July 2, 2007

Mr. Christopher M. Crane
President and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: DRESDEN STATION, UNITS 2 AND 3
NRC COMPONENT DESIGN BASES INSPECTION (CDBI)
REPORT 05000237/2007006; 05000249/2007006(DRS)

Dear Mr. Crane:

On May 18, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed a baseline inspection at your Dresden Station. The enclosed report documents the inspection findings which were discussed on May 18, 2007, with Mr. D. Bost and other members of your staff.

The 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. Specifically, this inspection focused on the design of components that are risk significant and have low design margin.

Based on the results of this inspection, three findings of very low safety significance, which involved violations of NRC requirements were identified. However, because these violations were of very low safety significance, and because they 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's 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 Inspector Office at the Dresden 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 (PARS) component of NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA by J. Lara Acting For/

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

Docket Nos. 50-237; 50-249
License Nos. DPR-19; DPR-25

Enclosure: Inspection Report 05000237/2007006; 05000249/2007006(DRS)
w/Attachment: Supplemental Information

cc w/encl: Site Vice President - Dresden Nuclear Power Station
Dresden Nuclear Power Station Plant Manager
Regulatory Assurance Manager - Dresden
Chief Operating Officer
Senior Vice President - Nuclear Services
Senior Vice President - Mid-West Regional Operating Group
Vice President - Mid-West Operations Support
Vice President - Licensing and Regulatory Affairs
Director Licensing - Mid-West Regional Operating Group
Manager Licensing - Dresden and Quad Cities
Senior Counsel, Nuclear, Mid-West Regional Operating Group
Document Control Desk - Licensing
Assistant Attorney General
Illinois Emergency Management Agency
State Liaison Officer
Chairman, Illinois Commerce Commission

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Director Licensing - Mid-West Regional Operating Group
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Senior Counsel, Nuclear, Mid-West Regional Operating Group
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Illinois Emergency Management Agency
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Letter to Christopher M. Crane from Ann Marie Stone dated

SUBJECT: DRESDEN STATION, UNITS 2 AND 3
NRC COMPONENT DESIGN BASES INSPECTION (CDBI)
REPORT 05000237/2007006; 05000249/2007006(DRS)

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REGION III

Docket No: License Nos.	50-237; 50-249 DPR-19; DPR-25
Report No:	05000237/2007006; 05000249/2007006(DRS)
Licensee:	Exelon Nuclear
Facility:	Dresden Station, Units 2 and 3
Location:	Morris, IL
Dates:	April 16, 2007, through May 18, 2007
Inspectors:	J. Jacobson, Senior Reactor Engineer, Lead Inspector A. Dunlop, Senior Reactor Engineer A. Dahbur, Reactor Engineer L. Kozak, Senior Reactor Analyst C. Zoia, Operations Inspector O. Mazzoni, Electrical Contractor H. Campbell, Mechanical Contractor
Approved by:	Ann Marie Stone, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000237/2007006; 05000249/2007006(DRS); 4/16/07 - 5/18/07; Dresden Nuclear Power Station; Component Design Bases Inspection.

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 four regional inspectors and two consultants. Three Green Non-Cited Violations (NCVs) were identified. The significance of most findings are indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process (SDP)." Findings for which the SDP does not apply may be Green, or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors, is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

Inspector-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a finding having very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control." Specifically, the licensee failed to incorporate the 125 VDC system minimum required voltage value as the acceptance criteria for the minimum battery terminal voltage inservice test procedure DES-8300-28 "Unit 2 - 125 Volt Main Station Battery Service Test." Following discovery, the licensee entered the issue into its corrective action program to revise the station batteries test procedures to include the minimum required voltage values.

  This finding was more than minor in accordance with IMC 0612, Appendix B, "Issue Screening," because, if the finding was left uncorrected it would become a more significant safety concern. Specifically, the failure to ensure that the battery terminal voltage during the battery discharge per the service test did not drop below the 125 system design input value could have affected the operability of safety-related equipment in the event of a design basis accident condition. The issue was of very low safety significance based on a Phase 1 screening in accordance with IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." (Section 1R21.3.b.1)

- Green. The inspectors identified a finding having very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee failed to assure and verify that the minimum available control voltage at the 4160 circuit breakers was adequate for the closing coils to close the breakers, following a design basis accident and loss of offsite power condition. Following identification of this issue, the licensee obtained a letter from the vendor (General Electric Nuclear Energy) suggesting that it was reasonable to conclude that the closing coils will operate at Dresden's minimum available voltage (58 volt) level based on ageing testing conducted in 1999 and 2007 testing of one of Dresden's breakers.

