks is as follows: 2. Accumulators ≥ 2000 ft ³

The inspectors used the following NRC inspection procedures/sections to perform this inspection:

- 65001.06 - Inspection of ITAAC-Related Installation of Mechanical Components
- 65001.06-02.04 - Testing and Verification

The inspectors performed a review of the volumetric measurements performed on the Unit 3 accumulator tanks 1 and 2 to verify that the tank volumes were in accordance with the associated Inspections, Tests, Analyses, and Acceptance Criteria. The inspectors reviewed the scanning methodology, the data analysis methodology, and the calculated volumes of the Unit 2 accumulator tanks as provided in VS3-MT02-VDR-001, Rev. 1 "AP1000 V.C. Summer Unit 3 Accumulator Tanks Volumetric Scanning Report". Specifically, the inspectors verified that the measured volume of each of the Unit 3 accumulator tanks, assuming maximum instrument uncertainty, was greater than 2000 cubic feet.

b. Findings

No findings were identified.

1A15 (Unit 3) ITAAC Number 2.2.03.08c.xi (196) / Family 06A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 2.2.03.08c.xi (196):

Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
8.c) The PXS provides RCS makeup, boration, and safety injection during design basis events.	xi) Inspection of the as-built CMT inlet diffuser will be conducted.	xi) The CMT inlet diffuser has a flow area ≥ 165 in ² .

The inspectors used the following NRC inspection procedure/section to perform this inspection:

- 65001.A - As-Built Attributes for SSCs associated with ITAAC

The inspectors reviewed as-built drawings of Unit 3 Core Makeup Tanks (CMTs) 1 and 2 to verify the flow area of the inlet diffusers met the requirements of the V.C. Summer Unit 3 FSAR. Specifically, the inspectors performed independent calculations to determine whether the total inlet diffuser flow area for each CMT was greater than 165

square inches as required by the ITAAC acceptance criteria. The inspectors also reviewed the licensee's analysis to verify the calculations were complete and adequate.

b. Findings

No findings were identified.

1A16 (Unit 3) ITAAC Number 3.3.00.02a.i.a (760) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.a (760) using the following NRC inspection procedures/sections:

- 65001.01-02.05 - Steel Structures
- 65001.F-02.02 - Fabrication Records Review
- 65001.F-02.03 - Observation of Fabrication Activities
- 65001.B-02.04 - Production Controls

The inspectors directly inspected two submodules associated with the reactor vessel cavity, CA04-04 and CA04-01, to verify whether the shape, size, dimensions, conformed to approved specifications and design drawings. The inspectors verified that there was adequate marking on the submodules to maintain the identity of the material from storage to installation. The inspector reviewed the receipt packages for CA04-04 and CA04-01, including weld travelers, and associated CMTR package to verify:

- whether the type and grade of material conformed to the UFSAR and drawings;
- that appropriate CMTRs were available; and
- that the CMTRs verified that materials meet the appropriate ASTM mechanical testing and composition requirements.

The inspectors reviewed E&DCRs and NCRs associated with the reactor vessel cavity to verify that the conditions were adequately evaluated by the responsible design organizations. The inspectors observed the quality control (QC) receipt inspection of CA04-04, which included observations of QC hold tags being appropriately hung. Additionally, the inspectors reviewed the records of the QC enhanced stud inspections for submodules CA04-01 through CA04-04 and receipt inspections for submodules CA04-03 through CA04-05.

The inspectors reviewed the status of various documents contained in work package VS3-CA04-S4W-00001 and the partially completed weld data record for field weld VS3-CA04-VWK-004-FW-0203-001. At the time of the inspection, one material ID hold point was signed-off for a single-V groove vertical seam weld (using backing bars) and several stiffener plates with fillet welds for the Unit 3 CA04 (reactor cavity) module. The inspectors verified that in-process modular assembly documentation was in accordance with the requirements of CB&I CSI 2-19 "Work Package Planning, Development, Approval, and Closure". Specifically, the inspectors observed various stages of in-process fit-up and tacking activities to determine whether welding shielding gases and tolerances of root opening, bevel angles, and alignment of faying surfaces were in

accordance with the requirements of AISC N690-1994, AWS D1.1-2000, and CB&I GWS-2 "AWS D1.1 – Structural Steel General Welding Specification". The inspectors also interviewed a welder and foreman to determine whether craft personnel understanding of the tolerances of weld joint geometry and welding parameters were consistent with the requirements of welding procedures.

Additionally, the inspectors observed a Mistras Level II QC Inspector [JCI (9255)] performing a final in-process magnetic particle inspection on a vertical seam butt weld, and reviewed the individual's certification summary (including annual visual acuity and color contrast verification) to determine whether inspection techniques and qualifications were in accordance with the requirements of the applicable approved procedures.

The inspectors reviewed weld records to verify that the identification of welds and welders were maintained for each weld. The inspectors reviewed weld procedures and welder qualifications to verify that they were qualified in accordance with AWS D.1.1 and qualifying procedures. The inspectors observed in process welding for two seam welds between submodules of CA04. The field welds were reviewed to verify:

- welding material and processes were adequately controlled;
- work was conducted in accordance with the weld record and traceable as such;
- surfaces to be welded were smooth, uniform, and free from significant surface discontinuities;
- weld joint geometries were as specified;
- shielding gas flowed per WPS;
- WPS instructions for preheat and interpass temperatures were followed;
- rods used in compliance with WPS, code section;
- inspections observed included completed weld inspections contained appropriate inspection hold points;
- NDE testing methods and acceptance criteria were qualified and approved; and
- the acceptability of the weld (accepted, rejected, or repaired) were documented in written reports, as applicable.

The inspectors observed portions of the magnetic particle testing (MT), a NDE method, for one of the welds to verify that the methods and acceptance criteria were as specified. The inspectors reviewed the MT and UT NDE records for both seam welds. The inspectors observed QC inspection of the welds in order to verify that hold points were adequately being followed. The inspectors reviewed a nonconformance associated with CA04 to verify that the repair was in accordance with AWS D1.1-200 and AISC N690-94.

b. Findings

No findings were identified.

1A17 (Unit 3) ITAAC Number 3.3.00.02a.i.b (761) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.b (761) using the following NRC inspection procedures/sections:

- 65001.01 - Inspection of ITAAC-Related Foundations & Buildings
- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.F - Inspection of the ITAAC-Related Design and Fabrication Requirements
- 65001.F-02.02 - Fabrication Records Review
- 65001.F-02.04 - General QA Review
- 65001.02-02.06 - Record Review
- 65001.02-02.07 - Problem Identification and Resolution
- 65001.B-02.01 - Program and Procedures Review
- 65001.A - As-Built Attributes for SSCs associated with ITAAC
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.04 - Review As-built Deviations/Nonconformance
- 65001.F-02.01 - Design Document Review

The inspectors performed a field inspection of construction activities associated with construction of the Unit 3 shield building. The inspectors conducted inspections of the concrete reinforcing steel installation and reviewed documents and applicable design drawings and specifications.

