UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
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LISLE, IL 60532-4352

August 6, 2010

Mr. Michael J. Pacilio
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO), Exelon Nuclear
4300 Winfield Road
Warrenville IL 60555

SUBJECT: CLINTON POWER STATION – COMPONENT DESIGN BASES INSPECTION (CDBI) INSPECTION REPORT 05000461/2010006(DRS)

Dear Mr. Pacilio:

On June 25, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed a component design bases inspection at your Clinton Power Station. The enclosed report documents the inspection results, which were discussed on June 25, 2010, with Mr. F. Kearney and other members of your staff.

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

Based on the results of this inspection, two NRC-identified findings of very low safety significance were identified. The findings involved a violation of NRC requirements. However, because of their very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as Non-Cited Violations (NCVs) in accordance with Section VI.A.1 of the NRC Enforcement Policy.

If you contest the subject or severity of a NCV, 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, DC 20555-0001, with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission – Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspectors Office at the Clinton Power 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 III, and the NRC Resident Inspectors at the Clinton Power Station.

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

Sincerely,

/RA/

Ann Marie Stone, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 50-461
License No. NPF-62

Enclosure: Inspection Report No. 05000461/2010-006
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-461
License No:	NPF-62
Report No:	05000461/2010-006(DRS)
Licensee:	Exelon Generation Company, LLC
Facility:	Clinton Power Station
Location:	Clinton, IL
Dates:	May 24 through June 25, 2010
Inspectors:	A. Dunlop, Senior Reactor Engineer, Lead J. Gilliam, Reactor Engineer, Electrical Engineer T. Hartman, Reactor Engineer, Operations Inspector N. Della Greca, Electrical Contractor C. Baron, Mechanical Contractor C. Edwards, Mechanical Contractor
Approved by:	Ann Marie Stone, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000461/2010006(DRS); 05/24/2010 – 06/25/2010; Clinton Power Station; Component Design Bases Inspection (CDBI)

The inspection was a 3-week onsite baseline inspection that focused on the design of components that are risk-significant and have low design margin. The inspection was conducted by regional engineering inspectors and three consultants. Two Green findings were identified by the inspectors. The findings were considered Non-Cited Violations (NCVs) of NRC regulations. The significance of most findings are indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or may be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified an NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," having very low safety significance for the licensee's failure to ensure adequate acceptance limits were incorporated into test procedures. Specifically, the licensee failed to properly consider instrument loop uncertainties and allowable emergency diesel generator frequency variance when determining the alert and required action values used in the inservice test procedure for testing of the residual heat removal pumps. Consequently, the acceptance criteria for the lower limits on degradation of pump head were non-conservative. This finding was entered into the licensee's corrective action program and a preliminary calculation performed by the licensee concluded that the pumps were operable.

  The finding was more than minor because it was associated with the Mitigating Systems cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the capability of the system to respond to initiating events to prevent undesirable consequences. This finding was of very low safety significance (Green) because the licensee was able to demonstrate pump operability and therefore, there was no loss of safety function. This finding had a cross-cutting aspect in the area of problem identification and resolution because the licensee did not thoroughly evaluate operating experience that included similar issues relating to the failure to appropriately account for instrument uncertainties in design analysis. [P.2(b)] (Section 1R21.3.b.(1))

- Green. The inspectors identified an NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," having very low safety significance for the licensee's failure to establish test conditions to assure that the 1B residual heat removal heat exchanger would perform satisfactorily in service under accident conditions. Specifically, the inspectors determined that the heat exchanger thermal performance test procedure did not assure adequate temperature differences to provide reliable test results. In addition, the most recent test was performed with lower temperature differences than those identified in plant calculations. This finding was entered into the licensee's corrective action program and a preliminary analysis performed by the licensee concluded the test results were acceptable.

The finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the residual heat removal heat exchanger performance test procedure did not establish appropriate test conditions to ensure that the component would perform its required function during an accident. Also, the inspectors determined that the finding was similar to Examples 3.j and 3.k of IMC 612, Appendix E, in that there was a reasonable doubt of the operability of the component based on the most recent test conditions. The inspectors determined the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding did not have a cross-cutting aspect because it did not represent current performance. (Section 1R21.3.b.(2))

REPORT DETAILS

1. **REACTOR SAFETY**

Cornerstone: Initiating Events, Mitigating Systems, and Barrier Integrity

1R21 Component Design Bases Inspection (71111.21)

.1 Introduction

The objective of the component design bases inspection is to verify that design bases have been correctly implemented for the selected risk significant components and that operating procedures and operator actions are consistent with design and licensing bases. As plants age, their design bases may be difficult to determine and an important design feature may be altered or disabled during a modification. The Probabilistic Risk-Assessment (PRA) model assumes the capability of safety systems and components to perform their intended safety function successfully. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems, and Barrier Integrity cornerstones for which there are no indicators to measure performance.

Specific documents reviewed during the inspection are listed in the Attachment to the report.

.2 Inspection Sample Selection Process

The inspectors selected risk-significant components and operator actions for review using information contained in the licensee's PRA and the Clinton Power Station Standardized Plant Analysis Risk (SPAR) Model. In general, the selection was based upon the components and operator actions having a risk achievement worth of greater than 1.3 and/or a risk reduction worth greater than 1.005. The operator actions selected for review included actions taken by operators both inside and outside of the control room during postulated accident scenarios. In addition, the inspectors selected operating experience issues associated with the selected components.

The inspectors performed a margin assessment and a detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design reductions caused by design modification, or power uprates, or reductions due to degraded material condition. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as performance test results, significant corrective action, repeated maintenance activities, Maintenance Rule (a)(1) status, components requiring an operability evaluation, NRC resident inspectors input of problem areas/equipment, and system health reports. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in depth margins. A summary of the reviews performed and the specific inspection findings identified are included in the following sections of this report.

This inspection constituted 30 samples as defined in Inspection Procedure 71111.21-05.

.3 Component Design

a. Inspection Scope

The inspectors reviewed the Updated Safety Analysis Report (USAR), Technical Specifications (TS), design basis documents, drawings, calculations and other available design basis information, to determine the performance requirements of the selected components. The inspectors used applicable industry standards, such as the American Society of Mechanical Engineers (ASME) Code, Institute of Electrical and Electronics Engineers (IEEE) Standards and the National Electric Code, to evaluate acceptability of the systems' design. The NRC also evaluated licensee actions, if any, taken in response to NRC issued operating experience, such as Bulletins, Generic Letters (GLs), Regulatory Issue Summaries (RISs), and Information Notices (INs). The review was to verify that the selected components would function as designed when required and support proper operation of the associated systems. The attributes that were needed for a component to perform its required function included process medium, energy sources, control systems, operator actions, and heat removal. The attributes to verify that the component condition and tested capability was consistent with the design bases and was appropriate may include installed configuration, system operation, detailed design, system testing, equipment and environmental qualification, equipment protection, component inputs and outputs, operating experience, and component degradation.

For each of the components selected, the inspectors reviewed the maintenance history, system health reports, operating experience-related information, vendor manuals, electrical and mechanical drawings, and licensee corrective action program documents. Field walkdowns were conducted for all accessible components to assess material condition and to verify that the as-built condition was consistent with the design. Other attributes reviewed are included as part of the scope for each individual component.

The following 19 components were reviewed:

- Residual Heat Removal (RHR) Pump 1B (1E12C002B): The inspectors reviewed the pump procurement specification and the design basis hydraulic analysis/calculations to verify that required total developed head (TDH), required net positive suction head (NPSH) and potential for vortex formation have been properly considered under all design basis accident/event conditions. The RHR pump inservice test (IST) procedures, recent test results, and trends in test data were reviewed to verify that component performance remains consistent with design basis requirements. The IST reference values (i.e., flow rate and developed head) were also reviewed to verify appropriate correlation to accident analyses conditions, taking into account set point tolerances and instrument inaccuracies. Documentation was reviewed to verify pump motor design was consistent with environmental qualification (EQ) basis for limiting conditions. The inspectors reviewed the pump room cooler and pump seal oil cooler differential pressure test and inspection procedures, including test/inspection results, to verify compliance with licensing commitments under GL 89-13, "Service Water System Problems Affecting Safety-Related Equipment," program plan.

- RHR Heat Exchanger 1B (1E12B001B): The inspectors reviewed the design basis documentation, including procurement specifications and Tubular Heat Exchanger Manufacturer's Association (TEMA) data sheet, and heat exchanger

analysis to verify equipment heat removal capability under design basis conditions. The inspectors reviewed the heat exchanger inspection and thermal test procedures, including recent inspection/test results, and trending data to assess the licensee's efforts to maintain the performance capability of this equipment. The licensee's tube plugging analysis was reviewed to confirm that adequate margin on heat transfer capability had been maintained after recent maintenance activities to plug a significant number of tubes.

