UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD.
KING OF PRUSSIA, PA 19406-2713

August 10, 2016

Mr. Bryan Hanson
Senior Vice President, Exelon Generation Co., LLC
President and Chief Nuclear Officer, Exelon Nuclear
4300 Winfield Rd.
Warrenville, IL 60555

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION – COMPONENT DESIGN BASES INSPECTION REPORT 05000219/2016007

Dear Mr. Hanson:

On July 15, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Oyster Creek Nuclear Generating Station. The enclosed inspection report documents the inspection results, which were discussed on July 15, 2016, with Mr. Michael Gillin, Plant Manager, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. In conducting the inspection, the team examined the adequacy of selected components to mitigate postulated transients, initiating events, and design basis accidents. The inspection involved field walkdowns, examination of selected procedures, calculations and records, and interviews with station personnel.

No findings were identified.

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

Sincerely,

/RA/

Paul G. Krohn, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 50-219
License No. DPR-16

Enclosure:
Inspection Report 05000219/2016007
w/Attachment: Supplementary Information

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Chief Nuclear Officer and Senior Vice President
Exelon Nuclear
4300 Winfield Road
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Letter to Mr. Bryan Hanson from Paul G. Krohn, dated August 10, 2016

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION – COMPONENT DESIGN BASES INSPECTION REPORT 05000219/2016007

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Docket No:	50-219
License No:	DPR-16
Report No:	05000219/2016007
Licensee:	Exelon Nuclear
Facility:	Oyster Creek Nuclear Generating Station
Location:	Forked River, New Jersey
Inspection Period:	June 13, 2016 – July 15, 2016
Inspectors:	J. Schoppy, Senior Reactor Inspector, Team Leader Division of Reactor Safety (DRS) D. Kern, Senior Reactor Inspector, DRS T. O'Hara, Reactor Inspector, DRS J. Richmond, Senior Reactor Inspector, DRS A. Della Greca, NRC Electrical Contractor W. Sherbin, NRC Mechanical Contractor
Approved By:	Paul G. Krohn, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY

IR 05000219/2016007; 6/13/16 - 7/15/16; Oyster Creek Nuclear Generating Station; Component Design Bases Inspection.

The report covers the Component Design Bases Inspection conducted by a team of four U.S. Nuclear Regulatory Commission (NRC) inspectors and two NRC contractors. No findings were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R21 Component Design Bases Inspection (IP 71111.21)

.1 Inspection Sample Selection Process

The team selected risk significant components for review using information contained in the Oyster Creek Probabilistic Risk Assessment (PRA) model and the U. S. Nuclear Regulatory Commission's Standardized Plant Analysis Risk (SPAR) model for the Oyster Creek Nuclear Generating Station. Additionally, the team referenced the Plant Risk Information e-Book (PRIB) for Oyster Creek in the selection of potential components for review. In general, the selection process focused on components that had a Risk Achievement Worth (RAW) factor greater than 1.3 or a Risk Reduction Worth (RRW) factor greater than 1.005. The components selected were associated with both safety-related and non-safety related systems, and included a variety of components such as pumps, tanks, diesel engines, batteries, motor control centers (MCCs), circuit breakers, and valves.

The team initially compiled a list of components based on the risk factors previously mentioned. Additionally, the team reviewed the previous component design bases inspection (CDBI) reports and excluded the majority of those components previously inspected. The team then performed a margin assessment to narrow the focus of the inspection to 16 components and 4 operating experience (OE) items. The team selected the suppression pool to review for large early release frequency (LERF) implications. The team's evaluation of possible low design margin included consideration of original design issues, margin reductions due to modifications, or margin reductions identified as a result of material condition/equipment reliability issues. The assessment also included items such as failed performance test results, corrective action history, repeated maintenance, Maintenance Rule (a)(1) status, operability reviews for degraded conditions, NRC resident inspector insights, system health reports, and industry OE. Finally, consideration was also given to the uniqueness and complexity of the design and the available defense-in-depth margins.

The team performed the inspection as outlined in NRC Inspection Procedure (IP) 71111.21. This inspection effort included walkdowns of selected components; interviews with operators, system engineers, and design engineers; and reviews of associated design documents and calculations to assess the adequacy of the components to meet design basis, licensing basis, and risk-informed beyond design basis requirements. Summaries of the reviews performed for each component and OE sample are discussed in the subsequent sections of this report. Documents reviewed for this inspection are listed in the Attachment.

.2 Results of Detailed Reviews

.2.1 Results of Detailed Component Reviews (16 samples)

.2.1.1 Standby Liquid Control Pump "B" and Standby Liquid Control Tank (2 samples)

a. Inspection Scope

The team inspected the "B" standby liquid control (SLC) pump to verify that it was capable of meeting its design basis requirements. The SLC system is designed to bring the reactor to a shutdown condition at any time in core life independent of control rod capabilities, including anticipated transients without scram (ATWS) events. The team reviewed the Updated Final Safety Analysis Report (UFSAR), calculations, drawings, and procedures to identify the most limiting requirements for the SLC pump. The team reviewed a sample of surveillance test results to verify that pump performance met the acceptance criteria, and that the flowpath was adequately tested. The team reviewed calculations for pump net positive suction head (NPSH) available versus required and discharge piping head loss to ensure that the pump could successfully inject into the reactor vessel consistent with design assumptions for the most limiting event, which is an ATWS event. The team also reviewed the pump discharge piping safety relief valve setpoint basis to determine if the relief valve setting was low enough to protect the piping, yet high enough so that the relief valve won't lift during pump operation. The team discussed the design, operation, and corrective maintenance of the SLC pump with the engineering staff to gain an understanding of the performance history and overall component health. Additionally, the team reviewed corrective action documents and system health reports, and performed several walkdowns of the pump area to assess the material condition of the equipment and Exelon's configuration control.

The inspectors also reviewed SLC tank volume calculations in order to ensure boron solution volume was adequate to provide the required shutdown margin when needed, and compared the volume requirements with SLC system Technical Specification (TS) Limiting Condition for Operations (LCOs). The team reviewed tank level instrument setpoint calculations and procedures for pump shut-off to ensure vortex margins at the tank outlet were adequate. Inspectors also reviewed the calibration and inspection data on the level transmitters and alarm setpoints to ensure that Exelon adequately maintained the equipment. The team reviewed calculations, drawings, and other documents supporting structural and seismic qualification for the SLC tank to ensure that design basis requirements were adequately addressed. The team reviewed recent in-service inspection (ISI) records for the tank to ensure that there was no appreciable structural degradation of the tank and associated equipment. The team discussed the design, operation, and corrective maintenance of the SLC tank with the engineering staff to gain an understanding of the performance history and overall component health. Additionally, the team reviewed corrective action documents and system health reports, and performed several walkdowns of the SLC tank and surrounding area to assess the material condition of the equipment and operating environment.

b. Findings

No findings were identified.

.2.1.2 Emergency Diesel Generator No. 1 (Mechanical Review)

a. Inspection Scope

The team conducted a mechanical review of the emergency diesel generator (EDG) No. 1. The review included a detailed review of the recent quarterly maintenance work orders and a review of the TSs, the UFSAR, and EDG vendor manual to identify design basis requirements for EDG No. 1. The team reviewed drawings and vendor documents to verify that the installed configuration supported the design basis function under accident conditions. The team interviewed the system engineer and reviewed system health reports to determine recent trends in EDG performance. The team also performed several walkdowns of both EDGs to assess the observable material condition, configuration control, and operating environment.