The inspectors performed independent measurements and observations of horizontal and vertical reinforcement; wall dowels; and locations, type and size of a sample of embedment plates in the east exterior cylindrical wall of the shield building between elevation 66'-6" and approximately 78'-6". Specifically, the inspectors observed reinforcing steel placement, and various documents within the work packages and design control documents associated with reinforcing steel placement, to verify:

- reinforcing steel spacing, splices, and development lengths were in accordance with the applicable specifications, codes, drawings, and procedures; and
- reinforcing steel was located properly in the structure, secured, free of concrete or excessive rust, and had proper clearances.

b. Findings

No findings were identified.

1A18 (Unit 3) ITAAC Number 3.3.00.02a.i.b (761) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.b (761) using the following NRC inspection procedures/sections:

- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.F-02.03 - Observation of Fabrication Activities
- 65001.02-02.01 - Inspection of Concrete Placement

The inspectors observed the placement of self-consolidating concrete within the shield building area under the containment vessel bottom head from elevation 66'-6" to 72'-6". Specifically, the inspectors performed observations of activities in the field to determine if:

- fabrication and procurement specifications were consistent with the design commitments and requirements documented in the Design Control Document for AP 1000 and engineering specifications;
- materials, components and other equipment received by the fabricator met design procurement specifications;
- accepted procedures and specifications were followed throughout the concrete placement;
- the equipment used was suitable and sized for the work;
- placement drop distances did not exceed specification requirements and did not result in segregation;
- the licensee had adequate foreign material exclusion controls; and
- the required monitoring during placement was performed by the licensee.

The inspectors also observed concrete testing to determine whether if it was completed in accordance with specification VS2-CC01-Z0-026, Rev. 6 and specification VS2-CC01-Z0-027, Rev. 4. Specifically, inspectors observed the following parameters for the sampled batch identified as batch ticket No.40504 for:

- verification of appropriate mix design, transport time, and placement location and
- any amount of water was added at the truck delivery point.

The inspectors also observed in-process concrete testing activities to determine whether:

- concrete temperature, slump, air content, and unit weight were determined at the proper locations and frequency as required by procedures, specifications, and ASTM standards;
- sample collection and testing techniques conformed to the procedures, specifications, and ASTM standards; and
- concrete strength test sample cylinders were made at the required locations and frequency.

b. Findings

No findings were identified.

1A19 (Unit 3) ITAAC Number 3.3.00.02a.i.c (762) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.c (762) using the following NRC inspection procedures/sections:

- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records

- 65001.F-02.01 - Design Document Review
- 65001.F-02.04 - General QA Review
- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.02 - Laboratory Testing
- 65001.02-02.06 - Record Review
- 65001.A.02.01 - Observation of in-Process Installation Activities
- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors observed concrete pre-placement activities for walls 7.3 from column line I to the shield building, J from column line 11 to the shield building, and K from column line 11 to the shield building from elevation 66'-6" to 82'-6" to determine whether pre-placement planning and training had been completed, and the pre-placement inspection was performed by QC before concrete was placed. Prior to concrete placement the inspectors inspected the form work and reinforcement placement for secureness, dimensional verification, and cleanliness. The inspectors observed concrete placement activities to determine whether:

- accepted procedures and specifications were followed throughout the concrete placement;
- the equipment used was suitable and sized for the work;
- each batch ticket was reviewed for verification of proper mix, transport time, placement location, and amount of temper water being added at the truck at delivery point;
- mixing time and rotations were adequate, including after any additions were made;
- placement drop distances did not exceed specification requirements and did not result in segregation;
- vibrators were handled and operated to ensure adequate consolidation and avoid voiding or honeycombing, including vertical operation and penetration through the new concrete into the previously placed layer;
- concrete was placed in lifts in accordance with the concrete placement plan;
- inspection during placement was performed as required; and
- records were produced, reviewed, and indicate mix, location, time placed, water additions, temperature of the concrete mix, and ambient conditions.

During the concrete placement, the inspectors observed in-process concrete testing to determine whether:

- concrete temperature, slump, air content, and unit weight were being determined at the proper location and frequency as required by procedures, specifications, and ASTM standards;
- sample collection and testing techniques conformed to the procedures, specifications, and ASTM standards;
- concrete strength test sample cylinders were made at the required location and frequency and were cured in accordance with specified requirements; and
- personnel performing sampling and testing were trained and knowledgeable.

b. Findings

No findings were identified.

1A20 (Unit 3) ITAAC Number 3.3.00.02a.i.c (762) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.c (762) using the following NRC inspection procedures/sections:

- 65001.01-02.06 - Records
- 65001.F-02.02 - Fabrication Records Review
- 65001.F-02.03 - Observation of Fabrication Activities
- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.06 - Record Review
- 65001.02-02.07 - Problem Identification and Resolution

The inspectors observed and reviewed the installation of reinforcing steel from elevation 66'-6" to 82'-6" for Walls L and M and 82'-6" to 100'-0" for Wall Q and Wall 11 from column line L to Q in the Unit 3 non-radiological controlled area of the auxiliary building. The inspectors observed reinforcing steel placement and reviewed applicable design drawings and specifications to determine whether structural concrete work was being performed in accordance with design specifications and approved procedures. Specifically, the inspectors verified:

- structural concrete design and construction was accomplished under controlled conditions and in accordance with applicable procedures, specifications, drawings, and approved procedures using qualified personnel;
- key building critical dimensions and materials satisfied design specifications, requirements, and relevant ITAAC;
- deviations from the design due to as-built conditions were identified and documented appropriately;
- records reflected that completed work met design specifications and acceptance criteria;
- reinforcing steel installation was controlled and performed in accordance with the applicable specifications, codes, drawings, and procedures;
- reinforcing steel was located properly in the structures, secured, free of excess rust, and had proper clearances;
- the licensee was identifying problems at an appropriate threshold and entering them into the corrective action program; and
- deviations from requirements were effectively resolved.

b. Findings

No findings were identified.

