



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BLVD
ARLINGTON, TEXAS 76011-4511

March 12, 2013

Donna Jacobs, Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC REACTOR
VESSEL HEAD AND STEAM GENERATOR REPLACEMENT PROJECTS
INSPECTION REPORT 05000382/2012009

Dear Ms. Jacobs:

On January 22, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed the reactor vessel head replacement and steam generator replacement inspection activities at your Waterford Steam Electric Station, Unit 3 facility. The enclosed inspection report documents the inspection findings, which were discussed on January 30, 2013, with you and members of your staff.

The inspections 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.

No findings were identified during this inspection.

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

Sincerely,

/RA/

Donald B. Allen, Chief
Project Branch E
Division of Reactor Projects

Docket No. 50-382
License No. NPF-38

Enclosure: Inspection Report 05000382/2012009
w/Attachment: Supplemental Information

Electronic distribution by RIV:

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**U.S. NUCLEAR REGULATORY COMMISSION
REGION IV**

Docket: 05000382

License: NPF-38

Report: 05000382/2012009

Licensee: Entergy Operations, Inc.

Facility: Waterford Steam Electric Station, Unit 3

Location: 17265 River Road
Killona, LA 70057

Dates: July 16, 2012 through January 22, 2013

Inspectors: D. Overland, Resident Inspector, Project Manager
R. Azua, Senior Project Engineer
W. Sifre, Senior Reactor Inspector
C. Hale, Reactor Inspector
C. Speer, Reactor Inspector
I. Anchondo, Reactor Inspector

Approved By: Donald B. Allen, Chief,
Project Branch E
Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000382/2012009; 07/16/2012 – 01/22/2013; Waterford Steam Electric Station, Unit 3; Reactor Vessel Head and Steam Generator Replacement Projects Report.

The report covered a six month period of inspection by resident and regional inspectors. No findings of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified Findings and Self Revealing Findings

None

B. Licensee-Identified Violations

None

REPORT DETAILS

Summary of Plant Status

Waterford Steam Electric Station, Unit 3, began the inspection period at approximately 100 percent power. On October 17, 2012, the plant was shutdown for a scheduled refueling outage (RF-18), a reactor vessel head replacement, and steam generator replacements. The unit remained shutdown for refueling outage RF-18 until January 17, 2013, when it commenced reactor startup and a return to full power.

4. OTHER ACTIVITIES

4OA5 Other Activities: Steam Generator Replacement (50001) and Reactor Vessel Head Replacement (71007) Activities

.1 Steam Generator Replacement Activities (50001)

a. Inspection Scope

This inspection report documents inspection activities related to the Waterford Steam Electric Station, Unit 3, steam generator replacement project. These steam generator replacement inspection activities are not part of the normal baseline inspection program, but are performed on an as-needed basis. Therefore, no sample size is specified. The inspectors completed the applicable portion of Inspection Procedure IP 50001, "Steam Generator Replacement Inspection," with the exception of some radiation protection program controls inspections. These inspections are planned and will be documented at a later date.

1. Design and Planning Inspections

Engineering and Technical Support

Inspections to review engineering and technical support activities were performed prior to, and during, the steam generator replacement outage by resident and regional inspectors. Inspectors reviewed key design aspects and modifications associated with steam generator replacement.

The inspectors reviewed permanent plant modifications (engineering change packages) and documentation, including safety screens and evaluations, to verify that they were performed in accordance with regulatory requirements and plant procedures. The inspectors also reviewed manufacturer records of parts and tubes of the replacement steam generators and reviewed preservice baseline eddy current examination results of new tubes.

Lifting and Rigging

The inspectors reviewed activities associated with applicable engineering design, modification, testing and analysis associated with steam generator lifting and rigging.

This included: (1) steam generator component safe load paths; (2) crane and rigging equipment; and (3) heavy load haul path.

The inspection focused on the impact of load handling activities on the reactor core, spent fuel, and their cooling, and other plant support systems for the reactor unit.

Radiation Protection Program

An inspection to review the radiation protection controls for the steam generator replacement activities was performed by regional inspectors. The results of this inspection are documented in inspection report 05000382/2012005 and included a review of:

- Exposure controls including temporary shielding
- Contamination controls
- Radioactive material management
- Radiological work plans and controls
- Emergency contingencies
- Project staffing and training plans
- Airborne radioactivity effluent controls

Additional inspection will be performed following the refueling outage by regional inspectors and documented in inspection report 05000382/2013004. This inspection will include a review of:

- ALARA planning
- Dose estimates and dose tracking

Security Considerations and Adverse Impact to the Site

The inspectors made frequent observations of security practices to verify that the licensee provided appropriate support for affected vital and protected area barriers during outage activities. The inspectors reviewed steam generator replacement activities associated with risk management to minimize any adverse impact on the site.