This finding was more than minor in accordance with IMC 0612, Appendix B, “Issue Disposition Screening,” because the finding was associated with the Mitigated Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring capability and reliability of systems that respond to initiating events. Specifically, the failure to assure adequate control voltage was available to close the 4160 breakers would have affected the capability of emergency diesel generators and other safety-related equipment to respond to initiating events. The issue was of very low safety significance based on a Phase 1 screening in accordance with IMC 0609, Appendix A, “Significance Determination of Reactor Inspection Findings for At-Power Situations.” (Section 1R21.3.b.2)

- Green. The inspectors identified a performance deficiency involving a Non-Cited Violation of Technical Specification (TS) 5.4.1 for the licensee’s failure to provide procedural controls for the unique identification of Regulatory Guide (RG) 1.97 post-accident instrumentation to aid the control room operator. Specifically, the licensee failed to adequately control the labeling on both unit’s control panels and the simulator, resulting in several improperly marked post-accident indicators.

  The finding was greater than minor because, if left uncorrected, it could become a more significant safety concern. Inaccurately labeled control room indicators of RG 1.97 post-accident instrumentation could lead to confusion and hamper the response of operators if conflicting indications resulted due to accident conditions. The issue was of very low safety significance based on a Phase 1 screening in accordance with IMC 0609, Appendix A, “Significance Determination of Reactor Inspection Findings for At-Power Situations.” (Section 1R21.6.b.)

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 inspectible 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. The operator actions selected for review included actions taken by operators both inside and outside of the control room during postulated accident scenarios.

The inspectors performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This assessment considered operational, maintenance, and calculated design margin. Recent operations procedure changes as well as manual operator actions were considered for operational margin. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results, significant corrective action, repeated maintenance activities, maintenance rule (a)(1) status, components requiring an operability evaluation, NRC resident inspector input of problem equipment, system health reports, and the potential margin issues list. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in depth margins. As practical, the inspectors performed walkdowns of the components to evaluate the as-built design and material condition. A summary of the reviews performed and the specific inspection findings identified are included in this report.

.3 Component Design

a. Inspection Scope

The inspectors reviewed the Final Safety Analysis Report (FSAR), Technical Specifications (TS), component/system design basis documents, drawings, 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, and the Institute of Electrical and Electronics Engineers (IEEE) Standards, to evaluate acceptability of the systems' design. The review was to verify that the selected components would function as 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 were consistent with the design bases and were appropriate included installed configuration, system operation, detailed design, system testing, equipment/environmental qualification, equipment protection, component inputs/outputs, operating experience, and component degradation.

For the components selected, the inspectors reviewed the maintenance history, system health report, and corrective action process documents. Walkdowns were conducted for accessible components to assess material condition and to verify the as-built condition was consistent with the design. Other attributes reviewed were included as part of the scope for each individual component.

The components (17 samples) listed below were reviewed as part of this inspection effort:

- High Pressure Core Injection (HPCI) Pump and Turbine: The inspectors reviewed various analyses, procedures, and test results associated with operation of the HPCI pumps under transient and accident conditions. The analyses included hydraulic performance, net positive suction head (NPSH), vortex formation, minimum flow, and transfer of the suction source. The inspectors also evaluated whether the discharge piping was maintained full of water to prevent potential water hammer issues. Testing results were reviewed to assess potential component degradation. The control logic to start and secure the HPCI pump and turbine was also reviewed during the inspection. The contaminated condensate storage tank and level instrument were reviewed to verify adequate freeze protection controls were in place. In addition, the licensee responses and actions to Bulletin 88-04, "Potential Safety-Related Pump Loss," were reviewed to assess implementation of operating experience.

