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

May 10, 2016

Michael Yox
Regulatory Affairs Director
Southern Nuclear Operating Company
7835 River Road, Bldg. 140, Vogtle 3&4
Waynesboro, GA 30830

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4 – NRC INTEGRATED INSPECTION REPORTS 05200025/2016001, 05200026/2016001

Dear Mr. Yox:

On March 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Vogtle Electric Generating Plant (VEGP) Units 3 and 4. The enclosed inspection report documents the inspection results, which the inspectors discussed on April 13, 2016, with Mr. Rauckhorst, Vogtle 3&4 Executive Vice President Construction, along with 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.

One NRC-identified finding of very low safety significance (Green) was identified during this inspection. This finding was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because the issue was entered into your corrective action program, the NRC is treating this issue as a non-cited violation (NCV) in accordance with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest this NCV, 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 VEGP Units 3 and 4.

If you disagree with the cross-cutting aspect assigned to the 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 VEGP Units 3 and 4.

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 made available electronically for public inspection in the NRC Public Document Room or from the Publically Available Records (PARS) component of NRC's document system ADAMS. ADAMS is accessible from the NRC Web site 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, Chief
Construction Projects Branch 4
Division of Construction Projects

Docket Nos.: 5200025, 5200026
License Nos: NPF-91, NPF-92

Enclosure: NRC Inspection Report (IR) 05200025/2016001 and 05200026/2016001
w/attachment: Supplemental Information

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 made available electronically for public inspection in the NRC Public Document Room or from the Publically Available Records (PARS) component of NRC's document system ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

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OFFICE	RII:DCP	RII:DCP	RII:DCP	RII:DCI	RII:DCI	RII:DCI	RII:DCI
SIGNATURE	/RA via email/	/RA via email/	/RA via email/	/RA via email/	/RA via email/	/RA via email/	/RA via email/
NAME	T. Chandler	S. Temple	P. Donnelly	L. Castelli	T. Steadham	A. Ponko	K. Steddenbenz
DATE	5/9/2016	5/5/2016	5/9/20165/ /2016	5/3/2016	4/28/2016	5/2/2016	5/3/2016
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

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SIGNATURE	/RA via email/	/RA via email/	/RA via email/	/RA via email/	/RA via email/		
NAME	A. Artayet	C. Smith	R. Mathis, III	G. Galletti	V. Meghani		
DATE	4/29/2016	5/2/2016	4/29/2016	4/29/2016	2/11/2016	5/ /2016	5/ /2016
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OFFICIAL RECORD COPY DOCUMENT NAME: G/CCI/DCP/CPB4/Vogtle 3 & 4 Integrated IR 05200025 2016001 0520026 2016001

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Numbers:	5200025 5200026
License Numbers:	NPF-91 NPF-92
Report Numbers:	05200025/2016001 05200026/2016001
Licensee:	Southern Nuclear Operating Company, Inc.
Facility:	Vogtle Unit 3 Vogtle Unit 4
Location:	Waynesboro, GA
Inspection Dates:	January 1, 2016 through March 31, 2016
Inspectors:	A. Artayet, Senior Construction Inspector, DCI P. Braxton, Resident Inspector, DCP L. Castelli, Senior Construction Inspector, DCI T. Chandler, Resident Inspector, DCP B. Davis, Senior Construction Inspector, DCI P. Donnelly, Resident Inspector, DCP J. Fuller, Senior Resident Inspector, DCP G. Galletti, Senior Reactor Operations Engineer, NRO R. Mathis, Construction Inspector, DCI V. Meghani, Reactor Inspector, DRS, Region III A. Ponko, Senior Construction Inspector, DCI C. Smith, Construction Inspector, DCI T. Steadham, Senior Construction Inspector, DCI K. Steddenbenz, Construction Inspector, DCI S. Temple, Resident Inspector, DCP
Accompanying Personnel:	Ken Mott, Technical Reviewer Alissa Neuhausen, DCI
Approved by:	Michael Ernstes, Chief Construction Projects Branch 4 Division of Construction Projects

Enclosure

SUMMARY

Inspection Report (IR) 05200025/2016001, 05200026/2016001; 01/01/2016 through 03/31/2016; Vogtle Unit 3 Combined License, Vogtle Unit 4 Combined License, structures and buildings – Unit 3 ITAAC 3.3.00.02a.i.d (763) and Unit 4 ITAAC 3.3.00.02a.i.d (763).

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. A green finding and non-cited violation associated with the Design/Engineering cornerstone was 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: Design/Engineering

- Green: The inspectors identified an ITAAC finding of very low safety significance (Green) and associated non-cited violation (NCV) of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix B, Criterion XV, "Nonconforming Materials, Parts, or Components" for Southern Nuclear Company's (SNC) failure through their contractor Westinghouse Electric Company (WEC) to adequately review and accept nonconforming items in accordance with documented procedures. The licensee entered this finding into their corrective action program as condition reports (CR) 10180672 and 10181738.

  The finding was associated with the Design / Engineering Cornerstone. The finding was considered more than minor because the performance deficiency represented a substantive failure to adequately implement a quality assurance process that rendered the quality of a structure, system, and component (SSC) indeterminate. The inspectors evaluated the finding in accordance with IMC 2519, "Construction Significance Determination Process," and determined the finding was of very low safety significance because the finding is associated with a portion of a structure (auxiliary building) assigned to the intermediate risk column of the AP1000 construction significance determination matrix. The inspectors determined that the finding represented an ITAAC finding because it was material to the acceptance criteria of VEGP Units 3 and 4 ITAAC 763, in that, if left uncorrected, the licensee may not have been able to demonstrate that the acceptance criteria of these ITAAC were met. The acceptance criteria of these ITAAC require that all deviations between the as-built structures and the approved designs be reconciled to verify that the as-built structures will withstand the design basis loads without a loss of structural integrity or other safety-related functions.

The inspectors determined that the failure to adequately review and accept nonconforming items in accordance with documented procedures may have resulted in a deviation from the approved design that would not have been reconciled by the licensee. The inspectors reviewed the finding for a possible cross-cutting aspect in accordance with IMC 0613 Appendix F, "Construction Cross-Cutting Areas and Aspects," and determined the finding has a cross-cutting aspect in the Human Performance area because the licensee's contractor, WEC, failed to use decision making-practices that emphasized prudent choices over those that were simply allowable. [H.14]. (Section 1A13)

B. Licensee-Identified Violations

None

REPORT DETAILS

Summary of Plant Construction Status

During this inspection period Westinghouse Electric Company, LLC (WEC) completed its acquisition of CB&I Stone & Webster, Inc. (Stone & Webster), the nuclear construction and integrated services business of Chicago Bridge & Iron N.V. (CB&I). Additionally, Fluor Corporation (Fluor) was subcontracted, by WEC, as the construction manager for the project.

For Unit 3, construction continued on the auxiliary building walls and floors from elevations 82'6" to 100'0". Concrete placements were made for the shield building and inside the containment vessel (CV). Assembly of the In Containment Refueling Water Storage Tank (IRWST)/Pressurizer wall module (CA02), IRWST southwest walls module (CA03), and the CV middle and upper rings was ongoing, as well as the CV top head. Installation of mechanical modules was ongoing. Installation of first shield building panels was completed.

For Unit 4, construction continued on the auxiliary building walls and floors from elevations 66'6" to 100'0". Concrete placements were made for the shield building. Assembly of the Steam Generator & Refueling Canal (CA01), Auxiliary Building Area 5 and 6 (CA20), CV middle and upper rings, and CVS/Access Tunnel (CA05) was ongoing. Installation of the CV lower ring was completed.

1. CONSTRUCTION REACTOR SAFETY
Cornerstones: Design/Engineering, Procurement/Fabrication, Construction/Installation, Inspection/Testing

IMC 2503, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) - Related Work Inspections

1A01 (Unit 3) ITAAC Number 2.5.01.03c (513) / Family 10F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 2.5.01.03c (513). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.16-02.03 - Design Documents
- 65001.F-02.01 - Design Document Review

The inspectors interviewed responsible design personnel and performed a review of licensee records and design documentation to verify that software diversity has been achieved between the Diverse Actuation System (DAS) and the Protection and Safety Monitoring System (PMS) as specified in ITAAC 2.5.01.03c. The inspectors assessed licensee conformance with 10 CFR 50.55a(h), 10 CFR 50 Appendix A - General Design Criterion 22, NUREG/CR-6303, "Method for Performing Diversity and Defense-in-Depth Analyses of Reactor Protection Systems, " Branch Technical Position 7-19 (NUREG-800), "Guidance for Evaluation of Diversity and Defense-In-Depth in Digital Computer-Based Instrumentation and Control Systems, " and the acceptance criteria of ITAAC 2.5.01.03c.

Software diversity between the DAS and PMS was sampled in the following areas: Algorithms, Logic, Program Architecture, Executable Operating System, and Executable Software.

Algorithms

The inspectors verified that algorithm diversity was achieved consistent with the ITAAC acceptance criteria by reviewing the PMS and DAS design documents of the digital systems that compare plant parameter incoming signals (i.e., proper S/G water level, in-range reactor coolant pressure) to pre-defined setpoints which determined whether or not to initiate a protective action. The NRC inspectors reviewed a sampling of design specifications, functional requirements, and system specifications to verify that the algorithms used were diverse between the PMS and DAS. The inspectors noted that the algorithms performed for the PMS were implemented through Common Q software, whereas the DAS executed algorithms were implemented within the Field Programmable Gate Array (FPGA). Specifically, the algorithm for the Steam Generator water level compensation was reviewed to ensure that algorithm definitions were different between PMS and DAS.

The inspection team also reviewed the attribute of algorithm diversity for the cyclic redundancy check (CRC) polynomials for the Component Interface Module (CIM), a PMS subsystem, and DAS. The inspectors completed a code review walk-through with the independent reviewer that originally performed the code review. The inspectors noted the Verilog code for the CIM subsystem and the DAS CRC32 modules were implemented using a different sequence of logic steps.

Logic

The inspectors reviewed the logic for the PMS and DAS to determine how each system accomplishes their setpoint comparison and trip actuation to confirm conformance to the software logic diversity acceptance criteria of the ITAAC. The inspectors reviewed DAS FPGA functional requirements, logic diagrams, and implemented logic for DAS partial trip protective function actuations. It was noted that the logic path for the partial trip setpoint comparison and actuation for the DAS was handled by the Advanced Logic System (ALS) FPGA platform control logic board (CLB) with logic that is implemented on an FPGA chip. For the PMS reactor trip signal, the inspectors reviewed design specifications and software design descriptions. The corresponding PMS reactor trip comparison and actuation logic path was noted by the inspectors to be executed in the Bistable Processor Logic (BPL) subsystem. It was observed that the process and activities required to physically program the DAS FPGA chip, such as simulation, synthesis and “place and route” tasks, are not a part of the PMS’s BPL software development process. In reference to the PMS, the inspectors observed that the BPL software development process includes developing protective safety function application specific software and loading that software onto a BPL processor module, of which the diverse DAS FPGA chip does not contain a processor module.

Program Architecture

The inspectors focused on verifying program architectural diversity based on an evaluation of the various communication methodologies employed within each subsystem and a review of each individual FPGA chip design. Specifically, the

inspectors reviewed PMS/CIM and DAS system design descriptions, block diagrams, and software requirements specifications (SRS) to confirm adequate identification and fulfillment of the system level requirements for communication technology diversity between the CIM/SRNC and DAS sub-systems. The inspection team confirmed that the PMS/CIM employed a combination of communication protocols consisting of: (Advant) High Speed Datalink (HSL) protocol, X-Bus, and Y-Bus. The PMS uses HSL for interdivisional communication, AF100 for intra-divisional communication, and User Datagram Protocol (UDP) for the Flat-panel Display System (FPDS) auxiliary communications. Additionally, Global Memory Data Elements (MDATs) are used for communications on the AC160 backplane used in the PMS. For the DAS communication, the Reliable ALS Bus and Test ALS Bus communication protocols are employed. The inspectors verified that each communication protocol was adequately defined and passed down to the subsystem requirements specifications as required. The inspectors confirmed that the utilization of the various communication protocols was either unique for each subsystem or used to fulfill different subsystem level requirements within each subsystem. For example, the use of discrete copper in the PMS/CIM architecture fulfilled subsystem level requirements that were different than the application of the same protocol used in the DAS subsystem.

The inspectors also reviewed various FPGA design documentation, including selected block diagrams for the PMS/CIM and the DAS subsystems and discussed the differences in the designs of these FPGAs with the vendor's staff to confirm that I/O structure, communication protocols, and design implementation of each was different for the PMS/CIM and DAS subsystems. The inspectors also reviewed the FPGA design specifications for each FPGA model and verified the chip designs were significantly different in terms of physical chip size, gate population, and ram block size. The inspectors noted that these differences enabled the use of different code structure and densities within the FPGA. The inspectors also verified that important characteristics of each FPGA design were implemented differently for each chip model. Specifically, the inspectors verified that the CIM FPGA used a non-segmented routing hierarchy, while the DAS FPGA utilizes a segmented hierarchical routing and clock structure. Clock conditioning circuits between the two FPGA designs were significantly different in density, layering, numbers of VersaTiles (D-flip-flops), and maximum user I/O's for each chip type.

In addition, the inspectors verified that the FPGA chips were physically dissimilar as a result of a visual inspection of prototype PMS/CIM and DAS circuit boards. The inspectors verified that each chip was uniquely labeled, and the physical dimensions were verified to be significantly different from each other. The inspectors verified that the work travelers for each PMS/CIM and DAS circuit board included inspection records which identified each FPGA by unique serial number in accordance with the visual inspection procedure requirements.

Executable Operating System and Executable Software

The inspectors reviewed technical reports, design specifications, software and hardware requirements, logic specifications, and functional requirements to assess that software diversity between the PMS and DAS was achieved in the areas of executable operating system and executable software. The inspectors noted that the safety function actuation logic executed in the PMS is generated by a microprocessor operating on a Common Q platform. In contrast, the DAS performs its functions using a

FPGA technology platform. The inspectors also noted that the Safety Remote Node Controller/Component Interface Module (SRNC/CIM), a subsystem of PMS, also functions on an FPGA platform. The inspectors observed that SRNC/CIM FPGA technology does not inherently function on an executable operating system and therefore does not utilize executable software. The inspectors noted the diversity between the PMS using a microprocessor based Common Q executable operating system/software and the DAS using an FPGA technology based system that does not have an executable operating system/software.

The inspection team also assessed the licensee's formal review and acceptance of Westinghouse document APP-DAS-J0R-002, "AP1000 Diverse Actuation System Diversity Analysis," Revision 0. This document is the Principal Closure Document (PCD) for ITAAC 2.5.01.03c and is cited in the ITAAC Determination Basis and directly supports the conclusion that the ITAAC Acceptance Criteria are met. The ITAAC Determination Basis is the information provided in the ITAAC Closure Notification that summarizes the methodology for conducting the inspections, tests and analyses, and the results that demonstrate the acceptance criteria are met. The inspection team verified that a PCD review was completed and documented in accordance with procedure, ND-RA-001-008, "ITAAC Principal Closure Document Acceptance," Version 2.0. In addition, the inspectors reviewed a sample of the qualification records for the responsible PCD reviewer to determine whether the reviewer's qualifications were current and in accordance with ND-RA-001-008. Specifically, the inspectors noted the reviewer's training was complete and current for course, ND-IA-015, "ITAAC PCD Review and Acceptance."

b. Findings

No findings were identified.

1A02 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures
- 65001.B-02.04 - Production Controls
- 65001.B-02.05 - Inspection
- 65001.B-02.06 - Records
- 65001.F-02.02 - Fabrication Records Review

The inspectors performed a direct inspection of the assembly of module CA05, which forms the east and south boundary walls of the chemical and volume control system (CVS) room from elevation 80'-6" to 107'-2" and the south wall providing separation between the vertical access and CVS room. The inspectors reviewed weld records for fabrication of weld numbers SV3-CA05-S4K-CV2217-07 and SV3-CA05-S4K-CV2219-16 associated with carbon steel structural submodules CA05-07 to CA05-08.

Specifically, the inspectors' verified applicable satisfactory Quality Control (QC) inspection sign-offs for cleanliness, material identifications, fit-up & tack, weld metal buildup, repair cavity, 100% final visual inspection, and 100% magnetic particle testing. In addition, the inspectors verified that weld rework/build-up/repair along with welder and material traceability, and applicable 10% and 100% Phased Array Ultrasonic Testing (PAUT) were properly documented for these full penetration single-V groove butt joints (using backing bars) in accordance with the requirements of the American Welding Society (AWS) D1.1:2000 Code for welding structural steel.

b. Findings

No findings were identified.

1A03 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures
- 65001.B-02.03 - Welder Qualification
- 65001.B-02.04 - Production Controls
- 65001.B-02.05 - Inspection
- 65001.B-02.06 - Records
- 65001.F-02.02 - Fabrication Records Review

The inspectors performed an inspection of the assembly of CA03, which forms the west wall of the in-containment refueling water storage tank from 103' to 135'-3". The inspectors reviewed two fabrication weld records for the double-welded groove butt joint weld numbers CV9999-A16 and CV9996-A02 for submodules CA03-15 to CA03-16 and CA03-02 to CA03-03, respectively. The inspectors verified established QC hold points were satisfactorily signed-off for fit-up & tack before depositing the first root pass weld metal layer along with subsequent visual examination of the completed root pass and backgouge prior to welding the opposite side, and that the traceability of materials and welders with continuity of qualifications were in accordance with the requirements of the AWS D1.6:1999 code for welding structural stainless steel.