The team reviewed recent seismic inspections of the EDGs, the EDG enclosures, and the EDG fuel oil storage tank to verify the seismic capability of the EDG enclosures and support equipment. The team verified that the location and installation of the cabinet mounting fasteners were in accordance with the installation drawings to ensure seismic adequacy. The team reviewed test procedures and recent test results against design bases documents to verify that acceptance criteria for the tested sequenced time parameters were supported by calculations or other engineering documents and that individual tests and analyses served to validate component operation under accident conditions. The team reviewed vendor documentation, system health reports, preventive and corrective maintenance history, and corrective action program (CAP) documents in order to verify that potential degradation was monitored or prevented, and that scheduled component inspections or replacements were consistent with vendor recommendations.

b. Findings

No findings were identified.

.2.1.3 Reactor Protection System Trip System Relays

a. Inspection Scope

The reactor protection system (RPS) is a control logic that monitors plant operating parameters and provides signals for reactor trip, engineered safety features system actuations, and primary and secondary containment isolation. The trip system relays provide the logic for scram solenoids actuation and control rod insertion. The team reviewed the UFSAR and the TSs to determine the design and operational requirements of the system and verified that the control logic conformed to the specified functional requirements. The team reviewed the voltage available to the control logic components to verify that it was adequate to prevent spurious actuations of the system. The team also reviewed recent calibration and test results of various reactor scram input functions, such as reactor pressure and reactor water level, to confirm that the plant monitoring instrumentation performed in accordance with their design basis requirements and provided the required actuation signals. Additionally, the team reviewed recent testing results of the system actuation logic to verify that it adequately responded to the actuation signals. The team performed a walkdown of accessible components, including RPS motor-generators, transmitters, monitoring instrumentation, and actuation relays to assess the material condition of the components and their vulnerability to the operating environment.

Finally, the team interviewed the system engineer to determine the functional history of the RPS system and reviewed selected corrective action issue reports (IRs) as well as the latest system health report to confirm that Exelon properly identified deficiencies and resolved them in a timely manner.

b. Findings

No findings were identified.

.2.1.4 Isolation Condenser Make-up Valves V-11-34 and V-11-36

a. Inspection Scope

The team inspected isolation condenser heat exchanger (HX) air-operated makeup valves V-11-34 and V-11-36 to verify they were capable of performing their design function. The isolation condenser system (ICS) is a standby, high pressure system for removal of fission product decay heat when the reactor vessel (RV) is isolated from the main condenser. The system works by natural circulation, with steam from the RV entering the ICS tubes, being condensed in the HX, and returned to the RV as condensate. A minimum of 22,730 gallons of water is maintained in the isolation condenser shell to provide a heat sink. Makeup water to the ICS shells is available via V-11-34 and V-11-36 from several sources including the demineralized water tank, the condensate storage tank, fire protection, and the torus. The makeup valves are normally maintained closed. Air is used to open the valves, and springs force the valves shut on a loss of instrument air pressure.

The team reviewed the UFSAR, the ICS risk information notebook, calculations, associated TSs, and procedures to identify the design basis requirements of the valves. The team also reviewed accident system alignments to determine if component operation would be consistent with the design and licensing bases assumptions. The team also reviewed valve testing procedures and valve specifications to ensure consistency with design basis requirements. The team reviewed periodic verification diagnostic test results and stroke test documentation to verify acceptance criteria were met and consistent with the design basis. The team interviewed the air-operated valve (AOV) program engineer to gain an understanding of maintenance issues and overall reliability of the valves. The team conducted a walkdown to assess the material condition of the valves, associated piping and supports, availability of the backup air accumulator supply, critical manual operator actions, and to verify that the installed valve configuration was consistent with design basis assumptions and plant drawings. The team also reviewed the maintenance and operating history of the valves, recent design modifications, the ICS and instrument air health reports, relevant industry OE, and applicable system test results to determine if there were any adverse operating trends and to ensure that Exelon adequately identified and addressed any adverse conditions. Finally, the team reviewed specific corrective action documents to verify that Exelon appropriately identified and resolved deficiencies, and properly maintained the valves.

b. Findings

No findings were identified.

.2.1.5 <u>"C" 125 VDC Battery and "C" Battery Bus Distribution Center DC-C</u>

a. Inspection Scope

The team reviewed the design, testing, and maintenance of the "C" 125 volt direct current (VDC) battery and battery bus (i.e., DC-C distribution center) to assess their capability and capacity to perform their design function of providing reliable power to connected loads under operating, transient, and worst case conditions. The team reviewed equipment design ratings, calculations, drawings, and maintenance procedures to evaluate the adequacy and appropriateness of design assumptions, equipment ratings, and material conditions. The team reviewed battery sizing calculations, load profile studies, and voltage drop calculations to evaluate whether the battery capacity and distribution system were adequate for the equipment load and duration required by the design and licensing bases, and to assess whether adequate voltage was available to meet minimum voltage specifications for connected loads during worst case loading conditions. The team also reviewed battery maintenance and surveillance test records, including modified performance and service discharge tests, to assess the battery's condition and to verify whether testing and maintenance were performed in accordance with approved procedures, vendor recommendations, industry standards, and design and licensing requirements. The team compared the service test and modified performance test load profiles to the load profile studies for the loss-of-coolant accident (LOCA) with a concurrent loss-of-offsite power (LOOP) and the station blackout design assumptions to ensure the load testing enveloped the predicted worst case loading conditions. In addition, the team compared as-found test and inspection results to established acceptance criteria to evaluate the as-found conditions and assess whether those conditions conformed to design basis assumptions and regulatory requirements.

The team reviewed short circuit calculations to assess whether the DC breakers were adequately sized and capable of interrupting short circuit fault currents. The team evaluated the DC over-current protective coordination studies to evaluate whether adequate breaker over-current trip coordination existed, such that a load short circuit would not result in de-energizing the entire distribution center. In addition, the team reviewed DC breaker inspection and test records to ensure the as-found test results satisfied established acceptance criteria and to assess whether the as-found conditions conformed to design basis assumptions and regulatory requirements. The team interviewed system and design engineers and walked down the "C" battery, DC-C distribution center, and battery chargers to independently assess the material condition, configuration control, and the operating environment. Finally, the team reviewed a sample of corrective action documents and system health reports to determine if there were any adverse trends and to assess Exelon's capability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.6 Scram Discharge Volume Drain Valves V-15-134 and V-15-121

a. Inspection Scope

The team inspected scram discharge volume (SDV) air-operated drain valves V-15-134 and V-15-121 to verify they were capable of performing their design function. The SDV drain valves are used to limit the loss of and contain reactor coolant (water displaced from above the control rod drive (CRD) hydraulic control unit piston and leakage past the CRD seals) from all 137 CRDs during a scram. During normal operation, the SDVs are empty with the drain valves open. A scram signal (or RPS actuation) de-energizes the SDV pilot valves, which vent control air and cause the SDV drain valves to close. The SDV drain valves must close within 30 seconds of a scram signal.