2. Steam Generator Removal and Replacement Inspections

The inspectors conducted steam generator removal and replacement inspections by performing selective inspections, consistent with the safety significance and inspection resources of the following areas:

Welding and Nondestructive Examination Activities

Inspectors reviewed or observed the following welding and nondestructive examination activities during the steam generator replacement outage:

- qualification certifications for the Non-Destructive Examinations (NDE) examiners
- NDE procedures and NDE technician qualification records to verify they met ASME code requirements
- containment restoration plan and the NDE records to verify ASME code requirements were satisfied
- contractors and licensee processes to verify they met ASME code requirements
- radiography films for several large bore pipe and containment liner welds to verify the welds met quality requirements
- cable tray restoration activities, including post maintenance testing
- results of mechanical snubber functional testing and associated nonconformance reports and nuclear notifications for safety related snubbers

Containment Opening Restoration Activities

The inspectors reviewed licensee activities related to construction activities associated with material, design, fabrication, installation, examination and testing of the shield building temporary opening and restoration.

The inspectors completed the following inspection activities:

- observation of hydro-cutting activities for the shield building temporary opening
- observation of restoration activities and review of the modification packages related to the shield building temporary opening including concrete and reinforcement bar restoration
- review of key shield building design aspects found in the updated final safety analysis report to confirm there were no deviations from the safety analysis and licensing basis, including review of 10 CFR 50.59 screenings and evaluations review of the engineering evaluations associated with shield building opening repairs to reinforcement bars including Zap Screwlok series mechanical splices
- review of the Zap Screwlok specification and observation of 77 (32 horizontal and 45 vertical) Zap Screwlok splices performed in the field
- review of procedures for welding rebar and observation of 21 welded splices performed in the field

- confirmed use of weld splices in place of Zap Screwlok splices satisfied code requirements to ensure all aspects of the original shield building structural design were met
- review of material test reports for the craft qualification of Zap Screwlok series mechanical splices
- review of material test reports for the Zap Screwlok sister splices performed by craft
- observation of concrete batch plant operations including material storage and handling of concrete components
- review of the shield building concrete mix design to ensure the mix was controlled to limit creep and shrinkage
- review of concrete batch plant inspection and certificate of conformance to National Ready Mixed Concrete Association standards
- review of certification of materials used in the concrete mix (cement, fine and course aggregates, water, and admixtures)
- observation of pre-placement condition of shield building opening including verification that forms were secure and free from water and that reinforcing steel was secured, clean, and had proper clearances
- review of QC pre-placement inspection to verify that all pre-placement inspections were completed prior to concrete placement
- observation of concrete placement

Relative to installation of concrete, the inspectors witnessed placement of concrete in the shield building wall to restore the temporary construction opening. The inspectors examined the reinforcing steel to ensure it was installed in accordance with design requirements and was properly cleaned, and observed the concrete forms to ensure tightness and cleanliness. The inspectors reviewed placement activities to ensure that activities pertaining to concrete delivery time, free fall, flow distance, layer thickness and concrete consolidation conformed to industry standards established by the American Concrete Institute (ACI). Concrete batch tickets were examined to ensure that the specified concrete was being delivered to the site. The inspectors also observed testing of the plastic concrete for slump, temperature, air content, and unit weight, and molding of the concrete cylinders for testing. Reviews were performed to ensure concrete testing was performed and the cylinders were molded in accordance with applicable American Society for Testing and Materials (ASTM) requirements. In addition, the inspectors reviewed activities to ensure that concrete testing was performed by qualified personnel from an independent testing company, and that concrete placement activities were continuously monitored by licensee and contractor quality control and quality assurance personnel.

The inspectors examined the concrete batch plant to verify proper storage and separation of materials and temperature controls. The inspectors reviewed results of quality control acceptance testing performed on materials (cement, water, fine and coarse aggregate, and admixtures) used for batching. The inspectors also reviewed records documenting inspection of the concrete batch plant and the concrete truck mixers. Activities were reviewed to determine if the contractor's inspection of the trucks and batch plant were performed in accordance with the guidance of the National Ready Mix Concrete Association, if the batch plant scales were calibrated in accordance with National Ready Mix Concrete Association recommendations, and if mixer efficiency tests were performed on the truck mixers in accordance with ASTM C-94. The inspectors reviewed the concrete mix data to ensure that mix proportions for delivered concrete were selected based on trial concrete mix results, that quality control acceptance criteria for the plastic concrete were based on the trial mixes, and that the trial mix met concrete strength requirements.