In addition, the inspectors reviewed a Mistras nondestructive examination (NDE) report for PAUT to determine whether inspection methods and techniques for straight and angle beam scanning, calibration, frequency, transducer size, wedge angle, and sensitivity for 10% examination of the acceptable seam weld was performed in accordance with the requirements of AISC N690-1994 paragraphs Q1.26.1.1 and Q1.26.2.1, and AWS D1.6:1999 for statically loaded structures.

b. Findings

No findings were identified.

1A04 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.03 - Special Considerations
- 65001.02-02.08 - Construction Interface Concerns
- 65001.A.02.04 - Review As-built Deviations/Nonconformance

The inspectors reviewed quality records and performed direct inspection of construction activities associated with the containment internal structures for Vogtle Unit 3. Specifically, the inspectors observed construction activities associated with the west side of the containment internal basemat between elevation 83'-0" and 87'-6".

The inspectors observed installation activities associated with formwork, embedments, and steel reinforcement to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- piping, penetrations, reinforcing steel, and embedments were located properly in the structure, were sized as specified in drawings, and had proper clearances;
- reinforcing steel and embedments were secured and free of concrete or excessive rust; and
- forms were secure, leak tight, and free from debris or excess water.

The inspectors observed concrete pre-placement activities to determine whether planning and training had been completed, including appropriate considerations for mass concrete, and that the pre-placement inspection was performed by quality control before any concrete was placed. Prior to concrete placement, the inspectors independently evaluated whether the reinforcing steel met drawings and specifications included in the work packages, all deviations were adequately captured and addressed, and preparation and cleanliness of the formwork had been completed. 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 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 approved and calibrated;
- 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 placement, the inspectors observed in-process concrete testing to determine whether:

- concrete temperature, slump, air content, and unit weight were determined at the proper location and frequency as required by procedures, specifications, and American Society for Testing and Materials (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 qualified.

The inspectors observed curing activities to determine whether curing was in accordance with specifications and procedures with regard to the method, materials, duration, temperature, and inspections. The inspectors performed independent inspection and measurements of the as-built concrete to determine whether the as-built configuration met the design specifications.

The inspectors interviewed licensee and contractor personnel to determine whether:

- contractors performing safety-related work followed approved implementing procedures that describe administrative and procedural controls, approved work processes, and inspection requirements;
- design processes were performed in compliance with applicable instructions and procedures;
- personnel conducting work and quality assurance roles were qualified and knowledgeable; and
- effective oversight in accordance with specifications and program requirements was implemented for the installation activities observed.

The inspectors reviewed a sample of nonconformances to verify:

- the licensee was identifying problems at an appropriate threshold and entering them into the corrective action program;
- any differences between the as-built and as-designed SSCs were documented and dispositioned in accordance with approved modification or change procedures; and
- the nonconformances were resolved and their dispositions had adequate technical bases.

b. Findings

No findings were identified.

1A05 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures
- 65001.01-02.06 - Records
- 65001.B-02.04 - Production Controls
- 65001.B-02.05 - Inspection
- 65001.B-02.06 - Records

The inspectors reviewed the welding records for a sample of welds associated with the attachment of the CA01 module to the containment internal structures basemat to determine whether welding was performed in accordance with the AWS D1.1:2000, "Structural Welding Code - Steel." The inspectors reviewed a sample of welding records for the welds between the embedment plates and the rebar couplers and between the embedment plates and the CA01 module wall plate.

Specifically, the inspectors reviewed records for the following partial joint penetration welds between the embedment plate and rebar coupler:

- CV9482-B105 -1, -2, -3, -4, -5, -6, -7, -8
- CV9482-B112 -1, -2, -3, -4, -5, -6, -7, -8
- CV9482-B117 -1, -2, -3, -4, -5, -6, -7, -8

The inspectors reviewed records for the following complete joint penetration welds between the embedment plate and the CA01 module wall plates:

- CV9516-B105-1
- CV9516-B112-1
- CV9516-B117-1
- CV8124-B-065
- CV8124-B-066
- CV8124-B-067
- CV8124-B-105
- CV8124-B-112

For these welds, the inspectors verified the following:

- the identification of welds and welders was maintained for each weld;
- the welding procedures and welders were qualified in accordance with the structural welding code;

- the welding material and weld processes were properly controlled; and
- nondestructive examination activities were performed according to the inspection procedures, AWS Code, and other design documents.

The inspectors performed an independent inspection of the welds to evaluate the weld quality. Specifically, the inspectors reviewed the condition of the welds to determine if they met the requirements from the industry standards and design specifications with regard to size, length, and location of welds.

The inspectors also completed this visual inspection to determine if any of the following conditions were present:

- cracks;
- lack of fusion;
- undercut;
- porosity; or
- insufficient weld size.

During the review of the welding records for the above welds, the inspectors verified the following:

- the work was conducted in accordance with a traveler (weld data sheet) that provided for the proper sequencing of the work and that this weld data sheet properly referenced the applicable procedures, drawings, specifications;
- the weld data sheet established adequate hold points as required by the quality inspection plan;
- the weld was traceable to the welder;
- the filler metal used in the joint was traceable and was qualified in accordance with the AWS Code;
- records provided adequate traceability to all aspects of the welding activity, including traceability to the welder who performed the work;
- records adequately documented the following attributes: reference to procedure and welder qualifications, inspector qualifications, weld material certifications and receipt inspection reports, weld data or process records (travelers), weld maps, weld inspection records, and NDE records;
- records were appropriately retained and stored in accordance with Quality Assurance (QA) program requirement; and
- accepted, rejected, and repaired items were documented in written reports.

b. Findings

No findings were identified.

1A06 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.02-02.06 - Record Review
- 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
- 65001.F-02.01 - Design Document Review
- 65001.F-02.04 - General QA Review

The inspectors reviewed quality records and performed direct inspection of construction activities associated with the Containment Internal Structures for Vogtle Unit 3. Specifically, the inspectors observed construction activities associated with the east side of the Containment Internal Structures Basemat from 82'6" to 87'6. The inspectors reviewed design specifications associated with procurement, receipt inspection, material storage, and quality control inspections in this area to ensure the associated requirements were adequately addressed.

The inspectors observed installation activities and performed independent measurements for the containment internal structures reinforced concrete basemat associated with the steel reinforcement, including horizontal and vertical reinforcing steel bars, and bar splices to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- horizontal and vertical reinforcing steel was located properly in the structure, was sized as specified in drawings and calculations, and had proper clearances; and
- reinforcing steel was secured and free of concrete or excessive rust.

The inspectors observed QC inspection walk downs of the structural and steel components in the northeast section of containment internal structure from elevation 82'-6" to 87'-6". The inspectors observed QC personnel in the process of completing a QC inspection to verify QC inspections for safety related concrete structures were completed in accordance with the applicable procedures and met the requirements of NQA-1 1994. Specifically, the inspectors verified the following:

- the installation and inspection sequences were maintained;
- the licensee had verified that the items to be installed met specified requirements;
- inspection and test reports were current, accurate, and complete;
- personnel conducting work and quality assurance roles were qualified and knowledgeable;
- effective oversight in accordance with specifications and program requirements was implemented for the installation activities observed; and
- the recorded information was complete, accurate, met the licensing basis, and conformed to applicable specifications.

The inspectors reviewed a sample of approved implementing procedures and specifications associated with procurement, receipt inspection, and material storage to determine whether the documents:

- met the requirements specified in the quality assurance program and the updated final safety analysis report (UFSAR), including the reconciliation of construction deviations in critical dimensions and tolerances;
- correctly translated requirements from applicable codes and standards;
- described work controls, approved work processes, and inspection requirements;
- clearly prescribed acceptable methods of quality control inspection to ensure that the as-built condition met specified design requirements, drawings and material specifications;
- included adequate provisions for traceability of items throughout fabrication, erection, installation, and use of item, including status of inspection or testing;
- require markings or other means of identification to ensure that only specified and accepted items are used and to prevent the use of incorrect or defective items;
- required markings to be applied to materials using methods that provide a clear and legible identification and does not adversely affect the function or service life of the item;
- where physical identification on an item is impractical or insufficient, alternate methods such as physical separation, procedural control, documentation, or other appropriate means are required;
- included appropriate quantitative and/or qualitative acceptance criteria for determining that the prescribed activities were accomplished satisfactorily; and
- provided qualification requirements for craft and quality control inspection personnel performing inspection, installation, and testing activities.

The inspectors reviewed a sample of purchase orders for structural steel embed plates, reinforcing steel, and anchor bolts to determine whether they appropriately specify acceptable quality, technical, and 10 CFR Part 21 and 10 CFR 50.55l requirements. The inspectors reviewed a sample of certified material test reports included in the material shipment packages to verify that materials meet the specified mechanical testing requirements. The inspectors reviewed a sample material records, including purchase orders, procurement documents, fabrication records, transportation records, material receiving reports, certificates of compliance, certified material test reports, quality inspection reports, storage requisition requests, material issue receipts, and installation work packages, to determine whether:

- the records were adequate to furnish evidence of activities affecting quality;
- the requisite material characteristics were documented;
- performance tests, nondestructive tests, material certification, chemical and physical tests, and other specification requirements were performed, documented, and met acceptance criteria;
- inspection records provided evidence that the timing of events and time-dependent work activities were consistent with their specification requirements;
- the records were reviewed and approved by the responsible organization;
- the recorded information was complete, accurate, met the licensing basis, and conformed to applicable specifications;
- the installation of components was properly controlled;

- the items were correctly stored and maintained in such a manner as to demonstrate conformance with design and procedure requirements; and
- the as-built SSCs conformed to applicable codes, standards, quality requirements, and technical requirements.

The inspectors inspected a sample of for structural steel embed plates, reinforcing steel, and penetrations items installed in the field to verify:

- the items were properly identified through markings and controlled in accordance with the approved implementing documents;
- markings were in accordance with the applicable quality and technical requirements;
- traceability of the items was consistent and accurate from identification through fabrication, storage, and installation;
- the inspection and testing status of the sampled items was easily verifiable and was current; and
- items that were indicated as incorrect, defective, or nonconforming were clearly marked, tagged, or segregated as appropriate.

A review of the design commitments, licensing basis documents, design calculations, and design output documents for structural embed plates was performed by the inspectors. Design calculations were reviewed to determine whether the embedments were designed in accordance with the licensing basis. The inspectors also reviewed the design calculations and output documents to verify the design was performed and controlled in accordance with applicable procedures and processes. The design documents and processes reviewed by the inspectors for the embed plates were global designs and apply for all embed plates used throughout the nuclear island of each unit. Specifically, the inspectors verified:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were correctly translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations; and
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

b. Findings

No findings were identified.

1A07 (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). The inspectors used the following NRC Ips/sections to perform this inspection:

- 65001.01-02.05 – Steel Structures
- 65001.B-02.03 – Welder Qualification
- 65001.B-02.04 – Production Controls
- 65001.B-02.05 – Inspection
- 65001.B-02.06 – Records
- 65001.F-02.02 – Fabrication Records Review

The inspectors reviewed fabrication weld records for two single-welded groove butt joint welds for joining shield building submodules 05G to 05H (weld numbers CV8645-5-GH-I and CV8645-5-GH-O). The inspectors verified that established QC hold points were satisfactorily signed-off for fit-up and tack to the backing bars before initiating the root pass and final surface visual examination. The inspectors also verified that traceability of materials, and continuity of qualifications for welders were in accordance with the requirements of the AWS D1.1:2000 code for welding structural steel.

In addition, the inspectors reviewed two Mistras NDE reports for PAUT to determine whether inspection methods and techniques for straight and angle beam scanning, calibration, frequency, transducer size, wedge angle, and sensitivity for 10% examination of the acceptable seam weld were performed in accordance with the requirements of AISC N690-1994 paragraphs Q1.26.1.1 and Q1.26.2.1, and AWS D1.1:2000-Annex K for statically loaded structures.

b. Findings

No findings were identified.

1A08 (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). The inspectors used the following NRC Ips/sections to perform this inspection:

- 65001.01-02.06 – Records
- 65001.01-02.07 – Identification and Resolution of Problem
- 65001.02-02.02 – Laboratory Testing
- 65001.A.02.02 – Installation Records Review
- 65001.A.02.03 – Independent Assessment/Measurement Inspection

The inspectors reviewed quality records and performed direct inspection of construction activities associated with the Shield Building Reinforced Concrete to Steel-Composite vertical transition modules for Vogtle Unit 3. Specifically, the inspectors observed construction activities associated with the mechanical connections along the interface with the reinforced concrete shield building wall for the following shield panels:

- 01H, which is located approximately at azimuth 182 degrees between elevations 103”-4” and 125’-3”

- 01Q, which is located approximately at azimuth 342 degrees between elevations 106”-6” and 117’-41/2”

The inspectors reviewed work packages, design drawings, and engineering and design coordination reports (E&DCRs) associated with the mechanical connections to determine whether:

- design requirements were properly translated into installation procedures;
- the documents adequately defined the final design and arrangement of these SSCs;
- critical attributes associated with the ITAAC were correctly identified; and
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

In addition, the inspectors reviewed E&DCR APP-1208-GEF-319, “Upset Bar Testing” which defined the test requirements to meet ACI 349-01 chapter 12.14 requirements for testing of mechanical connections, in this case the connection between the reinforced concrete and the steel-composite panels. The inspectors then reviewed the inspection report that contained the upset bar tensile test results to determine if the testing performed met the specified requirements.

The inspectors observed mechanical splice installation activities, including installation of the heavy hex nuts and flat washers to the horizontal reinforcement, to determine whether work instructions and procedures were implemented in the field. The inspectors reviewed documentation related to the installation of the heavy hex nuts and flat washers to the horizontal reinforcement to verify they were installed in accordance with applicable requirements. Additionally, the inspectors verified in the field that as-built connection surfaces were free of foreign materials, bolts and nuts achieved one hundred percent thread engagement, and the nuts could not be loosened by hand.

b. Findings

No findings were identified.

1A09 (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). The inspectors used the following NRC Ips/sections to perform this inspection:

- 65001.01-02.05 – Steel Structures
- 65001.01-02.06 – Records
- 65001.01-02.07 – Identification and Resolution of Problem
- 65001.A.02.01 – Observation of in-Process Installation Activities
- 65001.A.02.02 – Installation Records Review
- 65001.A.02.04 – Review As-built Deviations/Nonconformance
- 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 observed welding activities and reviewed welding records associated with the Unit 3 Shield Building to verify applicable codes, standards, specifications, and procedure requirements were met. Specifically, the inspectors observed in-process welding and reviewed associated weld data records, welding procedure specifications (WPSs), supporting procedure qualification records (PQRs), welder qualification records, NDE reports, and Nonconformance and Disposition Reports (N&Ds) related to the Course 1 to Course 2 weld seam.

The inspectors observed in-process welding of three outside horizontal welds (CV5491-3-O - shield panels 02J to 01L, CV5491-8-O - shield panels 02K to 01M, CV5491-10-O - shield panels 02L to 01N), as well as repair welding of CV5491-10-O, to verify that a sample of welding variables were within the ranges allowed by the WPS and AWS Code, specifically amperage, voltage, and travel speed.

The inspectors reviewed various records for the three previously mentioned welds, as well as one inside horizontal weld (CV5491-14-I - shield panels 02G to 01J) and one inside vertical weld (CV5491-13-I - shield panels 02L to 02M), to verify:

- work was conducted in accordance with weld data sheets that (1) properly referenced the applicable WPSs, drawings, and work package, (2) provided adequate hold points for QC signatures, and (3) provided traceability between welding material heat numbers, welders, measuring & test equipment (M&TE), NDE reports, and QC inspections for each weld;
- welding material requisitions (WMRs) from the associated work package selected the correct WPS, base material, filler material, and joint type;
- WPSs were available, up to date, accurate, and in conformance with code requirements;
- supporting PQRs appropriately qualified the specific ranges of welding variables listed in the WPS, and the type and number of qualification tests required received acceptable results;
- welder performance qualification records demonstrated that (1) the welders were assigned a unique identification number and demonstrated their skill by performing specific performance qualification tests, (2) the qualification testing conditions and qualification limits were fully documented, and (3) the appropriate number of acceptable test results was achieved;
- the flux used during submerged arc welding (SAW) was adequately certified as demonstrated by a Certificate of Compliance, Certificate of Conformance, and Certified Material Test Report (CMTR) that recorded acceptable results for chemistry, mechanical, and impact properties; and
- all nonconformances were appropriately identified, dispositioned, and closed in accordance with applicable procedures and sections of the AWS Code.

The inspectors also reviewed computed radiography records for portions of those five shield building wall welds. Specifically, for those portions of the welds with rejectable indications, the inspectors reviewed both the original and post-repair radiographs to determine if the indications were adequately repaired. The inspectors also reviewed selected radiographs of weld sections where the licensee did not identify any rejectable indications to determine if the weld sections contained any rejectable indications.

b. Findings

No findings were identified.

1A10 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.A.02.02 - Installation Records Review
- 65001.F-02.04 - General QA Review

The inspectors performed direct inspection of construction activities associated with the Shield Building for Vogtle Unit 3. Specifically, the inspectors observed construction activities associated with the ceiling of the lower annulus tunnel section along the northeast side of the shield building from approximately column line Q to the point where wall line 7.3 intersects the shield building between elevations 98’-0” and 100’-0”. The inspectors reviewed design specifications associated with procurement, receipt inspection, and material storage in this area to ensure the associated requirements were adequately addressed.