The team reviewed the UFSAR, in-service test (IST) plan, calculations, associated TSs, and procedures to identify the design basis requirements of the valves. The team also reviewed accident system alignments to determine if component operation would be consistent with the design and licensing bases assumptions. The team also reviewed valve testing procedures and valve specifications to ensure consistency with design basis requirements. The team reviewed periodic verification diagnostic test results and stroke test documentation to verify acceptance criteria were met and consistent with the design basis. The team interviewed the AOV program engineer to gain an understanding of maintenance issues and overall reliability of the valves. The team conducted a walkdown to assess the material condition of the valves, associated piping and supports, availability of the backup air accumulator supply, and to verify that the installed valve configuration was consistent with design basis assumptions and plant drawings. The team also reviewed the maintenance and operating history of the valves, the CRD system health report, and applicable system test results to determine if there were any adverse operating trends and to ensure that Exelon adequately identified and addressed any adverse conditions. Finally, the team reviewed specific corrective action documents to verify that Exelon appropriately identified and resolved deficiencies, and properly maintained the valves.

b. Findings

No findings were identified.

.2.1.7 Core Spray Pump 1A and Emergency Service Water Pump 1-1 4KV Circuit Breakers

a. Inspection Scope

Core spray pump 1A and emergency service water pump 1-1 receive power from safety-related 4160 V switchgear bus 1C. To ensure that the pumps received quality power during design basis conditions, the team reviewed the design of the 4kV switchgear bus and associated breakers and verified that they were capable of meeting their design basis requirements. In particular, the team reviewed load flow and voltage drop calculations to confirm that adequate voltage was available to the pump motors under limiting conditions. The team also reviewed the short circuit current calculations and verified that bus bracing and circuit breaker ratings were adequate for momentary and interrupting duty. Additionally, the team reviewed protective relay settings and periodic relay calibration test results to confirm that adequate coordination existed between the motor feeders and the bus supply breakers and to assure that an overload or faulted condition was isolated by the breaker closest to it.

The team confirmed that maximum switchyard voltage was used for short circuit calculations and that the calculated minimum bus voltage was based on degraded grid voltage conditions. The team reviewed the TSs, the UFSAR, and applicable operating procedures to identify the design basis requirements for the pump motors and verify that the circuit breakers control logic and functional testing conformed to the design requirements. The team reviewed the circuit breakers preventive maintenance (PM), and the results of inspections/tests to confirm the reliability of the equipment. The team interviewed the system engineer and performed a walkdown of the 4kV switchgear and control room panels to assess the material condition of observable components, configuration control, and operating environment. Finally, the team reviewed selected corrective action IRs and the latest system health report to confirm that deficiencies were appropriately identified and resolved in a timely manner.

b. Findings

No findings were identified.

.2.1.8 Emergency Diesel Generator Fuel Oil Transfer Pumps P-39-13 and P-39-14

a. Inspection Scope

The team inspected the EDG fuel oil transfer pumps (FOTPs) to evaluate whether they were capable of meeting their design basis and operational requirements to maintain each EDG fuel oil day tank (FODT) with sufficient fuel oil supply at a flow rate greater than the peak fuel oil consumption rate of the EDGs under all accident conditions, including LOOP. The team reviewed applicable portions of the TSs, the UFSAR, and the EDG design bases document (DBD) to identify the design basis requirements for the FOTPs. The team evaluated the FOTP NPSH under minimum fuel oil storage tank level conditions to ensure that pump operation would not be disrupted. The team reviewed the sizing of the FODTs and the levels associated with the FOTPs' start and stop to verify that the TS-required fuel oil quantity was not compromised. The team reviewed flowrate testing and results to verify that the pump performance bounded the analyzed FOTP performance and to determine if Exelon had adequately evaluated the potential for pump degradation. The team interviewed the system and design engineers to assess the material condition of the FOTPs and scheduled maintenance activities. The team also conducted several detailed walkdowns to visually inspect the physical/material condition of the FOTPs and their support systems to validate the data associated with the instruments supporting FOTP operation and to ensure adequate configuration control. Finally, the team reviewed corrective action documents and system health reports to evaluate whether there were any adverse operating trends and to assess Exelon's ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.9 Core Spray Parallel Isolation Valves V-20-15 and V-20-40

a. Inspection Scope

The team inspected core spray system injection valves, V-20-15 and V-20-40, to determine if the valves were capable of performing their design basis functions. Specifically, the team evaluated whether the normally closed valves, when opened, would provide an adequate flow path from the core spray system to the reactor pressure vessel. The team reviewed the UFSAR, TSs, TS Bases, drawings, procedures, and the IST bases document to identify the performance requirements for the valves. The team reviewed periodic motor-operated valve (MOV) diagnostic test results and stroke-timing test data to verify that acceptance criteria were met. The team evaluated whether the MOV's safety functions, performance capabilities, torque switch configurations, and design margins were adequately monitored and maintained. The team also reviewed MOV weak link calculations to ensure the ability of the MOVs to remain structurally functional while stroking under design basis operating conditions. The team verified that the MOV analyses used the maximum differential pressure expected across the valve during worst case operating conditions. The team also conducted several walkdowns of the valves and associated equipment to assess the material condition of the equipment and to evaluate whether the installed configuration was consistent with the plant drawings, procedures, and the design bases. Finally, the team reviewed corrective action documents to evaluate whether there were any adverse trends associated with the valves and to assess Exelon's capability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.10 125 VDC Power Panel DC-F

a. Inspection Scope

The team reviewed the design, testing, and maintenance of 125 VDC power panel DC-F to evaluate whether it was capable of meeting its design basis function to reliably power the associated loads during normal, transient, and worst case conditions. The team reviewed the one-line diagrams, control schematics, vendor specifications, nameplate data, associated calculations, and maintenance procedures to assess the adequacy of design, testing, and maintenance. Specifically, the team reviewed voltage drop and load flow calculations to evaluate whether the available voltage at each individual load was greater than the minimum required voltage under normal, transient, and worst case conditions. The team reviewed the panel supply and feeder breaker ratings and trip settings to assess whether adequate over-current protection coordination was provided between the loads and the feeder breaker. In addition, the team reviewed breaker inspection and test records to ensure the as-found test results satisfied established acceptance criteria and to assess whether the as-found conditions conformed to design basis assumptions and regulatory requirements. The team interviewed system and design engineers, and maintenance technicians and walked down the DC-F power panel to independently assess the material condition, configuration control, and the operating environment. Finally, the team reviewed a sample of corrective action documents and system health reports to evaluate whether there were any adverse trends and to assess Exelon's capability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.11 S1A Start-Up Transformer

a. Inspection Scope

The team inspected start-up transformer S1A to verify that it was capable of meeting its design basis requirements. The start-up transformer is designed to provide the preferred power source to safety-related 4160V bus 1C (via non-vital 4160V bus 1A) when voltage is not available from the normal supply. The team reviewed the load flow analysis, short circuit current calculations, and nameplate rating to verify that the transformer was capable of supplying maximum load requirements under normal, abnormal, and accident conditions. The team also reviewed the transformer protection scheme, protective relays trip settings, and relay coordination to confirm that faults upstream of the safety-related bus were adequately isolated without impacting the safety function of the bus. The team also reviewed the system health report and a sample of completed routine PMs and modifications associated with the S1A transformer to ensure that test results and modifications were in accordance with design requirements. The team performed a walkdown of the S1A transformer, surrounding transformer yard, and associated control room panels to assess the installed configuration, material condition, operating environment, and the potential vulnerability to hazards. The team also interviewed system and design engineers to discuss questions that arose during document reviews and walkdowns and to confirm the adequacy of maintenance and configuration control. Finally, the team reviewed selected corrective action documents to verify that Exelon appropriately identified and resolved deficiencies in a timely manner.

b. Findings

No findings were identified.

