UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

November 20, 2014

Mr. Christopher Costanzo, Site Vice President
Nine Mile Point Nuclear Station, LLC
Exelon Generating Station, LLC
P.O. Box 63
Lycoming, NY 13093-0063

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNITS 1 AND 2 – NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000220/2014007 AND 05000410/2014007

Dear Mr. Costanzo:

On October 10, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Nine Mile Point Nuclear Power Station. The enclosed inspection report documents the inspection results, which were discussed on October 10, 2014, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. In conducting the inspection, the team examined the adequacy of selected components and operator actions 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.

This report documents three NRC-identified findings which were of very low safety significance (Green). All of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance of the violations and because they were entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCV) consistent with Section 2.3.2.a of the NRC Enforcement Policy. If you contest any of the NCVs in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at Nine Mile Point Nuclear Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I; and the NRC Resident Inspector at Nine Mile Point Nuclear Station.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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 Public Docket Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

Docket No. 50-220, 50-410
License No. DPR-63, NPF-69

Enclosure:
Inspection Report 05000220/2014007 and 05000410/2014007
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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 Public Docket Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

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U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Docket No.:	50-220, 50-410
License No.:	DPR-63, NPF-69
Report No.:	05000220/2014007 and 05000410/2014007
Licensee:	Exelon Generation Company, LLC
Facility:	Nine Mile Nuclear Power Station, Units 1 and 2
Location:	Oswego, New York
Dates:	September 8 to October 10, 2014
Team Leader:	D. Kern, Senior Reactor Inspector, Division of Reactor Safety (DRS)
Inspectors:	W. Schmidt, Senior Reactor Analyst, DRS F Arner, Senior Reactor Inspector, DRS J. Ayala, Reactor Inspector, DRS J. Brand, Reactor Inspector, DRS N. Floyd, Reactor Inspector, DRS C. Edwards, NRC Mechanical Contractor J. Nicely, NRC Electrical Contractor W. Sherbin, NRC Mechanical Contractor
Approved by:	Paul G. Krohn, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000220/2014007 and 05000410/2014007; 9/8/2014 – 10/10/2013; Exelon Generation Company, LLC; Nine Mile Point Nuclear Power Station, Units 1 and 2; Component Design Bases Inspection.

The report covers the Component Design Bases Inspection conducted by a team of six NRC region based inspectors and three NRC contractors. The team identified three findings of very low risk significance (Green) and classified each as non-cited violations (NCV). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process (SDP)," dated June 2, 2011. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated January 1, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated July 9, 2013. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

Cornerstone: Mitigating Systems

- Green. The team identified a Green NCV of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix B, Criterion III, "Design Control," for failure to verify and assure, in Nine Mile Point Unit 1 design basis calculations, that adequate voltages would be available to Class 1E accident initiated motors, motor-operated valves (MOV), and control circuits powered from the 4160 V, 600 V, and 120 V distribution systems during a design basis loss-of-coolant accident (LOCA) with offsite power available. Specifically, Exelon did not identify and evaluate the minimum transient voltage for the design basis LOCA event regarding accident initiated motors, MOVs, and control circuits, and did not evaluate the capability of the safety-related main steam isolation valve motor brakes. Immediate corrective action included preliminary calculations using the design grid voltage sag, which determined the Reserve Service Station Transformer load tap changers, motor control center (MCC) control circuits, MOVs, and the main steam isolation valve motor brakes would have adequate voltage to remain capable of performing their safety functions. Exelon entered the issues into their corrective action program as issue reports 2386719, 2386824, 2387652, 2387888, 2392928, and 2393299.

  This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined the finding was of very low safety significance because it was a design deficiency confirmed not to result in a loss of safety-related MCC MOV operability or functionality. This team assigned a cross-cutting aspect associated with this finding because the long-standing performance deficiency continued during and after Exelon's review of related internal and external operating experience from 2012 to 2014. The team determined this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience (Aspect P.5), because Nine Mile Point Unit 1 staff did not effectively collect, evaluate, and implement relevant internal and external operating experience in a timely manner.
  (Section 1R21.2.1.1.b.1)

- Green. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for failure to verify the adequacy of the Nine Mile Point Unit 1 electrical design during a design basis loss of coolant accident (LOCA) event with sustained degraded grid voltage (DGV). Specifically, Exelon did not verify Class 1E loads would not be damaged or become unavailable for a design basis LOCA with a degraded voltage condition between the degraded voltage setpoint and the loss of voltage setting for the degraded voltage time delay of 21 +/- 3 seconds and subsequent reconnection to the emergency diesel generator. Immediate corrective actions included preliminary evaluation of the safety-related MOV that operate during the first 21 seconds of the accident, which determined there was reasonable assurance the MOV protective devices would not actuate during sustained DGV concurrent with a design basis LOCA. Exelon entered this issue into their corrective action program as issue reports 2387818 and 2392780.

  The finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss of operability or functionality. The team determined this issue had a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience (Aspect P.5), because the organization did not effectively collect, evaluate, and implement relevant internal and external operating experience in a timely manner. Despite NRC Regulatory Issue Summary 2012-11, "Adequacy of Station Electric Distribution System Voltages," and NRC Component Design Bases Inspections identifying similar performance deficiencies at other Exelon facilities during the last 3 years, the Nine Mile Point staff did not effectively evaluate and resolve this operating experience. (Section 1R21.2.1.1)

- Green. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," because Exelon did not verify the design adequacy of Nine Mile Point Unit 1 electrical power to safety-related MOVs to support their design function during design basis events. Specifically, Exelon did not verify that the thermal/magnetic breaker (TMB) protection on core spray (CS) loop injection MOV circuits 1V-40-01, 1V-40-09, 1V-40-10, and 1V-40-11 were properly sized to support the design function of repetitive MOV operation (throttling) in response to a design basis loss-of-coolant accident (LOCA). Routine throttling operation of the CS injection valves could potentially cause a TMB trip and loss of power to the MOV leading to the valve failing in an indeterminate position and not being capable of performing its design function to control reactor pressure vessel (RPV) level. Immediate corrective action included guidance to control room operators to close three of the MOVs when required to maintain RPV level and only use MOV 1V-40-09 which had a TMB tripping design of 17 seconds Exelon entered this issue into its corrective action program as issue report 2393386.

The finding was more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined that the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss of operability or functionality. The team determined that the central cause of this finding was not reflective of current performance or current plant modification processes. Therefore no cross-cutting aspect was assigned. (Section 1R21.2.1.2)

Licensee-Identified Violation

The team reviewed a violation of very low safety significance that was identified by Exelon. Corrective actions taken or planned by Exelon have been entered into Exelon's corrective action program. This violation and corrective action tracking number are listed in Section 4OA7 of this report.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, 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 Nine Mile Point Nuclear Power Station Probabilistic Risk Assessment (PRA) and the U.S. Nuclear Regulatory Commission's (NRC) Standardized Plant Analysis Risk (SPAR) model. Additionally, the Nine Mile Point (NMP) Significance Determination Process (SDP) analysis was referenced 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 team also selected components based on previously identified industry operating experience issues and the component contribution to the large early release frequency (LERF) was also considered. The components selected were located within both safety-related and non-safety related systems, and included a variety of components such as pumps, breakers, heat exchangers, electrical buses, transformers, 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 reports (05000220/2006008, 2008008, 2011007 and 05000410/2006008, 2008008, 2011007) to minimize the selection of those components previously inspected. The team then performed a margin assessment to narrow the focus of the inspection to 24 components and three industry operating experience (OE) samples. One component was selected because it was a containment-related structure, system, and components (SSC) and was considered for 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 operating experience. Finally, consideration was given to the uniqueness and complexity of the design and the available defense-in-depth margins.

The inspection performed by the team was conducted in accordance with NRC Inspection Procedure 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 and licensing basis requirements. A summary of the reviews performed for each component, operating experience sample, and the specific inspection findings identified 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 (24 samples)

.2.1.1 Unit 1 4160V Power Board 103

a. Inspection Scope

The team reviewed selected calculations for electrical distribution system load flow/voltage drop, degraded voltage protection, short-circuit, and electrical protection and coordination. The adequacy and appropriateness of design assumptions and calculations were reviewed to verify that bus capacity was not exceeded and bus voltages remained above minimum acceptable values under design basis conditions. The switchgear's protective device settings and breaker ratings were reviewed to ensure that selective coordination was adequate for protection of connected equipment during worst-case short-circuit conditions. Automatic and manual transfer schemes between alternate offsite sources and the emergency diesel generator were reviewed. Voltage protection schemes were reviewed for degraded and loss of voltage relaying. The team reviewed degraded and loss of voltage relays to verify that they were set in accordance with calculations, and that associated calibration procedures were consistent with calculation assumptions, associated time delays, and setpoint accuracy calculations. In addition, the latest surveillance was reviewed.

The team also evaluated selected portions of the licensee response to NRC Generic Letter (GL) 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," dated February 1, 2006. The station's interface and coordination with the transmission system operator for plant voltage requirements and notification set points were reviewed. The team reviewed the adequacy of instrumentation/alarms available. To ensure that breakers were maintained in accordance with industry and vendor recommendations, the team reviewed the preventive maintenance templates. System health reports, component maintenance history, and licensee corrective action program reports were reviewed to verify deficiencies and potential degradation mechanisms were appropriately identified and resolved. The team performed a visual non-intrusive inspection of accessible portions of the safety-related 4160 volt (V) switchgear to assess the installation configuration, material condition, and potential vulnerability to hazards. Finally, the team reviewed corrective action documents and system health reports to determine if there were any adverse operating trends and to assess Exelon's ability to evaluate and correct problems.

b. Findings

.1 Deficient Evaluation of Minimum Voltages to Nine Mile Point Unit 1 Class 1E Accident Initiated Motors and Motor Operated Valves during a Design Basis Loss of Coolant Accident with Offsite Power Available

Introduction. The team identified a Green non-cited violation (NCV) of Title 10 of the *Code of Federal Regulations* (CFR), Part 50, Appendix B, Criterion III, "Design Control" for failure to verify and assure, in design basis calculations, that adequate voltages would be available to Class 1E accident initiated motors, motor operated valves (MOV), and control circuits powered from the 4160 V, 600 V, and 120 V distribution systems during a design basis loss-of-coolant accident (LOCA) with offsite power available for Unit 1. Specifically, Exelon did not identify and evaluate the minimum transient voltage for the design basis LOCA event regarding accident initiated motors, MOVs, and control circuits, and did not evaluate the capability of the safety-related main steam isolation valve motor brakes.