Specifically, the inspectors reviewed a sample of approved implementing procedures and specifications associated with procurement, receipt inspection, and material storage to determine whether the documents:

- met the requirements specified in the quality assurance program and the UFSAR, including the reconciliation of construction deviations in critical dimensions and tolerances;
- correctly translated requirements from applicable codes and standards;
- described work controls, approved work processes, and inspection requirements;
- clearly prescribed acceptable methods of quality control inspection to ensure that the as-built condition met specified design requirements, drawings and material specifications;
- included adequate provisions for traceability of items throughout fabrication, erection, installation, and use of item, including status of inspection or testing;

- require markings or other means of identification to ensure that only specified and accepted items are used and to prevent the use of incorrect or defective items;
- required markings to be applied to materials using methods that provide a clear and legible identification and does not adversely affect the function or service life of the item;
- where physical identification on an item is impractical or insufficient, alternate methods such as physical separation, procedural control, documentation, or other appropriate means are required;
- included appropriate quantitative and/or qualitative acceptance criteria for determining that the prescribed activities were accomplished satisfactorily; and
- provided qualification requirements for craft and quality control inspection personnel performing inspection, installation, and testing activities.

The inspectors reviewed a sample of purchase orders for structural steel embed plates, reinforcing steel, and penetrations to determine whether they appropriately specify acceptable quality, technical, and 10 CFR Part 21 and 10 CFR 50.55(e) requirements. The inspectors reviewed a sample of certified material test reports included in the material shipment packages to verify that materials meet the specified mechanical testing requirements. The inspectors reviewed a sample material records, including purchase orders, procurement documents, fabrication records, transportation records, material receiving reports, certificates of compliance, certified material test reports, quality inspection reports, storage requisition requests, material issue receipts, and installation work packages, to determine whether:

- the records were adequate to furnish evidence of activities affecting quality;
- the requisite material characteristics were documented;
- performance tests, nondestructive tests, material certification, chemical and physical tests, and other specification requirements were performed, documented, and met acceptance criteria;
- inspection records provided evidence that the timing of events and time-dependent work activities were consistent with their specification requirements;
- the records were reviewed and approved by the responsible organization;
- the recorded information was complete, accurate, met the licensing basis, and conformed to applicable specifications;
- the installation of components was properly controlled;
- the items were correctly stored and maintained in such a manner as to demonstrate conformance with design and procedure requirements; and
- the as-built SSCs conformed to applicable codes, standards, quality requirements, and technical requirements.

The inspectors inspected a sample of for structural steel embed plates, reinforcing steel, and penetrations items installed in the field to verify:

- the items were properly identified through markings and controlled in accordance with the approved implementing documents;
- markings were in accordance with the applicable quality and technical requirements;
- traceability of the items was consistent and accurate from identification through fabrication, storage, and installation;

- the inspection and testing status of the sampled items was easily verifiable and was current; and
- items that were indicated as incorrect, defective, or nonconforming were clearly marked, tagged, or segregated as appropriate.

A review of the design commitments, licensing basis documents, design calculations, and design output documents for structural embed plates was performed by the inspectors. Design calculations were reviewed to determine whether the embedments were designed in accordance with the licensing basis. The inspectors also reviewed the design calculations and output documents to verify the design was performed and controlled in accordance with applicable procedures and processes. The design documents and processes reviewed by the inspectors for the embed plates were global designs and apply for all embed plates used throughout the nuclear island of each unit. Specifically, the inspectors verified:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were correctly translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations;
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

b. Findings

No findings were identified.

1A11 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.A.02.01 - Observation of in-Process Installation Activities
- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors observed the placement of concrete in the Unit 3 shield building vertical Reinforced Concrete/ Steel Concrete Composite (RC/SC) transition modules from elevation 103”6” to 113’6”. The inspectors verified that the as-built construction of the shield building met regulatory and design requirements.

The inspectors performed an independent walk-down of the vertical RC/SC transition modules prior to concrete placement to verify that installation of the shield building panels conformed to the final design.

The inspectors observed concrete pre-placement activities to determine whether pre-placement planning had been completed, including appropriate considerations for hot weather, and that a pre-placement inspection was performed by QC personnel before any concrete was placed. The inspectors observed concrete delivery and placement activities for the vertical RC/SC transition modules to determine whether:

- concrete was batched in accordance the specified mix design;
- mixing equipment operated at specified rotation speeds;
- transporting equipment was suitable, reliable, and in an acceptable condition;
- placement equipment used was suitable for the work and performed as required;
- scales and meters were calibrated;
- each truck was measured and each trip received proper ticketing and documentation; batch records were generated, controlled, reviewed for verification, and indicated placement location, mix, volume, date, transport time, amount of temper water being added at the truck delivery point, and special instructions;
- test results were being utilized at the batch plant to adjust mix proportions, as allowed by the procedures and specifications, to optimize concrete mix characteristics for the placement;
- remixing in the truck after required water additions conformed to the appropriate standards, including the amount of water allowed as called out in the concrete mix design specifications;
- the time limit between mixing and placement was not been exceeded;
- temperature limits were not exceeded;
- placement drop distances did not exceed specification requirements and did not result in segregation;
- vibrators were used properly by trained individuals;
- concrete was placed in lifts in accordance with the concrete placement plan; and
- inspection by QC personnel during placement was performed as required.

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

- concrete temperature, slump flow, air content, and unit weight were 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 specified; and
- personnel performing sampling and testing were trained and qualified.

b. Findings

No findings were identified.

1A12 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.01-02.04 - Key Dimensions and Volumes
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.F - Inspection of the ITAAC-Related Design and Fabrication Requirements
- 65001.F-02.01 - Design Document Review

The inspectors reviewed quality records and performed direct inspection of construction activities associated with the non-radiologically controlled area of the Auxiliary Building for Vogtle Unit 3. Specifically, the inspectors observed construction activities associated with the following wall sections between elevation 82'-6" and 100'-0":

- wall section along column line L between column lines 10 and 11
- wall section along column line M between column lines 10 and 11

The inspectors reviewed a sample of approved implementing procedures and specifications to determine whether the documents:

- met the requirements specified in the QA program and the UFSAR;
- described work controls, approved work processes, and inspection requirements;
- included appropriate quantitative and/or qualitative acceptance criteria for determining that the prescribed activities were accomplished satisfactorily;
- clearly prescribed acceptable methods of quality control inspection to ensure that the as-built condition met specified design requirements, drawings and material specifications; and
- provided qualification requirements for craft and quality control inspection personnel performing installation and testing activities.

For the wall section along column line L listed above, the inspectors reviewed a sample of design calculations, design changes, drawings included in the work packages, and specifications to determine whether:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations;
- the documents adequately defined the final design and arrangement of these SSCs;

- critical attributes associated with the ITAAC were correctly identified and documented for review and approval by responsible engineering personnel; and
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

The inspectors observed installation activities and performed independent measurements for the wall sections along column line L and column line M listed above associated with embedments, penetrations, and steel reinforcement, including horizontal and vertical reinforcing steel bars, bar splices, and embedment anchors to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- penetrations, reinforcing steel, and embedments were located properly in the structure, were sized as specified in drawings and calculations, and had proper clearances; and
- reinforcing steel and embedments were secured and free of concrete or excessive rust.

b. Findings

No findings were identified.

1A13 (Unit 3) ITAAC Number 3.3.00.02a.i.d (763) / Family 01F
(Unit 4) 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 IPs/sections to perform this inspection:

- 65001.01 - Inspection of ITAAC-Related Foundations & Buildings
- 65001.01-02.05 - Steel Structures
- 65001.A - As-Built Attributes for SSCs associated with ITAAC
- 65001.A.02.04 - Review As-built Deviations/Nonconformance
- 65001.B-02.05 - Inspection

The inspectors reviewed implementation of AISC N690-94 nondestructive examination requirements for structural combined partial joint penetration and fillet welds on basemat anchorage embedments.

b. Findings

Introduction

The inspectors identified an ITAAC finding of very low safety significance (Green) and associated non-cited violation (NCV) of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix B, Criterion XV, “Nonconforming Materials, Parts, or Components” for Southern Nuclear Company’s (SNC) failure through their contractor Westinghouse Electric Company (WEC) to adequately review and accept nonconforming items in accordance with documented procedures.

Description

During the week of February 7, 2016, the inspectors determined that the disposition of N&D reports SV3-CE01-GNR-000121, “Joseph Oat Embeds with PJP Welds Lacking AISC N690 Required NDE,” and SV0-CE01-GNR-000030, “Coupler Welds on CS Embeds from Cives Lacking N690 NDE,” did not meet the commitments established by the Units 3 and 4 UFSARs, respectively. Specifically, the N&D reports were dispositioned “use as is” without adequately verifying the nonconforming welds identified in the N&D reports met the requirements of American Institute of Steel Construction (AISC) Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities (AISC N690-94), as required by the Units 3 and 4 UFSARs.

N&D report SV3-CE01-GNR-000121 identifies a nonconformance in which the NDE required by AISC N690-94 was not performed on fabricated structural components supplied by Joseph Oat Corporation. Specifically, the magnetic particle testing (MT) or liquid penetrant testing (PT) required by AISC N690-94 Section Q1.26.2.2, “Partial Penetration Welds” was not performed on Seismic Category I embedments fabricated by Joseph Oat Corporation.

The impacted embedments are used to transmit loads to concrete structures and were fabricated with structural steel plates, weldable taper-threaded half couplers, and concrete reinforcing bars. The couplers are used to connect the reinforcing bars to the steel plates. Threads are machined into the ends of the reinforcing bars to provide a mechanical connection between the bars and half couplers which are fabricated with matching internal threads. The other end of the half coupler is welded to the steel plate with a combination partial joint penetration (PJP) groove and fillet welds to complete the connection. AISC N690-94 Section Q1.26.2.2 requires that a 10% sample of partial penetration welds be inspected by MT or PT to verify the quality of the welds are acceptable. This testing is in addition to 100% visual inspection (VT) of the welds.

Overall, 218 embedments are identified N&D report SV3-CE01-GNR-000121 as having nonconforming welds. The plates were fabricated in the late 2011 to early 2012 time frame and were the only seismic category I steel components supplied to the project by Joseph Oat Corporation. Of the 218 embedments, 202 were used exclusively in the radiologically controlled area of the Unit 3 auxiliary building to anchor the CA20 module to the nuclear island (NI) basemat at elevation 66’-6”. The remaining 16 embedments were procured as spares and were used for destructive testing of the mechanical connection between the couplers and reinforcing bars in September 2012.

Subsequently, the 16 spare embedments were discarded. As a result, none of the nonconforming welds were accessible for examination and the quality of the welds deemed to be indeterminate. A total of 4 mechanical couplers are attached to each plate for a total population of 808 nonconforming welds.

To address the nonconforming welds identified in N&D report SV3-CE01-GNR-000121, the licensee procured 55 additional embedments from Joseph Oat Corporation for the sole purpose of conducting NDE of the welds. These embedments were fabricated in November 2015 to the original drawings and specifications using the same WPS and, to the extent possible, the same welders.

The licensee performed MT of 110 welds on the additional plates in accordance with N690-94 and determined that the tested welds met the applicable acceptance criteria of AWS D1.1:2000. Based on these results, the licensee concluded that the welds identified in N&D report SV3-CE01-GNR-000121 conformed to requirements. However, none of the nonconforming welds identified in the N&D report SV3-CE01-GNR-000121 were directly inspected.

In effect, the approach taken to resolve the nonconformance was to increase the population of PJP welds completed by Joseph Oat Corporation and to perform MT on a 10% sample of the increased population. This sample, however, was limited to those welds on embedments procured in 2015 as none of the nonconforming welds identified in N&D report SV3-CE01-GNR-000121 were accessible for inspection.

Similarly, N&D report SV0-CE01-GNR-000030 identifies a nonconformance in which the NDE required by AISC N690-94 was not performed on fabricated structural components supplied by the Cives Steel Company. Specifically, the MT or PT required by AISC N690-94 Section Q1.26.2.2, “Partial Penetration Welds” was not performed on Seismic Category I embedments fabricated by the Cives Steel Company. These embedments were also fabricated with structural steel plates, weldable taper-threaded half couplers, and reinforcing bars. The nonconforming welds identified in N&D report SV0-CE01-GNR-000030 are similar to those identified in N&D report SV3-CE01-GNR-000121 and discussed above.

A total of 1217 nonconforming combination PJP and fillet welds are identified in N&D report SV0-CE01-GNR-000030. Of the 1217 nonconforming welds, 145 had been previously replaced with reinforcing bars welded directly to the plates with fillet welds, 869 had been incorporated into the Units 3 & 4 permanent construction, and 203 were on embedments that had not yet been installed and were available for NDE. The affected embedments were shipped on August 30, 2013, September 5, 2013, April 16, 2014, April 25, 2014, June 24, 2014, June 26, 2014, and February 4, 2015. All the 203 welds that were available for NDE were on embedments shipped on April 25, 2014, June 26, 2014, and February 4, 2015: all the nonconforming coupler to plate welds (138) on embedments from the April 16, 2014, and June 24, 2014, shipments had been replaced with reinforcing bars welded directly to the plates with fillet welds; and all the nonconforming welds (808) on embedments from the August 30, 2013, and September 5, 2013, shipments had been incorporated into the Unit 4 permanent construction. The August 30, 2013, and September 5, 2013, shipments consisted of 202 embedments which were used exclusively in the radiologically controlled area of the Unit 4 auxiliary building to anchor the CA20 module to the NI basemat at elevation 66’-6”. These embedments were similar to those used in Unit 3. A total of 4 mechanical couplers are

attached to each plate using combination PJP and fillet welds for a total population of 808 nonconforming welds from the August 30, 2013, and September 5, 2013, shipments. Based on discussions with the licensee, it was determined that the shipment date of the embedment roughly corresponded to the date when the associated nonconforming welds were completed.

To address the nonconforming welds identified in N&D report SV0-CE01-GNR-000030, the licensee performed MT of 123 of the 203 welds that were accessible for inspection and determined the tested welds met the applicable acceptance criteria of AWS D1.1:2000. Based on these results, the licensee concluded that all the welds identified in N&D report SV0-CE01-GNR-000030 conformed to requirements. However, none of the nonconforming welds identified in the N&D report SV0-CE01-GNR-000030 from the August 30, 2013, and September 5, 2013, shipments were directly inspected.

The inspectors noted that Section 3.8.4.2, "Applicable Codes, Standards, and Specifications" of the Unit 3 and Unit 4 UFSAR, respectively, list AISC N690-94 as being applicable to the design, material, fabrication, construction, inspection, and testing of Seismic Category I structures of the Auxiliary Building. Additionally, this section states, in part, that welding and inspection activities for Seismic Category I structural steel meet the requirements of AISC N690-94. As a result, the inspectors determined that the welds connecting structural steel plates and mechanical couplers, used for the attachment of reinforcing bars to the plates, are required to meet the applicable provisions of AISC N690-94.

AISC N690-94 Section Q1.23, "Fabrication," Section Q1.23.9, "Welded Construction," and Section Q1.17, "Welds" require that all welding related activities associated with fabricated structural steel components comply with all the provisions of the AWS "Structural Welding Code – Steel," (AWS D1.1) except as stated in the AISC specification. AWS D1.1-92 is adopted by reference in N690-94, however, AWS D1.1:2000 was approved for use in lieu of AWS D1.1-92 in license amendment 37.

The inspectors also noted that AISC N690-94 Sections Q1.26, "Nondestructive Examination," Q1.26.2, "Minimum Examination of Welds," Q1.26.2.2, "Partial-Penetration Welds," Q1.26.2.3, "Weld Samples," Q1.26.1.2, "Magnetic Particle Examination," and Q1.26.1.3 "Liquid Penetrant Examination" specify requirements for the inspection and acceptance of partial penetration welds.

AISC N690-94 Section Q1.26.2.2 states that partial penetration welds shall be 10 percent inspected by magnetic particle examination or liquid penetrant examination. The examination may be 10 percent of each weld or 100 percent of one weld in ten.

AISC N690-94 Section Q1.26.2.3 states, in part, that if a weld inspected in Section Q1.26.2.2 does not meet the acceptance criteria given in Section Q1.26.1, a second 10 percent sample shall be taken. If this sample does not meet the acceptance criteria, all welds represented by the samples should be inspected.

AISC N690-94 Sections Q1.26.1.2 and Q1.26.1.3 state, in part, that the acceptance criteria shall be in accordance with AWS D1.1, Section 8. The acceptance criteria for partial-penetration welds are provided in AWS D1.1-92, Section 8.15, "Quality of Welds." Similar criteria are provided in AWS D1.1:2000 which has been approved for

use in lieu of AWS D1.1-92. These requirements are provided in AWS D1.1:2000 Section 6, Part C “Acceptance Criteria.”

Based on a review of the applicable sections of N690-94 and AWS D1.1:2000, the inspectors concluded that adequate implementation of the weld inspection requirements provides reasonable assurance that partial-penetration welds are of adequate quality and suitable for service. These requirements consist of 100% VT and MT or PT of a representative sample of the population to verify the welds meet the AWS D1.1:2000 acceptance criteria as described in AISC Section Q1.26. If the weld samples meet the acceptance criteria, all the weld represented by the samples are deemed acceptable for use.

The inspectors reviewed N&D report SV3-CE01-GNR-000121 and concluded that the approach taken to resolve the nonconformance did not meet the requirements of AISC N690-94 Section Q1.26.2.2 in that 10% of the welds on the 202 embedment plates used in the Unit 3 auxiliary building to anchor the CA20 module to the NI basemat were not inspected by MT or PT to verify the weld quality was acceptable. Moreover, the inspectors determined that the MT performed by the licensee on welds completed by Joseph Oat Corporation in 2015 was insufficient by itself, based on industry standard sampling practices and principles, to conclude with reasonable assurance that the quality of the welds on the embedments fabricated by Joseph Oat Corporation in the 2011-2012 time frame and incorporated into the permanent construction met the acceptance criteria. As a result, the inspectors concluded that the quality of the welds identified in N&D report SV3-CE01-GNR-000121 was indeterminate.