- RHR Pump 1B Low Pressure Coolant Injection Isolation Valve (1E12F042B): The inspectors reviewed motor-operated valve (MOV) calculations and analysis to ensure the valve was capable of functioning under design conditions. These included calculations for required thrust, maximum differential pressure, and valve weak link analysis. Diagnostic testing and IST surveillance results, including stroke time and available thrust, were reviewed to verify acceptance criteria were met and performance degradation could be identified. Documentation was reviewed to verify valve motor design was consistent with EQ basis for limiting conditions. The inspectors also reviewed electrical calculations relating to actuator minimum terminal voltage under degraded voltage conditions and thermal overload sizing methodology.

- Standby Liquid Control (SLC) Pump 1B (1C42C001B): The inspectors reviewed the SLC system design basis hydraulic analysis/calculations to verify that required TDH, required NPSH, and potential for vortex formation have been properly considered under all design basis accident/event conditions. The SLC pump IST procedures, recent test results, and trends in test data were reviewed to verify that component performance remains consistent with design basis requirements. The IST reference values were also reviewed to verify appropriate correlation to accident analyses conditions, taking into account set point tolerances and instrument inaccuracies. Documentation was reviewed to verify pump motor design was consistent with EQ basis for limiting conditions.

- High Pressure Core Spray Suppression Pool Minimum Flow Bypass Valve (1E22F012): The inspectors reviewed MOV calculations and analysis to ensure the valve was capable of functioning under design conditions. These included calculations for required thrust, maximum differential pressure, and valve weak link analysis. Diagnostic testing and IST surveillance results, including stroke time and available thrust, were reviewed to verify acceptance criteria were met and performance degradation could be identified. Documentation was reviewed to verify valve motor design was consistent with EQ basis for limiting conditions. The inspectors also reviewed electrical calculations relating to actuator minimum terminal voltage under degraded voltage conditions and thermal overload sizing methodology.

- Emergency Diesel Generator (EDG) 1B (1DG01KB): The inspectors reviewed the EDG design, including seismic qualification, to confirm that it met the system design basis requirement. The design review also addressed the EDG starting and loading sequence. This was accomplished by evaluating logic and wiring diagrams, as well as the EDG voltage and frequency control circuits. The inspectors reviewed the EDG loading calculation and confirmed that the EDG vendor ratings conformed to the design basis load requirements. Additionally, the inspectors reviewed available instrumentation and alarms and verified that

the EDG was adequately protected during normal, abnormal, and emergency conditions. The inspectors reviewed the EDG performance by evaluating the system health report and completed surveillance tests to confirm that the EDG reached speed and frequency within the time established by the accident analysis and the Technical Specification. Additionally, the inspectors confirmed that the EDG was capable of accepting, rejecting, and sharing loads in accordance with the guidelines of Regulatory Guide 1.9, "Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants."

- EDG 1B Air Start System: The inspectors reviewed the EDG air start system for conformance with design basis requirements. This review included design basis calculations, test procedures, and test results to verify the capability of the system to start the EDG under limiting conditions. Specifically, the inspectors reviewed the capacity of the system, reviewed periodic leakage testing and acceptance criteria, and verified that adequate air pressure was maintained. The inspectors also verified that the system was adequately protected from internal flooding hazards.

- EDG Heating, Ventilation and Air-Conditioning (HVAC) Damper (VD01YB): The inspectors reviewed the EDG HVAC Damper and associated HVAC system for conformance with design basis requirements. This review included design basis calculations to verify adequate cooling during EDG operation. The inspectors reviewed the design of the damper and associated ductwork to withstand the pressure differentials associated with a postulated tornado without loss of function. The inspectors also reviewed the control system design associated with the damper and associated equipments. The inspectors also reviewed the effects of degraded voltage conditions on minimum power and voltage requirements. The inspectors also verified separation from other trains and divisions by reviewing electrical drawings.

- Shutdown Service Water (SX) Pump 1B (1SX01PB): The inspectors reviewed design basis calculations, test procedures, and test results to verify the capability of the SX pump to supply the required service water flow to components under limiting conditions. Specifically, the inspectors reviewed the bases of the pump test acceptance criteria, the calculated performance of the pump under post accident conditions, the performance of SX system vacuum breakers, and the basis for SX system valve throttle positions. The inspectors reviewed the performance of the SX strainers under test and accident conditions, reviewed the potential loss of SX flow due to valve leakage, and reviewed the licensee's monitoring of the SX piping system conditions.

- SX Outlet RHR Heat Exchanger Room 1A/B Cooler Valve (1SX023B): The inspectors reviewed the air-operated valve associated with the RHR heat exchanger for conformance with design basis requirements. This review included design basis calculations and test results to verify the capability of the valve to perform its required function. Specifically, the inspectors reviewed valve thrust calculations and stroke test results, reviewed the required air pressure to close the valve, and reviewed the setpoints of the associated air pressure regulator and rupture disc to verify the capability of the valve to perform its function under the most limiting conditions. The inspectors also reviewed the effects of degraded voltage conditions on minimum power and voltage

requirements. The inspectors also verified separation from other trains and divisions by reviewing electrical drawings.

- Screenhouse HVAC Fan (1VH01CB): The inspectors reviewed the fan and associated HVAC system for the safety-related portion of the screenhouse for conformance with design basis requirements. This review included design basis calculations to verify adequate cooling during post-accident operation. The inspectors reviewed the design to verify that the system would be protected in the event of a postulated tornado. The inspectors also reviewed the control system design associated with the fan and associated equipments. The inspectors also reviewed the effects of degraded voltage conditions on minimum power and voltage requirements. The inspectors also verified separation from other trains and divisions by reviewing electrical drawings.

- Instrument Air Supply for the Automatic Depressurization System (ADS): The inspectors reviewed the portions of the instrument air system associated with operation of the ADS for conformance with design basis requirements. The inspectors reviewed design basis calculations, leakage tests, and air quality to verify that the air supply would be capable of performing its function if the normal air supply was not available under accident conditions. Specifically, the inspectors reviewed the air system capacity, pressure, and leakage limits. The inspectors also reviewed the dew point of the makeup air supply to verify the required air system quality.

- Reserve Auxiliary Transformer (RAT) B, (1AP02EB): The inspectors reviewed modification EC 339047 that replaced the existing three-winding reserve auxiliary transformer, RAT 1, with three equivalent transformers, RATs A, B, and C, for potential impact on the design basis of the auxiliary power system. The inspectors confirmed that the three transformers were adequately sized to carry the existing loads. Additionally, the inspectors reviewed the one-line diagrams to verify that the revised design conformed to the system requirements. For RAT B, the inspectors reviewed transformer design data, including nameplate, sizing, current carrying capability, and input/output voltage rating. Also, the inspectors reviewed vendor test results and verified tap positions to confirm that the correct transformer impedance and tap settings were utilized in the voltage drop and short circuit calculations. The inspectors reviewed transformer loading and short circuit calculations. The review also confirmed the adequacy of the transformer protection, including lightning, over-current, differential, and ground fault protection. The inspectors reviewed protective relay setting calculations and surveillance testing of such relays to confirm that such settings conformed to the design system requirements. The review addressed the adequacy of the instrumentation and alarms available to the operators and the adequacy of the revised bus duct design to ensure that the bus duct rating was sufficient to support the transformer loading demands.

- 4.16 kV Auxiliary Power Bus 1B1 (1AP09E): The inspectors reviewed the one-line diagrams and the loading, short circuit and voltage drop calculations to evaluate the capability of the safety-related bus to supply adequate power to the associated loads in accordance with the design and licensing bases of the system. The review addressed minimum and maximum anticipated grid voltage, transformer impedance and tap settings, availability and performance of the

static var compensator, and major pump load requirements to confirm that design variables were adequately included in the analyses. The review also evaluated the switchgear design, the relay protection provided, the circuit breaker interrupting capability, and the ability of the bus to withstand maximum loading and available symmetrical and asymmetrical short circuit. The inspectors reviewed control logics and wiring diagrams of the supply breakers to confirm that manual transfers between the normal an alternate sources and between these and the emergency source utilized synchronizing equipment and that automatic transfers operated as described in the USAR. The inspectors also reviewed the degraded grid voltage analysis to confirm that, under postulated minimum grid voltage, adequate voltage was available at all safety-related components. Protective relay coordination curves were also reviewed to assure that the electrical equipment was adequately protected and that selective breaker tripping was provided under overload and faulted conditions. The inspectors reviewed surveillance testing of voltage and over-current relays to verify conformance with design calculations assumptions and conclusions.