Description. The team identified four examples of non-conservative inputs and methodologies in electrical calculations that contributed to the failure of the licensee to verify and assure adequate voltages to Class 1E accident initiated motors, MOVs, and control circuits powered from the 4160 V, 600 V, and 120 V distribution systems during a design basis accident (DBA) with offsite power available. The following examples contributed to the identified performance deficiency:

- Electrical calculation NIMO-ELMS-AC01, "U1 Auxiliary System Performance," Revision 1, evaluated starting 4160 V emergency system loads during a design basis event at steady-state voltages on the 4160 V safety-related buses associated with a nominal 115 kV grid voltage. However, the Transmission Operator plant/grid interface study NER-1E-015, "NMP 1&2 Offsite Grid Voltage Regulation Study," Revision 7, identified that the 115 kV grid will sag 3.5 percent as a result of the unit trip during a DBA. Exelon incorrectly used 115 kV as the grid voltage instead of incorporating the 3.5 percent grid voltage sag into calculation NIMO-ELMS-AC01. Consequently, Exelon did not identify and evaluate the minimum transient voltages to the Class 1E accident initiated motors and MOVs on the safety-related buses and motor control centers (MCC) during the initiation of a DBA with the subsequent unit scram and resulting sag of the 115 kV grid. For MOV's, the reduced voltage would reduce the available motor actuator output torque which would directly impact the mechanical torque and thrust calculations. In response to the teams concern, Exelon performed preliminary voltage drop calculations, taking into account the grid voltage sag. Based on these calculations Exelon determined that the most critical MOVs would have adequate voltage during the voltage transients, but would have reduced margins. Exelon entered the issue, including an extent-of-condition evaluation of voltage adequacy for additional safety-related loads, into the corrective action program as issue reports (IR) 2387652, 2386824, 2392928, and 2386719.

- Electrical calculations used steady-state voltages at the MCCs during a design basis event. As a result, Exelon did not evaluate the worst-case control circuit voltage drop for the control circuits for 600V motors and MOVs that were required to change state at the onset of a DBA. The use of steady-state voltages instead of transient voltages would predict higher control circuit voltages than would actually exist; therefore, the control circuit contactors may not have adequate voltage to energize until after the upstream 4160 V starting motors have accelerated. Exelon also did not evaluate the potential time delay impact for affected MOVs on the Updated Final Safety Analysis Report (UFSAR) accident analyses. To address the team's concern, Exelon performed preliminary evaluations for MCC 171B and concluded that there was sufficient voltage to ensure operation during the upstream motor start scenarios. The issue was entered into the corrective action program as IR 2386824.

- Electrical calculation NIMO-ELMS-AC01 did not evaluate the capability of main steam isolation valves IV-01-01 and IV-01-02 BRAKE-01-01 and BRAKE-01-02 motor brakes to operate and release to perform their safety function for a design basis event (DBE) during worst-case motor starting transient voltages. The motor brake vendor requires a minimum voltage of 90 percent (495 V). The Environmental Qualification Document Package for the motor brakes, 1EQP-MOV005 and report GLS-NMPCDNG-9322J-1, documented a one-time lower voltage test to verify the capability of the motor/motor brake system to close the valve at a low voltage during a DBA. The analysis supports operation of the motor brake at a voltage of 440 V (80 percent). The team determined that during a DBA with resulting transient voltages lower than steady-state conditions, the motor brake may have voltages as low as 429V (78 percent) and fail to operate and release during stroking of IV-01-01 and IV-01-02. Exelon's preliminary analysis, in response to the team's concern, indicated the MOV actuators had sufficient margin to close the valves with the motor brake still engaged. Exelon entered this issue into the corrective action program as IR 2387888.

- Electrical calculations did not use the worst case transient voltage to evaluate load tap changer (LTC) performance during a DBA. Consequently, Exelon did not ensure the automatic LTC controls and motor for the 101N and 101S Reserve Service Station Transformers, whose operation is needed to restore vital bus voltage during DBEs before the degraded voltage relays time out in 21 seconds, had adequate voltage to operate during DBAs. The team discussed this concern with Exelon, who performed a preliminary voltage drop calculation to demonstrate that sufficient voltage was available during the worst-case grid voltage levels. Exelon entered this issue into its corrective action program as IR 2393299.

Analysis. The team determined that the failure to verify and assure adequate voltages would be available to Unit 1 Class 1E accident initiated motors, MOVs, and control circuits powered from the 4160 V, 600 V, and 120 V distribution systems during a design basis LOCA with offsite power available was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated the finding in accordance with Inspection Manual Chapter (IMC) 0609, Significance Determination Process, Attachment 0609.04, "Initial Screening and Characterization of Findings," dated June 19, 2012, for the Mitigating Systems Cornerstone, and IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012. The team determined that the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss of operability or functionality. Specifically, Exelon's interim calculations and operability determinations demonstrated adequate voltage during a design basis LOCA with offsite power available, such that the Class 1E accident initiated motors and MOVs would perform their safety functions. The team reviewed Exelon's interim calculations and found them to be reasonable.

The team determined that this issue had a cross-cutting aspect in the area of Problem Identification and Resolution, OE, because the organization did not effectively collect, evaluate, and implement relevant internal and external OE in a timely manner. Although NRC Component Design Bases Inspections identified similar performance deficiencies at other Exelon facilities during the last 3 years, NMP staff did not effectively evaluate and resolve this internal OE. Additionally, Exelon's evaluation of NRC Regulatory Issue Summary 2012-11, "Adequacy of Station Electric Distribution System Voltages," Revision 1, did not result in implementing timely corrective measures. (IMC 0310, Aspect P.5)

Enforcement. 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. In addition, NMP Unit 1 UFSAR, Section 1A, "Principal Design Criteria," paragraph 7.0 states that the electrical power system has sufficient normal and standby auxiliary sources of electrical power to assure a capability for prompt shutdown and continued maintenance of the Station in a safe condition under all credible circumstances.

Contrary to the above, prior to September 29, 2014, Exelon did not establish and implement adequate design control measures to verify or check the adequacy of the electrical power system design. Specifically, Exelon did not verify adequate voltages were available to NMP Unit 1 101N and 101S Reserve Service Station Transformer LTCs and to Class 1E accident initiated motors, MOVs, and control circuits powered from the 4160 V, 600 V, and 120 V distribution system during a design basis LOCA with offsite power available. Immediate corrective actions included preliminary evaluation of voltage to LTCs, motors, MOVs, and control circuits during a design basis LOCA with a unit scram to verify safety-related components remained operable. This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. The violation was entered into the Exelon corrective action program as IRs 2386719, 2386824, 2387652, 2387888, 2392928, and 2393299. **(NCV 05000220/2014007-01, Deficient Design Control of NMP Unit 1 Electrical Calculations to Evaluate Minimum Voltages to Class 1E Accident Initiated Motors and MOVs during a Design Basis Event)**

.2 Deficient Evaluation of Nine Mile Point Unit 1 Electrical Protection Design to Ensure Survivability of Safety-Related Loads during Sustained Degraded Voltage

Introduction. The team identified a Green NCV of Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control" for failure to verify the adequacy of electrical design during a design basis LOCA event with sustained degraded grid voltage (DGV) for Unit 1. Specifically, Exelon did not verify that NMP Unit 1 Class 1E loads would not be damaged or become unavailable for a design basis LOCA with a degraded voltage condition between the degraded voltage setpoint and the loss of voltage setting for the degraded voltage time delay of 21 +/- 3 seconds and subsequent reconnection to the emergency diesel generator (EDG).

Description. NRC letter dated June 2, 1977, "Statement of Staff Positions Relative to Emergency Power Systems for Operating Reactors," Position 1(c)(3) states that the allowable time duration of a degraded voltage condition at all distribution levels shall not result in failure of safety systems or components. Furthermore, NRC Regulatory Issue Summary (RIS) 2011-12, "Adequacy of Station Electric Distribution System Voltages," Revision 1, clarifies that the DGV time delay chosen should be optimized to ensure that permanently connected Class 1E loads are not damaged under sustained degraded voltage conditions (such as a sustained degraded voltage below the degraded voltage relay voltage setting(s) for the duration of the time delay setting).

Electrical components typically have protective devices (such as a thermal overload (TOL) heater, thermal/magnetic breaker (TMB), fuses, or breakers with protective relays) which monitor the current drawn by the component. If, for example, voltage degrades sufficiently to stall or prevent the motor from starting, the protective device trips open the electrical circuit to prevent motor damage. The team reviewed electrical protection device specifications for a sample of 10 MOVs which receive automatic actuation signals in response to a design basis LOCA. The team noted that thermal overload heaters were typically set to trip after 10 seconds for stall or locked rotor current conditions. Additionally, the team determined several of the breaker thermal/magnetic trip device specifications indicated they could potentially trip prior to the 21 second DGV time delay (TD) relay actuation. If the protected device actuated before the end of the 21 second DGV TD, the associated electrical breaker would trip open and the component would not be capable of automatically actuating in response to the LOCA.

The team noted that the NMP Unit 1 electrical design calculations had not evaluated the protective device actuation and therefore did not assure and verify that connected Class 1E loads would not be damaged or become unavailable for a design basis LOCA and a sustained degraded voltage condition between the degraded voltage setpoint (3705 V) and the loss of voltage setting (3200 V) for the degraded voltage time delay of 21 +/- 3 seconds and subsequent reconnection to the EDG. Specifically, safety-related running components or safety-related loads which required starting during an accident had not been verified to ensure their protective devices would not trip, prior to and after the transfer to the EDG source for a sustained degraded grid condition coincident with a design basis LOCA. Control power circuits also had not been evaluated for the Class 1E accident-initiated motors to ensure that their control circuit fuses would not blow if the starter did not have sufficient voltage to pick-up during the degraded voltage time delay period.

Upon identification by the team, Exelon performed a preliminary evaluation of the NMP Unit 1 critical MOVs that operate during the first 21 seconds of the accident and concluded there was reasonable assurance that protective devices would not actuate during sustained degraded voltage concurrent with a design basis LOCA. Exelon entered this issue into its corrective action program as IRs 2387818 and 2392780. The team reviewed Exelon's preliminary evaluation and found the results to be reasonable.