The inspectors reviewed N&D report SV0-CE01-GNR-000030 and concluded the disposition was not in compliance with N690-94 and did not support a “use-as-is” disposition for all the nonconforming welds. Specifically, the approach taken to resolve the nonconformance did not meet the requirements of AISC N690-94 Section Q1.26.2.2 in that 10% of the welds from the August 30, 2013, and September 5, 2013, shipments were not inspected by MT or PT to verify the weld quality was acceptable. These welds were distinct from those tested in that they were completed during a time period well outside the range of those included in the sampling plan and represented the complete population of embedments used in the Unit 4 auxiliary building to anchor the CA20 module to the NI basemat. Moreover, the inspectors determined that the MT performed by the licensee on a sample of accessible nonconforming welds was insufficient by itself, based on industry standard sampling practices and principles, to conclude with reasonable assurance that the quality of the welds on the embedments fabricated by Cives Steel Company and shipped on August 30, 2013, and September 5, 2013, met the acceptance criteria. As a result, the inspectors concluded that the quality of the welds from these shipments was indeterminate.

Analysis

The inspectors determined that the failure to adequately review and accept nonconforming items in accordance with documented procedures was contrary to the requirements of 10 CFR Part 50, Appendix B, Criterion XV, and was a performance deficiency.

The finding was considered more than minor because the performance deficiency represented a substantive failure to adequately implement a quality assurance process that rendered the quality of an SSC indeterminate.

The inspectors determined that the finding represented an ITAAC finding because it was material to the acceptance criteria of VEGP Units 3 and 4 ITAAC 763, in that, if left uncorrected, the licensee may not have been able to demonstrate that the acceptance criteria of these ITAAC were met. The acceptance criteria of these ITAAC require that all deviations between the as-built structures and the approved designs be reconciled to verify that the as-built structures will withstand the design basis loads without a loss of structural integrity or other safety-related functions. The inspectors determined that the failure to adequately review and accept nonconforming items in accordance with documented procedures may have resulted in a deviation from the approved design that would not have been reconciled by the licensee.

The inspectors concluded the finding was associated with the Design / Engineering Cornerstone. The inspectors evaluated the finding in accordance with IMC 2519, "Construction Significance Determination Process," and determined the finding was of very low safety significance because the finding is associated with a portion of a structure (auxiliary building) assigned to the intermediate risk column of the AP1000 construction significance determination matrix.

The inspectors reviewed the finding for a possible cross-cutting aspect in accordance with IMC 0613 Appendix F, "Construction Cross-Cutting Areas and Aspects," and determined the finding has a cross-cutting aspect in the Human Performance area because the licensee's contractor WEC failed to use decision making-practices that emphasized prudent choices over those that were simply allowable. Specifically, the sampling plans developed to evaluate the nonconforming welds were not compliant with licensing commitments and, based on industry standard sampling practices and principles, insufficient to conclude with reasonable assurance that the nonconforming welds met the acceptance criteria of AWS D1.1:2000. [H.14].

Enforcement

10 CFR 50 Appendix B, Criterion XV, "Nonconforming Materials, Parts, or Components," requires, in part, that nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures.

Procedure APP-GW-GAP-428, "Control of Nonconforming Items for the AP1000 Program," Rev. 6, Section 7.21.1 states that deviations to design requirements with a disposition of "Repair" or "Use as is" shall be reviewed for licensing impact per APP-GW-GAP-147.

Procedure APP-GW-GAP-147, "AP1000 Current Licensing Basis Review," Revision 2, Section 2.0 states, in part, that AP1000 Activities, shall be reviewed against the current licensing basis to check they comply with licensing commitments.

UFSAR Section 3.8.4.2, "Applicable Codes, Standards, and Specifications" lists AISC N690-94 as being applicable to the design, material, fabrication, construction, inspection, and testing of Seismic Category I structures of the Auxiliary Building.

Additionally, this section states, in part, that welding and inspection activities for Seismic Category I structural steel meet the requirements of AISC N690-94.

AISC N690-94 Section Q1.26.2.2, “Partial-Penetration Welds” states that partial penetration welds shall be 10 percent inspected by magnetic particle examination or liquid penetrant examination. The examination may be 10 percent of each weld or 100 percent of one weld in ten.

AISC N690-94 Section Q1.26.1.2, “Magnetic Particle Examination” states, in part, that the acceptance criteria shall be in accordance with AWS D1.1.

Contrary to the above, the licensee failed to adequately review and accept nonconforming items in accordance with documented procedures, as evidenced by the following examples:

1. On January 16, 2016, AP1000 N&D report SV3-CE-01-GNR-000121, “Joseph Oat Embeds with PJP Welds Lacking AISC N690 Required NDE”, Revision 0 was dispositioned “use-as-is” without verifying the nonconforming items complied with the licensing basis. Specifically, the welds identified in the N&D report were not inspected to verify they met the acceptance criteria of AWS D1.1:2000 as required by AISC N690-94 Sections Q1.26.2.2 and Q1.26.1.2.

2. On January 6, 2016, AP1000 N&D report SV0-CE01-GNR-000030, “Coupler Welds on CS Embeds from Cives Lacking N690 NDE,” Revision 0 was dispositioned “use-as-is” without verifying all the nonconforming items complied with the licensing basis. Specifically, the welds on embedments supplied by Cives Steel Company on August 30, 2013, and September 5, 2013, were not inspected to verify they met the acceptance criteria of AWS D1.1:2000 as required by AISC N690-94 Sections Q1.26.2.2 and Q1.26.1.2.

Because this violation was of very low safety significance (Green) and was entered into the licensee’s corrective action program as condition reports (CR) 10180672 and 10181738, it is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Since the corrective actions have not been fully implemented, this NCV will remain open until the NRC can verify that the acceptance criteria of Units 3 and 4 ITAAC 763 are not impacted.

1A14 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.B-02.05 - Inspection

The inspectors reviewed work related to the rework disposition of N&D SV3-CA20-GNR-000708, "NDE Hold Point Ultrasonic Test (UT) Removed Improperly." The review was to determine whether ultrasonic and magnetic particle (MT) nondestructive testing activities were performed in accordance with the applicable quality and technical requirements. The inspectors selected welds associated with the installation of the CA20 submodule floor from column line 2 to 3 and J2 to K2 at elevation 82'6".

Specifically, the inspectors observed the final UT and MT inspections and reviewed the associated reports on welds CV0901-17 and CV0901-18, as detailed in sketch SV3-CA20-S4K-CV0901, "Weld Map for Installation of CA20 SA2 El. 82'6" Floors," revision 1, to determine whether these examinations were performed in accordance with NDE procedures 100-MT-302 and 100-UT-310 as well as AWS D1.1:2000.

b. Findings

No findings were identified.

1A15 (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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.03 - Special Considerations
- 65001.02-02.07 - Problem Identification and Resolution
- 65001.02-02.08 - Construction Interface Concerns
- 65001.02-02.09 - Concrete Quality Process Problems
- 65001.A.02.01 - Observation of in-Process Installation Activities
- 65001.A.02.04 - Review As-built Deviations/Nonconformance

The inspectors reviewed quality records and performed direct inspection of construction activities associated with the radiologically controlled area of the Auxiliary Building for Vogtle Unit 3. Specifically, the inspectors observed concrete construction activities associated with the following portions of the CA20 structural module:

- wall sections along column line 2 between column lines J-1 and N between elevation 66’-6” and 128’-1”
- wall section along column line 3 between column lines J-1 and J-2 between elevation 98’-0” and 128’-1”
- wall section along column line 3 between column lines J-2 and K-2 between elevation 66’-6” and 128’-1”
- wall section along column line 3 between column lines K-2 and L-2 between elevation 66’-6” and 89’-6”
- wall section along column line 4 between column lines J-1 and J-2 between elevation 66’-6” and 92’-6”

- wall section along column line 4 between column lines J-1 and J-2 between elevation 105’-2” and 128’-1”
- wall section along column line 4 between column lines J-2 and K-2 between elevation 66’-6” and 128’-1”
- wall sections along column line J-1 between column lines 2 and 4 between elevation 66’-6” and 128’-1”
- wall sections along column line J-2 between column lines 2 and 4 between elevation 66’-6” and 128’-1”
- wall section along column line K-2 between column lines 2 and 3 between elevation 66’-6” and 128’-1”
- wall section along column line K-2 between column lines 3 and 4 between elevation 66’-6” and 87’-3”
- wall section along column line L-2 between column lines 2 and 3 between elevation 66’-6” and 128’-1”
- wall section along column line L-2 between column lines 3 and 4 between elevation 66’-6” and 87’-3”

The inspectors reviewed a sample of approved implementing procedures and specifications to determine whether the documents:

- met the requirements specified in the quality assurance program and the UFSAR, including the reconciliation of construction deviations in critical dimensions and tolerances;
- correctly translated requirements from applicable codes and standards;
- described work controls, approved work processes, and inspection requirements;
- included appropriate quantitative and/or qualitative acceptance criteria for determining that the prescribed activities were accomplished satisfactorily;
- clearly prescribed acceptable methods of quality control inspection to ensure that the as-built condition met specified design requirements, drawings and material specifications;
- required measuring and test equipment to be calibrated and maintained in accordance with approved calibration procedures and vendor requirements; and
- provided qualification requirements for craft and quality control inspection personnel performing installation and testing activities.

The inspectors observed concrete delivery operations and reviewed batch plant records to determine whether:

- batch records were generated, controlled, and indicated placement location, mix, volume, date, time, and special instructions;
- each truck was measured and each trip received proper ticketing and documentation;
- transporting equipment was suitable, reliable, and in an acceptable condition;
- the time limit between mixing and placement was not exceeded;
- temperature limits were not exceeded;
- water was adjusted to account for moisture content of aggregates;
- test results were being utilized at the batch plant to adjust mix proportions, as allowed by the procedures and specifications, to optimize concrete mix characteristics for the placement; and,

- remixing in the truck after required water additions conformed to the appropriate standards, including the amount of water allowed as called out in the concrete mix design specifications.

The inspectors observed concrete pre-placement activities to determine whether pre-placement planning and training had been completed (including appropriate considerations for hot weather, cold weather, mass concrete, pumping, and contingency preparations for stopping a concrete placement) and the pre-placement inspection was performed by QC before any concrete was placed. Prior to concrete placement, the inspectors independently evaluated whether the placement configuration met drawings and specifications included in the work packages, all deviations were adequately captured and addressed, and preparation and cleanliness of the formwork had been completed. 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 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 approved and calibrated;
- 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 placement, the inspectors observed in-process concrete testing to determine whether:

- concrete temperature, slump, air content, and unit weight were 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 qualified.

The inspectors reviewed aspects of the concrete placement processes to determine whether process controls were in place, to verify that issues identified were adequately documented and corrected, and to verify that any process related issues did not adversely affect the concrete quality. The inspectors reviewed a sample of in-process

work packages for reinforcing steel, embedments, formwork, and concrete placement to determine whether:

- the latest approved procedures, drawings, and other work instructions were available at the installation area;
- the installation, inspection, and testing sequences were maintained;
- the licensee had verified that the items to be installed met specified requirements;
- the items being installed were not damaged prior to installation;
- materials, tools, and other equipment being used were qualified and approved in accordance with site procedures;
- nonconforming items were clearly identified, segregated if possible, and dispositioned;
- inspection and test reports were current, accurate, and complete; and
- design changes, field modifications, and nonconformances associated with the work observed were properly controlled and processed in accordance with the approved QA program.

The inspectors interviewed licensee and contractor personnel to determine whether:

- contractors performing safety-related work followed approved implementing procedures that describe administrative and procedural controls, approved work processes, and inspection requirements;
- design processes were performed in compliance with applicable instructions and procedures;
- personnel conducting work and quality assurance roles were qualified and knowledgeable; and
- effective oversight in accordance with specifications and program requirements was implemented for the installation activities observed.

The inspectors reviewed a sample of design changes to verify the following activities were performed in accordance with procedural requirements:

- coordination of structural concrete activities with other disciplines;
- the interchange of design information between designers, constructors, inspectors, and managers regarding structural work, constructability issues, and field changes;
- timeliness in design changes and drawing revisions; and
- documentation and inspection of installation activities for areas that would become inaccessible after concrete placement.

The inspectors reviewed a sample of nonconformances to verify:

- the licensee was identifying problems at an appropriate threshold and entering them into the corrective action program;
- any differences between the as-built and as-designed SSCs were documented and dispositioned in accordance with approved modification or change procedures; and
- the nonconformances were resolved and their dispositions had adequate technical bases.

b. Findings

No findings were identified.

1A16 (Unit 3) ITAAC Number E.3.9.05.01.05 (853) / Family 18A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number E.3.9.05.01.05 (853). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.18-02.08-Emergency Facilities and Equipment
- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors conducted a walkdown of the Operations Support Center (OSC), and reviewed a drawing of the Maintenance Support Building (MSB) to verify that the OSC is physically located within the MSB. The inspectors also reviewed the as-built verification statement in the licensee's principle closure document for this ITAAC.

b. Findings

No findings were identified.

1A17 (Unit 4) ITAAC Number 2.2.01.03a (93) / Family 06B

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 2.2.01.03a (93). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.06-02.01 - General Installation
- 65001.06-02.02 - Component Welding
- 65001.11-02.03 - Installation and Welding

The inspectors observed in-process machine SAW activities of the girth weld for the lower ring to the bottom head of the containment vessel, including Flux Core Arc Welding (FCAW) to the insert plate below the H02 equipment hatch and penetration sleeves. Specifically, the inspectors determined whether weld cleanliness, surface alignment, removal of temporary attachments, induction preheating, and bevel preparation of the head after weld build-up under the H02 were performed in accordance with the requirements of the 2000 Edition including 2002 Addenda of the American Society of Mechanical Engineers (ASME) Section III, Article NE-4000, Fabrication and Installation, for a double-welded groove butt joint.

b. Findings

No findings were identified.

1A18 (Unit 4) ITAAC Number 2.5.01.03c (513) / Family 10F

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 2.5.01.03c (513). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.16-02.03 - Design Documents
- 65001.F-02.01 - Design Document Review

The inspectors interviewed responsible design personnel and performed a review of licensee records and design documentation to verify that software diversity has been achieved between the DAS and the PMS as specified in ITAAC 2.5.01.03c. The inspectors assessed licensee conformance with 10 CFR 50.55a(h), 10 CFR 50 Appendix A - General Design Criterion 22, NUREG/CR-6303, "Method for Performing Diversity and Defense-in-Depth Analyses of Reactor Protection Systems, " Branch Technical Position 7-19 (NUREG-800), "Guidance for Evaluation of Diversity and Defense-In-Depth in Digital Computer-Based Instrumentation and Control Systems, " and the acceptance criteria of ITAAC 2.5.01.03c. Software diversity between the DAS and PMS was sampled in the following areas: Algorithms, Logic, Program Architecture, Executable Operating System, and Executable Software.

Algorithms

The inspectors verified that algorithm diversity was achieved consistent with the ITAAC acceptance criteria by reviewing the PMS and DAS design documents of the digital systems that compare plant parameter incoming signals (i.e., proper S/G water level, in-range reactor coolant pressure) to pre-defined setpoints which determined whether or not to initiate a protective action. The NRC inspectors reviewed a sampling of design specifications, functional requirements, and system specifications to verify that the algorithms used were diverse between the PMS and DAS. The inspectors noted that the algorithms performed for the PMS were implemented through Common Q software, whereas the DAS executed algorithms were implemented within the FPGA. Specifically, the algorithm for the Steam Generator water level compensation was reviewed to ensure that algorithm definitions were different between PMS and DAS.

The inspection team also reviewed the attribute of algorithm diversity for the CRC polynomials for the CIM, a PMS subsystem, and DAS. The inspectors completed a code review walk-through with the independent reviewer that originally performed the code review. The inspectors noted the Verilog code for the CIM subsystem and the DAS CRC32 modules were implemented using a different sequence of logic steps.

Logic

The inspectors reviewed the logic for the PMS and DAS to determine how each system accomplishes their setpoint comparison and trip actuation to confirm conformance to the software logic diversity acceptance criteria of the ITAAC. The inspectors reviewed DAS FPGA functional requirements, logic diagrams, and implemented logic for DAS partial trip protective function actuations. It was noted that the logic path for the partial

trip setpoint comparison and actuation for the DAS was handled by the Advanced Logic System FPGA platform control logic board with logic that is implemented on an FPGA chip. For the PMS reactor trip signal, the inspectors reviewed design specifications and software design descriptions. The corresponding PMS reactor trip comparison and actuation logic path was noted by the inspectors to be executed in the BPL subsystem. It was observed that the process and activities required to physically program the DAS FPGA chip, such as simulation, synthesis and "place and route" tasks, are not a part of the PMS's BPL software development process. In reference to the PMS, the inspectors observed that the BPL software development process includes developing protective safety function application specific software and loading that software onto a BPL processor module, of which the diverse DAS FPGA chip does not contain a processor module.

Program Architecture

The inspectors focused on verifying program architectural diversity based on an evaluation of the various communication methodologies employed within each subsystem and a review of each individual FPGA chip design. Specifically, the inspectors reviewed PMS/CIM and DAS system design descriptions, block diagrams, and SRS to confirm adequate identification and fulfillment of the system level requirements for communication technology diversity between the CIM/SRNC and DAS sub-systems. The inspection team confirmed that the PMS/CIM employed a combination of communication protocols consisting of: (Advant) HSL protocol, X-Bus, and Y-Bus. The PMS uses HSL for interdivisional communication, AF100 for intra-divisional communication, and UDP for the FPDS auxiliary Communications. Additionally, Global MDATs are used for communications on the AC160 backplane used in the PMS. For the DAS communication, the Reliable ALS Bus and Test ALS Bus communication protocols are employed. The inspectors verified that each communication protocol was adequately defined and passed down to the subsystem requirements specifications as required. The inspectors confirmed that the utilization of the various communication protocols was either unique for each subsystem or used to fulfill different subsystem level requirements within each subsystem. For example, the use of discrete copper in the PMS/CIM architecture fulfilled subsystem level requirements that were different than the application of the same protocol used in the DAS subsystem.