- Containment Cooling Service Water (CCSW) Pump: The inspectors ensured intake levels met CCSW pump suction submergence and NPSH requirements to ensure the pumps were capable of performing its safety functions. Hydraulic calculations were reviewed to ensure design requirements for flow and pressure were appropriately translated as acceptance criteria for pump testing. Analysis to ensure sufficient differential pressure could be maintained between the low pressure coolant injection system and CCSW system from potential leaks in the

heat exchanger to prevent release of primary to the environment were reviewed. Testing results were reviewed to assess potential component degradation. The CCSW pump seal water and thrust bearing modification was also reviewed to verify the pumps' ability to perform its safety functions was not degraded.

- HPCI Pump Discharge Valve: The team reviewed the motor-operated valve (MOV) calculations for 2-2301-8, including required thrust, structural, and maximum differential pressure, to ensure the valve was capable of functioning under design conditions. Periodic Verification Diagnostic and IST results were reviewed to verify acceptance criteria were met and performance degradation would be identified. Associated electrical calculations were reviewed to confirm that the design basis minimum voltage at the MOV motor terminals was consistent with the design inputs used in the MOV thrust calculations, and that the thermal overload heaters protecting the motors would not prematurely trip.

- Isolation Condenser Reactor Inlet Valve: The team reviewed the MOV calculations for 2-1301-3, including required thrust, structural, and maximum differential pressure, to ensure the valve was capable of functioning under design conditions. Periodic Verification Diagnostic and IST results were reviewed to verify acceptance criteria were met and performance degradation would be identified. Associated electrical calculations were reviewed to confirm that the design basis minimum voltage at the MOV motor terminals was consistent with the design inputs used in the MOV thrust calculations, and that the thermal overload heaters protecting the motors would not prematurely trip.

- Drywell Inboard Spray Valve: The team reviewed the MOV calculations for 3-1501-28B, including required thrust, structural, and maximum differential pressure, to ensure the valve was capable of functioning under design conditions. Periodic Verification Diagnostic and IST results were reviewed to verify acceptance criteria were met and performance degradation would be identified. Associated electrical calculations were reviewed to confirm that the design basis minimum voltage at the MOV motor terminals was consistent with the design inputs used in the MOV thrust calculations, and that the thermal overload heaters protecting the motors would not prematurely trip.

- HPCI Inboard Test Line Valve: The team reviewed the MOV calculations for 2-1501-20A, including required thrust, structural, and maximum differential pressure, to ensure the valve was capable of functioning under design conditions. Periodic Verification Diagnostic and IST results were reviewed to verify acceptance criteria were met and performance degradation would be identified. Associated electrical calculations were reviewed to confirm that the design basis minimum voltage at the MOV motor terminals was consistent with the design inputs used in the MOV thrust calculations, and that the thermal overload heaters protecting the motors would not prematurely trip.

- 480 Vac Bus 25: The inspectors reviewed electrical diagrams, calculations, and procedures, including system short circuit calculations, bus loading and voltage regulation studies. The MCC 25-1, MCC 25-2 are non safety-related MCCs and were identified as risk significant buses because they feed risk significant loads

related to Instrument Air (IA). Loss of IA causes the loss of make-up from the Condensate Storage Tank (CST) and outboard Main Steam Isolation Valve closure.

The team reviewed the adequacy of the 120 V voltage to the IA system and found that there were no calculations to ascertain adequacy of voltage at degraded voltage conditions occurring during the five-minute time out of the degraded voltage scheme timer. Nevertheless, the team verified that the five-minute time delay would be bypassed during accident conditions and adequate voltage would be available. The inspectors reviewed the setpoint calculations for the new RMS-9 protective trip devices installed in 480V Switchgear 25, by inspection of the time-current coordination graphs. The inspectors determined that adequate coordination existed.

- 480 Vac Bus 29: The inspectors reviewed electrical diagrams, calculations, and procedures, including system short circuit calculations, bus loading and voltage regulation studies. The inspectors reviewed the setpoint calculations for the new RMS-9 protective trip devices installed in 480 V Switchgear 29, and found similar conditions as for Bus 25. The inspectors reviewed electrical diagrams and procedures applicable to Breaker 293D which feeds MCCs 29-2 and 29-4 for adequacy.