Analysis. The team determined that the failure to verify electrical design adequacy to ensure that the allowable duration of a degraded voltage condition at all distribution levels would not result in failure of safety systems or components for Unit 1 was a performance deficiency. This performance deficiency was more than minor because it was similar to NRC IMC 0612, Appendix E, "Examples of Minor Issues," Example 3.j, in that the design analysis deficiency resulted in a condition where the team had reasonable doubt regarding the operability of safety-related systems or components during a LOCA concurrent with a sustained degraded voltage condition. The finding was associated with the Mitigating Systems Cornerstone attribute of design control and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated the finding in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Screening and Characterization of Findings," dated June 19, 2012, for the Mitigating Systems Cornerstone, and IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012. The team determined that the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss of operability or functionality.

The team determined that this issue had a cross-cutting aspect in the area of Problem Identification and Resolution, OE, because the organization did not effectively collect, evaluate, and implement relevant internal and external OE in a timely manner. Although NRC Component Design Bases Inspections identified a similar performance deficiency at other Exelon facilities during the last 3 years, NMP staff did not effectively evaluate and resolve this internal OE. Additionally, Exelon's evaluation of NRC RIS 2012-11 did not result in implementing timely corrective measures. (IMC 0310, Aspect P.5).

Enforcement. 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires in part, that design control measures provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. In addition, NRC letter dated June 2, 1977, required all licensees to verify the existing plant design or propose modifications to ensure onsite emergency power systems met certain criteria including Staff Position 1. Staff Position 1(c)(3) stated the DGV protection time delay shall be established such that the allowable time duration of a DGV condition at all distribution system levels shall not result in failure of safety systems or components. NMP-1 letter to the NRC dated July 14, 1977, responded to NRC Staff Position 1 and confirmed that the DGV time delays were chosen so that the voltage requirements for safety-related loads were maintained and that failures of safety-related systems would not occur.

Contrary to the above, prior to September 28, 2014, Exelon had not implemented design control measures to verify that the Unit 1 connected Class 1E loads would not be damaged or become unavailable for a design basis LOCA coincident with a sustained degraded voltage condition between the degraded voltage setpoint and the loss of voltage setting for the degraded voltage time delay of 21 +/- 3 seconds and subsequent reconnection to the EDG. Immediate corrective actions included preliminary evaluations of the critical MOVs that operate during the first 21 seconds of a LOCA and demonstration of reasonable assurance that protective devices would not actuate. This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. The violation was entered into the Exelon corrective action program as IRs 2387818 and 2392780. **(NCV 05000220/2014007-02, Deficient Design Control of NMP Unit 1 Electrical Protection Design to Ensure Survivability of Safety-Related Loads during a LOCA Coincident with Sustained Degraded Voltage)**

.2.1.2 Unit 1 600V Motor Control Center 171B

a. Inspection Scope

The team inspected MCC 171B to evaluate whether it could perform its design basis functions. The team reviewed selected calculations for electrical distribution system load flow/voltage drop, short-circuit, and electrical protection and coordination. The adequacy and appropriateness of design assumptions and calculations were reviewed to verify that bus and circuit breaker capacity was not exceeded and bus voltages remained above minimum acceptable values under design basis conditions. The MCC's protective device settings and breaker ratings were reviewed to ensure that selective coordination was adequate for protection of connected equipment during worst-case short-circuit conditions. To ensure that breakers were maintained in accordance with industry and vendor recommendations, the team reviewed the preventive maintenance inspection and testing procedures. The team performed a visual, non-intrusive inspection of observable portions of the safety-related MCC to assess the installation configuration, material condition, and the potential vulnerability to hazards. The team also reviewed corrective action documents and system health reports to determine if there were any adverse operating trends and to assess Exelon's ability to evaluate and correct problems.

b. Findings

Inadequate Protective Device Sizing for Unit 1 Safety-Related Core Spray Motor-Operated Injection Valves

Introduction. The team identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," because Exelon did not verify the design adequacy of electrical power to safety-related MOVs to support their design function during design basis events. Specifically, Exelon did not verify that Unit 1 TMB protection on core spray (CS) loop injection MOV circuits 1V-40-01, 1V-40-09, 1V-40-10, and 1V-40-11 were properly sized to support the design function of repetitive MOV operation (throttling to control reactor pressure vessel (RPV) level) in response to a design basis LOCA.

Description. Core spray injection valves 1V-40-01, 1V-40-09, 1V-40-10, and 1V-40-11 are normally closed. The valves have a safety function to provide containment isolation in the closed position. They also have a safety function to open to allow CS injection following a LOCA and subsequent RPV depressurization. In 1995, Boiling Water Reactor Owners Group (BWROG) Emergency Procedure Guidelines (EPG) were revised to direct throttling the CS injection valves to slowly restore reactor vessel level during RPV level recovery for a LOCA event. This reduced the need to repeatedly start and stop CS pumps to maintain RPV level, thereby improving CS pump reliability and availability.

Each CS injection MOV motor has two diverse protective devices (a TOL and a TMB) which monitor the adequacy of power to the motor. If power degrades or excessive current which could damage the motor is sensed, the protective devices are designed to trip (or open) the electrical circuit. The original Electrical Overload Heater Sizing

Calculations for the four CS injection MOVs sized the TOLs and TMB protection based on one duty cycle, which is an opening of the valve followed by a close stroke. The TOLs and TMBs were not sized to withstand multiple motor starting current surges and the associated motor heatup.

In 1995, modification N1-90-041, “Installation of Individual Core Spray System Minimum Flow Recirculation Lines and Remote Valve Throttling Capability,” Revision 1, was implemented to enable the CS injection valves to be used as throttle valves for maintaining RPV level consistent with the BWROG EPGs. The licensee recognized that frequent operation of the CS injection valves to throttle flow could cause the MOV TOL protective device to actuate, causing interruption of power to the MOV. The modification installed connections to allow operators to install jumpers and manually bypass the TOL relay device prior to operating the MOV as a throttle valve.

The modification specified that operational limitations (if identified) should be placed in the appropriate operating or emergency operating procedures. Emergency operating procedure N1-EOP-1, “NMP1 Emergency Operating Procedure (EOP) Support Procedure,” Attachment 4, step 3.4.4 states, “Throttle Core Spray Inboard IVs (40-01, 40-09, 40-10, and 40-11) as necessary to maintain RPV level as directed by the EOP Director.” The team determined that the number and frequency of valve operations to establish and maintain level is not defined in the procedure. Control room staff informed the team that the number of valve operations to establish and maintain level could vary between 5-10 throttles in a small period of time. The team identified that the TMB protection for MOVs 1V-40-10, -40-01, and -40-11 can trip in 2.5, 4, and 6 seconds respectively and in 17 seconds for MOV 1V-40-09, independent of the TOL protection relay being bypassed. Consequently, routine throttling operation of the CS injection valves may cause a TMB trip and loss of power to the MOV. This would cause the MOV to fail in an indeterminate position and not be capable of performing its design function to control RPV level.

The team determined that modification N1-90-041 had not considered that the TMB protection was the limiting factor for potential tripping. The team determined modification N1-90-041 was deficient in that consideration of the design function of throttling the CS injection MOV’s had not been factored into the protective device sizing criteria for the TMBs and had not been evaluated to ensure that the CS injection valve would not inadvertently trip during operation of the MOV in response to EOP guidance following design basis accident conditions. Specifically, the licensee did not recognize TMB protection was the limiting factor for potentially tripping power to the MOVs and therefore did not factor TMB protection into the protective device sizing criteria when changing the design function of the CS injection MOVs. The team discussed this issue with Exelon staff who entered this issue into the corrective action program as IR 2393386. Immediate corrective action included guidance to control room operators to close three of the MOVs when required to maintain RPV level and only use MOV 1V-40-09 which had a TMB tripping design of 17 seconds, thereby, providing reasonable assurance that the design function of controlling RPV level would be maintained.

Analysis. The team determined the failure to verify modification N1-90-041 design adequacy with respect to ensuring that Unit 1 TMB's on safety-related Core Spray Injection MOV circuits were properly sized to support their design function of cycling numerous times in response to design basis accidents was a performance deficiency. This performance deficiency was more than minor because it was similar to NRC IMC 0612, Appendix E, "Examples of Minor Issues," Example 3.j, in that the design analysis deficiency resulted in a condition where the team had reasonable doubt regarding the operability of the CS injection MOVs to throttle flow to maintain RPV level in accordance with EOP N1-EOP-1.

The finding was associated with the Mitigating Systems Cornerstone attribute of design control and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated the finding in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Screening and Characterization of Findings," dated June 19, 2012, for the Mitigating Systems Cornerstone, and IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012. The team determined that the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in loss of operability or functionality. The team determined that the central cause of this finding was not reflective of current performance or current plant modification processes in that the failure to properly size the CS MOV circuit TMBs occurred in 1995. Therefore, no cross-cutting aspect was assigned.

Enforcement. 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures provide for verifying or checking the adequacy of design. Modification N1-90-041, was implemented to enable the CS injection valves to be used as throttle valves for maintaining RPV level consistent with the BWROG EPGs. Emergency operating procedure N1-EOP-1, required operators to "Throttle Core Spray Inboard IVs (40-01, 40-09, 40-10, and 40-11) as necessary to maintain RPV level as directed by the EOP Director" in response to a LOCA.

Contrary to the above, prior to October 9, 2014, measures had not been established to verify the adequacy of design to ensure that TMBs on safety-related CS injection MOV circuits were properly sized to support their design function of cycling numerous times in response to design basis accidents. Immediate corrective action included an Operations Daily Order which provided guidance to control room operators for throttling the CS injection valves. This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. The violation was entered into the Exelon corrective action program as IR 2393386. **(NCV 05000220/2014007-02, Deficient Design Control of Protective Device Sizing for Unit 1 Core Spray Injection Motor-Operated Valves)**

2.1.3 Unit 1 Emergency Cooling Steam Isolation Valve (IV-39-10R)

a. Inspection Scope

The team inspected the Unit 1 emergency cooling (EC) steam isolation valve IV-39-10R to verify that it was capable of performing its design function. The EC system is provided as a redundant backup for the main turbine condenser to remove reactor core decay heat following reactor isolation and scram. The team reviewed the UFSAR, calculations, and procedures to identify the design basis requirements of the valve. The team also reviewed accident system alignments to evaluate whether component operation was consistent with the design and licensing bases assumptions. Valve testing procedures and valve specifications were also reviewed 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. Additionally, the team verified the valve safety function was maintained in accordance with NRC GL 89-10 guidance by reviewing torque switch settings, performance capability, and design margins. The team reviewed degraded voltage conditions and voltage drop calculations to confirm that the MOV would have sufficient voltage and power available to perform its safety function at worst case degraded voltage conditions.