The inspectors also reviewed various FPGA design documentation, including selected block diagrams for the PMS/CIM and the DAS subsystems and discussed the differences in the designs of these FPGAs with the vendor's staff to confirm that I/O structure, communication protocols, and design implementation of each was different for the PMS/CIM and DAS subsystems. The inspectors also reviewed the FPGA design specifications for each FPGA model and verified the chip designs were significantly different in terms of physical chip size, gate population, and ram block size. The inspectors noted that these differences enabled the use of different code structure and densities within the FPGA. The inspectors also verified that important characteristics of each FPGA design were implemented differently for each chip model. Specifically, the inspectors verified that the CIM FPGA used a non-segmented routing hierarchy, while the DAS FPGA utilizes a segmented hierarchical routing and clock structure. Clock conditioning circuits between the two FPGA designs were significantly different in density, layering, numbers of VersaTiles (D-flip-flops), and maximum user I/O's for each chip type.

In addition, the inspectors verified that the FPGA chips were physically dissimilar as a result of a visual inspection of prototype PMS/CIM and DAS circuit boards. The inspectors verified that each chip was uniquely labeled, and the physical dimensions were verified to be significantly different from each other. The inspectors verified that the work travelers for each PMS/CIM and DAS circuit board included inspection records which identified each FPGA by unique serial number in accordance with the visual inspection procedure requirements.

Executable Operating System and Executable Software

The inspectors reviewed technical reports, design specifications, software and hardware requirements, logic specifications, and functional requirements to assess that software diversity between the PMS and DAS was achieved in the areas of executable operating system and executable software. The inspectors noted that the safety function actuation logic executed in the PMS is generated by a microprocessor operating on a Common Q platform. In contrast, the DAS performs its functions using a FPGA technology platform. The inspectors also noted that the SRNC/CIM, a subsystem of PMS, also functions on an FPGA platform. The inspectors observed that SRNC/CIM FPGA technology does not inherently function on an executable operating system and therefore does not utilize executable software. The inspectors noted the diversity between the PMS using a microprocessor based Common Q executable operating system/software and the DAS using an FPGA technology based system that does not have an executable operating system/software.

The inspection team also assessed the licensee's formal review and acceptance of Westinghouse document APP-DAS-J0R-002, "AP1000 Diverse Actuation System Diversity Analysis," Revision 0. This document is the PCD for ITAAC 2.5.01.03c and is cited in the ITAAC Determination Basis and directly supports the conclusion that the ITAAC Acceptance Criteria are met. The ITAAC Determination Basis is the information provided in the ITAAC Closure Notification that summarizes the methodology for conducting the inspections, tests and analyses, and the results that demonstrate the acceptance criteria are met. The inspection team verified that a PCD review was completed and documented in accordance with procedure, ND-RA-001-008, "ITAAC Principal Closure Document Acceptance," Version 2.0. In addition, the inspectors reviewed a sample of the qualification records for the responsible PCD reviewer to determine whether the reviewer's qualifications were current and in accordance with ND-RA-001-008. Specifically, the inspectors noted the reviewer's training was complete and current for course, ND-IA-015, "ITAAC PCD Review and Acceptance."

b. Findings

No findings were identified.

1A19 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures
- 65001.B-02.03 - Welder Qualification
- 65001.B-02.04 - Production Controls
- 65001.B-02.05 - Inspection
- 65001.F-02.02 - Fabrication Records Review

The inspectors reviewed fabrication records of module CA05, which is part of the east wall for the chemical and volume control system (CVS) room from elevation 80-6" to 107'-2". The inspectors reviewed records for 2 single-welded groove butt joint weld-nos. CV12577-1 and -2 using backing bars during assembly of the structural submodules. Specifically, the inspectors verified QC hold points were satisfactorily signed-off for fit-up and tack before starting the root pass and final surface visual and magnetic particle examinations, and that the traceability of materials and welders with continuity of qualifications were performed in accordance with the requirements of the AWS D1.1:2000 code for welding structural steel.

The inspectors observed a localized weld repair on vertical seam CV12732-2-RW1 that joins carbon steel submodules CA05-05 to -06 under work package SV4-CA05-S4W-CV6034 obtained from WMR No. 145831. Specifically, the inspectors verified that the welding techniques for the weld repair cavity, weld filler metal classification ER80S-Ni1 using 3/32" diameter, and welder KWD5233 qualification for manual Gas Tungsten Arc Welding (GTAW) continuity were adequately implemented in accordance with the requirements of the CB&I GWS-2, AWS D1.1 - Structural Steel General Welding Specification.

In addition, the inspectors reviewed two Mistras NDE reports for PAUT of weld-nos. CV12577-1 and -2 to determine whether inspection methods and techniques for straight and angle beam scanning, calibration, frequency, transducer size, wedge angle, and sensitivity for 10% examination of the acceptable seam weld was performed in accordance with the requirements of AISC N690-1994 paragraphs Q1.26.1.1 and Q1.26.2.1, and AWS D1.1:2000-Annex K for statically loaded structures.

b. Findings

No findings were identified.

1A20 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.B-02.04 - Production Controls
- 65001.B-02.05 - Inspection
- 65001.B-02.06 - Records

The inspectors observed the assembly of the Vogtle Unit 4 CA05 structural module, which is part of the east wall for the chemical and volume control system (CVS) room from elevation 80-6" to 107'-2", to determine whether construction activities were performed in accordance with the AWS D1.1:2000 Code, relevant design documents, and 10 CFR Part 50, Appendix B. Specifically, the inspectors observed the welding and nondestructive testing for the two complete joint penetration welds between CA05-04 and CA05-05 (weld numbers CV12754-1 and CV12754-2). The inspectors also observed the in-process welding of weld number CV12733-2, which joined submodules CA05-01 and CA05-02.

The inspectors independently measured the groove angle and root opening of welds CV12754-1, CV12754-2, and CV12733-2 to verify that the as-fit joint conformed to the joint designation specified on the WPS and GWS-2 specification. The inspectors observed SMAW techniques of welder JDH3801 on the vertical weld seam CV12733-2. This butt joint was welded using two stringers of deposited weld metal on the backing bar for the first layer root pass to achieve complete joint penetration that joins submodules CA05-01 to CA05-02. In addition, the inspectors observed actual welding parameters on the aforementioned welds to verify that welders were within the ranges specified by WPS22-1.1S03.

The inspectors reviewed the certified material test reports for backing bar heat number JI4757 (A36) and filler metal lot number 1189C (ER80S-Ni1) for conformance to the material and procurement specifications. The inspectors verified that this material was purchased to the requirements of 10 CFR Part 21 and 10 CFR Part 50, Appendix B.

The inspectors performed an independent final visual inspection of welds CV12754-1 and CV12754-2 to determine whether the final weld satisfied the requirements of Table 6.1, "Visual Inspection Acceptance Criteria," of AWS D1.1:2000. The inspectors also verified that the final weld profile met the requirements of section 5.24.4, "Groove or Butt Welds," of AWS D1.1:2000.

The inspectors observed MISTRAS quality control inspectors performing magnetic particle inspection of CV12754-1 to determine whether the examination was performed according to procedure 100-MT-302, "Magnetic Particle Examination in Accordance with AWS Structural Welding Code." The inspectors also reviewed the final ultrasonic testing report on CV12754-1 to verify the examination was conducted and the weld was determined to be acceptable in accordance with 100-UT-310, "Ultrasonic Examination of Welds in Accordance with The AWS Structural Welding Code D1.1."

b. Findings

No findings were identified.

1A21 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01 - Inspection of ITAAC-Related Foundations & Buildings
- 65001.01-02.06 - Records
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.02 - Laboratory Testing
- 65001.02-02.06 - Record Review
- 65001.02-02.07 - Problem Identification and Resolution
- 65001.A.02.04 - Review As-built Deviations/Nonconformance
- 65001.F-02.02 - Fabrication Records Review

The inspectors reviewed quality records and performed inspection of construction activities associated with the containment internal structures for Vogtle Unit 4. Specifically, the inspectors observed activities associated with the concrete inside containment between elevations 71'-6" and 76'-6".

The inspectors reviewed test results for drilled concrete core cylinder compression breaks to determine whether:

- records were complete, accurate, and approved as required;
- test results were reviewed and evaluated against appropriate acceptance criteria;
- the records were retrievable; and
- any adverse trends or problems were identified at an appropriate threshold and documented in accordance with the approved into the corrective action program.

The inspectors reviewed the final inspection results, concrete core testing results, and other information related to the placement to determine whether the placement was subjected to an integrated review before acceptance, that the as-built documentation was complete, and that these activities were controlled and accomplished in accordance with the quality assurance program.

The inspectors reviewed the structural concrete records to determine whether they were complete, accurate, and provided evidence that the quality and code requirements were satisfied. The inspectors reviewed a sample of installation and inspection records to determine whether:

- the records were adequate to furnish evidence of activities affecting quality;
- adequate concrete production, placement, inspection, protection and curing activities were performed;
- the installation of embedded components was properly controlled;
- objective test results were available to demonstrate compliance with quantitative acceptance criteria;
- inspection records provided evidence that the timing of events and time-dependent work activities were consistent with their specification requirements; and
- the as-built SSCs conformed to applicable codes, standards, quality requirements, and technical requirements.

The inspectors reviewed a sample of nonconformances to verify:

- the licensee was identifying problems at an appropriate threshold and entering them into the corrective action program;
- any differences between the as-built and as-designed SSCs were documented and dispositioned in accordance with approved modification or change procedures; and
- the nonconformances were resolved and their dispositions had adequate technical bases.

b. Findings

No findings were identified.

1A22 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

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

The inspectors observed in-process vertical Gas Metal Arc Welding (GMAW) of a corner joint seam (CV13400-1) joining stainless steel submodules CA01-19D to CA01-48B. The inspectors reviewed WMR No. 147087 for work package SV4-CA01-S4W-CV1428 and weld record SV4-CA01-S4K-CV13400. Specifically, the inspectors verified that the backstep sequencing technique using fewer weld passes to minimize distortion, and weld filler metal classification ER2209 were adequately implemented by welder BSR9961 in accordance with the requirements of the AWS D1.6-1999 code for stainless structural steel.

b. Findings

No findings were identified.

1A23 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures

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

The inspectors observed in-process manual GTAW by welder AD7167 of a stainless steel pipe to the end plate of leak chase weld number MK L131-1 for submodule CA01-18. This was performed using a fillet weld and ER308L weld filler metal for work package SV4-WLS-P010-MEL0235 and weld record SV4-WLS-PLS-572-13. The inspectors determined that the contents of WMR 145801 were adequate in accordance with the requirements of CB&I FMC-1, Filler Metal Control, for this activity.

b. Findings

No findings were identified.

1A24 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.04 - Key Dimensions and Volumes
- 65001.01-02.05 - Steel Structures
- 65001.01-02.06 - Records
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.A.02.04 - Review As-built Deviations/Nonconformance
- 65001.B-02.06 - Records
- 65001.F-02.02 - Fabrication Records Review

The inspectors reviewed the associated drawings, receipt inspection packages, CMTRs, weld travelers, and N&Ds for submodule CA01-04, the wall connecting the reactor vessel cavity, refueling cavity, and east steam generator compartment from elevation 83'-0" to 153'-0", to verify the following:

- the quality assurance inspection reports indicated the material received was satisfactory;
- the chemical composition and mechanical properties determined through destructive testing met the industry standards for each heat number;
- traceability was maintained between each uniquely identified weld number and corresponding heat used; and
- all nonconformances were adequately identified, dispositioned with proper justifications, and appropriately reflected in approved design documents.

The inspectors performed direct measurements of selected dimensions of the CA01-14 steel submodule (reactor vessel cavity north wall) to determine whether the size, shape, and dimensions were in accordance with the approved design. The inspectors measured aspects such as stud spacing and location, plate size and thickness,

penetration sizes, and “C” channel and angle iron sizes and locations. Where actual dimensions differed from the approved drawings, the inspectors reviewed approved E&DCRs that were not yet incorporated into the drawings to determine whether the deviation was adequately controlled and approved. The inspectors also reviewed submodule identification, marking, and tagging to determine if adequate QA markings existed that indicated the receipt status and identity the submodule.

b. Findings

No findings were identified.

1A25 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.05 - Steel Structures
- 65001.01-02.06 - Records
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.A.02.04 - Review As-built Deviations/Nonconformance
- 65001.B-02.04 - Production Controls
- 65001.B-02.06 - Records

The inspectors performed an inspection of fabrication and receipt activities associated with the Unit 4 shield building. The inspectors reviewed various documents such as fabrication drawings, nonconformance and disposition reports (N&Ds), 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
- the as-built configuration was in accordance with the final design of the facility and met the associated ITAAC.

Specifically, the inspectors reviewed these records for the shield building panels 04J and 06H.

b. Findings

No findings were identified.

1A26 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.06 - Records
- 65001.01-02.07 - Identification and Resolution of Problem
- 65001.B-02.05 - Inspection
- 65001.B-02.06 - Records
- 65001.F - Inspection of the ITAAC-Related Design and Fabrication Requirements
- 65001.F-02.01 - Design Document Review
- 65001.F-02.02 - Fabrication Records Review

The inspectors performed an inspection of fabrication and receipt activities associated with the Unit 4 shield building. The inspectors reviewed various documents such as fabrication drawings, 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.

Specifically, the inspectors reviewed these records for the shield building panels 01Q and 01R.

b. Findings

No findings were identified.

1A27 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors performed direct inspection of construction activities associated with the Shield Building for Vogtle Unit 4. Specifically, the inspectors observed construction activities associated with the basemat section along the west side of the shield building between elevation 82'-6" and 87'-6".

Specifically, the inspectors performed direct observations, interviewed licensee personnel, and reviewed associated documentation from the work package for the concrete placement to ensure the following:

- pre-placement planning and training was completed as required to assure good quality construction and to protect against unplanned construction joints;
- provisions were established for the placement of mass concrete;
- pre-placement inspections were performed by QC prior to concrete placement;
- accepted procedures and specifications were followed throughout the concrete placement;
- the pump truck used to deliver the concrete to the point of placement was of suitable size and condition for the work;
- batch tickets were reviewed for verification of proper mix, transport time, placement location, and amount of temper water being added at the truck delivery point;
- placement drop distances did not exceed specification requirements and did not result in segregation;
- inspection during placement was performed as required;
- records were produced and reviewed, and indicated mix, location, time placed, water additions, and temperature of the concrete mix and ambient conditions;
- in process testing for concrete temperature, slump, air content, and unit weight were being determined at the proper location and frequency as required in the design specifications;
- test specimen samples, for concrete strength determination, were sampled at the required location and frequency and are cured in accordance with specified requirements; and
- concrete curing was in accordance with specifications and procedures with regard to the method, materials, duration, temperature, inspections, and records.

The inspectors observed installation activities and performed independent measurements for the shield building reinforced concrete basemat associated with the steel reinforcement, including horizontal and vertical reinforcing steel bars, and bar splices to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- horizontal and vertical reinforcing steel was located properly in the structure, was sized as specified in drawings and calculations, and had proper clearances; and
- reinforcing steel was secured and free of concrete or excessive rust.

A review of the design commitments, licensing basis documents, design calculations, and design output documents for structural embed plates was performed by the inspectors. Design calculations were reviewed to determine whether the embedments were designed in accordance with the licensing basis. The inspectors also reviewed the design calculations and output documents to verify the design was performed and controlled in accordance with applicable procedures and processes. The design documents and processes reviewed by the inspectors for the embed plates were global designs and apply for all embed plates used throughout the nuclear island of each unit. Specifically, the inspectors verified:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were correctly translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations;
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

b. Findings

No findings were identified.

1A28 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.01-02.03 - Key Site Parameters
- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.02-02.03 - Special Considerations
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.F-02.01 - Design Document Review

The inspectors reviewed quality records and performed direct inspection of construction activities associated with the non-radiologically controlled area of the Auxiliary Building for Vogtle Unit 4. Specifically, the inspectors observed construction activities associated with the following wall sections between elevation 66’-6” and 82’-6”:

- wall section along column line L between column lines 9.2 and 11
- wall section along column line M between column lines 9.2 and 11
- wall section along column line P between column lines 9.2 and 11
- wall section along column line 9.2 between column lines L and P

The inspectors reviewed a sample of approved implementing procedures and specifications to determine whether the documents:

- met the requirements specified in the quality assurance program and the UFSAR;
- correctly translated requirements from applicable codes and standards;
- described work controls, approved work processes, and inspection requirements;
- included appropriate quantitative and/or qualitative acceptance criteria for determining that the prescribed activities were accomplished satisfactorily;
- clearly prescribed acceptable methods of quality control inspection to ensure that the as-built condition met specified design requirements, drawings and material specifications; and
- provided qualification requirements for craft and quality control inspection personnel performing installation and testing activities.

For the wall section along column line L listed above, the inspectors reviewed a sample of design calculations, design changes, drawings included in the work packages, and specifications to determine whether:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations;
- the documents adequately defined the final design and arrangement of these SSCs;
- critical attributes associated with the ITAAC were correctly identified and documented for review and approval by responsible engineering personnel; and
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

The inspectors observed installation activities and performed independent measurements for the wall sections along column line L and column line M listed above associated with embedments, penetrations, and steel reinforcement, including horizontal and vertical reinforcing steel bars, bar splices, and embedment anchors to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- penetrations, reinforcing steel, and embedments were located properly in the structure, were sized as specified in drawings and calculations, and had proper clearances; and
- reinforcing steel and embedments were secured and free of concrete or excessive rust.