- MCCs 29-2 and 29-4: The team reviewed electrical diagrams for breakers supplying the following components: Diesel Oil Transfer Pump 2, Diesel Cooling Water Pump 2, CCSW Pump Vault 2C, Cooler Fan 1, and 2, CCSW Pump Vault, 2D Cooler Fan 1 and 2, Diesel Vent Fan 2, HPCI Room Cooler, Battery Charger 2 and 2/3, 2B Core Spray Pump Suction Valve from torus (2-1402-3B), HPCI Loop Full flow test outboard valve (2-1501-38B) and inboard valve (2-1501-20B), Containment Cooling Heat Exchanger tube side discharge valve (2-1501-3B). The team also reviewed the electrical overload protection at MCC's and the cable sizing to the loads to determine adequacy.

- 4160 Vac Bus 24 and 24-1: Transformer TR22 loading was reviewed and it was found that under design basis accident conditions, the transformer would be overloaded by over 14 percent on the H-X winding with 33-1 cross tie and over 13 percent with the 34-1 cross tie. The team verified that the operating procedures in place would limit the overloading condition to less than two hours, which was considered acceptable. The inspectors reviewed the adequacy of the offsite voltage source modifications recently performed that installed the new load tap changing transformer TR86. The inspectors verified that the addition of the load tap changer provided adequate voltage control to automatic compensate for grid voltage variations. The inspectors performed a walkdown of the TR 86 installation area, verifying that adequate spacing and clearances had been provided.

The inspectors attempted to review the calculations for protective relaying of the 4.16kV bus; however, the setpoints were established by a different division within the utility and were not formally documented. Nevertheless, at the request of the team the licensee performed protective relay settings calculations during the inspection for three loads off

Busses 24 and 24-1. These loads were selected by the team as Service Water Pump 2/3, fed from breaker 2408, off bus 24, Containment Cooling Service Water Pump 2D, fed from breaker 2408 off bus 24, and 480 VAC Switchgear 29, fed from breaker 2428, off bus 24-1. The calculations were found generally adequate by the team.

The inspectors reviewed the degraded voltage protection on safety bus 24-1, and the adequacy of offsite voltage source modifications that installed the new load tap changing transformer TR86. The inspectors verified that the addition of the load tap changer included features to prevent unforseen operation at potentially damaging high voltage on the safety-related buses and connected safety-related equipment. The inspectors verified that during EDG testing the operation of the load tap changer was placed in manual to prevent undesired voltage excursions when the EDG was paralleled with the grid.

- HPCI Pumps 2A and 2B: The team reviewed the design basis requirements of the HPCI pumps, which included, portions of the FSAR and Technical Specifications. The review extended to the pump parameters incorporated into both the Extended Power Uprate and Optima Fuel analyses. Included in the review were piping and instrumentation diagrams, pump line-ups as dictated by both normal and emergency operating conditions, pump capacities and inservice testing for the HPCI pumps. Design change history was reviewed to assess potential impact on system performance capability. The current condition of the pumps was further assessed by walkdowns of the HPCI system pumps and associated valves and instrumentation. A sample of HPCI pump Work Orders, Condition Reports and surveillance test results also were reviewed. Net positive suction head (NPSH) calculations for both short and long term periods after LOCA initiation were thoroughly reviewed, and these included original pump vendor NPSH test data requirements, and their ultimate incorporation into the NPSH calculations of record. The team reviewed additional calculations related to both flow measurement uncertainty and minimum flow (IEB 88-04) capability of the system.

- HPCI Heat Exchangers 2A and 2B: The team reviewed the design of the Dresden HPCI/CCSW heat exchangers, with focus on the design basis accident performance requirements and the associated concerns delineated in NRC Generic Letter 89-13. The calculations pertaining to Extended Power Uprate were reviewed, including those relating the heat exchanger “K-Factor,” used in transient analyses. The full spectrum of uncertainty calculations, evaluating measurements of both flows and temperatures, was reviewed, and the impact of these on the performance test results was examined and assessed. A walkdown of the heat exchangers was undertaken, and a discussion with the cognizant system engineer took place. Recent and earlier Incident Reports were reviewed, together with a sample of heat exchanger differential pressure surveillances.