.2.1.12 Service and Instrument Air Compressor P-6-1 and P-6-2

a. Inspection Scope

The team inspected service and instrument air compressors P-6-1 and P-6-2 to verify that they were capable of performing their design function. The plant compressed air system (PCAS) includes service air, instrument air (IA), and breathing air systems. The IA system provides air for pneumatic control of many AOVs throughout the plant, including the CRD scram valves, isolation condenser makeup valves, SDV drain valves, and the reactor building/torus vacuum breaker valves. Those safety-related AOVs fail to their safety position or have local air accumulators. PCAS is supplied by three 100% capacity air compressors, including P-6-1 and P-6-2.

The team reviewed design calculations, drawings, system modifications, and vendor specifications to evaluate the adequacy and appropriateness of design assumptions and operating limits. The team interviewed engineers, and reviewed test records, alarm response procedures, operating procedures, vendor manuals, and maintenance records to evaluate whether maintenance and testing were adequate to ensure reliable operation, and to evaluate whether those activities were performed in accordance with regulatory requirements, industry standards, and vendor recommendations.

The team also conducted several walkdowns of the air compressors, air dryers, accessible air piping and supports, local alarm panels, and associated control room instrumentation to assess the material condition, configuration control, and operating environment. Finally, the team reviewed corrective action documents and system health reports to evaluate whether there were any adverse trends associated with P-6-1 and P-6-2 to assess Exelon's ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.13 Suppression Chamber (Torus)

a. Inspection Scope

The team inspected the suppression pool to verify that it was capable of performing its design function. The team reviewed the design basis documents pertaining to the suppression pool (torus) and the applicable sections of the UFSAR to determine the design requirements. The team also reviewed torus internal coating inspection results from inspections performed during the most recent refueling outages to assess the material condition and structural integrity of the torus. The team reviewed recent pressure suppression chamber to drywell vacuum breaker and reactor building to pressure suppression chamber vacuum breaker surveillance test results to verify that the vacuum breakers remained operable and capable of performing their design function supporting suppression pool integrity. Due to the inaccessibility of the torus, the team reviewed a sample of past corrective action IRs to verify that Exelon was identifying and repairing non-conforming conditions, and reporting non-conforming conditions in the CAP. The team also reviewed associated corrective action reports and applicable instrumentation and control test results for the suppression pool temperature, pressure, and level instruments to determine if there were any adverse trends and to ensure that Exelon adequately identified and addressed any adverse conditions. The team conducted an extensive walkdown of the accessible portions of the exterior of the torus structure to assess the material condition (including evidence of leakage), structural supports, potential hazards, and configuration control.

b. Findings

No findings were identified.

.2.1.14 125 VDC Motor Control Center DC-2

a. Inspection Scope

The team reviewed the design, testing, and maintenance of 125 VDC MCC DC-2 to evaluate whether it was capable of meeting its design basis function to reliably power the associated loads during normal, transient, and worst case conditions. The MCC provided DC power to the "B" isolation condenser inlet and outlet condensate isolation MOVs. The team reviewed the one-line diagrams, control schematics, vendor specifications, associated calculations, and maintenance procedures to ensure the MCC could supply adequate voltage and current to the isolation condenser MOVs. Specifically, the team reviewed voltage drop and load flow calculations to determine if available voltage at each MOV was greater than the minimum required voltage under normal, transient, and worst case conditions.

The team reviewed the MCC supply and load breaker ratings and trip settings to assess whether adequate over-current protection coordination was provided between the loads and the feeder breaker. In addition, the team reviewed breaker inspection and test records to ensure the as-found test results satisfied established acceptance criteria, and to assess whether the as-found conditions conformed to design basis assumptions and regulatory requirements. The team interviewed system and design engineers, and maintenance technicians and walked down the DC-2 MCC to independently assess the material condition, configuration control, and the operating environment. Finally, the team reviewed a sample of corrective action documents and system health reports to evaluate whether there were any adverse trends and to assess Exelon's capability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.15 Motor Control Center 1B21

a. Inspection Scope

The team reviewed 480 volt MCC 1B21 to verify its ability to meet the design basis requirements in response to transient and accident events. The MCC is safety-related and provides power to several fans and motors, including the “B” SLC pump. The team reviewed the UFSAR and the electrical DBD to identify the design requirements and required operational parameters and reviewed the vendor documentation to verify that the equipment was properly rated and in conformance with the specification requirements. The team reviewed the short circuit calculations to confirm that the MCC and breakers were adequately rated. Additionally, the team reviewed the breaker coordination, as well as the motor overload relay selection calculations, to ensure that the protective devices were properly coordinated and adequately sized to ensure effective overload or fault isolation and to prevent spuriously tripping. The team reviewed voltage drop calculations, including the control voltage available at motor starters and control components, to confirm that adequate voltage was available to the equipment for meeting their design basis functions. The team reviewed the circuit breaker PMs and the results of recent breaker testing and inspections to confirm the reliability of the equipment. The team performed a walkdown of the MCC to assess the material condition of the equipment and components and their operating environment. Finally, the team interviewed the system engineer to determine the functional history of the MCC and reviewed selected corrective action IRs as well as the latest system health report to confirm that Exelon properly identified deficiencies and resolved them in a timely manner.

b. Findings

No findings were identified.

.2.2 Review of Industry Operating Experience and Generic Issues (4 samples)

The team reviewed selected OE issues for applicability at Oyster Creek. The team performed a detailed review of the OE issues listed below to verify that Exelon had appropriately assessed potential applicability to site equipment and initiated corrective actions when necessary.

.2.2.1 Flowserve Part 21 – Double Disc Gate Valve Wedge Pin Failures

a. Inspection Scope

The team assessed Exelon's applicability review and disposition of a Flowserve 10 CFR Part 21 report associated with double disc gate valve wedge pin failures. The Part 21 discussed issues concerning a wedge pin failure of an Anchor Darling double disc gate valve at Browns Ferry Nuclear Plant Unit 1. An investigation revealed that the wedge pin had broken in several locations and the disc retainer had fallen from the wedge assembly and was found located between the valve discs. A topical report developed by the Boiling Water Reactor Owners Group (BWROG) Valve Technical Resolution Group (VTRG) provided a recommended industry response to the Flowserve 10 CFR Part 21. Exelon documented recommended actions from the BWROG report in corrective action IR 2170339. Exelon's associated evaluation noted that the Part 21 was applicable to six Oyster Creek isolation condenser valves, V-14-30 through 35. Exelon completed the short-term recommendations prescribed in the BWROG report for each valve. These actions included: (1) conducting a wedge pin shear capability evaluation, (2) verification of no stem rotation during valve stroking into and out of the closed seat, and (3) trend review of the last two valve diagnostic tests looking for symptoms of stem/disk separation. In the long-term, Exelon performed valve stem position orientation monitoring in conjunction with the two-year MOV stem lubrication and valve packing re-torque.

b. Findings

No findings were identified.

.2.2.2 NRC Information Notice 2015-09: Mechanical Dynamic Restraint (Snubber) Lubricant Degradation Not Identified due to Insufficient Service Life Monitoring

a. Inspection Scope

The team assessed Exelon's applicability review and disposition of NRC Information Notice (IN) 2015-09. The NRC issued this IN to inform licensees about potential degradation of the lubricant (grease) in mechanical dynamic restraints (snubbers) not previously identified at some nuclear power plants due to insufficient service life monitoring. Adequate snubber lubrication is essential to their proper functioning to allow free thermal movement of a component or piping during normal operating conditions and to restrain the component or piping during abnormal dynamic conditions (e.g., earthquakes, turbine trips, safety/relief valve discharge, and rapid valve closures). The IN described four Oyster Creek snubber failures in 2010 due to hardened or missing grease.