For the wall sections listed above, the inspectors observed concrete pre-placement activities to determine whether pre-placement planning and training had been completed, including appropriate considerations for hot weather, and the pre-placement inspection was performed by quality control before any concrete was placed. Prior to concrete placement, the inspectors independently evaluated whether the reinforcing steel met drawings and specifications included in the work packages, all deviations were adequately captured and addressed, and preparation and cleanliness of the formwork had been completed. The inspectors observed concrete delivery and placement activities for the wall sections listed above to determine whether:

- accepted procedures and specifications were followed throughout the concrete placement;
- concrete was batched in accordance the specified mix design;
- mixing equipment operated at specified rotation speeds and blade wear was not excessive;
- transporting equipment was suitable, reliable, and in an acceptable condition;
- the placement equipment used was suitable for the work and performed as required;
- scales and meters were calibrated;
- each truck was measured and each trip received proper ticketing and documentation;
- batch records were generated, controlled, reviewed for verification, and indicated placement location, mix, volume, date, transport time, amount of temper water being added at the truck delivery point, and special instructions;
- test results were being utilized at the batch plant to adjust mix proportions, as allowed by the procedures and specifications, to optimize concrete mix characteristics for the placement;
- remixing in the truck after required water additions conformed to the appropriate standards, including the amount of water allowed as called out in the concrete mix design specifications;
- the time limit between mixing and placement was not been exceeded;
- temperature limits were not exceeded;
- placement drop distances did not exceed specification requirements and did not result in segregation;
- concrete was placed in lifts in accordance with the concrete placement plan; and
- inspection during placement was performed as required.

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

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

b. Findings

No findings were identified.

1A29 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.F-02.01 - Design Document Review
- 65001.F-02.03 - Observation of Fabrication Activities
- 65001.F-02.04 - General QA Review

The inspectors performed direct inspection of construction activities associated with the non-radiologically controlled area of the auxiliary building for Vogtle Unit 4. Specifically, the inspectors observed construction activities associated with the wall sections along column line I between column lines 7.3 and 10 between elevation 82’-6” and 100’-0” and along column line 7.3 from column line I to the shield building between elevation 66'-0" and 100'-0".

The inspectors observed installation activities and performed independent measurements for the Auxiliary Building wall section along column line I between column lines 7.3 and 10 between elevation 82’-6” and 100’-0” wall in the non-radiologically controlled portion of the building associated with the steel reinforcement, including horizontal and vertical reinforcing steel bars, and bar splices to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- horizontal and vertical reinforcing steel was located properly in the structure, was sized as specified in drawings and calculations, and had proper clearances; and
- reinforcing steel was secured and free of concrete or excessive rust.

The inspectors observed QC inspection walk downs of the auxiliary building wall section along column line I between column lines 7.3 and 10 between elevation 82’-6” and 100’-0” in the non-radiologically controlled portion of the building associated with steel reinforcement. The inspectors observed QC personnel in the process of completing a QC inspection. This was done to verify that QC inspections for safety related concrete structures were completed in accordance with the applicable procedures and met the requirements of NQA-1-1994. Specifically, the inspectors verified the following:

- the installation and inspection sequences were maintained;
- the licensee had verified that the items to be installed met specified requirements;
- inspection and test reports were current, accurate, and complete;
- personnel conducting work and quality assurance roles were qualified and knowledgeable;
- effective oversight in accordance with specifications and program requirements were implemented for the installation activities observed; and
- the recorded information was complete, accurate, met the licensing basis, and conformed to applicable specifications.

The inspectors reviewed the licensee's design commitments, design documents, design calculations, work package drawings, and specifications for the wall section along column line 7.3 to determine whether:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were correctly translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations;
- the documents adequately defined the final design and arrangement of these SSCs;
- critical attributes associated with the ITAAC were correctly identified and documented for review and approval by responsible engineering personnel; and
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

A review of the design commitments, licensing basis documents, design calculations, and design output documents for structural embed plates was performed by the inspectors. Design calculations were reviewed to determine whether the embedments were designed in accordance with the licensing basis. The inspectors also reviewed the design calculations and output documents to verify the design was performed and controlled in accordance with applicable procedures and processes. The design documents and processes reviewed by the inspectors for the embed plates were global designs and apply for all embed plates used throughout the nuclear island of each unit. Specifically, the inspectors verified:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were correctly translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations; and
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

b. Findings

No findings were identified.

1A30 (Unit 4) 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 IPs/sections to perform this inspection:

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

The inspectors observed assembly of the Vogtle Unit 4 CA20 structural module, which makes up part of areas 5 and 6 of the radiologically controlled area of the Auxiliary Building, to determine whether construction activities were performed in accordance with the applicable codes and standards. Specifically, with AWS D1.1:2000, AWS D1.6:1999 Codes, relevant design documents, and 10 CFR Part 50, Appendix B. The inspectors observed in-process machine welding, and reviewed welder/operator continuity logs and weld maps/records for the following ten leak chase fillet welds and nine complete joint penetration groove welds that join submodule walls by combining the use of a plug bar and backing plate with subsequent reports of acceptable phased-array ultrasonic examinations:

- CA20-19 and CA20-20 groove weld no. CV11163-L05-2
- CA20-19 and CA20-20 fillet weld-nos. CV11163-L05-5, -6, -7, and -8
- CA20-19 and CA20-20 groove weld nos. CV11163-L18-1 and -2
- CA20-19 and CA20-20 fillet weld-nos. CV11163-L18-5, -6, -7, and -8
- CA20-27 and CA20-28 groove weld-nos. CV12794-L31-1 and -2
- CA20-29 and CA20-30 groove weld-nos. CV13032-L28-1 and -2
- CA20-29 and CA20-30 fillet weld-nos. CV13032-L33-9 and -10
- CA20-71 and CA20-72 carbon steel groove weld no. CV11072-L36-3
- CA20-72 and CA20-73 carbon steel groove weld no. CV11047-L35-3-C1 (cut-out and re-weld)

During this inspection, the inspectors verified that a sample of welding variables were within the ranges allowed by the WPS, such as filler metal size and classification, voltage, amperage, travel speed, wire feed speed, shielding gas composition, and shielding gas flow rate. Furthermore, during the in-process welding, the inspectors verified the following attributes:

- the work was conducted in accordance with travelers (weld data sheet) that provided for the proper sequencing of the work and that these weld data sheets properly referenced the applicable code, procedures, drawings, and specifications;

- the weld data sheets established adequate hold points (signed-off by QC), as required by the quality inspection plan;
- the in-process fit-up and tack welding of the backing plate to the plug bar and adjoining plate bevels were adequate for butt and corner joints;
- the weld joint was sufficiently protected from inclement conditions, such as high wind;
- the welders and welding operators were traceable to the weld;
- the filler metals and backing bars used in the weld joint were traceable, and alloying contents and properties were in accordance with the requirements of material specifications; and
- the distortion caused by restraints and heating/cooling of metal was minimized by using fewer weld passes and the backstep sequencing technique with weld passes that were deposited in the direction opposite to the progress of welding.

The inspectors reviewed the certified material test reports for weld filler material and plug bar to verify conformance to site procurement specifications and related codes and standards. The inspectors verified that the material was purchased under the 10 CFR Part 21 and 10 CFR Part 50, Appendix B requirements.

In addition, the inspectors reviewed five Mistras NDE reports and a certification record of technician ID-507330 for Level II PAUT with annual visual acuity to determine whether inspection methods and techniques for straight and angle beam scanning, calibration, frequency, transducer size, wedge angle, and sensitivity for 10% examination of acceptable seam welds were performed in accordance with the requirements of AISC N690-1994 paragraphs Q1.26.1.1 and Q1.26.2.1, and AWS D1.6:1999 for statically loaded structures.

b. Findings

No findings were identified.

1A31 (Unit 4) 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 IPs/sections to perform this inspection:

- 65001.02-02.01 - Inspection of Concrete Placement
- 65001.A.02.01 - Observation of in-Process Installation Activities

The inspectors reviewed quality records and performed direct inspection of construction activities associated with the radiologically controlled area of the Auxiliary Building for Vogtle Unit 4. Specifically, the inspectors observed construction activities associated with the wall section along column line I between column lines 4 and 7 between elevation 82’-6” and 100’-0”.

The inspectors observed installation activities associated with formwork, embedments, and steel reinforcement to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- reinforcing steel and embedments were located properly in the structure, were sized as specified in drawings, and had proper clearances;
- reinforcing steel and embedments were secured and free of concrete or excessive rust; and
- forms were secure, leak tight, and free from debris or excess water.

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 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 approved and calibrated;
- 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 indicated mix, location, time placed, water additions, temperature of the concrete mix, and ambient conditions.

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

- concrete temperature, slump, air content, and unit weight were 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 qualified.

The inspectors observed curing activities to determine whether curing was in accordance with specifications and procedures with regard to the method, materials, duration, temperature, and inspections. The inspectors performed independent inspection and measurements of the as-built concrete to determine whether the as-built configuration met the design specifications.

b. Findings

No findings were identified.

1A32 (Unit 4) 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 IPs/sections to perform this inspection:

- 65001.01-02.01 - Procedures
- 65001.01-02.06 - Records
- 65001.A.02.02 - Installation Records Review
- 65001.A.02.03 - Independent Assessment/Measurement Inspection
- 65001.F-02.02 - Fabrication Records Review
- 65001.F-02.04 - General QA Review

The inspectors performed direct inspection of construction activities associated with the radiologically controlled area of the Auxiliary Building for Vogtle Unit 4. Specifically, the inspectors observed construction activities associated with the wall section along column line I between column lines 7 and 7.3 between elevation 82'-6" and 100'-0".

The inspectors observed installation activities and performed independent measurements for the Auxiliary Building wall in the radiologically controlled portion of the building associated with the steel reinforcement, including horizontal and vertical reinforcing steel bars, and bar splices to determine whether:

- the installation activities met applicable quality and technical requirements established by approved procedures, specifications, and drawings included in the work packages;
- horizontal and vertical reinforcing steel was located properly in the structure, was sized as specified in drawings and calculations, and had proper clearances; and
- reinforcing steel was secured and free of concrete or excessive rust.

The inspectors observed Quality Control (QC) inspection walk downs of the Auxiliary Building wall in the radiologically controlled portion of the building associated with steel reinforcement. The inspectors observed QC personnel in the process of completing a QC inspection to verify QC inspections for safety related concrete structures were completed in accordance with the applicable procedures, met the requirements of NQA-1 1994, and to determine whether:

- the installation and inspection sequences were maintained;
- the licensee had verified that the items to be installed met specified requirements;
- inspection and test reports were current, accurate, and complete;
- personnel conducting work and quality assurance roles were qualified and knowledgeable;

- effective oversight in accordance with specifications and program requirements were implemented for the installation activities observed; and
- the recorded information was complete, accurate, met the licensing basis, and conformed to applicable specifications.

A review of the design commitments, licensing basis documents, design calculations, and design output documents for structural embed plates was performed by the inspectors. Design calculations were reviewed to determine whether the embedments were designed in accordance with the licensing basis. The design documents and processes reviewed by the inspectors for the embed plates were global designs and apply for all embed plates used throughout the nuclear island of each unit. The inspectors also reviewed the design calculations and output documents to verify the design was performed and controlled in accordance with applicable procedures and processes and to determine whether:

- design activities were completed in accordance with applicable specifications, drawings, and approved procedures;
- design inputs were correctly identified and documented, and that their selection was reviewed and approved by the responsible engineering group;
- design outputs were correctly translated into drawings;
- design documentation demonstrated adequacy of design by reference to analyses, calculations, bounding condition checks, functional assessments, and/or engineering evaluations; and
- the documents were consistent with the design commitments and requirements of the technical specifications, the UFSAR, and code commitments.

b. Findings

No findings were identified.

1A33 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

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

The inspectors verified that the thickness of containment building internal structure Shield Wall between Reactor Vessel Cavity and Reactor Coolant Drain Tank (RCDT) Room is in accordance with the Unit 4 COL Appendix C, Table 3.3-1 "Definition of Wall Thickness for Nuclear Island Buildings, Turbine Building, and Annex Building":

The inspectors performed a walk-down of the Unit 4 NI and conducted an independent, direct measurement of the dimension between the north wall of the reactor vessel cavity and the south wall of the RCDT room at EL. 75'-6". The inspectors independently measured the thickness at three different sections of the shield wall. The inspectors also reviewed preliminary survey data to verify that the shield wall thickness listed above was met.

b. Findings

No findings were identified.

1A34 (Unit 4) 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). The inspectors used the following NRC IPs/sections to perform this inspection:

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

The inspectors performed concrete thickness inspection associated with the Containment internal structures for Vogtle Unit 4. Specifically, the inspectors sampled steel concrete composite submodule CA01-14, which forms, in part, the North wall of the reactor vessel cavity, prior to on-site assembly. The inspectors reviewed the dimensions specified in the Vogtle Unit 4 Combined License (COL), Appendix C, Table 3.3-1 for samples listed above. Additionally, the inspectors reviewed design drawings and independently measured the submodules and steel plate separation to verify the dimensions conformed to requirements specified in design drawings and the as-built concrete thickness of completed wall sections would be in accordance with the final design, the ITAAC, and UFSAR.

b. Findings

No findings were identified.

1A35 (Unit 4) ITAAC Number 3.3.00.02a.ii.b (765) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.ii.b (765). The inspectors used the following NRC IPs/sections to perform this inspection:

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

The inspectors performed inspection of construction activities to determine whether the plate separation of shield building sub-modules conforms to the required thicknesses of the building sections. Specifically, the inspectors performed independent measurements of a sample of shield building cylinder sub-modules. The sampled wall sections included:

- steel concrete composite sub-module 04J at elevation 123’-6”;
- steel concrete composite sub-module 05G at elevation 131’-6”; and
- steel concrete composite sub-module 06K at elevation 139’-6”.

The inspectors reviewed Vogtle Unit 4 Combined License, Appendix C, Table 3.3-1, to verify the shape, size, dimensions, and sub-module type conformed to the specifications and design drawings.

b. Findings

No findings were identified.

1A36 (Unit 4) ITAAC Number 3.3.00.02a.ii.b (765) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.ii.b (765). The inspectors used the following NRC IPs/sections to perform this inspection:

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

The inspectors performed inspection of construction activities to determine whether the plate separation of shield building sub-modules conforms to the required thicknesses of the building sections. Specifically, the inspectors performed independent measurements of a sample of shield building cylinder sub-modules. The sampled wall sections included:

- steel concrete composite sub-modules 07G and 07J at elevation 149’-6” and
- steel concrete composite sub-module 08A at elevation 159’-6”.

The inspectors reviewed Vogtle Unit 4 Combined License, Appendix C, Table 3.3-1, to verify the shape, size, dimensions, and sub-module type conformed to the specifications and design drawings.

b. Findings

No findings were identified.

1A37 (Unit 4) ITAAC Number 3.3.00.02a.ii.d (767) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.ii.d (767). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.A.02.02 - Installation Records Review
- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors reviewed survey data for sample of cast in place reinforced concrete walls located in the radiologically controlled area of the auxiliary building to determine whether they conformed to the as-built thickness requirements of the Vogtle Unit 4 Combined License, Appendix C, Table 3.3 1. Specifically, the inspectors verified the as-built thickness of the wall along column line 1 from column lines I to K-2 between elevations 66'-6" and 82" 6".

b. Findings

No findings were identified.

1A38 (Unit 4) ITAAC Number 3.3.00.02a.ii.d (767) / Family 01A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number 3.3.00.02a.ii.d (767). The inspectors used the following NRC IPs/sections to perform this inspection:

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

The inspectors independently measured the thickness of two submodules associated with structural module CA20, that in part make up column line L-2 from column lines 2 to 4 between elevations 66'-6" and135'-3". Specifically, the inspectors measured CA20-27 and CA20-28, while they were being welded together, 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 Appendix C of the Vogtle Unit 4 COL.

b. Findings

No findings were identified.

1A39 (Unit 4) ITAAC Number E.3.9.05.01.05 (853) / Family 18A

a. Inspection Scope

The inspectors performed a direct inspection of construction activities associated with ITAAC Number E.3.9.05.01.05 (853). The inspectors used the following NRC IPs/sections to perform this inspection:

- 65001.18-02.08 - Emergency Facilities and Equipment
- 65001.A.02.03 - Independent Assessment/Measurement Inspection

The inspectors conducted a walkdown of the OSC (Operations Support Center), and reviewed a drawing of the MSB (Maintenance Support Building) to verify that the OSC is physically located within the MSB. The inspectors also reviewed the as-built verification statement in the licensee's principle closure document for this ITAAC.

b. Findings

No findings were identified.

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

1P01 Construction QA Criterion 12

a. Inspection Scope

The inspectors reviewed the following QA program implementing documents to ensure that they address the QAPD and UFSAR commitments for the calibration, maintenance, and use of M&TE during the construction of Vogtle Units 3&4:

- Nuclear Quality Site Instruction QSI 12.01-V, Rev. 004, Control of Measuring and Testing Equipment;
- Nuclear Construction and Startup Procedure NCSP-03-10, Rev. 04.02, M&TE Control;
- Nuclear Metrology Standard MS-01.02, Rev. 01.00, Calibration Identification Labels, M&TE Identification Numbers, and Inventory;
- Nuclear Metrology Standard MS-01.05, Rev. 02.00, Preparation of Calibration Checklist, Calibrated M&TE History Card/Usage Log, and Checklist for Procurement of M&TE and Calibration Services;
- Nuclear Metrology Standard MS-01.11, Rev. 01.00, Storage and Handling of Measuring and Test Equipment; and
- Nuclear Metrology Standard MS-01.12, Rev. 01.00, Environmental Control in the Calibration Facility

The inspectors reviewed these implementing documents to verify that the following requirements were met:

- when M&TE is required by an approved procedure or work package, only calibrated M&TE is to be issued from the calibration facility;
- calibrations are performed at prescribed intervals, or prior to use;
- M&TE is calibrated, adjusted, and maintained against reference calibration standards having traceability to nationally recognized standards;
- calibrated M&TE is labeled, tagged, or suitably marked with a unique identification number, calibration date, calibration due date, and any limitations on use;
- out-of-calibration M&TE is tagged and segregated to prevent its use;
- calibrated M&TE, including standards used for calibrating M&TE, is handled and stored to maintain accuracy; and
- calibration data for each piece of M&TE is properly documented

The inspectors verified that both the paper copy and the electronic data base used to track M&TE were being maintained in accordance with applicable procedures. The inspectors verified that both log-out/log-in systems were being properly used by authorized personnel in the calibration facility. The inspectors also observed several pieces of M&TE being logged in or out. The inspectors interviewed several personnel in the calibration facility to verify that significant aspects of the M&TE program were understood.