The team interviewed the MOV program engineer to gain an understanding of maintenance issues and overall reliability of the valve. The team conducted a walkdown to assess the material condition of the valve, and to verify the installed valve configuration was consistent with design basis assumptions and plant drawings. Finally, corrective action documents were reviewed to verify that deficiencies were appropriately identified and resolved, and that the valve was properly maintained.

b. Findings

No findings were identified.

.2.1.4 Unit 1 Emergency Cooling Condensate Return Check Valve (CKV-39-03)

a. Inspection Scope

The team inspected the Unit 1 emergency cooling condensate return check valve, CKV-39-03, to verify that it was capable of meeting its design basis requirements. The check valve forms part of the containment isolation function along with the normally closed condensate return pneumatic valves. The team reviewed the UFSAR, drawings, and procedures to identify the design basis requirements of the check valve. The check valve testing procedures and EC system hydraulic analyses were reviewed to verify the design basis requirements were appropriately incorporated into the test acceptance criteria. The team reviewed a sample of test results to verify the acceptance criteria were met. The team reviewed the corrective and preventive maintenance of the check valve to gain an understanding of the performance history and overall component health. In addition, the team reviewed maintenance activities of the check valve to assess material condition. Finally, corrective action documents and system health reports were reviewed to verify deficiencies were appropriately identified and resolved, and that the check valve was properly maintained.

b. Findings

No findings were identified.

2.1.5 Unit 1 Core Spray Loop 12 Injection Valves (IV-40-01 and IV-40-09)

a. Inspection Scope

The team inspected the Unit 1 Core Spray Loop 12, Injection Valves, IV-40-01 and IV-40-09 to verify they were capable of performing their design function. The core spray system is a low pressure injection system designed to provide emergency core cooling during loss of coolant accidents, to maintain a water supply for normal shutdown cooling, and for torus refill or water makeup. The team reviewed the UFSAR, calculations, and procedures to identify the design basis requirements of the valves. The team also reviewed accident system alignments to evaluate whether component operation was consistent with the design and licensing bases assumptions. Valve testing procedures and valve specifications were also reviewed to ensure consistency with design basis requirements. The team reviewed periodic verification diagnostic test results and stroke test documentation to verify that acceptance criteria were met and consistent with the design basis. Additionally, the team verified the valve safety function was maintained in accordance with NRC GL 89-10 guidance by reviewing torque switch settings, performance capability, and design margins. The team reviewed the calculations for the degraded voltage at the MOV terminals, to ensure the proper voltage was used to verify adequate MOV torque. The team reviewed the calculations that establish control circuit voltage drop, short circuit, and protection/coordination including thermal overload sizing and application. Additionally MCC thermal overload testing programs were reviewed.

The team interviewed the MOV program engineer to gain an understanding of maintenance issues and overall reliability of the valves. Because the valves are inside containment and were not accessible for a plant walkdown inspection, the team reviewed photographs of the valves and verified the installed valve configuration was consistent with design basis assumptions and plant drawings. Finally, corrective action documents were reviewed to verify that deficiencies were appropriately identified and resolved, and that the valves were properly maintained.

b. Findings

No findings were identified.

2.1.6 Unit 2 'C' Residual Heat Removal System Minimum Flow Valves (2RHS*MOV4A and 2RHS*MOV4C)

a. Inspection Scope

Valves 2RHS*MOV4A and 4C were selected as a representative sample of the residual heat removal (RHR) system minimum flow valves. The team inspected the valves to verify they were capable of meeting their design basis requirements. The valves have active safety functions in both the open and closed positions. The team reviewed piping and information drawings (P&ID), component calculations, system calculations, and thrust calculations to verify that thrust and torque limits and actuator settings were correct. The team also reviewed calculations for degraded voltage at the MOV terminals to ensure that the proper voltage was used to verify adequate MOV torque. The team reviewed the calculations that establish control circuit voltage drop, short circuit, and protection/coordination including thermal overload sizing and application. Additionally MCC thermal overload testing programs were reviewed. The team reviewed the maintenance and functional history of the valves by sampling corrective action reports, work orders, system health reports, and in-service testing (IST) results. The team interviewed the MOV program engineer, operators, and the system engineer to gain an understanding of the overall reliability of the valves.

The team conducted a walkdown to assess the material condition of the valves and to verify the installed valve configuration was consistent with design basis assumptions and plant drawings. Finally, corrective action documents were reviewed to verify that deficiencies were appropriately identified and resolved, and that the valves were properly maintained.

b. Findings

No findings were identified.

.2.1.7 Unit 1 Containment Spray Pumps 111 and 121 (PMP-80-03 and PMP-80-04)

a. Inspection Scope

The team reviewed applicable portions of the NMP technical specifications (TS), the UFSAR, and the containment spray system design basis document (DBD) to identify the design basis requirements for the 111 and 121 containment spray pumps. The pumps provide for containment spray and flow to the containment spray heat exchangers for heat transfer from the torus water to Lake Ontario. The heat transfer capability must limit the torus water temperature increase to ensure adequate net-positive-suction-head (NPSH) is available post-accident to prevent cavitation of the containment spray and core spray pumps. The team reviewed design calculations and site procedures to verify that the design basis and design assumptions were appropriately translated into these documents. The team also reviewed design and operational requirements with respect to pump flow rate, developed head, achieved system flow rate, and NPSH. The team reviewed the pump discharge check valve testing and the associated acceptance criteria to ensure the valves would support the maximum assumed accident flowrate conditions. The team reviewed the adequacy of the pump's protection from the formation of air vortexes when operating under maximum flowrate conditions.

The team verified test procedures and test results were supported by DBDs and acceptance criteria were consistent with assumptions used in design basis calculations. The team also reviewed the adequacy of the pump baseline for IST and actual pump performance results to ensure the pumps were performing within accident analysis assumptions. The team reviewed operating and emergency operating procedures to verify that selected operator actions could be accomplished. Additionally, the team reviewed control schematics to verify that system operation complied with the system design requirements. The team reviewed calculations that established voltage drop, ampacity, protection and coordination, motor brake horsepower (BHP) requirements, and short circuit rating for the motor power supply and feeder cable to verify that the design bases and assumptions had been appropriately translated into design calculations. The team performed a walkdown of the pumps, accessible containment spray pump piping, and adjacent areas to assess material condition, operating environment, and configuration control. The team also reviewed a sample of containment spray system corrective action documents and the containment spray system health report to determine if there were any adverse operating trends and to ensure that Exelon adequately identified and addressed any adverse conditions.

b. Findings

No findings were identified.

.2.1.8 Unit 2 Residual Heat Removal Containment Spray Valve (2RHS*25A)

a. Inspection Scope

The team inspected the RHR containment spray inboard isolation valve (2RHS*25A) to verify that it was capable of performing its design function in response to transients and accidents. The valve is a normally closed containment spray line containment isolation valve. The safety function is to open (remote manual operation) after a DBE to enable drywell spray and to close for containment isolation when required. The team reviewed applicable portions of NMP's TSs and the UFSAR to identify the design basis requirements for the valve.

The team reviewed design calculations, valve specifications, and operating history to verify that the valve met the applicable American Society of Mechanical Engineers (ASME) Code requirements. The team reviewed a sample of surveillance test (ST) results to verify that valve performance met the acceptance criteria and that the criteria were consistent with the design basis. Additionally, the team reviewed operator training lesson plans to verify the technical adequacy and details of the plan with respect to valve operation. The team interviewed the MOV program engineer and reviewed the last two valve diagnostic test results and trending to assess valve performance capability, design thrust margin, and susceptibility to recent industry OE. This included a review of the latest boroscope inspection of the motor magnesium rotor to assess the equipment condition. The valve unseating thrusts were reviewed to ensure the thrust observed was not indicative of the potential for a disc-stem separation condition. The team reviewed a sample of RHR system corrective action documents and the RHR system health report to determine if there were any adverse operating trends and to ensure that Exelon adequately identified and addressed any adverse conditions. The team also performed a walkdown of the valve, adjacent areas, and accessible portions of the RHR system to assess material condition, operating environment, and configuration control.

b. Findings

No findings were identified.

.2.1.9 Unit 1 Containment Spray Heat Exchanger 111 (HTX-80-34)

a. Inspection Scope

The team inspected the 111 containment spray heat exchanger (HX) to verify that it was capable of meeting its design basis requirements. The team reviewed NMP's UFSAR, the containment spray DBD, drawings, and procedures to identify the design basis requirements of the heat exchanger. The containment spray heat exchangers are designed to provide for heat transfer from the torus water to Lake Ontario. The system heat transfer rate must limit the torus water temperature increase to ensure adequate NPSH is available post-accident to prevent cavitation of the containment spray and core spray pumps.

The team reviewed the design pressure and temperature of the HX shell and tubes to verify that operational procedures and performance under accident conditions were consistent with the design parameters. The team reviewed the flowpaths used in the EOPs for containment heat removal to ensure the design rated flow through the shell side of the HX was consistent with calculation inputs. The team reviewed the EOP procedures for realignment from containment spray to the torus cooling mode to ensure the system and valve configurations were consistent with design analyses. The team observed the performance of a containment spray pump ST, including the startup of the system from a semi-dry condition, to evaluate indications of any past or current water hammer effects. The team reviewed a bounding engineering calculation of record which reviewed the impact of plugging five tubes in the containment spray HX to ensure there was a negligible impact on HX performance. The team reviewed corrective action documents to verify deficiencies were appropriately identified and resolved, and that the containment spray HX had not been showing signs of any degradation.

b. Findings

No findings were identified.

.2.1.10 Unit 2 High Pressure Core Spray Injection Valve (2CSH*MOV107)

a. Inspection Scope

The team inspected the Unit 2 high pressure core spray (HPCS) injection valve to verify that it was capable of performing its design function in response to accident conditions. The safety function of the valve is to automatically open to provide makeup water to the reactor during accident or transient events. The team reviewed applicable portions of NMP's TSs and the UFSAR to identify the design basis requirements for the valve. The team reviewed calculations for degraded voltage at the MOV terminals to ensure the proper voltage was used to verify adequate MOV torque. The team reviewed the calculations that established control circuit voltage drop, short circuit, and protection/coordination including thermal overload sizing and application. Additionally MCC thermal overload testing programs were reviewed.