Lifting, Rigging and Steam Generator Movement and Reconnection Activities

The inspectors observed and reviewed activities throughout the refueling outage associated with heavy lifting and rigging. The inspectors observed the implementation and reviewed documentation related to several structural modifications associated with the heavy lifting activities.

The inspectors also observed and reviewed engineering evaluations concerning the removal and reinstallation of the following structural modifications:

- construction of the outside lift system, temporary work platform, and hatch transfer systems
- lifting and rigging preparations associated with old steam generators removal
- interference removal and placement of replacement steam generators
- temporary handling equipment construction and removal
- structural supports to facilitate steam generator replacement
- reactor cavity decking construction and removal
- movement and connection of replacement steam generators
- steam generator hold down / skirt bolts
- transfer of old steam generators to temporary storage

Outage Operating Conditions

The inspectors used Inspection Procedure 71111.20 to verify proper outage conditions. Completion of these inspection activities are documented in inspection reports 05000382/2012005 and 05000382/2013002.

Radiation Protection Controls

Inspection of the implementation of the radiation protection controls, including dose estimates and tracking, for the steam generator replacement will be performed following the refueling outage by regional inspectors. The details and results of these activities will be discussed in inspection report 05000382/2013004.

Foreign Materials Control

The inspectors performed frequent observations of the steam generator replacement activities to verify the licensee was implementing proper foreign materials controls. In particular, the inspectors observed controls related to reactor coolant system and secondary side openings.

Temporary Services

The inspectors reviewed the work package and drawings, and then observed the installation, use, and removal of temporary services in the containment building during the outage. Instructions for the use and controls for construction power were reviewed, and the installation was compared to the approved system sketches.

3. Additional Post-installation Verification and Testing

The inspectors conducted steam generator post-installation verification and testing inspections in accordance with the inspection plan. These activities included:

- Containment leak testing
- RCS leakage testing
- Steam generator secondary side leakage testing
- Calibration and testing of instrumentation for both the primary and secondary side systems affected by generator replacement

An additional inspection will be performed to include a review of procedures for equipment performance testing required to confirm the design and to establish baseline measurements and the conduct of testing, to include post installation and power ascension. This inspection will be performed following the refueling outage and documented in inspection report 05000382/2013003.

Storage of Old Steam Generators

The inspectors observed the transport of the old steam generators to their onsite storage location. Regional inspectors will review the radiological surveys for storage of the old steam generators following the refueling outage and the results will be documented in inspection report 05000382/2013004.

Specific documents reviewed during this inspection are listed in the attachment.

b. Findings

No findings were identified.

.2 Reactor Vessel Head Replacement Activities (71007)

a. Inspection Scope

1. Design and Planning Inspections

The inspectors used the guidance in Inspection Procedure 71007, "Reactor Vessel Head Replacement Inspection," to perform the following reactor vessel head design and planning inspection activities.

Engineering and Technical Support

Inspections were conducted by resident and regional office-based specialist inspectors to review engineering and technical support activities performed prior to, and during, the reactor vessel head replacement outage. This review verified that selected design changes and modifications to structures, systems, and components described in the UFSAR for transporting the new and old reactor vessel heads were reviewed in accordance with 10 CFR 50.59. Additionally, key design aspects and modifications associated with the reactor vessel head replacement were also reviewed. Finally, the inspectors verified that the licensee had confirmed that the replacement reactor vessel head conformed to design requirements and that there were no fabrication deviations from design requirements.

Lifting and Rigging

The inspectors reviewed engineering design, modification, and analysis associated with reactor vessel head lifting and rigging activities. This included: (1) crane and rigging equipment; (2) reactor vessel head component drop analysis; (3) safe load paths; and (4) load laydown areas.

Radiation Protection

Inspection activities to review the radiation protection plan and controls for reactor vessel head replacement were performed concurrent with the review of the steam generator replacement radiation protection controls and the results are documented in inspection report 05000382/2012005. Additional inspection of the dose estimate and tracking for the reactor vessel head replacement will be completed concurrent with the inspection of steam generator replacement activities following the refueling outage and documented in inspection report 05000382/2013004.

Security Considerations

This activity was performed in conjunction with the steam generator replacement inspection activities. These activities are described in the steam generator section of this report.

2. Reactor Vessel Head Fabrication Inspections at Licensee Facility

The inspectors used the guidance in Inspection Procedure 71007, "Reactor Vessel Head Replacement Inspection," to perform the following reactor vessel head fabrication inspection activities.