The inspectors inspected the following active pieces of M&TE that were ready for issue to the field:

- V-AD-0010, Ashcroft hydraulic pressure gauge, 0-300 psig
- V-22-0013, Fluke model 87V probe-type multimeter
- V-ADP-0107, Ashcroft pneumatic pressure gauge, 0-15 psig
- V-AP-0051, Fluke digital thermometer
- V-G-0026, Mitutoyo digital 6-inch caliper
- V-N-0037, Lenton/Erico torque wrench, 30-200 ft-lbf

The inspectors verified that each piece of M&TE was identified by a unique number, properly labeled to indicate the current calibration status, and properly stored in the correct location. The inspectors also reviewed the calibration data associated with each piece of M&TE to verify that the equipment was calibrated within its specified calibration interval, the accuracy was within specified limits, and the calibration documentation was traceable to the specific piece of M&TE.

The inspectors inspected the following pieces of new M&TE that were recently added to the tracking system:

- V-CAP-0001, Flin infrared imaging camera
- V-C2Z-0003, Fluke digital multimeter

The inspectors inspected the M&TE and its associated calibration records to verify that the M&TE was calibrated prior to being placed in service.

The inspectors inspected the following pieces of M&TE that were removed from service due to failing calibration:

- V-ADP-0058, Ashcroft pneumatic pressure gauge, 0-15 psig
- V-U-0024, Lascar Electronics temperature/humidity recorder

The inspectors inspected the M&TE to verify that the failed equipment had been properly tagged and stored in a segregated area. The inspectors verified that the associated out-of-tolerance reports were generated, and that the reports were forwarded to Field Engineering. The inspectors reviewed the completed out-of-tolerance reports and verified that the impact of the failed equipment had been evaluated and documented.

The inspectors reviewed the calibration records and tracking logs for the following pieces of M&TE that were issued to the field for use:

- V-ADP-0102, Ashcroft pneumatic pressure gauge, 0-15 psig
- V-2Z-0037, Fluke digital multimeter
- V-AP-0055, Fluke digital thermometer
- V-G-0052, Starrett dial indicator
- V-N-0095, Lenton torque wrench

The inspectors verified that all the issued pieces of M&TE were within their respective calibration intervals, each piece of equipment was signed out to a specific individual, and that a specific work package or approved procedure was identified in the check-out log for each piece of M&TE.

The inspectors observed the calibration of the following pieces of M&TE:

- V-N-0063, Stanley-Proto model 6016C torque wrench
- V-ADP-0087, Ashcroft pneumatic pressure gauge, 0-15 psig

The inspectors reviewed the associated calibration procedures, and verified that the appropriate calibration procedure was available at the work location. The inspectors verified that the M&TE was calibrated in accordance with the appropriate section of the calibration procedure, the calibration records were accurate and complete, and that the M&TE was properly tagged to indicate the current calibration status and any applicable limitations on its use.

The inspectors reviewed Nuclear Metrology Standard MS-01.11, Rev. 01.00, Storage and Handling of Measuring and Test Equipment to identify the special shipping requirements for M&TE. The inspectors interviewed the calibration facility supervisor to understand how these special shipping requirements were being implemented.

b. Findings

No findings were identified.

1P02 Construction QA Criterion 15

a. Inspection Scope

The inspectors reviewed a sample of N&D reports to determine whether the conditions were adequately reviewed and accepted, rejected, repaired, or reworked in accordance with the QA program implementing documents for the control of nonconforming material, parts, and components. The inspectors compared these N&D reports to Section 15, “Nonconforming Materials, Parts, or Components,” of the CB&I quality assurance program (CMS-720-03-PL-00020-A) and CB&I procedure QS 15.01, “Nonconformance & Disposition Report.”

The inspectors selected a sample of nonconforming items that the licensee either rejected, repaired, reworked, or accepted through evaluation. Additionally, the inspectors reviewed the N&D reports to determine whether:

- the nonconforming item was properly identified;
- the procedures for initiating, processing, and closing nonconformances were adhered to;
- reportability screening and evaluations under 10 CFR Part 21 and 10 CFR 50.55(e) were performed;
- the disposition, such as use-as-is, reject, repair, or rework of nonconforming items were properly identified and documented;
- adequate technical justification for the acceptability of a nonconforming item, dispositioned repair, or use-as-is was appropriately documented;
- nonconformances to design requirements dispositioned use-as-is or repair were subjected to design control measures commensurate with those applied to the original design;
- the as-built records properly reflected the accepted deviation, if applicable;
- controls were implemented to preclude the inadvertent use of nonconforming items and that nonconforming items were marked or tagged and segregated; and
- repaired or reworked items were reexamined in accordance with applicable procedures and with the original acceptance criteria unless the disposition had established alternate acceptance criteria.

b. Findings

No findings were identified.

1P03 Construction QA Criterion 16

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 no 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 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.

1P04 Construction QA Criterion 3

a. Inspection Scope

The inspectors reviewed a sample of E&DCRs to determine whether these changes were performed in accordance with procedure APP-GW-GAP-420, "Engineering and Design Coordination Report." The inspectors evaluated these design changes for conformance to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and Supplement 3S-1, "Supplementary Requirements for Design Control," of ASME NQA-1-1994. The inspectors also reviewed the licensing impact determination screening associated with each of these design changes to determine whether each change was properly evaluated against the current licensing basis as described in the Unit 3 and Unit 4 UFSAR and was performed in accordance with procedure APP-GW-GAP-147, “AP1000 Current Licensing Basis Review.” Furthermore, the inspectors reviewed these E&DCRs to determine whether each change received the proper level of engineering review and was incorporated into all affected documents.

b. Findings

No findings were identified.

1P05 Construction QA Criterion 7

a. Inspection Scope

The inspectors reviewed a sample of licensee surveillance reports, which the licensee performs as a supplement to the audit program and to verify that construction work is performed in accordance with the requirements of ASME NQA-1-1994, ASME Section III, and 10 CFR Part 50, Appendix B. Furthermore, the inspectors reviewed the surveillance results to determine whether the licensee had appropriately assessed the effectiveness of the control of quality by WECTEC and their subcontractors at intervals consistent with the importance, complexity, and quantity of the product or services. The inspectors also reviewed these reports to determine whether (1) the reports were adequate records of an activities affecting quality, (2) the reports were completed in accordance with the licensee’s quality assurance program implementing procedures, and (3) any issues identified by the licensee were appropriately identified (documented) and corrected in accordance with the project quality requirements.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

.1 Exit Meeting.

On April 13, 2016, the inspectors presented the inspection results to Mr. Rauckhorst, Vogtle 3&4 Executive Vice President Construction, along with other members of the licensee's staff and WEC staff members. The inspectors stated that no proprietary information would be included in the inspection report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensees and Contractor Personnel

S. DiTomasso, WEC ITAAC Manager
J. Dudiak, WEC Vice President
G. Glenn, WEC Licensing Engineer
R. Henderson, SNC Licensing
B. Hirmanpour, SNC Licensing – ITAAC
M. Klinvex, WEC Licensing Engineer
R. Lane, WEC ITAAC Engineer
R. Paese, WEC Licensing
B. Philips, WEC Licensing
T. Tuite, WEC DAS Engineer
M. Washington, SNC Licensing
J. Wethersby, SCANA ITAAC Engineer
F. Willis, SNC Licensing Supervisor
M. Yox, SNC Regulatory Affairs Director

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Item Number	Type	Status	Description
05200025/2016001-01	Non Cited Violation	Open	Failure to perform AISC N690-94 required weld NDE (Section 1A13)
05200026/2016001-01	Non Cited Violation	Open	Failure to perform AISC N690-94 required weld NDE (Section 1A13)

LIST OF DOCUMENTS REVIEWED

Section 1A01

Design Documents

1200-10211, “ALS 102, FPGA Binary, DAS Production,” Revision 3, February 2013
6105-10003, “SRNC Hardware Specification,” Revision 4, Dated March 25, 2013
6105-10004, “SRNC FPGA Software Requirements Specification,” Revision 13, Dated June 2015
6105-10014, “SRNC FPGA Software Design Description,” Revision 5, Dated June 2015
6105-00011, “CIM-SRNC Protocol Specification,” Revision 10, Dated February 2015
6105-20003, “CIM Hardware Specification,” Revision 4, Dated January 24, 2013
6105-20004, “CIM FPGA Software Requirements Specification,” Revision 17, Dated July 2015
6105-20014, “CIM FPGA Software Design Description,” Revision 5, Dated July 2015
6106-00105, “DAS ALS Design Specification,” Revision 6, Dated August 2014
6106-00401, “DAS FPGA Functional Requirements,” Revision 3, Dated August 2014
6106-00501, “DAS FPGA Design Specification,” Revision 3, Dated August 2014
6002-10204, “ALS-102 Core B FPGA Design Specification,” Revision 1, Dated August 23, 2012
6002-00010, “ALS Platform Requirements Specification,” Revision 18, Dated December 2013

APP-DAS-J1-001, “AP1000 Diverse Actuation System Functional Requirements,” Revision 7, Dated December 2015
APP-DAS-J3-321, “AP1000 Diverse Actuation System Detailed Functional Logic Diagram Instrument Channels,” Revision 4, November 2015
APP-DAS-J3-326, “Diverse Actuation System Detailed Functional Logic Diagram Reactor Trip,” Revision 3, November 2015
APP-DAS-J4-001, “Diverse Actuation System System Design Specification,” Revision 4, Dated July 2014
APP-DAS-J0R-002, “AP1000 Diverse Actuation System Diversity Analysis”, Revision 0, Dated December 2015
APP-PMS-J1-001, “AP1000 Protection and Safety Monitoring System Functional Requirements,” Revision 11, Dated December 2015
APP-PMS-J3-322, “Detailed Functional Diagram Steam Generator 2 Narrow Range Water Level Reactor Trips,” Revision 7, December 2015
APP-PMS-J4-020, “AP1000 System Design Specification for the Protection and Safety Monitoring System,” Revision 10, Dated January 2015
APP-PMS-J4-102, “AP1000 Protection and Safety Monitoring System Software Requirements Specification,” Revision 14, Dated May 15, 2014
APP-PMS-J4-020, “AP1000 System Design Specification for the Protection and Safety Monitoring System,” Revision 10, Dated May 15, 2014

WCAP-15775, “AP1000 Instrumentation and Control Defense-in-Depth and Diversity Report,” Revision 7, Dated November 2015
WCAP-16097-P-A, “Common Qualified Platform Topical Report,” Revision 3, Dated February 2013
WCAP-16675-P, “AP1000 Protection and Safety Monitoring System Architecture Technical Report,” Revision 7, Dated August 2015
WCAP-17179-P, “AP1000 Component Interface Module Technical Report,” Revision 5, Dated January 201

WCAP-17184-P, “AP1000 Diverse Actuation System Planning and Functional Design Summary Technical Report,” Revision 10, Dated November 2015WNA-DS-01271-GEN, “Component Interface Module Hardware Requirements Specification,” Revision 10, Dated January 2013
WNA-DS-01272-GEN, “Safety System Remote Node Controller Requirements Specification,” Revision 9, Dated September 2013
WNA-DS-02331-GEN, “Component Interface Module Logic Specification,” Revision 2, Dated March 2014

CIM code files, CIM-crc_32bit.v v1.2
DAS code files, DAS-b_crc32.v v1.8

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Work Order SV3-CA05-S4W-CV1867
Weld Record for Weld Number SV3-CA05-S4K-CV2217-07 (-RW3 with weld build-up, repair, and 100% PAUT)
Weld Record for Weld Number SV3-CA05-S4K-CV2219-16

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CB&I/Stone & Webster, Inc. Work Package SV3-CA03-S4W-CV2257 for weld-no. CV9999-A16, dated 9/15/15
CB&I/Stone & Webster, Inc. Work Package SV3-CA03-S4W-CV2256 for weld-no. CV9996-A02, dated 9/11/15
Mistras Phased Array Ultrasonic Examination Report V-15-UT-312-1520, dated 12/30/2015 for weld-no. CV9999-A16 for components CA03-15 to -16

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Risk Release of Unsat/Nonconforming Material/Equipment
V-RL-14-0163, Place concrete around CA04 to Elevation 95'-0", Rev. 1
V-RL-15-0079, SV3-CA04, Rev. 1
V-RL-15-0117, SV3-CA01 NI Place-SA3 CA01-12, 13, 14, 15, 16, 17, 42, & 43, Rev. 1
V-RL-15-0119, SV3-CA01-SA2 / CA01-27, 28, 29, 30, 31, 34, 41, 46, Rev. 1
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V-RL-15-0121, SV3-CA01 NI Place-SA5 CA01-18, 19, 20, & 21, Rev. 1
V-RL-15-0122, SV3-CA01 NI Place-SA6 CA01-01, 22, 23, 24, 35, & 37, Rev. 1
V-RL-15-0123, SV3-CA01 NI Place-SA7 CA01-32, 33, 36, 38 & 39, Rev. 1
V-RL-15-0124, SV3-CA01 NI Place-SA8 CA01-25, 47 & 48, Rev. 1
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V-RL-15-0126, SV3-CA01 NI Place-ASME, Rev. 1
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SV3-CC01-GNR-000284, "West Side 87'-6" Placement Lift Height Exceeded," Rev. 0
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SV3-1130-CCW-CV3399, "U3 Interior CV Placement, Curing and Repair of Concrete from Elev. 83'-0"," Rev. 1.0
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Drawings
SV3-CA01-S8K-CV8124, "Containment Building Areas 1-4 Module CA01 Basemat Connection Details Weld Map," sheets 1-4, Revision 4;
SV3-CA01-S4Y-700, "Containment Building Areas 1-4 Module CA01 Basemat Connection Table I," Revision 0;
SV3-CA01-S4Y-701, "Containment Building Areas 1-4 Module CA01 Basemat Connection Table," Revision 0;
SV3-CA01-S4-708, "Containment Building Areas 1-4 Module CA01 Basemat Connection Details," Revision 0;
SV3-CA01-S8-309, "Containment Building Module CA01 Basemat Connections Plan View Subassembly 04 and 05," Revision 0;
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CV9482-B112-1, -2, -3, -4, -5, -6, -7, -8;
CV9482-B117-1, -2, -3, -4, -5, -6, -7, -8;
CV9516-B117-1;
CV9516-B112-1;
CV9516-B105-1;
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QC Inspection Reports
Q445-15-11441
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MRR J132175-MRR-14-04877

Construction Quality Checklist (CQC) Form - CSI0342FORM83, “Installation of Reinforcing Steel Data Sheet” Scope Descriptions:
Type 3CH #8 T-Heads Underneath CA05
Elevation 87’-6”, Cage Steel in CA05 Module Beams
Elevation 87’-6”, #8 3CH’s in CA05 and the Bottom Mat NE of CB11

Drawings
APP-1110-CR-608, “Containment Concrete Bottom Reinforcement from EL 83’-0” up to El 96’-0” Plan at El 87’-6” PXS B Compartment,” Rev 0
APP-1110-CR-652, “Containment Concrete Reinforcement from El 83’-0” up to El 96’-0” Vertical Dowel Plan 1B,” Rev 0
APP-1110-CR-102, “Containment Concrete Reinforcement from El 83’-0” to El 96-0” Type 2/13/16 Details,” Rev 0
APP-1110-CR-103, “Containment Concrete Reinforcement from El 83’-0” to El 96-0” Type 1/5/6 Details,” Rev 0
APP-1110-CR-103, “Containment Concrete Reinforcement from El 83’-0” to El 96-0” Type 3 Details,” Rev 0
APP-1130-CE-003, “Containment Concrete Embedment Drawing Plan View El 87’-6” Detail B,” Rev 1
APP-1130-CE-005, “Containment Concrete Embedment at El 87’-6” Non-Standard Embedment Details,” Rev 0
APP-1100-CEB-014, “Containment Concrete Embedments Index at El 87’-6” (Sheet 2 of 4),” Rev 0
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APP-SS01-Z0-003, “Embedment and Miscellaneous Steel,” Rev. 4.