The team reviewed design calculations, valve specifications, and operating history to verify that the valve met the applicable ASME Code requirements. The team reviewed a sample of ST results to verify that valve performance met the acceptance criteria and that the criteria were consistent with the design basis. This review included ensuring the stroke time of the valve was consistent with IST requirements. Additionally, the team reviewed operator training lesson plans to verify the technical adequacy and details of the plan with respect to valve operation. The team interviewed the MOV program engineer and reviewed the last two valve diagnostic test results and trending to assess valve performance capability, design thrust margin, and susceptibility to recent industry OE. This included a review of the latest boroscope inspection of the motor magnesium rotor to assess the equipment condition. The valve unseating thrusts were reviewed to ensure the thrust observed was not indicative of the potential for a disc-stem separation condition. The team reviewed a sample of HPCS system corrective action documents to determine if there were any adverse operating trends and to ensure that Exelon adequately identified and addressed any adverse conditions. The team also performed a walkdown of the valve, adjacent areas, and accessible portions of the HPCS system to assess the material condition, operating environment, and configuration control.

b. Findings

No findings were identified.

2.1.11 Unit 2 'C' Service Water Pump (2SWP*P1C)

a. Inspection Scope

The team inspected the Unit 2 'C' Service Water (SW) Pump to evaluate whether it was capable of performing its design basis function, which is to provide a source of cooling water (lake water) to numerous safety-related area coolers, the RHR heat exchangers, and the EDG jacket coolers required to be in operation following a DBA. The team reviewed applicable portions of the UFSAR, TS, component procurement documents, and drawings to identify the design basis requirements for the pump. The team reviewed design calculations to assess available pump NPSH and total dynamic head

(TDH) needed to deliver required flow to the supplied components. The team reviewed the SW pump IST results and SW system flow verification tests to determine if adequate system flow was available. Specifically, the team reviewed pump data trends for vibration, pump differential pressure, and flow rate test results to verify acceptance criteria were met and acceptance limits were adequate. The team ensured that changes that would impact system flow dynamics, such as increases in pipe roughness, piping modifications, and revised heat load requirements were properly evaluated. Since the SW system has experienced a considerable amount of microbial induced corrosion (MIC) buildup, the team performed an extensive review of the basis for the current SW system hydraulic model to verify that it bounded actual system conditions. The team reviewed calculations that establish voltage drop, ampacity, protection and coordination, motor BHP requirements, and short circuit ratings for the motor power supply and feeder cable to verify that the design bases and assumptions had been appropriately translated into design calculations. The team also interviewed the system engineer and performed a walkdown of the pump to evaluate its material condition and assess the pump's operating environment. Finally the team reviewed corrective action documents and system health reports to determine if there were any adverse operating trends and to assess the licensee’s ability to evaluate and correct problems.

b. Findings

No findings were identified.

2.1.12 Unit 1 Containment Spray Raw Water Pump 122 (PMP-93-03)

a. Inspection Scope

The team inspected one of the Unit 1 containment spray raw water pumps to evaluate whether it was capable of performing its design basis function, which is to provide a source of cooling water (lake water) to the CS heat exchanger following a DBA. The team reviewed applicable portions of the UFSAR, TSs, component procurement documents, system DBD, and drawings to identify the design basis requirements for the pump. The team reviewed design calculations to assess available submergence and TDH needed to deliver required flow to the containment spray heat exchanger. The team reviewed the pump IST results and system flow verification tests to evaluate whether adequate system flow was available. Specifically, the team reviewed pump data trends for vibration, pump differential pressure, and flow rate test results to verify acceptance criteria were met and acceptance limits were adequate. The team ensured that changes that would impact system flow dynamics, such as increases in pipe roughness, MIC buildup, piping modifications, and revised heat load requirements were properly evaluated. The team reviewed calculations that establish voltage drop, ampacity, protection and coordination, motor BHP requirements, and short circuit ratings for the motor power supply and feeder cable to verify that design bases and assumptions had been appropriately translated into design calculations. The team also interviewed the system engineer and performed a walkdown of the pump to evaluate its material condition and assess the pump's operating environment. Finally the team reviewed corrective action documents and system health reports to determine if there were any adverse operating trends and to assess the licensee's ability to evaluate and correct problems.

b. Findings

No findings were identified.

2.1.13 Unit 1 Torus to Drywell Vacuum Breaker Valve (CHK-68-01)

a. Inspection Scope

The team inspected one of the Unit 1 Torus to Drywell Vacuum Breaker Valves to evaluate whether it was capable of meeting its design basis function, which is to relieve differential pressure between the torus and drywell following a DBA. The team reviewed applicable portions of the UFSAR, TSs, component procurement documents, system DBD, and drawings to identify the design basis requirements for the valve. The team reviewed calculations to determine if settings for opening the valve would meet design basis requirements for vacuum protection of the drywell. The team reviewed modifications made to the valve's position indication device to ensure that it did not materially alter the valve's seismic qualifications. The team reviewed IST results to determine if leakage rate and opening differential pressure requirements were being met and to determine if acceptance criteria limits for these parameters were adequate to ensure the valve would perform its intended function. The team interviewed the system engineer and performed a walkdown of the valve to evaluate its material condition and assess the valve's operating environment. Finally the team reviewed corrective action documents and system health reports to determine if there were any adverse operating trends and to assess the licensee's ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.14 Unit 1 Reactor Building Closed Loop Cooling Heat Exchanger #13 (HTX-70-15R)

a. Inspection Scope

The team inspected the Unit 1 Reactor Building Closed Loop Cooling (RBCLC) heat exchanger #13 to verify that it was capable of meeting its design basis requirements. The RBCLC heat exchanger removes heat from the RBCLC system, which is designed to provide cooling water to various reactor auxiliary systems and components under all plant conditions. The team reviewed the UFSAR, drawings, calculations, and procedures to identify and evaluate the functional requirements of the RBCLC heat exchanger #13 under the most limiting conditions. The team reviewed related system health reports and discussed the design, operation, and corrective maintenance of the heat exchanger with engineering staff to gain an understanding of the performance history and component health.

The team reviewed Exelon's NRC Generic Letter 89-13 response and methods used to maintain the safety function of the RBCLC heat exchanger #13, which included performance testing supplemented by cleaning and inspection. The team reviewed the results from the most recent maintenance of the heat exchanger to verify that the as-found and as-left conditions were acceptable. The team also reviewed the most recent thermal performance test to verify that the heat transfer was sufficient and provided adequate design margin. The team reviewed periodic non-destructive examination reports of the heat exchanger shell and tubes to verify that their physical integrity and tube plugging margin were being maintained. The team performed a walkdown of the heat exchanger, piping, and valves to assess the material condition and to verify operation was consistent with design.

b. Findings

No findings were identified.

.2.1.15 Unit 2 Division I Diesel Generator Jacket Water Coolers [2EGS*E1A and 2EGS*E2A]

a. Inspection Scope

The team inspected the Unit 2 Division I EDG jacket water coolers to verify that they were capable of meeting their design basis requirements. The jacket water coolers remove heat from the EDG engine to allow for continuous operation of the engine at maximum load when the EDG is needed as an alternative power supply. The team reviewed the UFSAR, drawings, calculations, and procedures to evaluate the functional requirements of the EDG jacket water coolers under the most limiting conditions. The team reviewed related system health reports and discussed the design, operation, and corrective maintenance of the coolers with engineering staff to gain an understanding of the performance history and component health.

The team reviewed Exelon's NRC Generic Letter 89-13 response and method used to maintain the safety function of the jacket water coolers, which included performance testing during monthly STs supplemented by cleaning and inspection. The team reviewed the visual inspection and eddy current test results from the most recent maintenance of the coolers to verify that the as-found and as-left conditions were acceptable. The team also reviewed the previous six EDG STs to verify that the heat transfer was sufficient during maximum loading and provided adequate cooling consistent with the calculated design values. The team performed a walkdown of the jacket water coolers, piping, and valves to assess the material condition and to verify operation was consistent with design.

b. Findings

No findings were identified.

.2.1.16 Unit 2 Service Water Pump Expansion Joints (2SWP*EJ12A/C/E)

a. Inspection Scope

The team inspected the Unit 2 Service Water Pump (SWP) P1A, P1C, and P1E expansion joints to verify that they were capable of meeting their design basis requirements. The SWP expansion joints are installed on the suction side of their respective pumps and absorb axial movements from thermal changes in the piping as well as movements due to earthquakes and vibrations. The team reviewed the UFSAR, calculations, and procedures to identify the design basis requirements of the expansion joints. The team reviewed corrective active documents and system health reports, and discussed the design and inspection of the expansion joints with engineering staff to gain an understanding of the performance history and component health. The team reviewed a sample of visual inspection results to verify that the joint dimensions met the acceptance criteria and that the criteria were consistent with the design basis. The team also performed a walkdown of the accessible portions of the SW system near the SWPs to assess the material condition and to verify operation was consistent with design.

b. Findings

No findings were identified.

.2.1.17 Unit 2, Division III Diesel Generator (Mechanical, 2EGS-EG2)

a. Inspection Scope

The Division III Diesel Generator provides electric power to the HPCS motor which drives the HPCS pump. This mechanical sample included a review of the HPCS control room cooling unit design and test, the fuel oil system oil consumption calculations and transfer pump testing, diesel engine jacket water cooler design and performance testing, and air start system check valve and starting air system capacity testing. The team reviewed the adequacy and appropriateness of design assumptions and calculations related to the sample systems. This included a review of diesel control room heat load calculations. Periodic thermal performance test results were reviewed to ensure the installed room cooling equipment performed as specified by the design and vendor documents.

The team also reviewed the adequacy and appropriateness of design assumptions and calculations related to diesel fuel oil storage capacity and consumption. Additionally, the team ensured the inservice tests of the fuel oil transfer pumps demonstrated the design basis required capacity. To ensure the quality of the fuel oil, the team verified that an appropriate chemical control program for fuel oil was in place. For the jacket water coolers, the team reviewed heat exchanger design documents, thermal performance testing, and recent heat exchanger inspections to ensure the coolers performed as designed. The testing of the air start system, including the check valves that perform a safety-related function of isolation was reviewed to ensure the air starting system had sufficient capacity to provide air pressure and volume to start the engine as required by design and licensing documents. The team interviewed the system engineer, performed a walkdown, and reviewed system health report to assess the material condition of the diesel generator. The team reviewed maintenance work records, corrective action documents, and industry operating experience records to verify that licensee personnel adequately evaluated degraded conditions and their impact on the components.

b. Findings

No findings were identified.