Heat Treatment

The inspectors verified that the material heat treatment used to enhance the mechanical properties of the reactor vessel head material carbon, low alloy, and high alloy chromium steels was conducted per ASME code and approved vendor procedures consistent with the applicable ASME Code, Section III, requirements. Also, inspections were performed to verify that adequate heat treatment procedures were available to assure that requirements associated with the following areas were met: (1) furnace atmosphere; (2) furnace temperature distribution and calibration of measuring and recording devices; (3) thermocouple installation; (4) heating and cooling rates; (5) quenching methods; and (6) record and documentation requirements.

Nondestructive Examination (NDE)

Inspections were conducted to ensure the manufacturing control plan included provisions for monitoring NDE to ascertain that the NDE was performed in accordance with applicable code, material specification, and contract requirements.

Welding

The inspectors reviewed the documentation for the weld overlay welding operations that established a layer of stainless steel cladding on the inside of the reactor vessel head to verify that it was accomplished per design. The inspectors also selected a sample of control element drive mechanism flange-to-nozzle welds and reviewed the following items: (1) certified mill test reports of the flange, weld material rods, and control element drive mechanism nozzles; (2) certified mill test reports for the welding material for the reactor vessel head cladding; (3) cladding weld records, weld rod material control requisitions, traceability of weld material rods, weld procedure qualification, welder qualifications, and nonconformance reports; (4) control element drive mechanism nozzle cladding welding inspection records, weld rod material control requisitions, traceability of weld material rods, weld procedure qualification, welder qualifications, and nonconformance reports; (5) control element drive mechanism to nozzle welding and welds inspection records, weld rod material control requisitions, traceability of weld material rods, weld procedure qualification, welder qualifications, and nonconformance reports; and (6) NDE procedures, NDE records of the welds, NDE personnel qualifications, and certification of the NDE solvents.

Procedures

Inspections were completed to ensure that repair procedures had been established and that these procedures were consistent with applicable ASME code, material specification, and contract requirements by verifying: (1) repair welding was conducted in accordance with procedures qualified to Section IX of the ASME code; (2) all welders had been qualified in accordance with Section IX of the ASME code; (3) records of the repair were maintained; and (4) that requirements had been established for the preparation of certified material test reports and that the records of all required examinations and tests were traceable to the procedures to which they were performed.

Code Reconciliation

The inspectors reviewed the required documentation, supplemental examinations, analysis, and ASME code documentation reconciliation to ensure that the original ASME code N-Stamp remains valid, and that the replacement head complies with appropriate NRC rules and industry requirements. The inspectors also ensured that the design specification was reconciled and a design report was prepared for the reconciliation of the replacement head, verifying that they were certified by professional engineers competent in ASME code requirements.

Quality Assurance Program

Inspections were conducted to ensure that: (1) machining was carried out under a controlled system of operation; (2) a drawing/document control system was in use in the manufacturing process; and (3) part identification and traceability was maintained throughout processing and was consistent with the manufacturer's quality assurance program. In addition, the inspectors ensured that only the specified drawing and document revisions were available on the shop floor and were being used for fabrication, machining, and inspection.

Compliance Inspection

The inspectors verified that the original ASME Code, Section III, data packages for the replacement reactor vessel head were supplemented by documents included in the ASME Code, Section XI, (pre-service inspection) data packages; examined selected manufacturing and inspection records of the finished machined reactor vessel head; and verified compliance with applicable documentation requirements.

3. Reactor Vessel Head Removal and Replacement Inspections

The inspectors used the guidance in Inspection Procedure 71007, "Reactor Vessel Head Replacement Inspection," to perform the following reactor vessel head removal and replacement inspection activities:

Lifting and Rigging

The inspectors observed and reviewed activities throughout the refueling outage associated with heavy lifting and rigging. The inspectors observed the implementation

and reviewed documentation related to several structural modifications associated with the heavy lifting activities.

The inspectors also observed and reviewed engineering evaluations concerning the removal and reinstallation of the following structural modifications:

- construction of the outside lift system, temporary work platform, and hatch transfer systems
- lifting and rigging preparations associated with old reactor vessel head removal
- interference removal and replacement of the new reactor vessel head
- temporary handling equipment construction and removal
- reactor cavity decking construction and removal
- movement of old and new reactor vessel heads
- reactor vessel head lift rig and polar crane
- transfer of old reactor vessel head to storage location

Major Structural Modifications

The structural modifications performed for the reactor vessel head replacement were limited to the construction opening created for the steam generator replacement activities. These activities are described in the containment opening restoration activities subsection of the steam generator section of this report.