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APP-CE01-S3C-002, Ap1000 Seismic Category I Generic Headed Anchor (HA) Embedments - Capacities Calculation, Rev. 1
APP-CE01-S3C-001, AP1000 Seismic Category I Generic Overlay Plate (OLP) and Deformed Wire Anchor (DWA) Embedments - Capacities Calculation, Rev. 1
APP-GW-C1-003, Selection Manual of Standard Attachments, Rev. 5
Design Specifications
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APP-SS01-Z0-003, Embedment and Miscellaneous Steel, Rev. 4
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APP-GW-C1-008, Post-Installed Anchor Bolt Product Selection, Design and Construction-Process Flow-Chart, Rev. 2
APP-GW-C1-007, Post-Installed Anchor Bolt Design Guide, Rev. 0
APP-GW-GAP-463, Procedure for the Placement of Standard and Non-Standard Attachments to All Structural Members in the Nuclear Island for All Component Types, Rev. 1

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APP-GW-GEF-1406, Changes to APP-GW-C1-002 for Code Compliance, Rev. 0
APP-CE01-GEF-034, Embed Calculation AWS D1.1 Code Reconciliation, Rev. 0
APP-CE01-38, Reinforcement Required for Free Edge, Rev. 0
APP-CE01-GEF-064, Deformed Wire Anchor Details, Rev. 0

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CB&I/Stone & Webster, Inc. Weld Record CV8645-5-GH-O (outside) for Work Order SV3-1208-SCW-CV4914
CB&I/Stone & Webster, Inc. Weld Record CV8645-5-GH-I (inside) for Work Order SV3-1208-SCW-CV4914
CB&I Welder Qualification Report for symbols MEW6934 (GH-I & -O), JRS3034 (GH-I), and JCH2338 (GH-O)
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SV3-1208-SC-100, “Shield Building Steel Wall Panels El. 100’-0” to El. 248’-6½” General Notes,” Rev. 2
SV3-1208-SC-101, “Shield Building Steel Wall Panels El. 100’-0” to El. 248’-6½” Location and Identification Rollout View,” Rev. 4
SV3-1208-SC-102, “Shield Building Steel Wall Panels El. 100’-0” to El. 248’-6½” Panel Schedule (Sheet 1),” Rev. 4
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SV3-1208-SC-108, “Shield Building Steel Wall Panels El. 100’-0” to El. 248’-6½” Critical Erection Tolerances Rollout View,” Rev. 0
SV3-1208-SC-112, “Shield Building Steel Wall Panels El. 100’-0” to El. 103’-6” Critical Erection Tolerances Plan & Section,” Rev. 0
SV3-1208-SC-113, “Shield Building Steel Wall Panels El. 103’-6” to 139’-6” Critical Erection Tolerances Plan & Section,” Rev. 0
SV3-1208-SC-281, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Connection Panel Group 28,” Rev. 2
SV3-1208-SC-282, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Connection Panel Group 28 Details 1,” Rev. 1
SV3-1208-SC-331, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Connection Panel Group 33,” Rev. 2
SV3-1208-SC-332, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Connection Panel Group 33 Details 1,” Rev. 1
SV3-1208-SC-903, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Typical Details (Sheet 3),” Rev. 2
SV3-1208-SC-904, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Typical Details (Sheet 4),” Rev. 2
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SV3-1208-SC-924, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Wall N Connection Details (Sheet 2),” Rev. 3
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SV3-1208-SC-926, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Wall Q Connection Details (Sheet 3),” Rev. 4

SV3-1208-SC-934, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Wall N Connection Details (Sheet 1),” Rev. 4
SV3-1208-SC-935, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Wall Q Connection Details (Sheet 1),” Rev. 7
SV3-1208-SC-936, “Shield Building Steel Wall Panels El. 100’-0” to 248’-6½” Wall Q Connection Details (Sheet 2),” Rev. 8
SV3-1208-SC-966, Shield Building Steel Wall Panels El. 100’-0” to El. 248’-6½” Connection Panel, Details 6,” Rev. 1
SV3-1208-SS-900, “Shield Construction Joint Plates Details,” Rev. 0

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APP-1208-GEF-295, “Shield Building Wall, RC/SC Fastener Installation Requirements,” Rev. 1
APP-1208-GEF-319, “Upset Bar Testing,” Rev. 0
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MS-16-00008, “Upset Rebar Tensile Test Data Record,” 1/8/16
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SV3-1208-GNR-000040, Shield Building Course 2 Vertical Root Gaps 02L & 02M, Rev. 0
SV3-1208-GNR-000041, Shield Building Mismatch of Panels 01P & 01Q, Rev. 0
SV3-1208-GNR-000044, Shield Building Q-Wall Mismatch Course 2, Rev. 0
SV3-1208-GNR-000048, Shield Building CV5491-8-O RT, Rev. 0
SV3-1208-GNR-000049, Shield Building CV5491-8-O-RW2 63-65 RT, Rev. 0
SV3-1208-GNR-000050, Shield Building Q-wall RT, Rev. 0

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WMR No. 162611, 02/11/2016
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V-16-RT-313-0088, Computed Radiography Examination Report for CV5491-13-I, 02/21/2016
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Material Shipment Packages
Purchase Order 132175-CE01.01, Load 5042, dated 4/1/14
Purchase Order 132176-CE01.01, Load #16

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APP-GW-GAP-113, “AP1000 Receiving Interface,” Rev. 5
DAPP 5-16, “US AP1000 Procurement Support,” Rev. 4
NEPP04-08, “Support of Procurement,” Rev. 11.00
NPP 10-01, “Material Receipt, Storage, and Control,” Rev. 05.00
QAD 07.14, “Receiving Inspection,” Rev. 03.01
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QS 15.03, “Risk Release of UNSAT/Nonconforming Material/Equipment,” Rev. 03.02
SV3-CC01-Z0-031, “Safety Related Placing Concrete and Reinforcing Steel,” Rev. 7
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APP-CE01-S3C-003, AP1000 Seismic Category I Generic Post Installed Attachments - Capacities Calculation, Rev. 0
APP-CE01-S3C-002, Ap1000 Seismic Category I Generic Headed Anchor (HA) Embedments - Capacities Calculation, Rev. 1
APP-CE01-S3C-001, AP1000 Seismic Category I Generic Overlay Plate (OLP) and Deformed Wire Anchor (DWA) Embedments - Capacities Calculation, Rev. 1
APP-GW-C1-003, Selection Manual of Standard Attachments, Rev. 5

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APP-SS01-Z0-003, Embedment and Miscellaneous Steel, Rev. 4
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APP-GW-C1-008, Post-Installed Anchor Bolt Product Selection, Design and Construction-Process Flow-Chart, Rev. 2
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APP-CE01-GEF-064, Deformed Wire Anchor Details, Rev. 0

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Fluor Concrete/Grout Delivery Ticket 69275 Batch 2506 dated 03/21/16
Fluor Concrete/Grout Delivery Ticket 69276 Batch 2506 dated 03/21/16
Fluor Concrete/Grout Delivery Ticket 69276 Batch 2506 dated 03/21/16
Fluor Concrete/Grout Delivery Ticket 69277 Batch 2506 dated 03/21/16
Fluor Concrete/Grout Delivery Ticket 69278 Batch 2506 dated 03/21/16
Fluor Concrete/Grout Delivery Ticket 69279 Batch 2506 dated 03/21/16

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APP-1200-GMP-016; Auxiliary Building Methodology and Procedures for Civil Structural Detail Evaluation; Rev. 0
APP-1200-S2C-134, "Thermal + SSE Analysis with ABAQUS Model," Rev. 0
APP-1200-S3C-110, "Auxiliary Building Wall L Reinforcement Detail Evaluation," Rev. 1

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SV3-CC01-Z0-026, Safety Related Mixing and Delivering Concrete, Westinghouse Seismic Category I, Safety Class C "Nuclear Safety", Rev. 6
SV3-CC01-Z0-027, Safety Related Concrete Testing Services, Westinghouse Category I, Safety Class C "Nuclear Safety", Rev. 4
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SV3-1220-CEW-CV1606, "Auxiliary Building Embed Plates & Anchor Bolts-EL 82'-6" walls – Area 1," Rev. 0
SV3-1220-CEW-CV1607, "Auxiliary Building Embed Plates & Anchor Bolts-EL 82'-6" walls – Area 2," Rev. 0
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SV3-CE01-GNR-000121, "Joseph Oat Embeds with PJP Welds Lacking AISC N690 Required NDE"
SV0-CE01-GNR-000030, "Coupler Welds on CS Embeds from Cives Lacking N690 NDE"
SV3-CA20-GNR-000808, "Joseph Oat Basemat Reinspection Sample"

Procedures and Specifications
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CB&I QS 14.02, "Inspection Report System," Revision 5
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CB&I GWS-2, “AWS D1.1 – Structural Steel General Welding Specification,” Revision 4
Joseph Oat Corporation Quality Control Procedure QC-2694-60, “Visual Examination of Welds,” Revision 0
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Engineering and Design Coordination Report (E&DCR) APP-CA00-GEF-119, "Leak Chase Weld Modification," revision 0
Lincoln Electric CMTRs for filler metal lot 1181R (ER80S-Ni1), 1181S (ER80S-Ni1), 1181X (ER2209), 1203A (ER2209) and 1232J (ER2209)
Welding Material Requisition 142303 for CV13032-L28-1 and -2
Welder Qualification Report for symbols (weld-no.) JCW7999 (L36-3), CLS6482 (L18-1), CEH4767 (L05-2), NCM0760 (L35-3-C1), PB3611 (L28-1)
Design Engineering Specification Number: DMD-M-NS-592209GTAW-02
Welding Program Document Number: TR-5.9-2209-GTAW, Duplex Stainless Steel Bare Wire/Rods AWS Classification and Process: ER2209, GTAW
Mistras Certification Records for UT Level II (phased-array), conventional UT Level III, and current annual visual acuity and color contrast for Technician ID 507330

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SV4-1220-CRW-CV2538, “Unit 4 Nuclear Island Aux. Bldg - Installation of Reinforcing Steel on Exterior Walls from Elev. 82’6” to 100’0” (Wall Placements 39 thru 48),” Rev. 0
SV4-1220-CCW-CV2540, “Unit 4 Nuclear Island Auxiliary Building Concrete Placement for Exterior Walls from Elev. 82’-6” to 100’-0” (Wall Placements 39 thru 48),” Rev. 0

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SV4-1220-CRW-CV2538, “Unit 4 Nuclear Island Aux. Bldg - Installation of Reinforcing Steel on Exterior Walls from Elev. 82’6” to 100’0” (Wall Placements 39 thru 48),” Rev. 0

Calculations
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APP-SS01-Z0-011, Post Installed Anchors for Seismic Category I Buildings and Structures, Rev. 0
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APP-GW-C1-008, Post-Installed Anchor Bolt Product Selection, Design and Construction-Process Flow-Chart, Rev. 2
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APP-CE01-GEF-034, Embed Calculation AWS D1.1 Code Reconciliation, Rev. 0
APP-CE01-38, Reinforcement Required for Free Edge, Rev. 0
APP-CE01-GEF-064, Deformed Wire Anchor Details, Rev. 0

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SV4-CA01-S5-14001, Containment Building Area 3 Module CA01 Submodule CA01-14 Isometric Views, Rev. 0
SV4-CA01-S5-14002, Containment Building Area 3 Module CA01 Submodule CA01-14 Isometric Views, Rev. 0
SV4-CA01-S5-14003, Containment Building Area 3 Module CA01 Submodule CA01-14 Structural Outline, Rev. 0
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Vogtle Unit 4 Combined License, Appendix C, Table 3.3-1

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Vogtle Unit 4 Combined License, Appendix C, Table 3.3-1

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SV4-1220-CCK-CV15910, "NI4 Wall Thickness Verification (Wall 45) Elevation 82'-6" - 100'-0"," Rev. 0
SV4-1220-CCK-CV15908, "NI4 Wall Thickness Verification (Wall 46) Elevation 82'-6" - 100'-0"," Rev. 0
SV4-1220-CCK-CV15909, "NI4 Wall Thickness Verification (Wall 47) Elevation 82'-6" - 100'-0"," Rev. 0

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SVO-XXEP-ITR-800008, Rev. 1, ITAAC Technical Deliverable(s) for ITAAC: E.3.9.05.01.05

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Vogtle Electric Generating Plant Units 3&4 UFSAR, Rev. 4.1
Southern Nuclear Operating Company, Nuclear Development Quality Assurance Manual, Rev. 14
Nuclear Quality Site Instruction QSI 12.01-V, Rev. 004, Control of Measuring and Testing Equipment
Nuclear Construction and Startup Procedure NCSP-03-10, Rev. 04.02, Measuring and Test Equipment (M&TE) Control
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SV0-EGS-GNR-000008, Existing (ASTM) B787 in Unpoured Walls and Slabs, Rev. 0
SV3-1208-GNR-000034, "Shield Building Coupler Filler Material," Rev. 0
SV3-CA03-GNR-000004, "Lack of fusion were detected in vendor welding," Rev. 0
SV3-CA03-GNR-000051, "SV3-CA03-SM12 Indications / Defects found in Vendor Weld," Rev. 0
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SV3-CA20-GNR-000710, "QC Fit-up Bypassed," Rev. 0
SV3-CA20-GNR-000755, "Improperly Removed Ultrasonic Thickness Hold Points," Rev. 0
SV3-CA20-GNR-000787, "CA20_19 Inaccessible BMR Rework," Rev. 0
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SV3-CC01-GNR-000288, “Excessive Vibrator Use West Side 87'-6" Placement Containment,” Rev. 0
SV3-CC01-GNR-000289, “NI3 Aux, 2A Wall violating ACI 117 thickness & surface slope B/W 66-6 to 82-6,” Rev. 0
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SV4-CE01-GNR-000031, “Missing Plate APP-12154-CE-PW534,” Rev. 0
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Quality Control Inspection Report CC113-15-10022

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APP-0000-GEF-097, “Embedment General Note modification,” Rev. 0
APP-CA00-GEF-850086, "Additional Note for SWD-7," Rev. 0
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APP-GW-GAP-147, “AP1000 Current Licensing Basis Review," Rev. Rev. 3

Section 1P05

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Transmittal Letter ND-16-0100, Subject: SNC Nuclear Development Quality Assurance (NDQA) Surveillance Report, SNC NDQA-2016-S001, for CA20 Work Packages, and associated N&Ds, Corrective Action Reports (CARs), and Management Suspensions of Work (MSOWs); dated January 22, 2016
Surveillance report NDQA-2016-S001, for CA20 Work Packages, and associated N&Ds, Corrective Action Reports (CARs), and Management Suspensions of Work (MSOWs)

ITAAC INSPECTED

No.	ITAAC No.	Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
93	2.2.01.03a	3.a) Pressure boundary welds in components identified in Table 2.2.1-1 as ASME Code Section III meet ASME Code Section III requirements.	Inspection of the 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.
513	2.5.01.03c	3.c) Software diversity between the DAS and PMS will be achieved through the use of different algorithms, logic, program architecture, executable operating system, and executable software/logic.	Inspection of the DAS and PMS design documentation will be performed.	Any DAS algorithms, logic, program architecture, executable operating systems, and executable software/logic are different than those used in the PMS.
760	3.3.00.02a.i.a	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.

No.	ITAAC No.	Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
761	3.3.00.02a.i.b	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.
762	3.3.00.02a.i.c	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.

No.	ITAAC No.	Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
763	3.3.00.02a.i.d	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.
764	3.3.00.02a.ii.a	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.

No.	ITAAC No.	Design Commitment	Inspections, Tests, Analysis	Acceptance Criteria
765	3.3.00.02a.ii.b	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.b) A report exists that concludes that the as-built concrete thicknesses of the shield building sections conform to the building sections defined in Table 3.3-1.
767	3.3.00.02a.ii.d	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.d) A report exists that concludes that the as-built concrete thicknesses of the radiologically controlled area of the auxiliary building sections conform to the building sections defined in Table 3.3-1.
853	E.3.9.05.01.05	5.1 The licensee has established a technical support center (TSC) and an onsite operations support center (OSC). [H.1]	5.1 An inspection of the as-built TSC and OSC will be performed, including a test of the capabilities.	5.1.5 The OSC is located in the Maintenance Support Building.

LIST OF ACRONYMS

ACI	American Concrete Institute
ADAMS	Agencywide Documents Access & Management System
AISC	American Institute of Steel Construction
ALS	Advanced Logic System
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BPL	Bistable Processor Logic
CB&I	Chicago Bridge and Iron
CFR	Code of Federal Regulations
CIM	Component Interface Module
CLB	Control Logic Board
CRC	Cyclic Redundancy Check
CMTR	Certified Material Test Report
COL	Combined License
CV	Containment Vessel
CVS	Chemical and Volume Control System
DAS	Diverse Actuation System
E&DCR	Engineering and Design Coordination Report
EPC	Engineering, Procurement, and Construction
FCAW	Flux Core Arc Welding
FPGA	Field Programmable Gate Array
GMAW	Gas Metal Arc Welding
GTAW	Gas Tungsten Arc Welding
HSL	High Speed Datalink
IP	Inspection Procedures
IR	Inspection Report
IRWST	In-Containment Refueling Water Storage Tank
ITAAC	Inspections, Tests, Analysis, and Acceptance Criteria
MDATs	Memory Data Elements
MSB	Maintenance Support Building
MT	Magnetic Particle Testing
M&TE	Measuring & Test Equipment
NCV	Non-Cited Violation
N&D	Nonconformance and Disposition Report
NDE	Nondestructive Examination
NI	Nuclear Island
NRC	Nuclear Regulatory Commission
OSC	Operations Support Center
PARS	Publicly Available Records
PAUT	Phased Array Ultrasonic Testing
PCD	Principal Closure Document
PJP	Partial Joint Penetration
PMS	Protection and Safety Monitoring System
PQR	Procedure Qualification Record
PT	Liquid Penetrant Testing
QA	Quality Assurance
QC	Quality Control
RC	Reinforced Concrete

SAW	Submerged Arc Welding
SC	Steel Concrete Composite
SCE&G	South Carolina Gas & Electric
SRNC	Safety Remote Node Controller
SRS	Software Requirements Specifications
SSC	Structure(s), System(s), and Component(s)
UDP	User Datagram Protocol
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic Testing
WEC	Westinghouse Electric Company
WMR	Welding Material Requisition
WPS	Welding Procedure Specification
VT	Visual Inspection

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Letter to M. Yox from Michael Ernstes dated May 10, 2016

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