- 480 V Auxiliary Power Bus 1B – Auxiliary Building (1AP12E): The inspectors reviewed the one-line diagrams, bus loading, short circuit, and voltage drop calculations to ensure that the safety-related 480 V load center was capable of supplying adequate voltage to the auxiliary building loads. The review included load center and circuit breaker rating, circuit breaker interrupting capacity, and capability of the bus to withstand maximum loading and available symmetrical and asymmetrical short circuit. The coordination/protection calculation for the incoming line and feeder breaker was also reviewed to confirm adequacy of load protection and selective trip coordination between these breakers. The inspectors confirmed that adequate 125 Vdc was available to the circuit breakers spring charging motor and close and trip coils to ensure opening and closing of the breakers under all modes of operation.

- Nuclear System Protection System Bus B (1C71-PC01B): The inspectors reviewed seismic qualification, voltage drop and minimum voltage calculations. The calculation review verified methodology, design inputs, assumptions, and results.

- 125 Vdc Motor Control Center (MCC) 1B (1DC14E): The inspectors reviewed seismic qualification and various electrical calculations associated with the 1B 125 Vdc MCC. These included voltage drop, minimum voltage, and short circuit calculations. The inspectors reviewed load flow and short circuit current calculations to determine the design basis for maximum load. The calculation review also verified methodology, design inputs, assumptions, and results. The inspectors reviewed bus surveillance and preventive maintenance testing for issues that affect reliability.

- 125 Vdc 1B Battery (1DC): The inspectors reviewed seismic qualification and various electrical calculations associated with the safety-related 1B 125 Vdc batteries. These included battery sizing, voltage drop, minimum voltage, and station blackout coping. The calculation review verified methodology, design inputs, assumptions, and results. The battery surveillance, corrective actions,

system health report and performance history including cell voltage, charging, specific gravity, electrolyte level, and temperature correction were also reviewed to ensure acceptance criteria were met and performance degradation would be identified.

- Balance of Plant DC Bus E: The inspectors also reviewed seismic qualification, voltage drop, and minimum voltage calculation. The calculation review verified methodology, design inputs, assumptions, and results.

b. Findings

(1) Non-Conservative Acceptance Criteria for RHR Pump Performance Testing

Introduction: A finding of very low safety significance (Green) and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," was identified by the inspectors for licensee's failure to include adequate acceptance limits in test procedures. Specifically, when determining the alert and required action values used in the IST procedure for testing of the RHR pumps, the licensee failed to properly consider instrument loop uncertainties and allowable EDG frequency variance. As a result, the acceptance criteria for the lower limits on degradation of TDH were non-conservative.

Description: The General Electric (GE) design document 762E425AC, "GE Process Diagram, RHR System," stated that each RHR pump shall have a minimum TDH of approximately 275 feet at a flowrate of 5050 gallons per minute (gpm). The design basis for this value was reconstituted as part of the extended power uprate and feedwater leakage control (FWLC) modification projects to verify that current IST acceptance criteria limits for the RHR pumps would still envelope any changes in system design requirements resulting from these modifications. The inspectors review of hydraulic calculation 01RH29, "Development of RHR Pump Curves and Comparison with the System Resistance Curves for Concurrent Operation of FWLC with RHR Operating Modes A-1, A-2, B-1 and B-2," determined that the licensee had failed to correct this calculation for a previously determined change in assumed post-accident EDG frequency variance from 1 to 2 percent to correspond to the variance allowed by TS. Further, the inspectors determined that the licensee had incorrectly concluded that the original pre-operational pump performance test curve used in this calculation did not have to be conservatively adjusted (downward) to account for instrument uncertainties associated with the test data used to generate the test curve. Correcting the hydraulic analysis for these errors, the inspectors determined that for the most limiting mode of operation (combined containment spray/FWLC mode) RHR pump 1A would not be able to supply the required flow of 4079 gpm if the pump were allowed to degrade more than approximately 4.3 percent below the current IST reference value. Thus, the current IST limits in procedure CPS 9053.7, "RHR B/C Pumps & RHR B/C Water Leg Pump Operability," for alert (5 percent degradation) and required action (7 percent degradation) were both below the minimum value needed to support this safety-related design function of the RHR system.

The licensee initiated Action Request (AR) 1084176 and performed an immediate operability evaluation to address the issue. Based on the most recent IST test data, the performance curve for RHR pump 1A was 0.9 percent below the reference value curve and therefore, the licensee concluded the pump remained operable. The licensee

implemented an administrative limit of 3.5 percent degradation for the next inservice test of the 1A RHR pump until completion of a comprehensive evaluation. The inspectors had no further concerns with the licensee's evaluation of this issue.

Analysis: The inspectors determined that the failure to properly account for instrument uncertainties and allowable EDG frequency variance in development of the acceptance criteria for inservice testing of the RHR pumps was a performance deficiency.

The performance deficiency was determined to be more than minor because the finding was associated with the Mitigating Systems cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to consider instrument uncertainties and EDG frequency variance in the development of IST acceptance criteria resulted in the establishment of acceptance criteria values that did not ensure that the RHR pumps could meet their intended safety function.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of findings," Table 3b for the Mitigating System cornerstone. The finding screened as very low safety significance (Green) because the finding was a design deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed an operability evaluation that concluded the RHR 1A pump actual degradation was only 0.9 percent, which was less than the preliminary allowable degradation limit of 4.3 percent. As such, sufficient margin existed to ensure the RHR system would be capable of successfully performing the combined containment spray/FWLC mode functions.

This finding has a cross-cutting aspect in the area of problem identification and resolution, because the licensee did not thoroughly evaluate IN 2008-02 "Findings Identified during Component Design Bases Inspections," which included similar issues relating to the failure to appropriately account for instrument uncertainties in design analysis. [P.2(b)]

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

Contrary to the above, from 1999 until present, the licensee failed to incorporate adequate acceptance limits in IST test procedures. Specifically, instrument loop uncertainties and allowable EDG frequency variance were not adequately included when the new acceptance criteria were established in procedure CPS 9053.7 for the inservice testing of the RHR pumps after installing FWLC modifications. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as AR 1084176, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. (NCV 05000461/2010006-01, Non-Conservative Acceptance Criteria for RHR Pump Performance Testing)

(2) Inadequate Test Control of RHR Heat Exchangers

Introduction: A finding of very low safety significance (Green) and associated NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," was identified by the inspectors for the licensee's failure to establish test conditions to assure that the 1B RHR heat exchanger would perform satisfactorily in service under accident conditions. Specifically, the inspectors determined that the heat exchanger thermal performance test procedure did not assure adequate temperature differences to provide reliable test results. In addition, the most recent test was performed with lower temperature differences than those identified in plant calculations.

Description: The inspectors identified a performance deficiency related to the periodic thermal performance testing of the 1B RHR heat exchanger. This heat exchanger had a significant number of tubes plugged that exceeded the number assumed by the vendor in their determination of its heat removal capability. As a result, GE performed an analysis that exchanged allowed number of plugged tubes for lower tube fouling. The assumed fouling allowed by this analysis appeared unrealistically low based on the service water source being lake water and would be difficult to verify through testing. The heat exchanger was tested every two years to verify its thermal performance in accordance with the licensee's Generic Letter 89-13 program. The test was normally performed with the plant online, using the temperature difference between the lake (ultimate heat sink) and the suppression pool to provide a heat load for the test. The test included measuring both flows and temperatures under test conditions, then performing an analysis to verify that the heat exchanger's performance would be adequate under accident conditions. The test was normally performed with significantly lower temperature differences than the design basis accident condition.

Test procedure CPS 2700.20, "RHR A(B) Heat Exchanger Thermal Performance Test Covered by NRC Generic Letter 89-13," Revision 4, provided instructions for collecting RHR heat exchanger test data. The inspectors noted that this procedure did not include a required minimum temperature difference or a required minimum suppression pool temperature to perform this test. The procedure did include a note directing the suppression pool temperature to be increased to 93 degrees Fahrenheit (°F), as required, and stating that a lower temperature may be used at the discretion of the cognizant/test engineer. An additional note, added to revision 4 of the procedure (June 1, 2010), stated that if the suppression pool temperature is not increased then this temperature difference is recommended to be 25°F and optimally 30°F. The inspectors were concerned that this procedure would not ensure that reliable test data would be obtained with relatively small temperature differences and requested the basis of the minimum recommended temperature differences.