Containment Access and Integrity

This activity was performed in conjunction with the steam generator replacement inspection activities. These activities are described in the containment opening restoration activities subsection of the steam generator section of this report.

Outage Operating Conditions

The inspectors used Inspection Procedure 71111.20 to verify proper outage conditions. Completion of these inspection activities are documented in inspection reports 05000382/2012005 and 05000382/2013002.

Foreign Materials Control

The inspectors performed frequent observations of the steam generator replacement activities to verify the licensee was implementing proper foreign materials controls. In particular, the inspectors observed controls related to reactor coolant system and secondary side openings.

Temporary Services

The inspectors reviewed the work package and drawings, and then observed the installation, use, and removal of temporary services in the containment building during the outage. Instructions for the use and controls for construction power were reviewed, and the installation was compared to the approved system sketches.

Storage of Removed Reactor Vessel Head

The inspectors observed the transport of the old reactor vessel head to its onsite storage location. Regional inspectors will review the radiological surveys for storage of the old reactor vessel head following the refueling outage and the results will be documented in inspection report 05000382/2013004.

4. Reactor Vessel Head Post Installation Verification and Testing Inspections

This activity was performed in conjunction with the steam generator replacement inspection activities. These activities are described in the steam generator section of this report.

b. Findings

No findings were identified.

4OA6 Meetings

Exit Meeting Summary

On January 30, 2013, the inspectors presented the inspection results to Ms. Donna Jacobs, Vice President, Operations, and other members of the licensee's staff. The licensee acknowledged the observations presented. Some proprietary information was reviewed during this inspection but no proprietary information was included in this report.

4OA7 Licensee-Identified Violations

None

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Jacobs, Vice President, Operations
K. Cook, General Manager, Plant Operations
A. Barnett, Engineer, Engineering Code Programs
L. Blocker, NDS Manager
D. Boan, Supervisor, Radiation Protection
J. Brawley, ALARA Supervisor, Radiation Protection
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W. Hardin, Senior Licensing Specialist, Licensing
M. Haydel, Supervisor, Engineering
B. Heath, Manager, Chemistry
L. Holman, Engineer, Engineering Code Programs
B. Klienlen, Senior Lead NDE, Engineering Code Programs
B. Lanka, Manager, System Engineering
B. Lindsey, Manager, Operations
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B. Pellegrin, Manager, Emergency Planning
R. Perry, Manager, Emergency Planning
G. Pickering, Senior engineer, Engineering Code Programs
G. Pierce, Manager, Training
J. Pollack, Senior Licensing Specialist, Licensing
R. Porter, Manager, Design Engineering
W. Rentz, Director, Emergency Planning, EOI
C. Rich, Jr., Director Nuclear Safety Assurance
J. Signorelli, Operations Training Instructor
D. Viener, Supervisor, Engineering Programs and Components
M. Vierra, Dosimetry Senior Technician, Radiation Protection
J. Vollmer, Dosimetry Supervisor, Radiation Protection
J. Williams, Senior Specialist, Licensing

NRC Personnel

D. Overland, Resident Inspector, Project Manager
M. Davis, Senior Resident Inspector
R. Azua, Senior Project Engineer
W. Sifre, Senior Reactor Inspector
M. Williams, Reactor Inspector

I. Anchondo, Reactor Inspector
 C. Hale, Reactor Inspector
 C. Speer, Reactor Inspector
 A. Johnson, Steam Generator Engineer

LIST OF DOCUMENTS REVIEWED

Section 4OA5: Other Activities

Procedures, Drawings, and Documents

| <u>NUMBER</u> | <u>TITLE</u> | <u>REVISION / DATE</u> |
|-----------------|---|----------------------------|
| EPEM1001 | Procedure for Magnetic Particle Examination | 3 |
| EPEP1001 | Procedure for Liquid Penetrant Examination | 1 |
| EPEU1003 | Procedure for Ultrasonic Examination of Thick. Measur. | 1 |
| EPEV1001 | Visual Examination Procedure | 1 |
| PP-NDE-011 | NDE Program Plan | 3 |
| QP-N05004T02 | Entergy RRVH for Waterford Unit 3 Replacement of RV Closure Head | 10 |
| N-7763-30 | Ultrasonic Examination Procedure for Head Forging | 2 |
| N-7763-40 | Magnetic Particle Procedure for Head Forging | 1 |
| CWTR3-08-144 | Replacement Reactor Vessel Closure Head DN 4500159169-07 and WEC Response to Garlock Heliflex Email | Mar. 18, 2008 |
| QC-WF3-00123542 | QC Inspection (Volumes 1, 2, and 3) | |
| CWTR3-12-180 | Transmittal of Westinghouse Quality Program Audit Plan: WES-2011-183 | Oct. 1, 2012 |
| GQP-9.6 | Visual Examination of Welds | 13 |
| GQP-9.7 | Solvent Removable Liquid Penetrant Examination and Acceptance Standard for Welds, Base Materials, and Cladding (50-150 F) | 15 |
| 901084-01 | Reactor Vessel CEDM Installation Using Standard "D" Weld Head | 0 |