1A21 (Unit 3) ITAAC Number 3.3.00.02a.i.d (763) / Family 01F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.i.d (763) using the following NRC inspection procedures/sections:

- 65001.01 - Inspection of ITAAC-Related Foundations & Buildings
- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.F-02.01 - Design Document Review
- 65001.F-02.04 - General QA Review
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.04 - Review As-built Deviations/Nonconformance

The inspectors reviewed a sample of records related to Unit 3 Wall 1 from I to N to verify that deviations from requirements and design were effectively resolved. Specifically, the inspectors reviewed a sample of E&DCRs and N&D reports to determine that any changes or deviations from the design are appropriately captured and evaluated within the scope of the license requirements and associated procedures.

b. Findings

No findings were identified.

IMC 2504, Construction Inspection Program – Inspection of Construction and Operational Programs

1P01 Quality Assurance Implementation, Appendix 3, Inspection of Criterion III – Design Control (IP 35007)

a. Inspection Scope

The inspector reviewed Unit 3 Geologic Excavation Mapping Report 2091-PR-04, Rev. 0, for consistency with regulatory requirements and associated Unit 3 Geologic Mapping License Condition 2.D(12)(g). The inspector verified that documented results were in accordance with commitments in Section 2.5 of the combined license application and with guidance in Regulatory Guide 1.208. The full text and all attachments, figures, tables, and plates (large geologic maps) comprising the report were verified, including attributes related to Unit 3 excavation geology, mapping methodology, excavation sequence, records control, and reference project documents. Additionally, the inspector verified results of petrographic studies, and that the plates depicted the Unit 3 power block excavation plan, top of sound rock and final foundation grade level with 2-ft elevation contours, the geologic map of top of sound rock in the nuclear island area, and the geologic map of final foundation grade for the nuclear island excavation, including the west, south, east, and north walls of the nuclear island. The inspector determined

that the licensee had taken all appropriate steps to satisfy requirements stated in License Condition 2.D(12)(g).

b. Findings

No findings were identified.

1P02 Quality Assurance Implementation, Appendix 9, Inspection of Criterion IX – Control of Special Processes (IP 35007)

a. Inspection Scope

The inspectors reviewed a sample of the licensee's implementing documents to verify controls were provided to assure that special processes are conducted by qualified personnel in accordance with applicable codes, standards, specifications, and other special requirements. Specifically, the inspectors reviewed procedures for the qualification of welders and QC welding inspectors to verify they were in conformance with the licensee's Quality Assurance Program Document requirements, UFSAR commitments, and applicable codes and regulations.

The inspectors reviewed the following two implementing documents to verify they provided adequate qualification and re-qualification requirements with respect to education, experience, training, and performance qualification tests:

- QAD 02.15, "Qualification and Certification of Inspection and Test Personnel," Rev. 06.01 and
- CWP-1, "Construction Welding Program," Rev. 3.

The inspectors also inspected implementation of the above procedures by reviewing a sample of qualifications and re-qualifications for welders and QC welding inspectors. Specifically, the inspectors reviewed welders' records of welder performance qualification tests, as well as QC welding inspectors' certification of qualification records, periodic performance evaluations, eye test certifications, ANSI Level II/III qualification summaries, inspector training records, and special process examinations for structural weld inspection, pipe welding and brazing, and stud welding, to verify the records met the applicable procedures, codes, and regulations.

b. Findings

No findings were identified.

1P03 Quality Assurance Implementation, Appendix 10, Inspection of Criterion X – Inspection (IP 35007)

a. Inspection Scope

During the NRC's inspection of safety-related welding activities associated with the V.C. Summer Unit 2 CA01 structural module, the inspectors evaluated the contractor's program for the inspection of activities affecting quality. Specifically, the inspectors reviewed the CB&I QC inspection plan number F-S561-007 which covers visual weld inspections of AWS D1.1 welds and F-S561-008 which covers visual weld inspections of

AWS D1.6 welds to determine whether they established appropriate guidance for the QC inspection of structural modules to assure quality. The inspectors reviewed these procedures to verify that appropriate in-process, routine inspections and hold point inspections were prescribed. Regarding routine, in-process QC inspections of welding activities, the inspectors verified that inspection plans F-S561-007 and F-S561-008 established adequate guidance to ensure that the requirements of Section 6.5.4 of AWS D1.1:2000 and Section 6.5.3 of AWS D1.6-1999 were satisfied. The inspectors reviewed several inspection reports detailing the results of routine inspections performed to support a Quality Control Surveillance Report of welding activities.

b. Findings

Introduction

The inspectors identified a construction finding of very low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to accomplish safety-related, required quality control inspections in accordance with CB&I QC inspection plans F-S561-007, "AWS D1.1 - Visual Weld Inspection - Carbon Steel" and F-S561-008, "AWS D1.6 - Visual Weld Inspection - Stainless Steel" and procedure QS 09.02, "Structural Field Welding."

Description

On May 13, 2015, the inspectors identified that CB&I QC has failed to perform routine inspections of in-process welding activities since September 19, 2014, specifically on CA01 module fabrication. Section 6.5.4, "Scope of Examination," of AWS D1.1:2000, "Structural Welding Code - Steel," requires the following: "The inspector shall, at suitable intervals, observe joint preparation, assembly practice, the welding techniques, and performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this Code [AWS D1.1:2000] are met." Section 6.5.3 of AWS D1.6:1999, "Structural Welding Code - Stainless Steel," requires the following: "The inspector shall observe, at suitable intervals, the joint preparation, assembly practice, welding techniques, and performance of each welder and welding operator, to made certain applicable requirements of this code [AWS D1.6:1999] are met."

Item number 13 (attribute code W19) of QC inspection plan F-S561-007 requires the QC inspector to verify the following, as applicable, on a routine basis; pre-heat, voltage, amperage, travel speed, shield gas flow rate, interpass temperature, complete weld pass fusion and tack weld acceptance. Item number 11 (attribute code W19) of QC inspection plan F-S561-008 requires the QC inspector to verify the following, as applicable, on a routine basis; pre-heat, voltage, amperage, travel speed, shielding gas composition and flow rate, position of welding, filler material, interpass temperature, fusion, weave bead width and tack weld acceptance.

Section 6.1.6 of CB&I QS 10.67 states that routine inspections are performed to monitor activities that are not associated with pre-established hold or notification points. Moreover, this procedure states that routine inspections are performed on a periodic basis at frequencies and to a depth commensurate with the specific activity, complexity, attribute and quality performance activity. Section 6.4.2.c of CB&I QS 09.02 states that QC shall perform in-process surveillance inspections of welds.

Through review of available inspection reports and discussions with the CB&I QC manager, the inspectors identified that CB&I had not performed the routine inspections specified above since September of 2014. The inspectors determined that the failure to perform these inspections on a routine basis was contrary to the AWS D1.1:2000 Code, CB&I inspection plan F-S561-007, AWS D1.6:1999 Code, CB&I inspection plan F-S561-008, and CB&I procedure QS 09.02.