The licensee provided excerpts from calculations that included pre-test temperature measurement uncertainty. Calculations 065-017, "Summary Report, Clinton GL-89-13 Program Support," Revision 3, and 065-019, "RHR & DG Heat Exchanger Testing Specification & Acceptance Criteria," Revision 3, addressed the expected measurement uncertainties associated with this test; these calculations were based on an assumed minimum temperature difference of 30°F. The licensee stated that they had not performed formal analyses to support performance of this test with temperature differences of less than 30°F. Also, calculation 065-019 stated that if the difference is less than 30°F, the uncertainties start to substantially increase.

The inspectors determined that the most recent test conducted on December 11, 2008, had been performed with an average temperature difference of approximately 23°F. The licensee stated that the test condition had been evaluated prior to the test and found to be acceptable based on an informal evaluation. The post-test data evaluation for that test (EC 373382) concluded that the heat exchanger performance was acceptable with a margin of approximately 5 percent; however, discussions with engineering personnel indicated that the post-test evaluation had been based on less conservative temperature measurement uncertainties than the original calculations. An informal sensitivity analyses, performed by engineering personnel during the inspection, concluded that the corrected temperature measurement uncertainty would be slightly smaller than the predicted difference between a "clean" condition and a heat exchanger at the fouling limit. This analysis verified that the 2008 test results did demonstrate operability. However, the 2008 post-test data evaluation did not include an appropriate temperature measurement uncertainty analysis and would not have reliably identified a heat exchanger in an inoperable condition. In response to the inspector's concern, the licensee initiated AR 1083290.

Analysis: The inspectors determined that the failure to assure that the RHR heat exchanger would perform its design function was a performance deficiency that was reasonably within the licensee's ability to foresee and prevent. The finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the RHR heat exchanger performance test procedure did not ensure that the component would perform its required function during an accident. Also, the inspectors determined that the finding was similar to Examples 3.j and 3.k of IMC 612, Appendix E, in that there was a reasonable doubt of the operability of the component based on the most recent test conditions. Additional analyses were required to verify that the component would be capable of performing its design function under limiting conditions.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of findings," Table 3b for the Mitigating System cornerstone. The finding screened as very low safety significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. Additional informal analyses, performed during the inspection, demonstrated that the component was operable. This finding did not have a cross-cutting aspect because it did not represent current performance.

Enforcement: Title 10 CFR 50, Appendix B, Criterion XI, "Test Control," requires, in part, that a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is performed in accordance with written test procedures and test results are documented and evaluated to assure that test requirements have been satisfied. Test procedures shall include provisions for assuring that all prerequisites for the given test have been met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions.

Contrary to the above, as of June 25, 2010, the licensee's procedure CPS 2700.20 did not establish adequate test conditions to assure that the RHR heat exchanger would perform satisfactorily in service under accident conditions. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as AR 1083290, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. (NCV 05000461/2010006-02, Inadequate Test Control of RHR Heat Exchangers)

.4 Operating Experience

a. Inspection Scope

The inspectors reviewed 7 operating experience issues to ensure that NRC generic concerns had been adequately evaluated and addressed by the licensee. The operating experience issues listed below were reviewed as part of this inspection:

- IN 1992-27, Supplement 1, "Thermally Induced Accelerated Aging and Failures of ITE/Gould AC Relays Used in Safety-Related Applications";
- IN 2005-30, "Safe Shutdown Potentially Challenged by Unanalyzed Internal Flooding Events and Inadequate Design";
- IN 2007-05, "Vertical Deep Draft Pump Shaft and Coupling Failures";
- IN 2007-34, "Operating Experience Regarding Electrical Circuit Breakers";
- IN 2008-02, "Findings Identified During Component Design Bases Inspections";
- IN 2008-13, "Main Feedwater System Issues and Related 2007 Reactor Trip Data"; and
- IN 2009-14, "Painting Activities and Cleaning Agents Render Emergency Diesel Generators and other Plant Equipment Inoperable."

b. Findings

No findings of significance were identified.

.5 Modifications

a. Inspection Scope

The inspectors reviewed 4 permanent plant modifications related to selected risk significant components to verify that the design bases, licensing bases, and performance capability of the components had not been degraded through modifications. The modifications listed below were reviewed as part of this inspection effort:

- ECN 28511, Drill 1/8 Inch Hole in 1E12F042C Disc;
- EC 339047, Reserve Auxiliary Transformer (RAT) Replacement Project;

- FECN 27062, SLC Tank Level Setpoint Change for Adequate NPSH; and
- WO 1124073-01, Replace 1DC02E Battery.

b. Findings

No findings of significance were identified.

.6 Risk Significant Operator Actions

a. Inspection Scope

The inspectors performed a margin assessment and detailed review of four risk significant, time critical operator actions. These actions were selected from the licensee's PRA rankings of human action importance based on risk achievement worth values. Where possible, margins were determined by the review of the assumed design basis and USAR response times and performance times documented by job performance measures results. For the selected operator actions, the inspectors performed a detailed review and walk through of associated procedures, including observing the performance of some actions in the station's simulator and in the plant for other actions, with an appropriate plant operator to assess operator knowledge level, adequacy of procedures, and availability of special equipment where required.

The following operator actions were reviewed:

- Operator Fails to Align Division 3 EDG to Division 1 or 2;
- Operators Fail to Align SX Injection Through RHR B;
- Operator Fails to Both Lower Reactor Pressure Vessel Level and Control Level in an Anticipated Transient Without Scram; and
- Failure of Operator to Remove Q/S Relay to Prevent 1M-MCC Shunt Trip.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

.1 Review of Items Entered Into the Corrective Action Program

a. Inspection Scope

The inspectors reviewed a sample of the selected component problems that were identified by the licensee and entered into the corrective action program. The inspectors reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions related to design issues. In addition, corrective action documents written on issues identified during the inspection were

reviewed to verify adequate problem identification and incorporation of the problem into the corrective action program. The specific corrective action documents that were sampled and reviewed by the inspectors are listed in the attachment to this report.

b. Findings

No findings of significance were identified.

4OA6 Meeting(s)

.1 Exit Meeting Summary

On June 25, 2010, the inspectors presented the inspection results to Mr. F. Kearney, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. Several documents reviewed by the inspectors were considered proprietary information and were either returned to the licensee or handled in accordance with NRC policy on proprietary information.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

F. Kearney, Site Vice President
M. Kanavos, Plant Manager
K. Baker, Senior Manager Design Engineering
S. Clary, Engineering Programs Manager
T. Chalmers, Operations Director
S. Clary, Engineering Programs Manager
J. Coombs, MOV Engineer
B. Corley, Operations
C. Culp, GL 89-13 Engineer
B. Davis, Senior Manager Plant Engineering
S. Fatora, Maintenance Director
R. Frantz, Regulatory Assurance
S. Gackstetter, Training Director
M. Gandi, Design Engineer
A. Hable, Probabilistic Risk Assessment Engineer
J. Hall, Plant Engineering
M. Heger, Mechanical/Structural Design Engineering Manager
S. Lakebrink, Design Engineering
D. Kemper, Regulatory Assurance Manager
M. Kimmich, Plant Engineering
S. Kowalski, Engineering Response Manager
J. Mosley, Electrical Design
F. Pournia, Site Engineering Director
D. Smith, Plant Engineering
C. VanDenburgh, Nuclear Oversight Manager

Nuclear Regulatory Commission

B. Kemker, Senior Resident Inspector
D. Lords, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened/Closed

000461/2010006-01	NCV	Non-Conservative Acceptance Criteria for RHR Pump Performance Testing
000461/2010006-02	NCV	Inadequate Test Control of RHR Heat Exchangers

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather, that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