The inspection included a review of corrective action documents and maintenance documents, interviews with the Engineering Programs Manager, and a walkdown of selected snubbers on the core spray, isolation condenser, and condensate transfer systems. The team reviewed corrective actions which included repair/replacement of snubbers, expanded snubber testing scope, establishment of a new snubber testing and maintenance program, revisions to the Exelon snubber service life monitoring procedure, and recommended revision to the Exelon shelf life and storage procedure. The team also reviewed results of snubber inspection and testing performed during the 2012 and 2014 refueling outages.

b. Findings

No findings were identified.

.2.2.3 NRC Information Notice 2013-05: Battery Expected Life and Its Potential Impact on Surveillance Requirements

a. Inspection Scope

The team reviewed Exelon's evaluation of NRC IN 2013-05, "Battery Expected Life and Its Potential Impact on Surveillance Requirements." This IN described changes in battery design conditions, such as additional DC loads, which resulted in unrecognized reductions in battery capacity and battery life. As a result, certain TS surveillance test frequencies for battery performance and modified performance discharge testing became non-conservative. Specifically, the team reviewed Exelon's battery sizing calculations to evaluate whether the calculation used an aging factor of 1.25, in accordance with Institute of Electrical and Electronics Engineers (IEEE) 485. The recommended aging factor was intended to ensure that the TS surveillance frequency for battery discharge testing remained conservative when batteries reached 85 percent of their expected life.

b. Findings

No findings were identified.

.2.2.4 NRC Information Notice 2012-19: License Renewal Post-Approval Site Inspection Issues

a. Inspection Scope

The team assessed Exelon’s applicability review and disposition of NRC IN 2012-19, “Post-Approval Site Inspection for License Renewal.” This IN described issues associated with management and implementation of the aging management programs (AMPs) described in the UFSAR, regulatory commitments for license renewal, and license conditions that were added as part of license renewal. Exelon initiated IR 1448779 to evaluate the OE and addressed the specific issues communicated via IN 2012-19 as they pertained to Oyster Creek. Based on this review, Exelon assigned plant specific corrective actions to ensure that the same conditions were not repeated at the Oyster Creek Nuclear Generating Station. Additionally, the team reviewed a sample of four license renewal AMP inspections completed since Oyster Creek entered the period of extended operation in April 2009 to verify that Exelon adequately performed commitments in accordance with the Oyster Creek USFAR, Appendix A Final Safety Analysis Report Supplement (License Renewal).

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (IP 71152)

a. Inspection Scope

The team reviewed a sample of problems that Exelon had previously identified and entered into the CAP. The team reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions. In addition, the team reviewed corrective action IRs written on issues identified during the inspection to verify adequate problem identification and incorporation of the problem into the CAP. The specific corrective action documents that the team sampled and reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA6 Meetings, including Exit

On July 15, 2016, the team presented the inspection results to Mr. Michael Gillin, Plant Manager, and other members of the Exelon staff. The team verified that no proprietary information was retained by the inspectors and the team returned the proprietary information reviewed during the inspection to the licensee. The team verified that this report does not contain proprietary information.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Exelon Personnel
M. Caldeira, IST Engineer
T. Cappuccino, Senior Regulatory Assurance Specialist
J. Clark, Senior Manager, Plant Engineering
L. Dormann, Electrical Design Engineer
R. Dutes, Regulatory Assurance Specialist
M. Gillin, Plant Manager
M. Hand, Structural Design Engineer
M. Heck, Engineering Response Team Electrical Engineer
W. Ho, Structural Design Engineer
J. Jiminez, Senior Reactor Operator
T. LaPlante, CRD System Manager
P. Litorovich, System Engineer
M. McKenna, Manager, Regulatory Assurance
C. Muggleston, ASME Section XI Program Manager and LR Program AMP Coordinator
T. Nickerson, Design Engineer
J. Parker, Component Maintenance Optimization Engineer
P. Procacci, Electrical Design Engineer
H. Ray, Senior Manager, Design Engineering
C. Ricketts, EDG System Engineer
W. Saraceno, Mechanical System Engineering Branch Manager
S. Schwartz, Senior Staff Engineer
J. Tabone, AOV/MOV Program Engineer
H. Tritt, Electrical Design Engineering Manager
L. Valez, Manager, Engineering Programs
D. Yatko, Electrical Design Engineer

NRC Personnel:
E. Andrews, Resident Inspector
B. Cook, Senior Reactor Analyst
A. Patel, Senior Resident Inspector

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Open and Closed

None.

LIST OF DOCUMENTS REVIEWED

Audits and Self-Assessments

AR 02561757, Readiness Review for 2016 NRC Component Design Basis Inspection, dated 2/26/16

Calculations

10.000.05, 4160V, 1C & 1D Switchgear Room Temperature Study, dated 2/28/85
1302X-5350-021, OC RPS Instrument Modification Response Time Calculations, dated 8/14/81
3731-71-11-002, Appendix R – Condenser Shell Makeup Valve Accumulator Volume, Revision 1
13432.27.02, Scram Discharge Volume Capacity Calculation, Revision 2
13432.27.04, Setpoints for Scram Discharge Instrument Volume Level Switches, Revision 4
C-1302-187-5320-024, O.C. Drywell Ext. UT Evaluation in Sandbed, Revision 2
C-1302-211-E320-126, OC Isolation Condenser Shell Level Uncertainty (Normal Environment), Revision 5
C-1302-213-5320-010, OC-SEP Tank Seismic Analysis, Revision 0
C-1302-213-5450-001, OC EOP Boron Injection Variables, Revision 8
C-1302-213-E310-001, Standby Liquid Control (SLC) Net Positive Suction Head (NPSH), Revision 0
C-1302-213-E5420-022, OC NSR Pipe Analysis Liquid Poison System Pump Suction, Revision 1
C-1302-241-E610-080, Torus Pool Temperature for NPSH and to Determine Containment Spray System, dated 12/14/12
C-1302-241-E610-081, Suction Strainer Debris Generation and Transport, dated 5/7/08
C-1302-700-5350-003, OC-4160V Class 1E Protective Device Relay Set Points, Revision 6
C-1302-700-5350-011, OC – Minimum Voltage at MCC's 1A2 & 1B2 During LOCA & Degraded Grid, Revision 0
C-1302-700-5350-012, OC Short Circuit Study, Revision 4
C-1302-700-5350-014, OC Voltage Drop Study – Start 4KV and 480 Volt Motors during HELB, Revision 0
C-1302-700-5350-015, OC Voltage Drop Study – LOOP/LOCA Loading – 4100V Driving Voltage, Revision 0
C-1302-700-5350-019, OC Voltage Drop Study – Start Large Motors during HELB for MOV Analysis, Revision 1
C-1302-700-5350-021, OCNGS – Protective Relays 4.16KV Switchgear, Revision 6 – 6C
C-1302-730-5350-004, Generic Letter 89-10 Motor Operated Valves (MOV) Degraded Grid Voltage Calculation, Revision 9
C-1302-730-5350-005, O/L Heater Sizing for NSR OCNGS Generic Letter 89-10 MOVs, Revision 3
C-1302-730-5350-008, Generic Letter 89-10 MOV Voltage Drop, Revision 4 & 4A
C-1302-730-5350-014, TOL Sizing for Cont. Spray Valves V-21-5 and V-21-11, Revision 1
C-1302-730-5350-016, Overload Calculation for EDG Fuel Oil Pump Motor, Revision 2
C-1302-732-5350-018, 480 VAC MCC NSR Motor 129V Control Circuit Voltage Drop Calculation, Revision 2
C-1302-732-5350-021, OCNGS: Protection of Class 1E 460V MCC Motors during Worst Case Voltage, Revision 1
C-1302-735-5320-005, DC Panel Seismic Qualification, Revision 0
C-1302-735-5350-008, Battery Bus Coordination, Revision 4
C-1302-735-E320-037, Electromatic Relief Valve Voltage Drop, Revision 3
C-1302-735-E320-039, Battery Charger Voltage Drop, Revision 0
C-1302-735-E320-040, "A", "B", and "C" Battery Capacity, Revision 2
C-1302-735-E320-044, 125 VDC Voltage Drop, Revision 2 & 2B