Analysis

The inspectors determined that the failure to meet 10 CFR Part 50, Appendix B, Criterion V, represented a performance deficiency. The finding was determined to be more than minor because the issue represented a substantive failure to implement an adequate quality oversight function. Specifically, routine welding inspections were not performed by the licensee's contactor for over seven months during the fabrication of CA01, the steam generator compartment and fuel transfer canal module. The finding was determined to be a construction finding because it was not associated with a specific ITAAC. The inspectors concluded that this finding was associated with the Construction/Installation Cornerstone. The inspectors utilized Appendix A of IMC 2519, "Construction Significance Determination Process," to evaluate the finding. The inspectors determined that the finding was of very low safety significance (Green) because other pre-weld inspections including material identification, fit up, cleanliness, welder qualification, filler material, and proper post-weld non-destructive examinations including visual, magnetic particle and ultrasonic testing were completed that gave reasonable assurance the structure will meet its design function and a use-as-is determination can be made without a detailed analysis. The inspectors screened the finding for a possible construction cross-cutting aspect in accordance with Appendix F, "Construction Cross-Cutting Components and Aspects" of IMC 0613. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Resolution [P.3], because the licensee failed to ensure that effective corrective action was taken on CAR 2014-0025 "Documentation of Fit-Up and In-Process Weld Inspections".

Enforcement

Criterion V, "Instructions, Procedures, and Drawings," of 10 CFR Part 50, Appendix B, requires, in part, that activities affecting quality shall be prescribed by documented procedures and shall be accomplished in accordance with these procedures. Item number 13 of CB&I inspection plan [QC inspection procedure] F-S561-007, "AWS D1.1 - Visual Weld Inspection - Carbon Steel," Rev. 3, and item number 11 of CB&I inspection plan F-S561-008, "AWS D1.6, Visual Weld Inspection - Stainless Steel", require QC inspectors to verify various in-process welding attributes and welder performance. Contrary to the above, from September 19, 2014, to May 13, 2015, the licensee, through its contractor CB&I, failed to accomplish safety-related, routine inspections of in-process, safety-related welding activities associated with structural modules in accordance with the aforementioned inspection plans and procedures.

This violation was entered into the corrective action program as SCE&G Condition Report CR-NND- 2015- 00927. Because this violation was of very low safety significance (Green) and it was entered into the corrective action program, this violation is being treated as a non-cited violation (NCV 05200027/2015002-02), Failure to

Perform Required QC Visual Examinations of In-Process Welding, consistent with Section 2.3.2 of the NRC Enforcement Policy and EGM 11-006.

1P04 Quality Assurance Implementation, Appendix 16, Inspection of Criterion XVI – Corrective Action (IP 35007)

a. Inspection Scope

Daily Corrective Action Program Review

As part of the various inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during inspection activities and plant status reviews to verify they were being entered into the licensee's corrective action program at an appropriate threshold. The inspectors verified that adequate attention was being given to timely corrective actions and any adverse trends were identified and addressed. The inspectors reviewed corrective action program procedures and evaluated implementation of these procedures to determine whether the procedures contained guidance for the following attributes:

- classification, prioritization, and evaluation for reportability (i.e., 10 CFR 50.55(e)) of conditions adverse to quality;
- complete and accurate identification of the problem in a timely manner commensurate with its significance and ease of discovery;
- screening of items entered into the CAP to determine the proper level of evaluation;
- identification and correction of procurement documents errors, deviations from procurement document requirements, defective items, poor workmanship, incorrect vendor instructions, significant recurring deficiencies at both vendor shops and on site, and generic procurement related deficiencies;
- identification and correction of design deficiencies;
- consideration of extent of condition, generic implications, common cause, and previous occurrences;
- classification and prioritization of the resolution of the problem commensurate with its safety significance;
- identification of corrective actions that are appropriately focused to correct the problem;
- identification of root and contributing causes, as well as actions to preclude recurrence for significant conditions adverse to quality;
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue;
- provisions for escalating to higher management those corrective actions that are not adequate or not timely; and
- conditions adverse to quality were trended to proactively identify potential adverse trends and potential common cause problems, and the trending results were reported to management.

Routine Review of Items Entered into the Corrective Action Program

On a routine basis, the inspectors screened a sample of issues entered into the licensee and the engineering and procurement (EPC) consortium's corrective action programs.

The inspectors attended several weekly management review committee meetings at the site and held discussions with licensee and EPC consortium personnel responsible for the screening and correction of the issues to determine if:

- the licensee and the EPC consortium were identifying equipment, human performance, and program issues at an appropriate threshold and were entering the issues into their respective corrective action programs;
- the licensee and the EPC consortium appropriately classified the issues and took appropriate short-term corrective actions;
- conditions adverse to quality were controlled in accordance with each company's quality assurance program; and
- potential adverse trends were appropriately identified and corrected by the licensee or their contractors.

Selected Issues for Follow-Up Inspection

Based on the inspectors' routine screening of corrective action records, the inspectors selected a sample of issues entered in the corrective action programs to determine if the handling of these issues was consistent with the applicable quality assurance program requirements and 10 CFR Part 50, Appendix B. Specifically, the inspectors reviewed the corrective action records listed in the documents reviewed section of this report. The inspectors reviewed these corrective action documents to determine if:

- conditions adverse to quality were promptly identified and corrected;
- classification and prioritization of the resolution of the problem was commensurate with its safety significance;
- for significant conditions adverse to quality, the cause was determined, corrective actions were taken to prevent recurrence, and the cause and corrective actions taken were documented and reported to appropriate levels of management;
- conditions were appropriately screened;
- the licensee and their contractors properly evaluated and reported the condition in accordance with 10 CFR 50.55(e) and 10 CFR 21;
- the identification and correction of design deficiencies were being adequately addressed;
- extent of condition was being adequately addressed; and
- appropriate corrective actions were developed and implemented.

b. Findings

No findings were identified.

4. OTHER INSPECTION RESULTS40A6 Meetings, Including Exit

.1 Exit Meeting

On July 9, 2015, the inspectors presented the inspection results to Mr. Ron Jones, Vice President of New Nuclear Operations, along with other licensee and consortium staff members. The inspectors stated that no proprietary information would be included in the inspection report.