CALCULATIONS

Number	Description or Title	Revision
01DG06	DG System Air Start Design Pressure	0
01DG14	Diesel Air Start Time Approximation	0
01IA06	Testing ADS Air Supply	0
01IA09	IA ADS Supply Testing	0
01IA10	1IA044A – SRV Supply Air Design Basis	1
01ME24	Suppression pool minimum water level for adequate NPSH	1
01ME77	Calcs for Flooding – Safe Shutdown Analysis	4B
01RH19	TS Surveillance Requirements for LPCI Pump Differential Pressure at Rated Flow	4 & 5
01RH21	NPSH Calculation – RHR Suction from Suppression Pool	1a
01RH22	Instrument Loop Uncertainty for RHR Pump IST	1
01RH29	Development of RHR Pump Curves and Comparison with the System Resistance Curves for Concurrent Operation of FWLC with RHR Operating Modes A-1, A-2, B-1 and B-2	0
01SC07	NPSH for 1C41C001	3
065-017	Summary Report, Clinton GL-89-13 Program Support	3
065-017, Att. 1	Pre-Test Analysis of RHR Heat Exchanger Performance	3
065-017, Att. 2	Pre-Test Temperature Measurement Uncertainty Analysis for RHR Performance Testing	3
065-019	RHR & DG Heat Exchanger Testing Specification & Acceptance Criteria	3
065-022	Allowable Fouling Factors for RHR HX	2
19-AI-14, Vol. A-D	Fast Transfer of ESF Buses 1A1 & 1B1 between RAT & ERAT	2
19-AJ-46, Vol. A-E	Circuit Breaker Sizing for AC Motor Operated Valves (MOVs)	0
19-AJ-70, Vol. A-K	Class 1E Motor Control Center (MCC) Control Circuit Voltage and Fuse Adequacy Analysis	2
19-AK-13, Vol. A-M	Analysis of Load Flow, Short Circuit, and Motor Starting Using ETAP Power Station	3
19-AN-02, Vol. A-D	4160V ESS Bus Main, Reserve Feed and Medium Voltage Bus U.V. Relay Settings	9
19-AN-04, Vol. A-F	480V ESF Switchgear Breakers and Associated Upstream Relay Settings	12

CALCULATIONS

Number	Description or Title	Revision
19-AN-07, Vol. A-B	4.16 KV Bus 1A & 1B Relay Settings	4
19-AN-08, Vol. A	4160V ESF Switchgear Buses 1A1 and 1B1 Motor Relay Settings	4
19-AN-09, Vol. A-C	4160V Division 3 ESF Bus 1C1 Motor Relay Settings	1
19-AN-13, Vol. A-D	4.16KV Bus Ducts 1ET4 & 1RT4 Relay Settings	2
19-AN-14, Vol. A-E	Division 1 and 2 Diesel Generator Relay Settings	10
19-AN-19	Calculation for Functional Requirements for 1st and 2nd Level Under Voltage Relays at 4kV Buses 1A1,1B1, & 1C1	3
19-AN-20, Vol. A-B	Division 1 and 2 Diesel Generator Relay Settings	2
19-AN-30, Vol. A-C	ERAT Protective Relay Settings	0
19-AN-31	Relay Settings for RAs A, B, & C	1
19-AN-37	LTC Control Settings for RATs A, B, & C	0
19-AX-03	Circulating Current During Manual Source Transfer (RAT to ERAT & Vice Versa)	1
19-D-14	Molded Case Circuit Breaker Settings for 125Vdc MCCs 1A, 1B, and 1D	1G
19-D-24	Estimating load for 125 VDC System – MCC 1B	5B
19-D-29	Review of Division II Direct Current (DC) System 1B	12D
19-D-42	Station Blackout Analysis- 4hr Battery Capacity	4G
1E12F042B	Midas Calc for MOV 1E12F042B	3
1E22F012	Midas Calc for MOV 1E22F012	2
3C10-0182-004	Secondary Containment Subcompartment Parameters for EQ of Equipment	2A
3C10-0485-001	Internal Flooding Calculations	8
3C10-1088-001	SBO Coping Assessment	4A
CI-CPS-204	Diesel Generator Division 1 & 2 – K6 Field Flash Time Delay Relay	0
CI-CPS-704	Diesel Generator Load Sequence Timers for 4 KV Motor Loads	0
EAD-DG-1, Vol. A-J	Starting KVA During Loss-of-Offsite Power (LOOP) Coincident with Loss-of-Coolant Accident (LOCA) for Diesel Generators 1A and 1B	2
EC 352469	RHR Heat Exchanger – Div II Data and Performance Evaluation November 16, 2004	0
EC 363579	RHR Heat Exchanger – Div II Data and Performance Evaluation November 15, 2006	0

CALCULATIONS

Number	Description or Title	Revision
EC 373382	RHR Heat Exchanger – Div II Data and Performance Evaluation December 11, 2008	0
EQ-CL001	EQ of RHR Pump Motors	23
EQ-CL027	EQ of Limitorque Motor Operators	35
EQ-CL610	EQ of SLC System Pump Motors	12
IP-0-0122	Tech Spec Indicator Loop Uncertainty Evaluation for DG Air Receiver Pressure	0
IP-C-0050	Control Room Indication Channel Uncertainty – Diesel Generator I/II Output Frequency	0
IP-E-0024, Vol. A-F	SVC Redundant Protection System Settings	0
IP-M-0054	Min. Pressure Required for Div I ADS Backup Air Bottles	1
IP-M-0130	Capability of HVAC Ductwork to Withstand Negative Air Pressure that may Exist During a Tornado	0
IP-M-0144	Maximum Differential Pressures Across Dampers	0
IP-M-0162	Differential Pressure Calc. for RH Valves, 1E12-F042A/B/C	1
IP-M-0188	Tornado Induced Atmospheric De-Pressurization and its Effects on HVAC Systems	0
IP-M-0233	System Response Time Evaluation for LPCS, HPCS and LPCI Injection	2
IP-M-043	NPSH for 1C41C001	0
IP-M-0448	Diesel Generator Room Temperature Due to Max Diesel Rating	4B
IP-M-0470	Evaluation of SX Flow to SX Pump Motor Bearing Cooler	1A
IP-M-0486	Shutdown Service Water (SX) System Hydraulic Network Analysis Model	6
IP-M-0605	Flow Velocities in Unit 1 SX Pump Bay	0
IP-M-0610	Design Basis System Parameters for AOVs	0
IP-Q-0396	Operability Evaluation of Equipment at Elevated Temperature in Diesel Generator Room	1
SIR-03-104	Enhanced Tube Plugging Criteria for RHR HX A/B @ CPS	1b
SQ-CL073	Dynamic Qualification of Active Valves	22
SQ-CL610	Dynamic Qualification of SLC Pump 1C41-C001 A/B	4
SQ-CL614	Dynamic Qualification of RHR Pumps and Motors	3
VD-01	Diesel Generator Room Cooling Load	5A
VD-03	Diesel Generator Facility Air Flow Requirements	4
VD-32	Diesel Gen/ Oil Storage Tank Rooms/ Day Tank Rooms Temp Survey Data Evaluation	1
VH-01	Shutdown Service Water Pump Room Cooling Load	2A
VH-31	Performance Evaluation of SSW Pump Rooms A, B, C Cooling Coils Under SX Flow Acceptance	3

CORRECTIVE ACTION DOCUMENTS GENERATED DUE TO THE INSPECTION

Number	Description or Title	Date
AR 1073254	1TSDG076B Protective Sheath Loose	05/25/10
AR 1073755	Incorrect Calc Status in Passport	05/26/10
AR 1074678	MOV Midas Calc Contains Non-Conservative Data	05/28/10
AR 1074788	NRC Inspectors Challenges Information in AR 1037486	05/28/10
AR 1077191	Dew Point for ADS Backup Air Bottles	06/04/10
AR 1078359	Removed RHR B Pump/HX Room Coolers Not Inspected	06/08/10
AR 1078471	Basis for Negative Pressure Not Documented in Calc	06/08/10
AR 1078896	2010 Power Transformer Temp Alarm Inconsistencies	06/09/10
AR 1078901	Procedure Allows Flow Instr Not Per ASME Code Accuracy	06/09/10
AR 1079024	Calculation Has Several Minor Errors	06/10/10
AR 1079058	Calculation [01SX47] Found in Wrong Status	06/10/10
AR 1079301	EOP 1A Support Procedure Enhancement	06/10/10
AR 1079457	2010 PRA Cutsets Assumed Operator Actions in Error	06/11/10
AR 1081637	RHR Flow Calculation and TS Bases Revision Needed	06/17/10
AR 1082680	Procedure Cancelled Due to CDBI Review	06/21/10
AR 1082793	LL Initial Document Request Corrections	06/21/10
AR 1082774	Calculation Used Incorrect Cooling Capacity	06/21/10
AR 1082845	Internal Flooding Calc Needs Minor Revision	06/21/10
AR 1083162	PRA Assumptions Not Consistent with Op Response	06/22/10
AR 1083187	SLC Pump Calc for NPSH Needs Revision	06/22/10
AR 1083288	List HX Inspect/Clean PMRQS in Program Document	06/22/10
AR 1083290	Revise 2700.20 to Ensure Repeatable Test Results	06/22/10
AR 1084176	Issues in RHR System Calculations	06/24/10
AR 1088124	J10 EQ Program Enhancement Opportunities	07/06/10