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| 901084-01B | Reactor Vessel Closure Head CEDM Installation – Personnel Qualification | 0 |
| 901084-01C | Welding Power Supply, Dimetrics 300Amp. Goldtrack II and Magnatech “D” Head Welding System | 1 |
| QEP 20.09 | Requirements for AWS Reinforcement Bar Welding | 3 |
| QEP 20.04 | Welder Performance Qualification | 5 |
| QEP 11.03 | Concrete and Grout | 0 |
| QEP 11.03-1 | Concrete Placement Report | Dec 15, 2012 |
| 39597-8427-A20 | Steel Reinforcement Reinstallation for Temp Concrete Opening | 3 |
| 39597-8427-A19 | Construction Hatch Concrete Cutout Details | 4 |
| 39597-8427-A14 | EC Markup EC8427 G518 Containment Wall Opening | 3 |
| EC 8427 (ECN39100) | Containment Wall Opening for the SG/RVCH Replacement | 0 |
| 39597-SPEC-C-002 | Concrete and Grout Specification for the SG/RVCH Replacement Project | 5 |
| 39597-SPEC-C-005 | Reinforcing Steel and ZAP Screwlok Series Mechanical Splices to Repair the Concrete Opening for the SG/RVCH Replacement Project | 1 |
| 39597-CGDP-003 | Commercial Grade Dedication Plan for Concrete Mix Design | 4 |
| WP 1730, Att. 13 | Dry Cooling Tower Fans Shift Inspection | Oct 19-22, 2012 |
| S&ME Log No. 12-409-001 | Certified Materials Test Report for Sister Splices of Mechanical Couplers | Dec 13, 2012 |
| S&ME Sample No. 12-311-001 | Certified Materials Test Report for Preliminary North Augusta Sand Testing | Nov 15, 2012 |
| S&ME Sample No. 12-175-001 | Certified Materials Test Report for Type I/II LA Portland Cement (Davenport) | Nov 15, 2012 |
| S&ME Sample No. 12-175-002 | Certified Materials Test Report for Tap Water | Nov 15, 2012 |

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| S&ME Sample No. 12-175-002 | Certified Materials Test Report for ADVA 190 Water Reducer | Nov 15, 2012 |
| S&ME Sample No. 12-175-007 | Certified Materials Test Report for No. 57 Stone (Isabel Quarry) | Nov 15, 2012 |
| S&ME Sample No. 12-175-008 | Certified Materials Test Report for Sand (Honey Island Quarry) | Nov 15, 2012 |
| S&ME Sample No. 12-225-001 | Certified Materials Test Report for Type I/II LA Portland Cement (Festus) | Nov 15, 2012 |
| S&ME Sample No. 12-353-001 | Certified Materials Test Report for No. 57 Stone (Isabel Quarry) | Nov 19, 2012 |
| S&ME Log No. 12-348-001 through 12-348-015 | Certified Materials Test Reports for Craft Qualification for Mechanical Coupler | Nov 1, 2012 |
| S&ME Sample No. 12-050W-001 (Lab & Field) | Certified Material Test Report for Compressive Strength of Concrete | Dec 18, 2012 |
| Heat Lot No. 5078845 | Certified Material Test Report for Zap Screwlok | Oct 22, 2012 |
| A12409-R-001 | Root Cause and Evaluation For Use In As-Is Condition of Shield Building Concrete Cylindrical Walls | 0 |
| PAD EC8427 | Process Applicability Determination for Containment Wall Opening for the SG/RVCH Replacement | 3 |
| Checklist No. SC-37 | Concrete Batch Plant and Lab Surveillance | Jul 25, 2012 |
| Checklist No SC-37b | Concrete Batch Plant Surveillance | Dec 14, 2012 |
| | Concrete Delivery Tickets | Dec 15, 2012 |
| | Concrete Batch Tickets | Dec 15, 2012 |
| | White Paper: Limiting Concrete Cracking in the Shield Building Construction Opening Repair | Nov 20, 2012 |
| | National Ready Mixed Concrete Association Certificate | Jul 8, 2012 |
| | Shield Building Construction Hatch Opening Wall Inspection | Nov 6, 2012 |
| | Concrete Mix Design 548GA | 4 |