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensees and Contractor Personnel

J. Arnall, Manager, CB&I
C. Baucom, Licensing, CB&I
H. Cote, Engineer, CB&I
J. Findlay Salter, Licensing, SCE&G
A. Rice, Manager, Licensing SCE&G
J. Robinson, Site Engineering Manager, WEC
G. Sanders, Licensing, SCE&G
K. Spinola, Site Engineering, WEC

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Item Number</u>	<u>Type</u>	<u>Status</u>	<u>Description</u>
05200027/2015002-01	NCV	Open	Failure to Incorporate Grout Strength Acceptance Limits from Engineering Documents (Section 1A03)
05200027/2015002-02	NCV	Open/ Closed	Failure to Perform Required QC Visual Examinations of In-Process Welding (Section 1P03)

LIST OF DOCUMENTS REVIEWED

Section 1A01:

ASME Code Data Reports:

WEC, Form N-1 Certificate Holder's Data Report for Nuclear Vessels, V.C. Summer Unit 2, NPT Serial No. VS2-RCS-MV-01

Doosan, Form N-2 Certificate Holder's Data Report for Identical Nuclear Parts and Appurtenances, V.C. Summer Unit 2, NPT Serial Nos. N08032-10101 and N08032-10102

WEC, Form N-2 Certificate Holder's Data Report for Identical Nuclear Parts and Appurtenances, V.C. Summer Unit 2, NPT Serial Nos. 4786-4829, 4832-4859, 4864-4905, 4908-4911, 4914-4921, 4926-4994

Certified Material Test Reports:

CN2010100009 for Heat Nos. 2B07263, 2C0762 (Transition Ring)

CN2010090027 for Heat Nos. 2B07149, 2C07150 (Lower Shell)

CN2009080006 for Heat Nos. 2C95420, 2C95421, 2B95422 (Upper Shell)

CN2009120054 for Heat No. 2C95782 (Outlet Nozzle A)

4882 for Heat No. G15834/PLN1 (Outlet Nozzle Safe End A)

CN2010010051 for Heat Nos. 2B95950, 2C95951, 2B95952 (Closure Head)

HKQ-090630-013 for Heat No. E90130 (Quickloc Nozzles)

VS2-MV11-VQQ-002, VS2-MV11-VQQ-003 (CRDM Nozzles)
 NQC-09-090, NQC-10-036, TR-P0810-2, TR-P1009, TR-P1010 (Clad Material)
 CN2010010050 for Heat No. 2A96254 (Lifting Lugs)
 CN2009120014 for Heat No. 2C96127 (Lifting Lugs)
 TR-P0951, TR-P0951-1 (Filler Material for Lifting Lugs)
 CMTR No. KN-1482 (Filler Material)
 CMTR Nos. KN-1482 and TR-P1066 (Filler Material)
 CMTR Nos. NQC-09-103, TR-P1021-3, TR-P1021-2 (Filler Material)
 CMTR Nos. NQC-11-241, NQC-11-242 (Filler Material)

Welding Procedure Specifications (Closure Head Flange Keyway):

A-M-0308-138, Rev. 2
 A-T-0308-124, Rev. 1

Procedure Qualification Records (Closure Head Flange Keyway):

QA-M-0308-021, Rev. A
 QA-M-0308-022, Rev. A
 QA-T-0308-014, Rev. A
 QA-T-0308-016, Rev. A

Nondestructive Examination Reports (Closure Head Flange Keyway):

P120625-044-001, Report of Liquid Penetrant Examination
 P100706-004-001, Report of Liquid Penetrant Examination
 P101011-025-001, Report of Liquid Penetrant Examination
 P100727-019-001, Report of Liquid Penetrant Examination
 P101112-021-001, Report of Liquid Penetrant Examination
 P101231-012-001, Report of Liquid Penetrant Examination
 P101231-016-001, Report of Liquid Penetrant Examination
 M100217-011-001, Report of Magnetic Particle Examination
 U101221-047-001, Report of Ultrasonic Examination
 U101221-052-001, Report of Ultrasonic Examination

Nondestructive Examination Reports (Lifting Lugs):

M100508-004-001, Report of Magnetic Particle Examination
 M100510-108-001, Report of Magnetic Particle Examination
 M100510-110-001, Report of Magnetic Particle Examination
 M100510-117-001, Report of Magnetic Particle Examination
 M100510-118-001, Report of Magnetic Particle Examination
 M100510-119-001, Report of Magnetic Particle Examination
 M100512-044-001, Report of Magnetic Particle Examination
 M100512-045-001, Report of Magnetic Particle Examination
 M100518-042-001, Report of Magnetic Particle Examination
 M100607-061-001, Report of Magnetic Particle Examination

Nonconformance Reports:

NCR_110149, Rev. 1 (Weld No. 102-21A)
 NCR_111017, Rev. 1 and 2 (Weld No. 101-40)

Section 1A02:

APP-MV01-Z0-101, Design Specification for AP1000 Reactor Vessel for System: Reactor Coolant System (RCS), Rev. 12
 APP-RXS-M3-001, Reactor System (RXS) System Specification Document (SSD), Rev. 6
 APP-MV01-V6-151, QuickLoc Instrument Nozzle, Rev. 5
 APP-MV01-V6-128, Latch Housing Installation, Rev. 5
 WEC, APP-VW40-Z0-050, AP1000 Filler Material Specification: SFA-5.5 Low Alloy Steel Electrodes for SMAW of ASME Section III Applications, Rev. 1
 WEC, APP-VW40-Z0-230, AP1000 Filler Material Specification: SFA-5.23 Low Alloy Steel Material for SAW of ASME Section III Applications, Rev. 1
 WEC, APP-VW30-Z0-110, AP1000 Filler Material Specification: SFA-5.11 ENiCrFe-7 (UNS W86152) Nickel Alloy Electrodes for SMAW of ASME Section III Applications, Rev. 0
 WEC, APP-VW30-Z0-140, AP1000 Filler Material Specification: SFA-5.14 ERNiCrFe-7 (UNS N06052) and ERNiCrFe-7A (UNS N06054) Bare Nickel Alloy Filler Metal for GTAW, PAW, or GMAW of ASME Section III Applications, Rev. 1
 WEC, APP-VW30-Z0-141, AP1000 Filler Material Specification: SFA-5.14 ER/EQNiCrFe-7 (UNS N06052) and ER/EQNiCrFe-7A (UNS N06054) Bare Nickel Alloy Filler Metal for SAW of ASME Section III Applications, Rev. 0
 Doosan, AP-MPS21-065, Material Purchase Specification for SA-508 Grade 3 Class 1 Forging (to be used for the Reactor Vessel Lower Head), Rev. 4
 Doosan, EPS-M03-137, Material Purchase Specification for E8016-G Low Alloy Steel Covered Electrodes, Rev. G
 Doosan, EPS-A03-126, Material Purchase Specification for Mn-Mo Alloy Steel Wire and Flux for Submerged Arc Welding, Rev. E
 WM-VC23AP1000-200RV, Weld Map of General Arrangement, Rev. 1
 WM-VC23AP1000-201RV, Weld Map of Closure Head Assembly, Rev. 0
 WM-VC23AP1000-202RV, Weld Map of Lower Vessel Assembly, Rev. 2
 WM-VC23AP1000-203RV, Weld Map of Upper Vessel Assembly, Rev. 1
 WM-VC23AP1000-204RV, Weld Map Final Vessel Assembly, Rev. 1