CORRECTIVE ACTION DOCUMENTS REVIEWED DURING THE INSPECTION

Number	Description or Title	Date
CR 1-98-08-219	High Percentage Contactors Failing Minimum Voltage Pull-in Test	08/19/98
CR 1-98-08-342	Engineering Evaluation on Administrative Limits for Battery Connection Resistance	01/21/00
AR 0116160	Start Time for the Vivision 2 DG in the Alert Range	
AR 0223859	Failure of ITE/Gould J10 Relays/ Clinton Vulnerability	05/26/04
AR 0373302	J-10 Failure Analysis Results	09/14/05
AR 0380153	IN 2005-30 Internal Flood Design	09/30/05
AR 0466787	Circuit Breaker Reliability	07/01/06
AR 0492132	1AP09EC 4160V Bus 1B1 Reserve Feed Breaker UV Relay Flag Dropped	05/21/06
AR 0593531	Vertical Deep Draft Pump Shaft and Coupling Failures	07/25/07
AR 0606712	1SX023B Packing Friction Low	03/20/07

CORRECTIVE ACTION DOCUMENTS REVIEWED DURING THE INSPECTION

Number	Description or Title	Date
AR 0670088	Non-Conservative TS for 4.16 KV Vital Bus Voltage	09/11/07
AR 0675758	Time Reqd for Div 3 DG to Div 1/2 Bus Xtie Longer Than PRA	09/19/07
AR 0681038	Problems Discovered with 4303.01P023 During Walkdown	10/06/07
AR 0694690	IN 2007-34 Electrical Circuit Breakers	11/05/07
AR 0705426	Pre INPO FASA on FW for the Fleet	11/19/08
AR 0727269	1DG005E is Lifting Early	01/26/08
AR 0734254	Reactor Scram Caused by Trip RR 'B' Pump	02/11/08
AR 0756068	1DG01KB: Division 2 EDG Increased Start Time Evaluation	03/19/08
AR 0778101	NRC FIN 2008002-02, Auto Runback of TDRFP	05/21/08
AR 0813512	IN 2008-13 Main Feedwater Issues and 2007 Reactor Trip Data	09/03/08
AR 0847196	NRC FIN 2008004-01, Inadequate Post Maintenance Testing	11/19/08
AR 0975069	IN 2009-14 Painting & Cleaning Agents Cause Inoperable EDG	10/05/09
AR 1020112	Breakers Failed During PM Testing per 8410.14	01/22/10
AR 1020124	ORM Required Breakers Failed During PM Testing per 8410.14	01/22/10
AR 1020137	1AP71E 3 Molded Case Circuit Brks Failed During MCC Testing	01/22/10
AR 1020237	1DC16E Ground	01/23/10
AR 1021761	TT Did Not Capture Correct Data	01/26/10
AR 1028716	1DC02E: High Electrolyte Levels on Multiple Battery Cells	02/11/10
AR 1032998	Incorrect Non-Tech Spec Data Logged for 9080.22	02/19/10
AR 1035722	ORM Required Breakers Failed During PM Testing per 8410.14	02/25/10
AR 1037486	2010 CDBI FASA Identifies Flow Balance Procedure Weakness	03/02/10
AR 1038634	ECR Response for Min. Wall Concern on SX Pipe Inadequate	03/04/10
AR 1041260	9382.01 9.1.6 Acceptance Criteria Not Aligned with ORM 2.5.3	03/11/10
AR 1041729	Follow-up to AR 1028716 High Electrolyte Level Div 2 Battery	03/11/10
AR 1059122	AP Exceeds Maintenance Rule Condition Monitoring Criteria	04/20/10
AR 1069618	Locked Valve Throttling per 3211.01V001	05/14/10
AR 1072011	Use of Floor Drain Socks in Safety Related Areas	05/21/10

DRAWINGS

Number	Description or Title	Revision
2998-3	Anchor Darling 4” 900# Gate Valve, Motor Operated	E
767E786	GE Interface Control Dwg, RHR HX	C
93-14585	Anchor Darling 12” 600# Gate Valve, Motor Operated	B
E02-1AP01, Sh 11	Single Line Diagram – Part 1	U
E02-1AP01, Sh 02	Single Line Diagram – Part 2	C
E02-1AP01, Sh 23	Single Line Diagram – Part 3	C
E02-1AP01, Sh 04	Single Line Diagram – Part 4	H
E02-1AP01, Sh 05	Single Line Diagram – Part 5	G
E02-1AP03, Sh 01	Electric Loading Diagram	AB

DRAWINGS

Number	Description or Title	Revision
E02-1AP99, Sh 11	AP 4160V Bus 1B1 Main Feed Breaker 252-201B	R
E02-1AP99, Sh 12	AP 4160V Bus 1B1 Reserve Feed Breaker 252-221B1	W
E02-1AP99, Sh 14	AP 4160V Bus 1B1 Diesel Gen. Feed Bkr 252-FG1KB	AA
E02-1AP99, Sh 15	Reserve Auxiliary Transformer 1; Emerg. Reserve Auxiliary Transformer, Buses 1RT4 & 1ET4 Protective Relays (System F)	M
E02-1AP99, Sh 17	Reserve Auxiliary Transformer 1; Emerg. Reserve Auxiliary Transformer; Buses 1RT4, 1ET4 & 1RT6 Protective Relays (System S)	M
E02-1AP99, Sh 39	AP 4160V Bus 1B1 – DC Failure and AC Under Voltage	T
E02-1DC02	Key Diagram 125V DC MCC 1B	AE
E02-1DC04	Key Diagram 125V DC MCC 1E (1DC16E)	X
E02-1DC06	125V DC & Uninterruptible Power Supply Systems	Z
E02-1DC99	Battery & D.C. Distribution System, 125V DC MCC & Dist. PNL 1B Alarms & Instrumentation	AJ
E02-1DG99, Sh 18	Diesel Generator 1B PGCC Interface Part 1	N
E02-1DG99, Sh 19	Diesel Generator Sys (DG) - Diesel Generator 1B PGCC Interface Part 2	E
E02-1DG99, Sh 20	Diesel Generator 1B PGCC Interface Part 3 & Miscellaneous Alarms	K
E02-1DG99, Sh 25	Diesel Generator 1B Control Part 1	V
E02-1DG99, Sh 26	Diesel Generator Sys (DG) - Diesel Generator 1B Control Part 2	M
E02-1DG99, Sh 27	Diesel Generator 1B Control Part 3	W
E02-1DG99, Sh 28	Diesel Generator Sys (DG) - Diesel Generator 1B Control Part 4	R
E02-1DG99, Sh 29 and 30	Diesel Generator 1B Control Part 5	G
E02-1DG99, Sh 33 and 34	Diesel Generator 1B Excitation	L
E02-1HP99, Sh 07	High Pressure Core Spray System (NSPS) (1E22-1050)	L
E02-1HP99, Sh 503	HPCS Min Flow Valve (1E22-F012) & HPCS Suction Valve (1E22 F015)	H
E02-1RH99, Sh 07	Residual Heat Removal System (NSPS) (1E12-1050)	M
E02-1RH99, Sh 16	Residual Heat Removal System (NSPS) (1E12-1050)	P
E02-1RH99, Sh 17	Residual Heat Removal System (NSPS) (1E12-1050)	K
E02-1RH99, Sh 518	1B Containment Spray Valve 1E12-F028B & Pump 1B LPCI Injection Spray Valve 1E12-F042B	M
E02-1RH99, Sh 527	RHR Sys B&C (Div. 2) MOV Overload Indication & Bypass Relays	G
E02-1RH99, Sh 530	Residual Heat Removal Pump 1B	H