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| | Certificate of Compliance for rebar- Mackson, Inc. | Nov 9, 2010 |
| ECN 35317 | Entergy Operations, Inc. – Waterford 3 Steam Generator Supports for the Steam Generator/Reactor Vessel Closure Head Replacement | 0 |
| CEP-PT-001 | ASME Section XI Pressure Testing Program | 305 |
| CEP-NDE-0902 | VT-2 Examination | 7 |
| 03-8022567 | Operating Instruction, Primary System Severing | 3 |
| EC 8438/ECN 22199 | Hot Gap displacement Requirements for Reactor Coolant System Stops and Replacement Steam Generator Supports | 0 |
| WF3-PS-00009 | Code Reconciliation for EC8433 Steam Generator 1 and 2 Reactor Coolant System Piping | 0 |
| ECN 24060 | Steam Generator Tube Structural Analysis for Replacement Steam Generator Component Qualification (10CFR50.59 Evaluation) | 0 |
| EC 8465 | Waterford Replacement Steam Generator Mechanical Systems and Components Impact Review | 2010-08 |
| EC 8458 | Replacement Steam Generator Qualification | 2010-10 |
| EC 8439 | Miscellaneous Rupture Restraint Modifications for the Steam Generator / Reactor Vessel Closure Head Replacement | 2010-09 |
| EC 8438 | Steam Generator Supports for the Steam Generator / Reactor Vessel Closure Head Replacement | 2010-05 |
| EC 8435 | Steam Generator Blowdown System Piping and Temporary Supports for the Steam Generator / Reactor Vessel Closure Head Replacement | 2010-07 |
| EC 8433 | Reactor Coolant System Piping and Temporary Supports for the Steam Generator / Reactor Vessel Closure Head Replacement Project | 2010-04 |
| EC 8427 | Containment Wall Opening for the Steam Generator / Reactor Vessel Closure Head Replacement | 2010-11 |
| 6660E14 | Replacement Steam Generator – Waterford Unit 3 Tubesheet | 5 |
| 6660E07 | Replacement Steam Generator – Waterford Unit 3 Channel Head Partition Plate | 3 |
| 6660E06 | Replacement Steam Generator – Waterford Unit 3 Channel Head | 7 |

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| 6660E00 | Replacement Steam Generator – Waterford Unit 3 Outline | 2 |
| 6660E27 | Replacement Steam Generator – Waterford Unit 3 Access Closure Hardware | 7 |
| 6660E84 | Replacement Steam Generator – Waterford Unit 3 Shipping Assembly | 3 |
| 6660E83 | Replacement Steam Generator – Waterford Unit 3 Final Pressure Boundary Assembly Covers and Hydrostatic Test | 3 |
| 6660E82 | Replacement Steam Generator – Waterford Unit 3 Upper to Lower Assembly | 2 |
| 6660E77 | Replacement Steam Generator – Waterford Unit 3 Primary Separator Assembly Lower Deck Weldment Machining | 1 |
| 6660E76 | Replacement Steam Generator – Waterford Unit 3 Primary Separator Assembly Drain Bucket Assembly | 3 |
| 6660E71 | Replacement Steam Generator – Waterford Unit 3 Lower Deck Support Assembly | 3 |
| 6660E69 | Replacement Steam Generator – Waterford Unit 3 Primary Separator Assembly Lower Deck Weldment | 1 |
| 6660E67 | Replacement Steam Generator – Waterford Unit 3 Primary Separator Assembly Middle Deck Assembly | 3 |
| 6660E66 | Replacement Steam Generator – Waterford Unit 3 Modular Separator | 4 |
| 6660E53 | Replacement Steam Generator – Waterford Unit 3 Feedwater Ring Assembly | 5 |
| 6660E52 | Replacement Steam Generator – Waterford Unit 3 Upper Internals Installation | 2 |
| 6660E49 | Replacement Steam Generator – Waterford Unit 3 AVB Retaining Ring and Retainer Bar | 1 |
| 6660E47 | Replacement Steam Generator – Waterford Unit 3 Anti-Vibration Bars Configuration | 1 |
| 6660E42 | Replacement Steam Generator – Waterford Unit 3 Tubing Assembly | 1 |
| 6660E40 | Replacement Steam Generator – Waterford Unit 3 Tube Support Plate | 1 |