.2.1.18 Unit 2, Suppression Pool Cooling Return Valve (2RHS-MOV30B)

a. Inspection Scope

This valve is normally open in order to provide a return pathway to the suppression pool when the ‘B’ RHR pump is in operation for long term core cooling and decay heat removal. The valve also has a remote manual safety function to close as an outboard containment isolation valve. The team reviewed TSs, operating procedures, and the UFSAR to determine the licensing and operating basis for the valve. The inspectors reviewed MOV calculations and analyses to ensure the valve was capable of functioning under design basis conditions. These included calculations for required thrust, maximum differential pressure, and valve weak link analysis. The team reviewed the calculations for the degraded voltage at the MOV terminals, to ensure the proper voltage was used to verify adequate MOV torque. The team reviewed the calculations that establish control circuit voltage drop, short circuit ratings, and protection/coordination including thermal overload sizing and application. Additionally MCC thermal overload testing programs were reviewed.

Diagnostic testing and IST ST results, including exercise test, position indication, available thrust, and containment leak rate testing were reviewed to verify acceptance criteria were met and performance degradation, if present, could be identified. The team interviewed the system engineer, performed a walkdown, and reviewed system health reports to assess the material condition of the valve. Work order and preventive maintenance histories were reviewed to ensure the valve and motor operator were being properly maintained. Corrective action documents were reviewed to ensure problems were identified and corrected.

b. Findings

No findings were identified.

.2.1.19 Unit 1 #161B 125V Direct Current Station Battery Charger

a. Inspection Scope

The team inspected the #161B 125V direct current (DC) station battery charger to evaluate whether it could perform its design function of providing a reliable source of DC power to connected loads under normal operating conditions. The safety-related chargers provide power for all DC control functions. They supply all steady state normal DC power and maintain the associated safety-related station batteries fully charged.

The team reviewed the UFSAR, TSs, TS Bases, the system DBD, drawings, and procedures to identify the performance requirements for the station battery charger. The team reviewed the testing and operation of the #161B station battery charger to verify it could perform its design function. The team reviewed periodic maintenance to verify that maintenance would not adversely affect the capability of performing its intended safety function during normal operating conditions. The team also reviewed the battery charger capability calculation to verify the charger was capable of supplying rated capacity for its required time. Design and system engineers were interviewed regarding the design, operation, testing, and maintenance of the charger. The team performed a walkdown of the #161B station battery charger and associated distribution panels to assess the material condition of the equipment. Finally, a sample of condition reports were reviewed to ensure Exelon was identifying and properly correcting issues associated with the #161B battery charger.

b. Findings

No findings were identified.

.2.1.20 Unit 1 Automatic Depressurization System Logic

a. Inspection Scope

The team inspected automatic depressurization system (ADS) time delay relays RLY-01-102A/2, RLY-01-102B/2, RLY-01-102C/2, and the associated logic to evaluate whether the relays could perform their design basis function to automatically initiate ADS to reduce nuclear system pressure so that the core spray system can inject water into the reactor. The ADS consists of six solenoid-activated electromatic relief valves; three primary and three back-up valves.

The team reviewed the UFSAR, TSs, TS Bases, the system DBD, drawings, and procedures to identify the performance requirements for the ADS valves. The team reviewed the surveillance testing of the ADS actuation circuitry to verify its performance under design basis conditions. The team reviewed calculations and discussed the design, operation, and maintenance of the system with station engineers. The team also conducted a walkdown of related and accessible components 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 basis. Finally, the team reviewed corrective action documents and system health reports to determine if there were any adverse operating trends and to assess Exelon's ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.21 Unit 2 '2C' Division III 125VDC Station Battery

a. Inspection Scope

The team inspected the '2C' Division III station battery to evaluate whether it could perform its design basis function to provide DC power to the Division III switchgear for 2 hours following a design basis LOCA and loss of off-site power. The Division III switchgear provides DC control power to the HPCS diesel.

The team reviewed the UFSAR, TSs, TS Bases, the system design description, drawings, and procedures to identify the performance requirements for the battery. The team reviewed the surveillance testing of the '2C' battery to verify the battery performance testing encompassed the design basis loads. The team reviewed calculations and discussed the design, operation, and maintenance of the battery with station engineers. The team also conducted a walkdown of related and inspectable components to assess the material condition of the equipment and to evaluate whether the installed configuration was consistent with plant drawings, procedures, and the design basis. Finally, the team reviewed corrective action documents and system health reports to determine if there were any adverse operating trends and to assess Exelon's ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.22 Unit 2 4160/600V Transformer 2EJS*X1A

a. Inspection Scope

The team inspected the U2 4160/600V Transformer 2EJS*X1A to verify it would perform its design function during DBEs. The team reviewed calculations such as load flow/voltage drop, and electrical protection and coordination to verify the design adequacy. The team assessed the sizing, loading, protection, and voltage taps for the transformer to ensure adequate voltage would be supplied to the 600V power boards. Additionally, the team reviewed the protective device settings to ensure that the feeder cables and transformer were protected in accordance with industry standards. Finally, the team performed a walkdown of portions of the close-coupled, safety-related 600V Power Board 2EJS*US1 and 4kV/600V transformer 2EJS*X1A to assess the installation configuration, material condition, and potential vulnerability to hazards.

b. Findings

No findings were identified.

.2.1.23 Unit 1 #11 Emergency Service Water Pump Motor (MOT-72-04)

a. Inspection Scope

The team reviewed calculations that establish voltage drop, ampacity, protection and coordination, motor BHP requirements, and short circuit ratings for the motor power supply and feeder cable to verify that design bases and design assumptions were appropriately translated into design calculations. The team performed a visual non-intrusive inspection of observable portions of the motor to assess the installed configuration, material condition, and the potential vulnerability to hazards. Additionally, the team reviewed corrective action documents to determine if there were any adverse operating trends and to assess Exelon's ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.1.24 Unit 2 'C' Service Water Pump Motor (2SWP*M1C)

a. Inspection Scope

The team reviewed calculations that establish voltage drop, ampacity, protection and coordination, motor BHP requirements, and short circuit ratings for the motor power supply and feeder cable to verify that design bases and design assumptions were appropriately translated into design calculations. The team performed a visual non-intrusive inspection of observable portions of the motor to assess the installation configuration, material condition, and the potential vulnerability to hazards. The team also reviewed corrective action documents to determine if there were any adverse operating trends and to assess Exelon's ability to evaluate and correct problems.

b. Findings

No findings were identified.

.2.2 Review of Industry Operating Experience and Generic Issues (3 samples)

The team reviewed selected OE issues for applicability at NMP Units 1 and 2. The team performed a detailed review of the OE issues listed below to evaluate whether Exelon had appropriately assessed potential applicability to site equipment and initiated corrective actions when necessary.

.2.2.1 NRC Information Notice 2012-14, Motor-Operated Valve Inoperable Due To Stem-Disc Separation

a. Inspection Scope

The team selected NRC Information Notice (IN) 2012-14 for a detailed review. The team evaluated Exelon's applicability review and disposition of NRC IN 2012-14 at the NMP

Station. The NRC issued this IN to inform licensees about an event where an MOV failed at the connection between the valve stem and disc. The team reviewed Exelon's evaluation and actions relative to the conditions described within NRC IN 2012-14 to ensure that Exelon had performed appropriate evaluations for the NMP Units. The team interviewed the MOV program engineer, reviewed a sample of valve diagnostic test results and trending, and reviewed a sample of Exelon's remote valve position verifications to independently assess MOV susceptibility to this failure mechanism.

b. Findings

No findings were identified.

.2.2.2 NRC Information Notice 2012-06, Ineffective Use of Vendor Technical Recommendations

a. Inspection Scope

The team inspected the licensee's review of NRC IN 2012-06, "Ineffective Use of Vendor Technical Recommendations." The IN described that the NRC's review of recent operating experience involving ineffective use of vendor technical recommendations which identified that many of the events allowed latent failures to exist undetected and become underlying causes of risk-significant initiating events. The team reviewed Exelon's evaluation of the potential impact of the identified issues to determine if the issues in the IN were directly applicable to NMP and that appropriate corrective actions were taken, if applicable. The team also reviewed IRs 2387669 and 2387669 which identified a weakness associated with the periodic vendor interface program. The licensee entered the issue into its corrective action program.

b. Findings

No findings were identified.

2.2.3 NRC Information Notice 2012-12: Heating, Ventilation, and Air Conditioning Design Control Issues Challenge Safety System Function

a. Inspection Scope

The team evaluated NMP's applicability review and disposition of NRC IN 2012-12. The NRC issued this IN to inform addressees about certain events involving heating, ventilation, and air conditioning (HVAC) system design control issues that challenged, or potentially challenged safety system functions. Although the example events described in this IN all dealt with HVAC system design deficiencies, the NRC noted that these events illustrate the importance of rigorously evaluating modifications made to any safety-related systems to verify that the design-basis requirements for these system continue to be met. As sample HVAC items to review, the team selected: a) the design of the Unit 1 Screen-Pump House HVAC equipment for its response to a loss of offsite power (LOOP) under minimum and maximum ambient air conditions; and b) design of the Unit 2 Intake Structure deicing equipment also for its response to a LOOP but for minimum lake water temperatures. The team also reviewed procedures CNG-CM-1.01-1003, “Design Engineering and Configuration Control,” Revision 601, used to develop modifications and CC-AA-202-1001, “Quality Review Team,” Revision 7 used for quality product review to assure that design changes comply with each plant's design and licensing bases.

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 identified and entered into their corrective action program. The team reviewed these issues to evaluate whether Exelon had an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions. In addition, corrective action documents written on issues identified during the inspection were reviewed to evaluate adequate problem identification and incorporation of the problem into the corrective action program. In addition, the team reviewed IR2345014 which discussed Unit 2 DGV time delay test equipment which did not meet vendor-specified harmonic distortion criteria and the licensee’s initial operability assessment. Other corrective action documents that were sampled and reviewed by the team are listed in the attachment.

b. Findings and Observations

No findings were identified.