DRAWINGS

Number	Description or Title	Revision
E02-1RP99	Protection System (RP) NSPS Power Distribution (1C71-1060)	S
E02-1SC99, Sh 04	Stand-by Liquid Control System (1C41-1050)	L
E02-1SC99, Sh 502	Standby Liquid Control Pumps 1A, 1B -1C41-C001A & 1C41-C001B,	G
E02-1SX99, Sh 02	Shutdown Service Water Pump 1B	AA
E02-1SX99, Sh 29	SX Division 2 MOV Overload Indication & Bypass Relays GE Load Driver Circuits	W
E02-1VD99 Sh 2	DG Vent Oil Room 1B Exhaust Fan	N
E02-1VD99 Sh 5	DG Vent Oil Room 1B Exhaust Fan	U
E02-1VD99 Sh 8	DG Ventilation Sys Misc. HVAC Control PNL	P
E02-1VH99 Sh 2	SSW Pump Room 1B Supply Fan	AA
E-CLT6-T02-OSY01-1	Single Line Diagram – 345 kV Switchyard	U
M01-1105-002	Turbine Building Floor Plan	D
M01-1105-005	Aux Fuel Bldg & Containment Basement Floor Plan	D
M01-1105-006	Control & Diesel Gen Bldg Basement Floor Plan	D
M01-1109-001	Miscellaneous Floor Plans	J
M05-1035-001	Diesel Gen Aux System Starting Air Exhaust and Combustion	AE
M05-1035-002	Diesel Gen Aux System Starting Air Exhaust and Combustion	AB
M05-1035-003	Diesel Gen Aux System Starting Air Exhaust and Combustion	AE
M05-1040-007	Instrument Air	AG
M05-1052-001	Shutdown Service Water System	AU
M05-1052-002	Shutdown Service Water System	AN
M05-1052-003	Shutdown Service Water System	AJ
M05-1052-004	Shutdown Service Water System	V
M05-1052-005	Shutdown Service Water System	AF
M05-1074-001	High Pressure Core Spray P&ID	AH
M05-1075-002	Residual Heat Removal P&ID	AM
M05-1103-001	Diesel Generator Room Ventilation	P
M05-1106-002	Shutdown Service Water Ventilation	K
M10-9002-001	Main Steam System	C
M10-9002-002	Main Steam System	D
M10-9103-001	Diesel Generator Room HVAC System	B
VPF 3607-164	Sectional Dwg, RHR pump	E
VPF 3676-138	Final Test Data w/curve for C41-C001	1
VPF 3736-183	X-Section TD-60 Top View, SLC Pump	0

MISCELLANEOUS

Number	Description or Title	Date or Revision
	Letter from C&D Technologies to Exelon- Clinton Nuclear Power, Subject Certificate of Compliance/ Conformance	12/10/09
	System Health Reports – MS, SX, VD, VH, DG, AP, and Switchyard	03/31/10
1SX01PB	Summary of SX Pump Flow Test Data	01/18/08-04/12/10
1SX023B	Summary of SX AOV IST Test Data	10/20/06-04/13/10
21A1921	GE Purchase Specification, SLC Pump	4
21A9425	GE Purchase Specification, RHR HX	1
21A9514BA	GE Purchase Specification Data Sht, RHR pump	0
51493 A	Waukesha Electric System Certified Power Transformer Test Report	10/02
762E425AC	GE Process Diagram, RHR System	5
9 1051 00 99X	Basler Electric Instruction Manual – Underfrequency Overvoltage Module	
A4672T	Waukesha Electric System Transformer Instruction Book Work Order W02-4672	11/97
DC-IA-01-CP	Instrument Air System Design Criteria	6
EPU-T0310	EPU Task T0310, RHR System Analysis	0
EPU-T0400	EPU Task T0400, Containment System Response	0e
ER-AA-321	SLC Pump IST Reference Value Baseline Data Sheet	4
FASA Report 978587	CDBI FASA Readiness for 2010 NRC Component Design Basis Inspection	03/26/10
GE-NE-0000-0010-6516-01	RHR Heat Exchanger Tube Plugging	1
Manual # K2908-001	C&D Power Systems Stationary Battery Installation and Operating Instructions	02/24/86
P-CN742261KS	Outline Dimensions for 2x3 TD-60, SLC Pump	C
SQ-CL027	Dynamic Qualification of Division I, II, & III Emergency Diesel Generator Sets	26
U-601574	CPS original response letter to GL 89-13	01/29/90
U-601756	CPS amended response letter to GL 89-13	12/31/90
U-603130	CPS updated response letter to GL 89-13	02/04/99
VTD-K2801-019	Vendor Manual for SLC Pumps	17
VTD-K2801-026	Vendor Manual for Motor Operated Anchor Darling Gate & Globe Valves	11
VTD-K2801-115	Vendor Manual for RHR Pumps	7

MODIFICATIONS

Number	Description or Title	Date or Revision
ECN 28511	Drill 1/8 Inch Hole in 1E12F042C Disc	10/26/94
FECN 27062	SLC Tank Level Setpoint Change for Adequate NPSH	03/11/94
WO 1124073-01	Replace 1DC02E Battery	01/23/10
EC 353793	Replace Obsolete BOP 1E DC Main Feed Breaker	03/14/06
EC 339985	Increase Tube Plugging allowance for RHR B Heat Exchanger	1
EC 339047	Reserve Auxiliary Transformer (RAT) Replacement Project, Non-Segregated Bus, Relay Panels, Power and Control Cabling for RAT Low Voltage Side	4
ECN 9657	Install Rupture Disks in IA Lines	10/12/90

PROCEDURES

Number	Description or Title	Revision
AD-AA 101	Processing of Procedures and T&RMs	13
CPS 1003.10	CPS Program for NRC GL 89-13	6c
CPS 1870.02	Control of Drain Socks	8
CPS 2700.13	Division 2 SX System Flow Balance Verification	5d
CPS 2700.20	RHR A(B) Heat Exchanger Thermal Performance Test Covered by NRC Generic Letter 89-13	4
CPS 2700.22	Cooling Coil Air Side Performance Monitoring for Generic Letter 89-13	3
CPS 3211.01	Shutdown Service Water (SX)	25a
CPS 3214.01	Plant Air (IA & SA)	24f
CPS 3312.01	RHR System Operation	38a
CPS 3314.01	SC System Operation	11b
CPS 3506.01	Diesel Generator and Support Systems (DG)	32c
CPS 3506.01P003	Division 3 Diesel Generator Operations	0h
CPS 3515.01	Operation of 6900/4160/480 V Circuit Breakers	5a
CPS 4200.01	Loss of AC Power	16a
CPS 4303.01	Extensive Damage Mitigation Guide	3c
CPS 4303.01c002	Cross-connecting Div 3 DG to Div 1(2) ECCS Electrical Busses	0
CPS 4303.01P023	Cross-connecting Div 3 DG to Div 1(2) ECCS Electrical Busses	0
CPS 4401.01	RPV Control	28
CPS 4404.01	ATWS RPV Control	28
CPS 4411.02	Terminating and Preventing Injection	7a
CPS 4411.03	Injection/Flooding Sources	7
CPS 4411.04	Throttling ECCS Flow	4
CPS 5010.07	Reserve Auxiliary Transformer (RAT) – High Temp	27

PROCEDURES

Number	Description or Title	Revision
CPS 8410.01	Molded Case Circuit Breaker/Bucket Component Functional Testing and Maintenance	28
CPS 8410.04	Molded Case Circuit Breaker/Bucket Component Functional Testing and Maintenance	28
CPS 8410.06	General Electric 4160V Power Circuit Breaker Maintenance	7A
CPS 8410.08	General Electric 4160V Power Circuit Breaker Switchgear Maintenance	3
CPS 8410.12	Westinghouse Cubicle Inspection	4
CPS 8410.14	Cubicle/ MCC Clean and Inspect and Associated Molded Case Circuit Breaker Testing	7
CPS 8410.21	Westinghouse DHP 6900, 4160 Volt Power Circuit Breaker	6
CPS 8433.01	Generic Procedure for 125 V dc Battery Maintenance	24
CPS 8433.07	125Vdc Battery Connection Resistance Check	3a
CPS 9015.01	SLC System Operability	39e
CPS 9015.02	SLC Injection Operability	37a
CPS 9051.02	HPCS Valve Operability	39a
CPS 9053.07	RHR B/C Pumps & RHR B/C Water Leg Pump Operability	46a
CPS 9061.11	Instrument Air Check Valve Operability and Pipe Pressure Test	42
CPS 9061.11C003	Div 2 IA SRV/IA Tests	5
CPS 9061.11C004	Div 2 IA Piping/Check Valve Tests	7
CPS 9069.02	Shutdown Service Water Valve Operability Test	32d
CPS 9080.02	Diesel Generator 1B Operability – Manual and Quick Start Operability	49b
CPS 9080.10	DG Operability – Independence Verification	27f
CPS 9080.13	Diesel Generator 1A 1B 24 Hour Run and Hot Restart - Operability	
CPS 9080.22D001	DG 1B – ECCS Integrated Data Sheet	26
CPS 9082.01	Off-Site Source Power Verification	
CPS 9382.01	125Vdc Battery Pilot Cell Check	35
CPS 9382.02	125Vdc Battery ICV and Battery Charger Checks	33
CPS 9382.13	Division II 125Vdc Battery Service Test	29
CPS 9382.17	Division II 125Vdc Battery Performance Discharge Test	27
CPS 9861.09	Shutdown Service Water Boundary Valve Leak Testing	0f
CPS 9861.09D001	Leak Rate Testing for SX Valves 1SX225	0a
CPS 9861.09D002	Leakage Test on Valve 1SX014B	0e
CPS 9861.09D003	Leak Rate Testing for SX Valve 1SX011A	0b
CPS 9861.09D004	Leak Rate Test on Valve 1SX082A	1a