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| 6660E34 | Replacement Steam Generator – Waterford Unit 3 Wrapper Barrel Assembly | 5 |
| 6660E31 | Replacement Steam Generator – Waterford Unit 3 External Attachments | 4 |
| 6660E21 | Replacement Steam Generator – Waterford Unit 3 Feedwater Nozzle | 2 |
| 6660E19 | Replacement Steam Generator – Waterford Unit 3 Secondary Pressure Boundary | 5 |
| 1062-1205-1 | Technical Review of Westinghouse Evaluation of Waterford 3 Replacement Steam Generator Tube Wear Acceptability | Oct.17, 2012 |
| TR-NCE-12-5 | Acceptability of Waterford Unit 3 Replacement Steam Generators Relative to Tube Wear Potential | 0 |
| EC 8458 | Analysis of the Reactor Coolant System with Replacement Steam Generators for Branch Line Pipe Breaks for Waterford Unit 3 3716 MWt | 1 |
| CN-NCE-08-16 | Development of GENF Computer Code Model for Waterford Unit 3 Replacement Steam Generators | 0 |
| CN-NCE-08-7 | Waterford 3 Replacement Steam Generator Thermal and Hydraulic Data | 2 |
| CN-NCE-W3RSG-17 | Waterford 3 Steam Electric Station Delta 110 Replacement Steam Generator Lower Internals Analysis | 1 |
| CN-NCE-09-2 | Flow-Induced Vibration and Tube Wear Evaluation for Waterford 3 Replacement Steam Generators | 0 |
| WCAP-17263-P | Regulatory Guide 1.121 Analysis and Structural Integrity Performance Criterion Application for the Waterford Unit 3 Model Delta 110 Replacement Steam Generators for a NSSS Power of 18696 MWt/SG | 1 |
| CN-NCE-09-15 | Thermal and Hydraulic Design Analysis Report for Waterford Unit 3 Model Delta-110 Replacement Steam Generators | 0 |
| CN-NCE-09-13 | ATHOS Analysis of the Waterford Unit 3 Model Delta-110 Replacement Steam Generators | 0 |
| WCAP-17066-P | Waterford 3 Steam Electric Station Delta 110 Replacement Steam Generator Design Report | 0 |

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| 39597-HLLP-001 | Heavy Load Lifting Permit | May 15, 2012 |
| 39597-CLE-001 | Critical Lift Evaluation | 2 |
| QEP 10.05 | Rigging and Handling | July 20, 2012 |
| ECC09-007 | Qualification of Temporary Loads Inside the Containment Building Structure for the SG/RVCH Replacement Project | 0 |
| ECN 26827 | Rigging and Handling for Steam Generator / Reactor Closure Vessel Head Replacement | 0 |
| ECC09-008 | Qualification of Temporary Loads Outside the Containment Building Structure | 0 |
| QEP 20.04 | Welder Performance Qualification | Sep. 11, 2009 |
| ECN 38086 | Containment Wall Opening for the Steam Generator / Reactor Vessel Closure Head Replacement | 0 |
| 2012-07299 | Evaluation of Train B Dry Cooling Tower Air Recirculation and Temporary Work Platform | 0 |
| EC 8427 | 10 CFR 50.65 Assessment of the Presence of Temporary Work Platform (TWP) Installed by EC8427 to Support the Waterford 3 Steam Generator and Reactor Vessel Closure Head Replacement Project | 0 |
| W3F1-2011-0041 | Request for Alternative to ASME IWE-5221 Regarding Post Repair Testing of Waterford 3's Steel Containment Vessel Opening Waterford Steam Electric Station, Unit 3 | July 27, 2011 |
| 39597-CALC-C-113 | Construction Opening Debris Trough, Associated Piping, and Pipe Supports | Feb. 4, 2008 |
| 39597-CALC-C-112 | Qualification of the Dry Cooling Tower B Air Flow Deflector Temporary Wall | Feb. 4, 2008 |
| 39597-CALC-C-087 | Qualification of the Temporary Work Platform for the Steam Generator / Reactor Vessel Closure Head Replacement Project | Feb. 4, 2008 |
| EC 8427 | Containment Wall Opening for the Steam Generator / Reactor Vessel Closure Head Replacement | 0 |
| ECM10-006 | Dry Cooling Tower B Air Flow Reduction Limits to Support Steam Generator Replacement | 0 |

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| ECM10-003 | Dry Cooling Tower B Air Flow Analysis for the Steam Generator / Reactor Vessel Closure Head Replacement Project | 0 |
| 2010-011 | Containment Wall Opening for the Steam Generator / Reactor Vessel Closure Head Replacement / EC8427(ECN 21794 for Temporary Work Platform) | 0 |
| ECT 8427-01 | Containment Construction Hatch Leak Test | 1 |
| CEP-NDE-0902 | VT2 Visual Examination (ASME Section XI) | 7 |