C-1302-735-E320-046, Electromatic Relief Valve Voltage Drop for Appendix-R, Revision 1
C-1302-735-E320-047, "B" & "C" Battery Capacity for Station Blackout, Revision 1A
C-1302-735-E320-048, Mechanical Timeline Input for Battery Calculation, Revision 0
C-1302-735-E320-049, "B" & "C" Battery Sizing Calculation, Revision 1
C-1302-735-E510-035, 125 VDC System Short Circuit Study, Revision 0
C-1302-741-5350-001, Loading of Emergency Diesel Generators, Unit Substations, and 4.16 kV Buses 1A & 1B, Revision 0
C-1302-821-5360-002, 4160 Switchgear Loss of Ventilation, Revision 0
C-1302-861-5360-004, EDG #1 and #2 Fuel Oil Transfer Motor/Pump Support, Revision 0A
C-1302-862-5360-002, Diesel Generator Fuel Requirements, Usable Tank Volume and Pump NPSH, Revision 6
C-1302-862-E310-006, Emergency Diesel Generator Fuel Pipe Analysis, Revision 1
C-1302-862-E310-007, Void Diesel Generator Fuel Transfer Pump Inlet Pressure, Revision 1
C-1302-862-E310-008, Emergency Diesel Generator (EDG) Fuel Oil Piping Analysis, Revision 0
C-1302-900-E540-020, Weak Link Analysis Calculation for OC MOVs, Revisions 1 and 01A
C-1302-911-E120-008, Fire Safe Shutdown Analysis for DC-C Distribution Area, Revision 0G4
ES-027, Environmental Parameters – Oyster Creek NGS, Revision 4
M001, Emergency Diesel Oil Storage Tank (MK No. T-39-002), Revision 2

Completed Surveillance, Performance, and Functional Tests
604.4.015, Reactor Building to Torus Power VAC BKR CHK and IST, performed 5/14/16
609.4.001, Isolation Condenser Valve Operability and In-Service Test, performed 3/28/16
609.4.010, A Isolation Condenser Make-up Line Check Valve In-Service Test, performed 7/1/16
609.4.011, B Isolation Condenser Make-up Line Check Valve In-Service Test, performed 4/7/16 & 7/1/16
610.3.06, Core Spray System 1 Isolation Valve Actuation Test, performed 2/17/16
610.3.105, Core Spray System 1 Instrument Channel Calibration, Test and System Operability, performed 5/28/15
610.4.003, Core Spray System 1 Valve Operability Test, performed 2/17/16
610.4.011, Core Spray System Testable Check Valve Leakage and IST, performed 4/30/16
612.3.006, SLC Tank Level Sensor Calibration, performed 8/1/11
612.4.001, SLC Pump and Valve Operability and IST, performed 4/13/16
619.4.011, SDIV Vent and Drain Exercise performed 1/2/16
619.4.022, Scram Discharge Volume Vent and Drain Valve Functional Test performed 11/7/10, 10/23/12, & 10/5/14
619.4.025, Automatic Scram Contactor Test, performed 3/2/16
632.2.001, Normal Emergency Interlock Test, performed 10/9/14
635.2.001, 4160 Switchgear Buses (A, B, C, D) and Circulating Water Pump Protective Relay Surveillance, performed 2/16/16 & 5/16/16
636.4.001, Diesel Generator No. 1 Automatic Actuation Test, performed 10/6/14
636.4.003, Diesel Generator #1 Load Test, performed 5/23/16 & 6/11/16
TP 254/15, A/B/C Battery, MG and C/D 4160 Switchgear Rooms Heat-Up Test, performed 5/17/90

Completed Preventive Maintenance, Calibrations, and Inspections
157-002, Structural Monitoring Report Diesel Generator Building, System 157, dated 7/27/11
609.3.008, Isolation Condenser B Shell Water Level Instrument Calibration (IB06B), performed 4/7/16
619.3.011, SDIV Digital Level Cal and Test, performed 5/16/12, 5/28/13, & 8/24/15
619.3.016, RPS I High Drywell Pressure Scram Test and Calibration, performed 1/22/16 & 5/13/16

619.3.017, Reactor High Pressure Scram Test and Calibration, System 1, performed 4/14/15
619.3.020, 600 PSIG Bypass Switch Calibration and Scram Reset Test, performed 10/5/14
619.3.023, Reactor High/Low Level Test and Calibration, System 2, performed 5/22/15
619.3.024, Reactor Protection System Time Delay Relay Test and Calibration, performed 9/28/14
619.3.026, RPS II High Drywell Pressure Scram Test and Calibration, performed 12/31/15 & 3/25/16
619.3.027, Reactor High Pressure Test and Calibration, System 2, performed 4/20/15
619.3.111, SDIV Analog Level Calibration and Test, performed 2/23/15
619.3.113, Reactor High/Low Level Bistable Calibration and Test, System 1, performed 3/7/15, and 3/16/16
619.3.117, Reactor High Pressure Scram Bistable Calibration and Test, System 1, performed 7/22/15
619.3.121, SDIV Scram Bistable Calibration and Test, and Rod Block Logic Test, performed 5/15/15
619.3.123, Reactor High/Low Level Bistable Calibration and Test, System 2, performed 12/2/15
619.3.127, Reactor High Pressure Scram Bistable Calibration and Test, System 2, performed 7/16/15
CY-OC-120-530, Liquid Poison System Sampling, performed 4/13/16
General Electric Startup Transformers Test Report, dated 9/15/66
R2137381, Internal and External Inspection, Liquid Poison Tank, performed 3/10/14
R2184483, Lubrication and Visual Inspection of Liquid Poison Pump, performed 3/5/13
TR14T2365-01-01, ATC Nuclear Test Report for Westinghouse Thermal Overload Relays Part Numbers AA13P and AA23P and Thermal Overload Heaters Part Numbers FH29, FH30, FH40, and FH41, Revision 0
Wyle Test Report No. T71074-1, Certification Test Report, Crosby Liquid Relief Valve Model JMWKB, dated 9/9/13

Corrective Action Issue Reports (IRs)

0630284	1393021	1515963	1622838	2382348
0630434	1393627	1524696	1628754	2384875
0659443	1401226	1549950	1638261	2386729
0673565	1407085	1550330	1639300	2338293
0694690	1407100	1550576	1639308	2389584
0742095	1422943	1551933	1639319	2389585
0801400	1435959	1553707	1639326	2436605
0842492	1437014	1555619	1639331	2448320
0948375	1437828	1559520	1639338	2452205
1057139	1438253	1560774	1639347	2470320
1069881	1438256	1563024	1639349	2471926
1132790	1441101	1564598	1639350	2471929
1137580	1448779	1568022	1664517	2472372
1139909	1465637	1575590	1665760	2472912
1170026	1476586	1587431	1667841	2479234
1278641	1485178	1594080	1685480	2480314
1320106	1492090	1597041	1687267	2482851
1325599	1507271	1598442	1687272	2486093
1333345	1511816	1606613	1692457	2497406
1335427	1512551	1614019	1699849	2497537
1337139	1513477	1619313	2038961	2510773
1341942	1514754	1619946	2061675	2514942
1368377	1514995	1620266	2172149	2522772
1389786	1515949	1621643	2219179	2528639