Weld No. 101-40

CMTR No. CN2010100009 for Heat Nos. 2B07263, 2C0762 (Transition Ring)
 CMTR No. CN2010090027 for Heat Nos. 2B07149, 2C07150 (Lower Shell)
 CMTR No. KN-1482 (Filler Material)
 WPS A-M-0303-152, Rev. 1
 WPS A-MA-0303-216, Rev. 1
 Record of Welder or Welding Operator Qualification Tests for ID Nos. BYE, EVY, TGW
 Table of Certified Welder (which lists re-qualifications) for ID Nos. BYE, EVY, TGW
 M111031-002-001, Report of Magnetic Particle Examination
 U111031-043-001, Report of Ultrasonic Examination
 U111215-038-001, Report of Ultrasonic Examination
 R111006-033-001, Report of Radiographic Examination
 NCR_111017, Rev. 1 and 2

Weld No. 101-51

CMTR No. CN2010090027 for Heat Nos. 2B07149, 2C07150 (Lower Shell)
 CMTR No. CN2009080006 for Heat Nos. 2C95420, 2C95421, 2B95422 (Upper Shell)
 CMTR Nos. KN-1482 and TR-P1066 (Filler Material)
 WPS A-M-0303-152, Rev. 1
 WPS A-MA-0303-216, Rev. 1

Record of Welder or Welding Operator Qualification Tests for ID Nos. APM, BWM
 Table of Certified Welder for ID Nos. APM, BWM
 P120905-009-001, Report of Liquid Penetrant Examination
 M120330-077-001, Report of Magnetic Particle Examination
 M120406-029-001, Report of Magnetic Particle Examination
 M120430-028-011, Report of Magnetic Particle Examination
 U120430-017-001, Report of Ultrasonic Examination
 R120425-006-001, Report of Radiographic Examination
 WDN_120147, Rev. 0

Weld No. 102-21A

CMTR No. CN2009080006 for Heat Nos. 2C95420, 2C95421, 2B95422 (Upper Shell)
 CMTR No. CN2009120054 for Heat No. 2C95782 (Outlet Nozzle A)
 CMTR Nos. NQC-09-103, TR-P1021-3, TR-P1021-2 (Filler Material)
 WPS A-M-0303-151, Rev. 5
 WPS A-MA-0303-217, Rev. 4
 Record of Welder or Welding Operator Qualification Tests for ID Nos. APM, BTN, BVR
 Table of Certified Welder for ID Nos. APM, BTN, BVR
 M101206-036-001, Report of Magnetic Particle Examination
 M110106-038-001, Report of Magnetic Particle Examination
 M110112-042-001, Report of Magnetic Particle Examination
 M101227-065-001, Report of Magnetic Particle Examination
 M110106-039-001, Report of Magnetic Particle Examination
 M110222-056-001, Report of Magnetic Particle Examination
 U110222-030-001, Report of Ultrasonic Examination
 U111004-054-001, Report of Ultrasonic Examination
 U110603-025-001, Report of Ultrasonic Examination
 R110225-010-001, Report of Radiographic Examination
 R111110-001-001, Report of Radiographic Examination
 NCR_110149, Rev. 1

Weld No. 301-20A

CMTR No. CN2009120054 for Heat No. 2C95782 (Outlet Nozzle A)
 CMTR No. 4882 for Heat No. G15834/PLN1 (Outlet Nozzle Safe End A)
 CMTR Nos. NQC-11-241, NQC-11-242 (Filler Material)
 WPS A-T-0843-129, Rev. 1
 WPS A-T-0843-130, Rev. 1
 WPS A-TM-0843-150, Rev. 1
 Record of Welder or Welding Operator Qualification Tests for ID Nos. BTT, BVS, BWG, BWK, BXP, EYJ, UCS
 Table of Certified Welder for ID Nos. BTT, BVS, BWG, BWK, BXP, EYJ, UCS
 P120312-048-001, Report of Liquid Penetrant Examination
 U120217-020-001, Report of Ultrasonic Examination
 R120227-046-001, Report of Radiographic Examination

Weld No. 103-25A

CMTR No. CN2009120054 for Heat No. 2C95782 (Outlet Nozzle A)
 CMTR Nos. NQC-11-070, NQC-11-071, NQC-11-072, NQC-12-133, NQC-12-134 (Buttering)
 WPS A-M-0343-171, Rev. 1
 WPS A-T-0343-155, Rev. 2

WPS A-T-0343-156, Rev. 3

WPS A-T-0343-153, Rev. 2

WPS A-T-0343-180, Rev. 2

WPS A-T-0343-183, Rev. 0

Record of Welder or Welding Operator Qualification Tests for ID Nos. SMY, SRX

Table of Certified Welder for ID Nos. SMY, SRX

P100909-052-001, Report of Liquid Penetrant Examination

P101021-048-001, Report of Liquid Penetrant Examination

P101124-025-001, Report of Liquid Penetrant Examination

U101021-031-001, Report of Ultrasonic Examination

U101021-032-001, Report of Ultrasonic Examination

U101124-026-001, Report of Ultrasonic Examination

R101023-046-001, Report of Radiographic Examination

R101112-020-001, Report of Radiographic Examination

IW-10-07-106, Chemical Analysis Report

IW-10-11-1834, Chemical Analysis Report

WDN-100392, Rev. 0

Weld Nos. 101-10E and 101-10H

CMTR No. CN2010010051 for Heat Nos. 2B95950, 2C95951, 2B95952 (Closure Head)

CMTR No. HKQ-090630-013 for Heat No. E90130 (Quickloc Nozzles)

CMTR Nos. NQC-11-241, NQC-11-242 (Filler Material)

WPS A-T-0843-135, Rev. 3

WPS A-T-0843-136, Rev. 2

Record of Welder or Welding Operator Qualification Tests for ID Nos. BVS, BVV, BWM

Table of Certified Welder for ID Nos. BVS, BVV, BWM

P120126-010-001, Report of Liquid Penetrant Examination

U120126-030-001, Report of Ultrasonic Examination

R120130-036-001, Report of Radiographic Examination

Weld Nos. 103-10-01, 103-10-11, 103-10-28, 103-10-40, 103-10-46, 103-10-56, 103-10-69