During the inspection, the team identified the Unit 2 DGV protection time delay relay calibration procedure was deficient, because it permitted calibration with test equipment that didn’t meet vendor- specified harmonic distortion criteria. If not properly calibrated, the DGV protection circuit could be inoperable. The team determined the initial operability impact reviews for this issue by both the Unit 2 Senior Reactor Operator and the Station Operations Committee lacked depth and were deficient. Neither recognized the potential impact on offsite power operability. Each considered the issue administrative. Consequently, Unit 2 operated with offsite power in an indeterminate state for 6 days.

The team discussed the initial operability impact assessment with station management, who promptly initiated a detailed and comprehensive operability impact assessment. Exelon determined that the actual test equipment used for calibration met the vendor-specified criteria and offsite power remained operable. The team reviewed Exelon’s operability assessment and found the results to be reasonable. The team determined the deficient calibration procedure and deficient operability impact assessment were minor because they were related to equipment qualification and no equipment operability or functionality was significantly affected. In accordance with IMC 0612, "Power Reactor Inspection Reports," the above issues constituted violations of minor significance that are not subject to enforcement action in accordance with the Enforcement Policy. Exelon entered the team's observations into their corrective action program (IRs 2345014, 2392774, and 2400345). Other corrective action documents that were sampled and reviewed by the team are listed in the attachment.

4OA6 Meetings, including Exit

On October 10, 2014, the team presented the inspection results to Mr. Christopher Costanzo, Site Vice President, and other members of the Exelon staff. The team verified that none of the information in this report is proprietary.

4OA7 Licensee-Identified Violations

The following violation of NRC requirements was identified by Exelon. The issue was determined to have very low safety significance (Green) and met the criteria of Section 2.3.2 of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV.

- 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. In addition, NRC letter dated June 2, 1977, required all licensees to verify existing plant design or propose modifications to ensure onsite emergency power systems met certain criteria including Staff Position 1. Staff Position 1(c)(2) stated the DGV protection time delay duration, shall minimize the effect of short duration disturbances from reducing the availability of the offsite power source(s). Staff Position 1(c)(3) stated the DGV protection time delay shall be established such that the allowable time duration of a DGV condition at all distribution system levels shall not result in failure of safety systems or components.

  Contrary to the above, prior to October 9, 2014, Exelon did not adequately evaluate the sequencing of Unit 2 safety-related loads and associated transient voltages to the Unit 2 Class 1E accident initiated motors and MOVs on the-safety related buses and MCC's during the initiation of a design basis loss of coolant event, subsequent unit trip, and resulting sag of the 115kV grid. Specifically, Exelon did not ensure the chosen DGV protection time delay duration: (1) minimized the effect of short duration disturbances from reducing the availability of offsite power sources; and, (2) maintained voltage requirements for safety-related loads to ensure that failures of safety-related systems would not occur. Exelon did not identify the resulting voltage transients, minimum 4kV motor and 600V MOV starting voltages, associated motor actuator output torque, and control circuit voltages to safety-related MOV motors.

  Exelon identified these deficiencies as a result of their review of NRC RIS 2011-12R1 and contracted in September 2014 to have the electrical calculations revised. Initial results, using the grid operator specified grid sag of 3.5 percent following a unit trip, indicated that the transient 4KV safety bus voltage would be too low to reset the DGV relays. This would result in the unintended disconnection of offsite power and transfer to the EDG. Immediate actions included reevaluation of the postulated grid sag and transient 4 kV bus voltages. Exelon's subsequent assessment concluded that grid stability had improved and offsite power remained operable. The team reviewed Exelon's assessment and immediate actions and found them to be reasonable. Exelon entered this issue into the corrective action program as IRs 2393336 and 2392930. The team determined that the finding was of very low safety significance (Green) in accordance with IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," Mitigating Systems, because it was a design deficiency confirmed not to result in loss of operability or functionality.

ATTACHMENT: SUPPLEMENTARY INFORMATION

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
J. April, Senior Reactor Operator
R. Corcoran, Mechanical Design Engineer
R. Corieri, Senior Engineer
T. Davis, Generic Letter 89-13 Program Manager
J. Driscoll, Fin Senior Reactor Operator
B. Felicita, Unit 2 EDG System Engineer
R. Ferrer, Senior Design Engineer
R. Franklyn, Design Engineer Mechanical
S Goodwin, System Engineer
G. Inch, Senior Design Engineer
P. Kehoe, IST Program Analyst
P. Konu, EQ Program Engineer
B. Koscielniak, MOV Program Supervisor
W. Marsh, System Engineer
P. Martini, Electrical Design Engineer
M. McGiniley, MOV Program Owner
V. Patel, Senior Design Engineer
S. Peters, Site Appendix J Program Owner
D. Pokon, Senior Electrical Design Engineer
J. Reid, Senior Mechanical Design Engineer
T. Roche, System Engineer
S. Scanion, System Engineer
R. Slawta, Unit 1 RBCLC System Engineer
A. Smith, EQ Engineer in Training
T. Svereika, System Engineer

NRC Personnel
Eric Miller, Resident Inspector, NMP

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000220/2014007-01	NCV	Deficient Design Control of NMP Unit 1 Electrical Calculations to Evaluate Minimum Voltages to Class 1E Accident Initiated Motors and MOVs during a Design Basis Event (Section 1R21.2.1.1.b.1)
05000220/2014007-02	NCV	Deficient Design Control of NMP Unit 1 Electrical Protection Design to Ensure Survivability of Safety-Related Loads during a LOCA Coincident with Sustained Degraded Voltage (Section 1R21.2.1.1.b.2)
05000220/2014007-03	NCV	Deficient Design Control of Protective Device Sizing for Unit 1 Core Spray Injection Motor-Operated Valves (Section 1R21.2.1.2)

LIST OF DOCUMENTS REVIEWED

Audits and Self-Assessments
SA-2013-000263, FSA for CDBI, 12/15/13

Calculations
2-SQ-018, Optimized Thrust for 2CSH*107, Revision 2
2-SQ-026, Unit 2 Evaluate The Impact of COF On Valves 2RHS*MOV4A, 2RHS*MOV4B, 2RHS*MOV4C, 2ICS*MOV129, 2ICS*MOV136, Revision 0
2-SQ-051, Torque Optimization for CLOW Valves, Revision 0
4.16KVT101N/SLTCSP, U1 RAT Tap Setting Analysis, Revision 3
4.16KV102/103LF, U1 Analysis Support for Grid Degraded Voltage, 07/17/14
4.16KV-PB102/103SETPT/27, U1 Degraded Voltage Setpoint, Revision 3
125VDCSC161ABES, 125VDC Battery Chargers SC161A and SC161B Equipment Sizing, Revision 1
520.1-39-WL070, Unit 1 Weak Link, Revision 0
600V-System-MOV/VD, U1 AC MOV Motor Terminal Voltage, Revision 0
600VPB17PDCS, PB 17 Coordination Study, Revision 4
600VMCC171B01-02, MOV Protection OL Sizing – 1V-01-02, Revision 2
600VMCC171B33-01, MOV Protection OL Sizing – 1V-33-01R, Revision 3
600VMCC171B40-09, MOV Protection OL Sizing – 1V-40-09, Revision 4
600VMCC171B40-10, MOV Protection OL Sizing – 1V-40-10, Revision 4
600VMCC171B40-01, MOV Protection OL Sizing – 1V-40-01, Revision 4
600VMCC171B40-11, MOV Protection OL Sizing – 1V-40-11, Revision 4
4160V-PB102/103-PDCS, U1 Coordination/Protection Study PB102/103, Revision 0
A10.1-1-N-339, NMP2 Service Water System Proto-Flo Model, Revision 0
A10.1-AD-002, Unit 2 Temperature Effects on AC Powered MOVs, Revision 2E-130
A10.1-G-039, Max Operating Conditions and Safety Functions for SR MOVs, Revision 0
A10.1-G-048, Sizing Calculation for GL 89-10 CSH System MOVs, Revision 4
A10.1-N-131, Available Net Positive Suction Head for SWP*P1A-F, Revision 1

A10.1-N-340, Proto-Flo SWP Base Hydraulic Model – Normal Operation, Revision 1
A10.1-N-341, 3 SWP Pumps – LOCA under Degraded Conditions, Revision 0, Disp H
AX-19B, Piping Stress Calculation for Service Water Piping - Screenwell Building - Suction Side of Pumps 2SWP*P1C,D,E,F (as-built), Revision 3
AX-19C, Piping Stress Calculation for Service Water Piping - Screenwell Building - Suction Side of Pumps 2SWP*P1A,B (as-built), Revision 3
EC-136, U2 Degraded Voltage Relay Setpoint, Revision 4
EC-145, Verification of Adequacy of Division III Battery 2BYS*BAT2c and Battery Chargers 2BYS*BAT2C1 & 2C2, Revision 4EC-154, U2 Starting Voltage Verification for Class 1E MOVs, Revision 5
EC-196, U2 DV, UV, and Timer Relay Setpoint Calculation, Revision 3
EC-151, U2 Auxiliary System Performance, Revision 5
EGF-14-1, Standby Diesel Generator Fuel Oil Transfer Pump Sizing, Revision 0
EGF-17, Fuel Oil Storage Tank Hi-Lo Level Alarm Setpoints, Revision 1A
EGF-17-1, Usable Fuel Oil in HPCS Diesel Generator Tank, Revision 1
EGS-002, Diesel Engine Jacket Water Cooler at 84F Lake Temperature, Revision 0
HVP-6, Standby Diesel Generator Building Control Room Cooling Load and Unit Cooler Sizing, Revision 3
HVP-12, Performance of Diesel Building Unit Coolers, Revision 0
MPR-1691, NMP Unit 2 Gate Valve Pressure Locking Due to Bonnet Heatup, Dated November 1995
N/A, Annual Voltage Study for 115KV Offsite Power Supply, 03/11
NER-1E-015, NMP 1&2 Offsite Grid Voltage Regulation Study, Revision 0
NER-2M-029, Heat Exchanger Tube Information, Revision 3
NIMO-ELMS-AC01, U1 Auxiliary System Performance, Revision 1
PX-89069, Min Wall Evaluation for 2EGS*E1B/E2B/E1A/E2A, Revision 0
S0EOPWS15B, Net Positive Suction Head Worksheet B, Containment Spray Pump, Revision 2
S10-HVAC-HV09, Screen House Max, Min & Normal Temperatures, Revision 1
S13.4-70HX02, RBCLC Heat Exchanger Thermal Performance Evaluation, Revision 2
S13.4-70HX06, RBCLC Heat Exchanger Thermal Performance Evaluation, Revision 2
S13.4-70HX09, RBCLC Heat Exchanger Thermal Performance Evaluation, Revision 1
S13.4-70HX014, Mechanical Design Assessment of RBCLC Heat Exchanger Duty Performance with Higher than Expected Tube Side Resistance, Revision 0
S13.4-70HX015, RBCLC System Thermal Performance for 10-Hour Shutdown with Increased Lake Temperature, Revision 0
S14-40F013, Unit 1 Core Spray System Thermal Expansion Relief Calculation, Revision 0
S14-80-F014, Containment Spray System IST Approved Pump Curves and Design Bases, Revision 5
S14-80-F030, Containment Spray System Design Basis Hydraulic Analysis, Revision 0
S14-93-F007, containment Spray Raw Water Required Pressure & TDH, Revision 3
S14-93-F003, IST Approved Pump Curves – Containment Spray Raw Water Pumps, Revision 2
S14-93-HX07, Determine Allowable Fouling Factor Based on K-Value Used In Torus Heatup Analysis With 84 F Service Water Temperature, Revision 0
S14-93-HX09, Evaluate Impact of Plugging Five Tubes in a Containment Spray Heat Exchanger, Revision 0
S14-93-HX09, Containment Spray Heat Exchanger Performance Model, Revision 1
S20.1-40WLV002, Access The Impact of Modification Made Under EE00987 on The Weak Link Analysis of IV-40-01, IV-40-09, IV-40-10, & IV-40-11, Revision 1