PROCEDURES

Number	Description or Title	Revision
CPS 9861.09D005	Leakage Test on Valve 1SX082B	1a
CPS 9861.09D006	Leakage Test on Valve 1CC075A and 1CC076A	1a
CPS 9861.09D007	Leakage Test on Valve 1CC075B and 1CC076B	1a
CPS 9861.09D008	Leakage Test on Valve 1SX014A	0e
CPS 9861.09D009	Leakage Test on Valve 1SX011B	0b
CPS 9861.09D010	Leakage Test on 1SX073A/B, 1SX076A/B, 1SX107A/B, 1E12F094	0a
CPS 9861.09D011	Leakage Test on Valve 1SX014C	1a
CPS 9861.09D012	Leakage Test on Valve 1SX020A	0c
CPS 9861.09D013	Leakage Test on Valve 1SX020B	0b
ER-AA-340	GL 89-13 Program Implementing Procedure	6
ER-AA-340-1001	GL 89-13 Program Implementation Instructional Guide	7
ER-AA-340-1002	Service Water Heat Exchanger Inspection Guide	4
ER-AA-340-1003	GL 89-13 Program Performance Indicators	3
ER-AA-410-1001	AOV Design Basis Review & Setpoint Control	2
ER-AA-600-1011	Risk Management Program	7
ER-AA-600-1015	FPIE PRA Model Update	10
ER-AA-600-1021	Risk Management Application Methodologies	4
LS-AA-115	Operating Experience Program	15
LS-AA-115-1003	Processing of Significance Level 3 OPEX Evaluations	1
MA-AA-716-230-1001	Oil Analysis Interpretation Guideline	11
MA-AA-723-301	Periodic Inspection of Limitorque MOVs	5
MA-CL-723-301-1001	Clinton Specific MOV PM Inspection	4

SURVEILLANCES (COMPLETED)

Number	Description or Title	Date
CPS 2700.13	Division 2 SX System Flow Balance Verification	06/24/08
CPS 2700.20	RHR B Heat Exchanger Thermal Performance Test Covered by NRC Generic Letter 89-13	12/08/08
CPS 9061.11C003	Div 2 IA SRV/IA Tests	02/01/10
CPS 9061.11C004	Div 2 IA Piping/Check Valve Tests	01/30/10
CPS 9069.02	Shutdown Service Water Valve Operability Test	04/14/10

TRAINING DOCUMENTS

Number	Description or Title	Revision
JPM 4110315LSN01	Inject to the RPV Using SX Through LPCI	00
SE-JIT-11	ATWS Level and Pressure Control Wind Sprints	00

WORK DOCUMENTS

Number	Description or Title	Date
MWR D81123	Inspect & Clean RCIC Pump Room Cooler	10/11/97
MWR D81137	Inspect & Clean RHR Pump 1B Room Cooler	01/07/98
WO 0489275 & WO 0561228	Inspect, Boroscope, Clean, Eddy Current & Hydrolase as req'd RHR HX Room 1B Cooling Coil A/B	02/10/06
WO 0561226 & WO 0561227	Inspect, Boroscope, Clean, Eddy Current & Hydrolase as req'd RHR Pump Room 1B Cooling Coil A/B	02/12/06
WO 0572756	Diesel Generator 1B Calibrate Time Delay Relays	05/14/05
WO 0685746	Replace Auto-Start Relay, 1DG01KB/1AP61E5E-ASR	04/17/07
WO 0706206-01	9080.13R21 OP DG Operability – Independence Verification	01/30/08
WO 076009	MCC Clean and Inspect and Test 125V DC MCC 1B	01/22/10
WO 0767218	RHR B Pump Room Cooler Air Flow Test Results	06/20/02
WO 0772260	Diagnostic Test for Thrust Verification of 1E12-F042B	02/04/06
WO 0862268	Perform Loop Calibration of Div. II DG Output Current Loop	04/18/07
WO 0863080-01	9080.13B20 OP DG 1B 24 HR Run and Hot Restart	10/18/07
WO 0865526	RHR B Pump Room Clr Hydraulic Resistance Test Results	04/15/08
WO 0910588	RHR B Heat Exchanger Inspection	03/20/09
WO 0910617	9382.13B21 Ver *125V DC Battery Service Test (DIV II)	01/14/08
WO 0910690-01	9080.22R20 OP DG 1B Integrated Test (All Sections)	02/03/08
WO 0918129	8410.04 Molded Case Circuit Breaker Testing	01/21/10
WO 0984113-41	PMG EC – RAT Replacement Project Non-Segregated Bus, Relay Panels, Power/Control	12/21/07
WO 0984113-69	PMG EC – RAT Replacement Project Non-Segregated Bus, Relay Panels, Power/Control	01/09/08
WO 1014842	Calibrate DG1B Output Voltage Indicator	04/13/09
WO 1066302	RHR B Pump Seal Cooler Inspection Results	03/06/09
WO 1074191-01	Calibrate Time Delay Relays 1UAY-DG852, 854, 856, 858	04/14/09
WO 1105803	MCC Clean/ Inspect and Test 1AP96E	02/03/10
WO 1119104	9080.25 DG 1B Test Mode Override Load Reject Operability	09/16/09
WO 1124073- 03	Perform Battery Service Test	01/24/10
WO 1124073-14	EM XOW1 Equalize Charge to 1DC02E	02/19/10
WO 1128964-01	9080.13B20 OP DG 1B 24 HR Run and Hot Restart	10/16/09
WO 1141697-01	9080.22R20 OP DG 1B Integrated Test (All Sections)	01/27/10
WO 1150752	Diagnostic Test for Thrust Verification of 1E12-F042B	01/18/10
WO 1152946	Division 2 Diesel Speed Control MOP Checks	04/14/09
WO 1161041	1AP76E MCC Clean, Inspect, Test AB MCC 1B2	01/22/10
WO 1161042	1AP77E MCC Clean, Inspect, Test AB MCC 1B3	01/30/10
WO 1270227	9080.02B20 OP DG 1B Operability – Semi-Annual Quick Start Test	03/17/10
WO 1303780	Ground on DC MCC 1E	01/22/10
WO 1320453-01	9080.02B22 OP DG 1B 24 Operability – Monthly Test	04/14/10
WO 1330121-01	9080.02B22 OP DG 1B 24 Operability – Monthly Test	05/12/10

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access Management System
ADS	Automatic Depressurization System
AR	Action Request
ASME	American Society of Mechanical Engineers
CDBI	Component Design Bases Inspection
CFR	Code of Federal Regulations
DRS	Division of Reactor Safety
EDG	Emergency Diesel Generator
EQ	Equipment Qualifications
°F	Degrees Fahrenheit
FWLC	Feedwater Leakage Control
GE	General Electric
GL	Generic Letter
gpm	Gallons Per Minute
HVAC	Heating, Ventilation and Air-Conditioning
IEEE	Institute of Electrical & Electronic Engineers
IMC	Inspection Manual Chapter
IN	Information Notice
IP	Inspection Procedure
IR	Inspection Report
IST	Inservice Test
kV	Kilovolt
MCC	Motor Control Center
MOV	Motor-Operated Valve
NCV	Non-Cited Violation
NPSH	Net Positive Suction Head
NRC	U.S. Nuclear Regulatory Commission
PARS	Publicly Available Records
PRA	Probabilistic Risk Assessment
RAT	Reserve Auxiliary Transformer
RHR	Residual Heat Removal
RIS	Regulatory Issue Summary
SDP	Significance Determination Process
SLC	Standby Liquid Control
SPAR	Standardized Plant Analysis Risk
SRA	Senior Reactor Analyst
SX	Service Water
TEMA	Tubular Heat Exchanger Manufacturer’s Association
TDH	Total Developed Head
TS	Technical Specification
USAR	Updated Safety Analysis Report
Vac	Volts Alternating Current
Vdc	Volts Direct Current
WO	Work Order

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Sincerely,

/RA/

Ann Marie Stone, Chief
Engineering Branch 2
Division of Reactor Safety

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