CMTR No. CN2010010051 for Heat Nos. 2B95950, 2C95951, 2B95952 (Closure Head)

CMTR Nos. VS2-MV11-VQQ-002, VS2-MV11-VQQ-003 (CRDM Nozzles)

CMTR Nos. NQC-11-241, NQC-11-242 (Filler Material)

WPS A-T-4343-173, Rev. 1

WPS A-T-4343-174, Rev. 1

Record of Welder or Welding Operator Qualification Tests for ID Nos. AMJ, BVR, UCS

Table of Certified Welder for ID Nos. AMJ, BVR, UCS

P120614-021-001, Report of Liquid Penetrant Examination

P120315-031-001, Report of Liquid Penetrant Examination

P120326-036-001, Report of Liquid Penetrant Examination

P120406-007-001, Report of Liquid Penetrant Examination

P120412-011-011, Report of Liquid Penetrant Examination

P120315-031-002, Report of Liquid Penetrant Examination

P120326-037-001, Report of Liquid Penetrant Examination

P120406-001-001, Report of Liquid Penetrant Examination

P120412-013-001, Report of Liquid Penetrant Examination

P120416-029-001, Report of Liquid Penetrant Examination

P120315-031-003, Report of Liquid Penetrant Examination

P120326-038-001, Report of Liquid Penetrant Examination

P120406-002-001, Report of Liquid Penetrant Examination

P120412-015-001, Report of Liquid Penetrant Examination
 P120416-030-001, Report of Liquid Penetrant Examination
 P120418-039-001, Report of Liquid Penetrant Examination
 P120315-031-004, Report of Liquid Penetrant Examination
 P120326-039-001, Report of Liquid Penetrant Examination
 P120406-003-001, Report of Liquid Penetrant Examination
 P120412-017-001, Report of Liquid Penetrant Examination
 P120416-031-001, Report of Liquid Penetrant Examination
 P120418-040-001, Report of Liquid Penetrant Examination
 P120419-057-001, Report of Liquid Penetrant Examination
 P120315-031-005, Report of Liquid Penetrant Examination
 P120326-040-001, Report of Liquid Penetrant Examination
 P120406-004-001, Report of Liquid Penetrant Examination
 P120412-019-001, Report of Liquid Penetrant Examination
 P120416-032-001, Report of Liquid Penetrant Examination
 P120418-042-001, Report of Liquid Penetrant Examination
 P120419-059-001, Report of Liquid Penetrant Examination
 P120420-053-001, Report of Liquid Penetrant Examination

Section 1A03:

Specifications

VC2-CC01-Z0-031, "Safety Related Placing Concrete and Reinforcing Steel, Westinghouse Seismic Category I and II, Safety Class C "NUCLEAR SAFETY", Westinghouse Seismic Category III, Safety Class E", Rev. 6
 VC2-CC01-Z0-027, "Safety Related Concrete Testing Services, Westinghouse Safety Class C "NUCLEAR SAFETY RELATED"", Rev. 4

Non-conformance and Dispositions

N&D VS2-CY01-GNR-000012, Low Breaks: Unit 2 – Core Holes D1 through D7
 N&D VS2-CC01-GNR-000156, Terminator/ WLS conflict
 N&D VS2-CR01-GNR-000062, 4-Line missing dowels
 N&D VS2-CR01-GNR-000252, Rebar/Embed P8 Interference – layer 3
 N&D VS2-CR01-GNR-000259, CB&I N&D for dowel interference with embed plate P8
 N&D VS2-CR01-GNR-000263, CB&I N&D to relocate dowels due to interference with embed

Procedures

NCSP-3-32-0-A, "Grouting Operations", Rev. 004

Miscellaneous

CAPAL DI 100179204, "Grouted Embedment Pull Test"
 Test Plan VSG-CR01-VTR-800000, "Pull-Out Test (POT) Program for Interior Wall Dowel Repair", Rev. 0
 CAR 2015-1412, "On-Site Operations for Pre-Blended Grouts"
 CAR 2015-1265, "Grout Placement Card Incorrect for Application / Not following Grout Manufacturer's Recommendations"

Section 1A04:

APP-1110-CR-531, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Vertical Dowel Layout at CJ 76'-6", Rev. 2

APP-1110-CR-532, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Vertical Dowel Layout at CJ 80'-0"/80'-6", Rev. 0

APP-1110-CR-533, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Vertical Dowel Layout at CJ 83'-0"/84'-6", Rev. 0

APP-1110-CR-537, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Plan at EL 80'-6" CVS Compartment," Rev. 0

APP-1110-CR-538, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Plan at EL 83'-0" West SG/Vertical Access Compartment," Rev. 0

APP-1110-CR-539, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Plan at EL 83'-0" East SG/Vertical Access Compartment," Rev. 0

APP-1110-CR-540, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Plan at EL 80'-0" West SG Compartment," Rev. 0

APP-1110-CR-519, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" General Vertical Dowel Plan," Rev. 4

APP-1110-CR-521, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Plan at EL 83'-0"/84'-6", Rev. 4

APP-1110-CR-520, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6" Plan at EL 80'-0" & 80'-6", Rev. 4

APP-1110-CR-525, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6 Sections," Rev. 4

APP-1110-CR-526, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6 West SG Area Dowel Plan," Rev. 3

APP-1110-CR-527, "Containment Concrete Reinforcement EL 71'-6" up to 83'-0"/84'-6 East SG Area Dowel Plan," Rev. 3

Section 1A05:

Procedures and Specifications

CB&I QS 09.02, Structural Field Welding, Rev. 1

CB&I QS 09.31, Welder/Welding Operator Qualifications, Rev. 3

CB&I WPC-01, Welding Control Procedure, Rev. 5

Drawings/Weld Maps

CB&I Dwg. VS2-CA01-VWK-241, Titled VS2-CA01-S4W-02002 Seam 4634 Weld Map, Rev. B, dated 4/29/15

CB&I Dwg. VS2-CA01-VWK-244, Titled VS2-CA01-S4W-02002 Seam 1634 Weld Map, Rev. C, dated 2/3/15

Certified Material Test Reports

Lincoln Electric CMTR 5183652 for ER80S-Ni1 of Heat-No. 1063N, dated April 3, 2012

Lincoln Electric CMTR 6339162 for E7018 of Lot-No. 1164R, dated March 5, 2014

Lincoln Electric CMTR 6028117 for ER2209 of Heat-No. 1063T, dated November 13, 2013

Lincoln Electric CMTR 6964559 for E8018-C1 of Heat-No. 1182N, dated November 13, 2013