S22.4-68M001, Vacuum Breaker Opening Force, Revision 1
S22.4-68-V01, Yoke and POS Bracket Seismic Check, Revision 1
STRS056305003, Design Report, Revision 0
STRS056305004, Documentation of Compliance, Revision 0
STRS056305005, Bellows Calculations, Revision 0
U1 Device Setpoint Specification, Revision 12

Condition Reports, Issue Reports, and Other Corrective Action Documents

1996-001516	2010-007409	2012-001069	2013-008023
1998-000261	2010-007774	2012-001071	2013-008042
2005-005067	2010-012327	2012-001093	2013-009236
2006-003526	2011-002348	2012-001995	2013-010296
2007-001125	2011-003740	2012-007158	2013-010299
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2009-000326	2011-004763	2013-001225	2014-004867
2009-000675	2011-006464	2013-001369	2014-005021
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2009-006313	2011-007021	2013-001992	2014-006734
2009-006738	2011-008173	2013-002401	2014-006911
2010-004127	2011-010339	2013-002897	2014-007070
2010-004189	2011-010372	2013-003176	2014-008380
2010-004605	2011-011317	2013-003321	
2010-005339	2012-001018	2013-006697	
2010-006816	2012-001056	2013-005090	

Issue Reports

02000070	02384656*	02387733*	02392928*
02004114	02386352*	02387764*	02392930*
02221920*	02386719*	02387818*	02393299*
02344821*	02386824*	02387888*	02393336*
02345059*	02387589*	02391561*	02393386*
02345014*	02387652*	02392774*	02387669*
02381168*	02387728*	02392780*	02400345*

* NRC identified during this inspection.

Design & Licensing Bases

1EQDP-MOV001, Unit 1 Environmental Qualification Package, Revision 2
1EQDP-MOV004, Unit 1 Environmental Qualification Package, Revision 2
2EQDP-MOV001, Unit 2 Environmental Qualification Package, Revision 0.100
2EQDP-MOV004, Unit 2 Environmental Documentation Package, Revision 3DE-CB.KJ-083, Configuration Baseline Documentation for Emergency Diesel Generator System, Revision 1
93-064, NMP1 Safety Classification Basis Core Spray System Report, Revision 8
94-072 Safety Evaluation for Core Spray Minimum Flow Recirculation Lines/Throttling, Revision 0

DCD-311, AC Load and Power Distribution, Revision 1
DCP N2-05-142, Unit 2 ECCS Closed Loop System Designation, Revision 0
DCP NI-99-025, Unit 1 Thermal Overpressure Protection for Core Spray Penetrations X-13a and X-14
DE-CB.PK-062, Configuration Baseline Documentation for 125 VDC Control Power System, Revision 1
ECP-10-000662, Unit 1, Emergency Cooling System (EC) Closed loop Determination, Revision 0
N1-90-041, Installation of Individual Core Spray System Minimum Flow Recirculation Lines and Remote Valve Throttling Capability, Revision 1
NEG-1E-009, Thermal Overload Protection, Revision 1
Nine Mile Point Nuclear Station Unit N0. 1 Response to NRC Bulletin 88-04 For Core Spray System Pumps (TAC N0. 69940), dated 6/12/1991
Nine Mile Point Unit 1 Technical Specifications
Nine Mile Point Unit 1 Updated Final Safety Analysis Report
Nine Mile Point Unit 2 Technical Specifications
Nine Mile Point Unit 2 Updated Final Safety Analysis Report
NMP1L, Summary of Commitment Changes, 10/22/04
NMP2L 1172, Dated September 30, 1988
NRC Task Interface Agreement 2011-003, Final Response to TIA for Degraded Voltage Time Delays, 06/29/11
SDBD-203, Containment Spray System Design Basis Document, Unit 1, Revision 5
SDBD-207, Primary Containment, Revision 2
SDBD-503, Reactor Building Closed Loop Cooling System Design Basis Document, Revision 7

<u>Drawings</u>
0001.130.203-003, U2 RSST LTC Connection Diagram, Revision 1
0005321122033, Sht. 1, Unit 2 3”-6” Gate Valve Bolted Bonnet Forged Motor Operator, Revision 0
0005360923346, 18” Right Hand Wafer Stop Valve Assy., Revision 1
09-000015, SB-00S Assembly, Revision 0
15-477-4071, Unit 2, Wiring Diagram for 2RHS-MOV-4A, B, & C, Revision 3
12177-EE-10AJ-3, Battery External Connection Diagram 125VDC, 24/48VDC, Revision 3
12177-EM-21AM-2, Radiation Zones, Monitors & Access Controls, Control Building EL 261'-0", Revision 2
83301, Expansion Joint Assembly - 24" IPS, Revision A
C-18006-C, Sht. 1, Drywell & Torus isolation Valves P&ID, Revision 41
C-18006-C, Sht. 2, Drywell & Torus Isolation & Blocking Valves, Revision 32
C-18007-C, Sht. 1, Reactor Core Spray P&ID, Revision 58
C-18007-C, Sht. 2, Reactor Core Spray P&ID, Revision 5
C-01812-C, Sht. 1, Containment Spray Raw Water System P&ID, Revision 26
C-01812-C, Sht. 2, Reactor Core Spray P&ID, Revision 5
C-18012-C, Reactor Containment Spray System P&I Diagram, Revision 47
C-18017-C, Sht. 1, Emergency Cooling System P&ID, Revision 55
C-18022-C, Reactor Building Closed Loop Cooling System P&ID, Sheet 2, Revision 55
C-18022-C, Service Water Reactor & Turbine Buildings P&ID, Sheet 1, Revision 74
C-18027-C, Service Water Reactor Building P&ID, Sheet 2, Revision 18

C-18326-C, Screen & Pump House, Service Water, Section 7-7, Revision 15
C-19409-C-1, One Line Diagram – Auxiliary System, Revision 13
C-19409-C-1B, One Line Diagram – Auxiliary System, Revision 17
C-19409-C-3, Single Line 4160V PB 102 & 103, Revision 27
C-19436-C, Elementary Wiring Diagram 600 Volt Power Board 16 (Battery Charger 161A), Sheet 6D, Revision 0
C-19440-C-2, 600V Power Board 171B, Revision 43
C-19839-C, One Line Diagram 125VDC Control Bus, Sheet 1, Revision 0
C-19859-C, Elementary Wiring Diagram Reactor Protection System (CH11 Auto Depressurization-Core Spray) ERV Valve #111, Revision 24
C-23090-C, Connection Diagram Auxiliary Control Cabinet 1559, Revision 1
C-26848-C, Reactor Containment Spray Piping Isometric Line to Torus, Revision 12
C-27177-C, Drywell & Torus Vacuum Relief System No 68, Revision 4
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LIST OF ACRONYMS

AC	Alternating Current
ADS	Automatic Depressurization System
ASME	American Society of Mechanical Engineers
BHP	Brake Horsepower
BWROG	Boiling Water Owners Group
CDBI	Component Design Bases Inspection
CFR	Code of Federal Regulations
CS	Core Spray
DBA	Design Basis Accident
DBD	Design Basis Document
DBE	Design Basis Event
DC	Direct Current
DGV	Degraded Grid Voltage
EC	Emergency Cooling
EDG	Emergency Diesel Generator

EOP	Emergency Operating Procedure
EPG	Emergency Plant Guideline
GL	Generic Letter
HPCS	High Pressure Core Spray
HVAC	Heating Ventilation and Air Conditioning
HX	Heat Exchanger
IMC	Inspection Manual Chapter
IN	[NRC] Information Notice
IP	Inspection Procedure
IR	Issue Report
IST	In-Service Testing
kV	Kilovolt
LERF	Large Early Release Frequency
LOCA	Loss-of-Coolant Accident
LOOP	Loss of Offsite Power
LTC	Load Tap Changer
MCC	Motor Control Center
MIC	Microbial Induced Corrosion
MOV	Motor Operated Valve
NCV	Non-Cited Violation
NMP	Nine Mile Point
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
OE	Operating Experience
P&ID	Piping and Instrument Diagram
PRA	Probabilistic Risk Assessment
RAW	Risk Achievement Worth
RBCLC	Reactor Building Closed Loop Cooling
RHR	Residual Heat Removal
RIS	Regulatory Issue Summary
RPV	Reactor Pressure Vessel
RRW	Risk Reduction Worth
SDP	Significance Determination Process
SPAR	Standardized Plant Analysis Risk
SSC	Structures, Systems, and Components
ST	Surveillance Test
SW	Service Water
SWP	Service Water Pump
TD	Time Delay
TDH	Total Dynamic Head
TMB	Thermal Magnetic Breaker
TOL	Thermal Overload
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
V	Volt