2534473	2631588	2679751	2682541*	2688292*
2546223	2631652	2680143	2682557*	2688386*
2599413	2632082	2680262	2682911*	2688414*
2563163	2635992	2681446*	2682898	2688422
2564479	2637922	2681450*	2682902	2688431*
2567276	2643151	2681493*	2682915	2688442*
2587825	2643153	2681494*	2684028	2688443*
2595749	2643486	2681498*	2684559*	2689351*
2598652	2643830	2681714*	2684653*	2691248
2601675	2644907	2681742	2684846	2691386
2602571	2646708	2681903*	2685114*	2691393
2604423	2647355	2681911*	2685696*	2691421*
2611672	2664863	2681945*	2686036*	2691457
2611802	2666512	2681956*	2686039*	2691912*
2612770	2672827*	2681962*	2686166*	2691746*
2623267	2674973	2681995*	2686276*	2692109*
2623279	2678084	2682116*	2686751*	2692123*
2623589	2678426	2682292	2687236*	2692132*
2624853	2678807	2682304*	2687305*	2692297*
2625022	2678872	2682348	2687335*	2692371*
2625435	2678874	2682443*	2687363*	2693062*
2626117	2678875	2682448*	2687688*	2694284*
2628066	2678914	2682456*	2687889	2697704*
2628069	2679071	2682508*	2688276*	
2628088	2679099	2682519*	2688289*	

*IR written as a result of this inspection

<u>Design & Licensing Bases</u>

ASME OMb Code-2004, Code for Operation and Maintenance of Nuclear Power Plants, updated through 2006 Addenda

GPUN 3731-019, Study for Compliance of 4160V 1C and 1D Switchgear Rooms' Ventilation Systems with Appendix R Requirements, dated March 1985

NRC Letter from D.G. Eisenhut to all BWR Licensees, Clarification of Equivalent Control Capacity for SLC System (GL 85-03), dated 1/28/85

NRC Regulatory Guide 1.137, Fuel-Oil Systems for Standby Diesel Generators, Revision 1

OC-PSA-005.01, Isolation Condenser System PRA Notebook, Revision 2

OC-PSA-005.20, Condensate Transfer System PRA Notebook, Revision 2

OC-PSA-005.21, Instrument Air System PRA Notebook, Revision 2

Oyster Creek Nuclear Generating Station Inservice Testing (IST) Program Plan, Fifth Ten-Year Interval, Revision 23

SDBD-OC-212A, Low Pressure Core Spray System, Revision 3

SDBD-OC-225, Design Basis Document for Control Rod Drive System, Revision 1

SDBD-OC-641, Design Basis Document for Reactor Protection System, Revision 4

SDBD-OC-740, Design Basis Document for Emergency Power System, Revision 1

SDBD-OC-852, Design Basis Document for Plant Compressed Air System, Revision 3

<u>Drawings</u>

3B-735-18-1000 Sh. 1 & 2, MCC DC-2 Connection Diagram, Revision 4
3D-861-22-1002, Diesel Generator Base Frame Supports, Revision 0
3E-862-21-1000, Emergency Diesel Generator Diesel Fuel Oil Storage & Transfer System, Revision 25
86N-36864-A1-C001, Loop Diagram RE05A, Panel 19R Front, Revision 5
86N-36864-A2-C001, Loop Diagram RE05B, Panel 18R Rear, Revision 5
86N-36864-A3-C001, Loop Diagram RE05/19A, Panel 18R Front, Revision 4
86N-36864-A4-C001, Loop Diagram RE05/19B, Panel 19R Rear, Revision 4
88N-42654-CD-0001, Loop Diagram RE03A, Panel 18R Front, Revision 4
88N-42654-CD-0003, Loop Diagram RE03B, Panel 19R Front, Revision 4
88N-42654-CD-0005, Loop Diagram RE03C, Panel 18R Rear, Revision 4
88N-42654-CD-0007, Loop Diagram RE03D, Panel 19R Rear, Revision 4
AU-2079-5, 8 Inch, 600 lb. Class Gate Valve, Revision 0
BR 2004, Sh. 2, Condensate Transfer System, Revision 100
BR 2006, Sh. 5, Turbine Building Closed Cooling Water System, Revision 59
BR 2013 Sh. 1 & Sh. 6, Instrument (Control) Air System, Revision 76 & 89
BR-3000, Electric Power System One-Line Diagram, Revision 14
BR 3001 Sh. 1, Main One Line Diagram, Revision 18
BR 3001 Sh. 2, Emergency Power System One Line Diagram, Emergency Diesel Generators, Revision 4
BR 3001A, 4160V System, One Line Diagram, 4160V Swgr Bus 1A, Revision 11
BR-3029 Sh. 2A, Emergency Condenser Isolation Control Schematic, Revision 27
BR-E1102, Emergency Condenser System Elementary Diagram, Revision 16
DJP 3E-851-21-1000, Air Compressors for Service Air System and TBCCW System, Revision 1
EB-D-3033, DC-C and DC-2 One-Line Diagram, Revision 32
EM 8393039 Sh. 8, Emergency Diesel Generator #1 Panel Arrangement Generator Cabinet, Revision 5
GE-148F262 Sh. 1, Emergency Condenser Flow Diagram, Revision 55
GE-148F723, Liquid Poison System Flow Diagram, Revision 40
GE-197E871, Scram Discharge Volume System, Control Rod Drive Hydraulic System, and Nitrogen Charging System, Revision 30
GE-223R0173 Sh. 1, 4160V System, Electrical Elementary Diagram, 4160V Switchgear – Typical Developments, Revision 18
GE-223R0173 Sh. 2, 4160V System, Electrical Elementary Diagram, 4160V Swgr 1A Unit A4 Alternate Source Start-up Xfmr SA, Revision 20
GE-223R0173 Sh. 3, 4160V System, Electrical Elementary Diagram, 4160V Swgr 1B Unit B11 Alternate Source Start-up Xfmr SB, Revision 22
GE-223R0173 Sh. 5, 4160V System, Electrical Elementary Diagram, 4160V Swgr 1A Unit A4 Alternate Source Start-up Xfmr SA, Revision 21
GE-223R0173 Sh. 11, 4160V System, Electrical Elementary Diagram, 4160V Swgr 1A Unit A12 Incoming Line Aux Xfmr 1A, Revision 24
GE-223R0173 Sh. 16, Emerg. Svc. Water System, Electrical Elementary Diagram, 4160V Swgr 1C Unit C1, Emerg. Service Water Pump 1-1 (52A), P-3-003A, Revision 17
GE-223R0173 Sh. 18, Core Spray System, Electrical Elementary Diagram, 4160V Swgr 1C Unit C5, Core Spray Pump NZ01-A, P-20-001A, Revision 24
GE-223R0173 Sh. 20, 4160V System, Electrical Elementary Diagram, 4160V Swgr 1C Unit CB Main Breaker 1C, Revision 21