Welder Performance Qualification Records

CB&I Record of Welder Performance Qualification Test – AWS D1.1 with Test No. 5SS-03 (GMAW) for welder STR9205, and 2CS-03 (SMAW) and 2CS-06 (GTAW) for welder DHB6381

CB&I Record of Welder Performance Qualification Test – AWS D1.6 with Test Nos. 2CS-03, 2CS-04 (FCAW), and 8CS-08 for welders SMC7070, TDS3568, KRH2484, MCP5255

Non-destructive Examination Reports

Mistras Ultrasonic Examination Report V2-15-W-U-0151, dated 1-24-2015 for weld-no. VS2-CA01-VWK-145-FW-0504-03 (2nd 10% inspection)

Mistras Ultrasonic Examination Report V2-15-W-U-0269, dated 2-10-2015 for weld-no. VS2-CA01-VWK-145-FW-0504-03-RW1 (repair)

Mistras Ultrasonic Examination of Welds in Accordance with the AWS Structural Welding Code D1.1, 100-UT-310, Rev. 6*, dated 7/01/2013

Mistras Magnetic Particle Examination Report V2-15-W-M-0743, dated 3/13/2015

Mistras Magnetic Particle Examination Report V2-15-W-M-0737, dated 3/14/2015

Mistras Magnetic Particle Examination Report V2-15-W-M-0856, dated 3/26/2015

Nonconformance & Disposition Reports

APP-GW-GNR-850014, "WPS 8-8-72 (NCR 14-182) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850018, "WPS C1-1-1 (NCR 14-211) Structural WPS Noncompliance to ASME Code Requirements," Rev. 0

APP-GW-GNR-850034, "WPS 1-1-141 (NCR 14-243) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850035, "WPS 1-1-91 (NCR 14-165) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850036, "WPS 1-1-107 (NCR 14-282) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850038, "WPS 1-1-107 (NCR 14-153) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850043, "WPS 1-1-86 (NCR 14-159) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850068, "WPS 10-10-76 (NCR 14-169) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850086, "NCR 13-638, VS2 CA20-22 wrong WPS used (USE-AS-IS)

APP-GW-GNR-850100, WPS 1-1-39 (NCR 14-395) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850139, "WPS 1-1-43 (NCR 14-173) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850141, "WPS 10-10-316 (NCR 14-130) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850159, "WPS 1-1-159 (NCR 14-1496) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850160, "WPS 1-10-218 (NCR 14-158) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850169, "WPS 1-1-43 (NCR 14-902) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-GW-GNR-850171, "WPS 1-1-99 (NCR 14-904) Structural WPS Noncompliance to AWS Code Requirements," Rev. 0

APP-1208-GNR-850169, "NNI CBI NOUC 132177-058 for UT less than 100% coverage," Rev. 0

APP-CA01-GNR-000003, "Base Metal Repair," Rev. 0

VS2-CA01-GNR-000145, "CA01-17 Undersized Welds," Rev. 0

VS2-CA01-GNR-000212, "CA01-13 Inaccessible Studs & Fillet Weld," Rev. 0

VS2-CA01-GNR-000276, "CA01-14 Missing Weld on Stiffener Angle," Rev. 0

VS2-CA05-GNR-000007, "CA05-06 Channel to WT Welds," Rev. 0

APP-CB65-GNR-850001, "NCR 13-977 VS2 CB65 Weld Can Not Achieve Weld Design," Rev. 0

APP-CA01-GNR-850347, "VS2-CA01-31 (NCR 14-1042) 100% UT Can't be Performed," Rev. 0

Section 1A06:Drawings

VS2-1208-SC-100-R2, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " General Notes

VS2-1208-SC-281-R2, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Connection Panel Group 28

VS2-1208-SC-282-R1, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Connection Panel Group 28 Details 1

VS2-1208-SC-331-R2, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Connection Panel Group 33

VS2-1208-SC-332-R2, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Connection Panel Group 33 Details 1

VS2-1208-SC-701-R2, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Type 2 Panel Group 70

VS2-1208-SC-702-R0, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Type 1 Panel Group 70 Details 1

VS2-1208-SC-703-R0, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Type 1 Panel Group 70 Details 2

VS2-1208-SC-704-R0, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Type 1 Panel Group 70 Details 3

VS2-1208-SC-902-R1, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Typical Details (Sheet 2)

VS2-1208-SC-909-R5, Shield Building Steel Wall Panels EL. 100'-0" to EL. 248'-6 $\frac{1}{2}$ " Typical Details (Sheet 6)

Documentation Packages

VS2-1208-SC-01Q, Documentation Package for AP1000 Shield Building Structural Modules, Group 28, NNI JO 7341-F, Rev. 1

VS2-1208-SC-01H, Documentation Package for AP1000 Shield Building Structural Modules, Group 33, NNI JO 7341-F, Rev. 2

VS2-1208-SC-09J, Documentation Package for AP1000 Shield Building Structural Modules, Group 70, NNI JO 7341-F, Rev. 0

VS2-1208-SC-09L, Documentation Package for AP1000 Shield Building Structural Modules, Group 70, NNI JO 7341-F, Rev. 0

Quality Assurance Inspection Reports

Q445-14-10069

Q445-14-10073

Q445-15-10217

Q445-15-10227

Section 1A07:Procedures and Specifications

CB&I WCP-1, "Welding Control Procedure," Rev. 5

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QC Inspector ID No. 1356214

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100123539
100306128
100306721

LIST OF ACRONYMS

ACI	American Concrete Institute
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
CB&I	Chicago Bridge and Iron
CFR	Code of Federal Regulations
CIS	Containment Internal Structures
CMT	Core Makeup Tanks
CMTR	Certified Material Test Report
CRDM	Control Rod Drive Mechanism
Doosan	Doosan Heavy Industries & Construction Company
E&DCR	Engineering and Design Coordination Report
EPC	Engineering and Procurement
IMC	Inspection Manual Chapter
ITAAC	Inspections, Tests, Analysis, and Acceptance Criteria
MT	Magnetic Particle Testing
N&D	Nonconformance and Disposition
NCR	Nonconformance Reports
NCV	Noncited Violation
NDE	Nondestructive Examination
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PQR	Procedure Qualification Record
QA	Quality Assurance
QC	Quality Control
RC	Reinforced Concrete
SC	Steel Concrete Composite
SCE&G	South Carolina Electric and Gas
SMAW	Shielded Metal Arc Welding
SSC	Structure, System, and Component
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic
WDN	Welding Defect Notice
WEC	Westinghouse Electric Company
WPQR	Welder Performance Qualification Record
WPS	Welding Procedure Specification