- HPCI Room Cooler 2-5747: The inspectors reviewed analyses addressing the maximum potential HPCI room heat load under accident conditions. Additionally, an analysis evaluating the HPCI room thermal response with reduced room cooler capacity was reviewed. This evaluation verified the capability of required

HPCI equipment to perform its required function with the cooler fan running and essentially zero cooling water flow.

- Recirculation Pump MG Breakers 2A and 2B: The inspectors reviewed the vendor documentation and surveillance procedures to ensure vendor maintenance and testing recommendations were incorporated.

- 125 Vdc Bus 2A: The inspectors selectively reviewed one-line and schematic diagrams as well as calculations for the 125 Vdc electrical distribution Bus 2A. Voltage drop to selected loads, including the 4160 Vac switchgear control devices were evaluated to determine if adequate voltage was available during accident conditions. Breaker interrupting rating and electrical coordination were reviewed for adequacy.

- 125 Vdc Unit 2 Main Battery Charger: The inspectors reviewed electrical documents for 125 Vdc Unit 2 Main battery charger, including sizing calculation, its contribution to short circuit fault current, and breaker sizing. In addition, the test procedures were reviewed to determine if maintenance and testing activities for the battery charger were in accordance with USAR requirements and vendor recommendations. The inspectors also performed a visual non-intrusive inspection of observable portions of the Unit 2 main battery charger to assess the installation configuration, material condition, and potential vulnerability to hazards.

- 125 Vdc Unit 2 Main Battery: The inspectors reviewed various electrical documents for the 125 V voltage direct current (dc) Unit 2 main battery, including battery sizing calculation, short circuit fault current testing, Technical Specification Surveillance requirements, the 7-day, 90-day, 24-month and 60-month, (Service and Performance tests) surveillance to confirm that the 125 Vdc system health and sufficient capacity exists for the battery to perform its safety function. The inspectors reviewed the ventilation calculations to verify that the temperature rise in the battery room specifically during station black out and post-LOCA conditions would not adversely affect the performance of the battery. To assess the licensee's identification and disposition of adverse conditions, the inspectors reviewed a sample of corrective action documents for the 125 Vdc Unit 2 main battery. The inspectors also performed a visual non-intrusive inspection of observable portions of the Unit 2 main battery to assess the installation configuration, material condition, and potential vulnerability to hazards.

b. Findings

Two Green NCVs were identified.

b.1 Inadequate Acceptance Criteria in 125 Vdc Station Battery Service Test Procedures

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," having very low safety significance (Green) for failure to have adequate acceptance criteria in 125 Vdc safeguard station battery service test. Specifically, the licensee failed to incorporate the 125 Vdc system minimum voltage design value as the acceptance criteria for the minimum battery terminal voltage inservice test procedure DES-8300-28 "Unit 2 - 125 Vdc Main Station Battery Service Test."

Description: Surveillance procedure DES-8300-28 "Unit 2 - 125 Vdc Main Station Battery Service Test," was to be performed every 24 months to ensure that 125 Vdc safeguards station battery capacity was adequate. This test was required to meet the Technical Specification 3.8.4.4 which required the licensee to verify that each station battery has adequate capacity to supply, and maintain in operable status, the required emergency loads for the design duty cycle when subject to a battery service test. During the inspectors' review of the last test data completed in March 2006 the inspectors noted that the battery terminal voltage dropped down to approximately 108 volts during the first minute of the discharge. The inspectors also noted that the only voltage value that was monitored in test procedure DES-8300-28 as the minimum acceptable battery terminal voltage was 105 Vdc. This requirement was stated in step G.11 "Limitation and Actions" of the procedures which required to terminate the test when the terminal voltage reached 105 Vdc.

The inspectors noted that the voltage drop calculation DRE03-0025 "Baseline Calculation for 125 Vdc ELMS-DC Conversion to DCSDM," used a minimum battery terminal voltage during the first minute of 107.34 for Unit 2 main battery as the basis for calculating the available minimum voltage value for the safety-related dc loads during the Unit 2 load shed scenario. The inspectors were concerned that the acceptance criteria specified inservice test procedure (DES-8300-28) of 105 Vdc did not assure that the battery would have adequate voltage during the first minute to perform its safety function in the event that the voltage was to drop below 107.34. The inspectors reviewed the previously completed performance and service tests and verified that the operability of Unit 2 main battery had never been challenged by verifying that the battery terminal voltage did not drop below the 107.34. The inspectors also verified the operability of the other station batteries during the previous tests. The licensee issued IR630890 to revise the station batteries test procedures to include the required minimum voltage values.