GE-237E566 Sh. 1, Reactor Protection System Electrical Elementary Diagram, Revision 45
GE-237E566 Sh. 2, Reactor Protection System Electrical Elementary Diagram, Revision 46
GE-237E566 Sh. 3, Reactor Protection System Electrical Elementary Diagram, Revision 15
GE-237E566 Sh. 4, Reactor Protection System Electrical Elementary Diagram, Revision 27
GE-237E566 Sh. 5, Reactor Protection System Electrical Elementary Diagram, Revision 47
GE-237E566 Sh. 6, Reactor Protection System Electrical Elementary Diagram, Revision 40
GE-237E566 Sh. 7, Reactor Protection System Electrical Elementary Diagram, Revision 12
GE-237E566 Sh. 8, Reactor Protection System Electrical Elementary Diagram, Revision 5
GE-237E566 Sh. 9, Reactor Protection System Electrical Elementary Diagram, Revision 6
GE-237E566 Sh. 10, Reactor Protection System Electrical Elementary Diagram, Revision 4
GE-237E566 Sh. 11, Reactor Protection System Electrical Elementary Diagram, Revision 9
GE-237E566 Sh. 12, Reactor Protection System Electrical Elementary Diagram, Revision 6
GE-237E566 Sh. 13, Reactor Protection System Electrical Elementary Diagram, Revision 8
GE-237E566 Sh. 14, Reactor Protection System Electrical Elementary Diagram, Revision 11
GE-237E566 Sh. 15, Reactor Protection System Electrical Elementary Diagram, Revision 7
GE-237E566 Sh. 18, Reactor Protection System Electrical Elementary Diagram, Revision 4
GE-3904E896 Sh. 1, Connection Diagram, Main Transformer M1B, Revision 5
GE-3904E896 Sh. 2, Connection Diagram, Main Transformer M1B, Revision 10
GE-3919D460AB Sh. 1, Elementary Diagram, Transf. M1B, Revision 10
GE-729E182 Sh. 1, Auto Depressurization System Elementary Diagram, Revision 35
GE-729E182 Sh. 2 & 3, Auto Depressurization System Elementary Diagram, Revision 21
GE-729E182 Sh. 4 & 5, Auto Depressurization System Elementary Diagram, Revision 4
GE-885D781, Core Spray System, Revision 76
GE-931D0217 Sh. 2, Main Generator Electrical Elementary Diagram, Revision 35
GE-951D0255 Sh. 2, Start Up Transformer Protective Relays & Control Electrical Elementary C Diagram, Start-Up Transformer A, Revision 0
GU-3C-735-11-003, DC-F 125 VDC Power Panel Schedule, Revision 6
GU-3D-711-17-1002, Main Gen Protect Relays Electrical Elementary Diagram, Generator Back-Up Lock-Out Relay 86GB, Revision 4
JC P6-50-00 Sh. 1, System Diagram, Oyster Creek 230 KV Substation, Revision 15
JC P6-50-00 Sh. 2, System Diagram, Oyster Creek Sub & SW Pt and Radwaste Sub, Revision 11
JC P6-50-00 Sh. 3, System Diagram, Oyster Creek Substation, Revision 11
PC26984950, Dimension Drawing for Liquid Poison Injection Pump, Revision B
SM 73-4157, Poison System Storage Tank, Revision 1

Engineering Evaluations

02-0370-1336, Impell Corporation Report - Evaluation of Environmental Condition from High Energy Line Breaks, Revision 0
02-00923, Evaluate Isolation condenser Valve IST Acceptance Criteria, Revision 0
06-00926, EXOC011-CALC-001 Isolation Condenser Heat Capacity CALC, Revision 0
A2170339, Tech Eval for Grouping MOVs for TP-13-006 Periodic Testing, Revision 0
Enercon Services Report No. EXOC003-PR-01, Mission Time of Oyster Creek Emergency Diesel Generators, Revision 0
IR 2584237, Failure of EDG #1 to Start during Normal Bi-Weekly Load Testing Apparent Cause Evaluation, dated 12/28/15
IR 2610027, Emergency Diesel Generator #1 Coolant Leak Apparent Cause Evaluation, dated 2/17/16

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92239469	C2030310	R2097596	R2183027	R2227654
A0786689	C2032485	R2113875	R2195482	R2229051
A2123383	C2034831	R2117087	R2202444	R2239469
A2172691	C2034989	R2119272	R2202598	R2239604
A2190293	C2035598	R2119275	R2202606	R2239661
A2260615	C2035783	R2119356	R2202776	R2239664
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304, Standby Liquid Control System Operation, Revision 48
307, Isolation Condenser System, Revision 125
308, Emergency Core Cooling System Operation, Revision 96
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335, 34.5 KV and 13.8 KV Electrical System, Revision 32

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636.4.016, Diesel Generator #2 Fast Start Test, Revision 10
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ABN-35, Loss of Instrument Air, Revision 13
ABN-39, RPS Failures, Revision 5
ABN-48, Loss of USS-1B2, Revision 5
ABN-55, DC Bus C and Panel/MCC Failures, Revision 9
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EMG-3200.01A, Attachment 1, RPV Control – No ATWS EOP Flowchart, Revision 8
EMG-3200.01B, RPV Control with ATWS, Revision 8
EMG-3200.02, Primary Containment Control, Revision 8
EMG-3200.048, Emergency Depressurization with ATWS, Revision 5
EMG-SP1, Confirmation of Automatic Initiations and Isolations, Revision 0
EMG-SP11, Alternate Pressure control systems – Isolation Condensers, Revision 1
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VM-OC-0095, Operating Manual – MU20E Power Plants Diesel Generators, Revision 12
VM-OC-0096, Engine Maintenance Manual – 645E4 Turbo Charge Engine, Revision 2
VM-OC-0552, ITE Molded Case Circuit Breakers, Revision 1
VM-OC-5927, Valtek Valve and Valve Operator Maintenance Bulletins, Revision 2
VM-OC-5934, Instructions for Liquid Poison Pumps, Revision 4

LIST OF ACRONYMS

ADAMS	Agency-Wide Documents Access and Management System
AMP	Aging Management Program
AOV	Air-Operated Valve
ATWS	Anticipated Transients Without Scram
BWROG	Boiling Water Reactor Owners Group
CAP	Corrective Action Program
CDBI	Component Design Bases Inspection
CFR	Code of Federal Regulations
CRD	Control Rod Drive
DBD	Design Basis Document
DC	Direct Current
DRS	Division of Reactor Safety
EDG	Emergency Diesel Generator
FODT	Fuel Oil Day Tank
FOTP	Fuel Oil Transfer Pump
HX	Heat Exchanger
IA	Instrument Air
ICS	Isolation Condenser System
IEEE	Institute of Electrical and Electronics Engineers
IN	Information Notice
IP	Inspection Procedure
IR	Issue Report
ISI	In-Service Inspection
IST	In-Service Test
LCO	Limiting Condition for Operation
LERF	Large Early Release Frequency
LOCA	Loss-of-Coolant Accident
LOOP	Loss-of-Offsite Power
MCC	Motor Control Center
MOV	Motor-Operated Valve
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
OE	Operating Experience
PCAS	Plant Compressed Air System
PM	Preventive Maintenance
PRA	Probabilistic Risk Assessment
PRIB	Plant Risk Information e-Book
RAW	Risk Achievement Worth
RPS	Reactor Protection System
RRW	Risk Reduction Worth
RV	Reactor Vessel
SDV	Scram Discharge Volume
SLC	Standby Liquid Control
SPAR	Standardized Plant Analysis Risk
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
VDC	Volts, Direct Current
VTRG	Valve Technical Resolution Group