Analysis: The inspectors determined that the failure to include the 125 Vdc system minimum voltage design value as the acceptance criteria for the minimum battery terminal voltage inservice test procedure DES-8300-28 was a performance deficiency because the failure could have resulted in a loss of function during a design basis accident conditions. The inspectors further determined that the issue was within the

licensee's ability to foresee and correct, and that it could have been prevented because the licensee had performed this test in 2004.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, "Issue Disposition Screening," because if the finding was left uncorrected it would become a more significant safety concern. Specifically, the 125 Vdc acceptance criteria could result in declaring a battery operable when the voltage during the first minute was below it's design limit.

The inspectors screened the finding using IMC 0609, Appendix A, Phase 1 screening. The finding screened as Green because it was not a design issue resulting in loss of function per Part 9900, did not represent an actual loss of a system safety function, did not result in exceeding a TS allowed outage time, and did not affect external event mitigation.

The inspectors did not identify a cross-cutting aspect to this finding.

Enforcement: Title 10 CFR Part 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 inservice 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, as of May 17, 2007, the licensee's procedure DES 8300-28 failed to include the acceptable minimum voltage value into the acceptance criteria. Specifically, the inspectors identified that the acceptance criteria for the minimum battery terminal voltage as stated inservice test procedure DES-8300-28 for the Unit 2, 125 Vdc system was 105 Vdc. The licensee did not verify that the batteries met the one-minute design limit of 107.34.

The licensee entered the finding into their corrective action program as IR630890. Because this violation was not willful, was of very low safety significance and was entered into the licensee's corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. (NCV 05000237/2007006-01; 05000249/2007006-01(DRS))

b.2 Adequate Control Voltage for 4160 Breaker's Closing Coil was not Assured

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control" having very low safety significance (Green) involving the licensee's failure to assure and verify that adequate control voltage was available for the closing coils for the 4160 breakers. Specifically, the licensee failed to assure that the minimum available control voltage at the 4160 breakers met the minimum rated voltage value for the closing coils, instead the licensee's design calculation credited 58 volts based on a one time testing initially conducted at the site in 1994. The licensee also failed to verify that the 58 volts was adequate for the closing coils to close the breakers during periodic testing.

Description: Calculation DRE03-0025 “Baseline Calculation for 125 VDC ELMS-DC Conversion to DCSDM,” indicated that the minimum available voltage for the closing coil for several breakers associated with switchgears 23-1, 24-1, 33-1 and 34-1 was 58 volts. Specifically, the calculation showed that for Units 2 and 3 diesel output breaker 2422 and 3427, the voltage available for the closing coil, following an LOOP/LOCA condition, was 67 and 58.51 volts respectively. The 4160 switchgear circuit breakers closing coil minimum pickup voltage acceptance criteria of 58 Vdc was based on testing initially conducted at Dresden site in 1994. The General Electric (GE) data sheet for the Magne-Blast Type AM-4.16-250 Power Circuit Breaker which was referenced in Sargent and Lundy Calculation 7317-43-19-2 specified the minimum pickup voltage for the closing coil for these type breakers, used by the 4160 switchgear at Dresden station, as 90 volts. The inspectors noted that Preventive Maintenance (PM) procedure MA-DR-725-113 “Inspection and Maintenance of General Electric 4KV Magne-Blast Circuit Breakers Type AMH4.76-250 (Horizontal Drawout),” which is performed on 4-year intervals for each circuit breaker, included steps to verify that each circuit breaker closed instantaneously at the coil rated voltage of 90 Vdc. However, the inspectors identified a concern regarding the two diesel output breakers 2422 and 3427, because of the low margin of the available voltage for the closing coils following a LOOP/LOCA, and since there was no evidence that these two breakers were ever tested or verified that they would close at the minimum available 58 volts.

In response to the inspectors’ questions, the licensee referenced the results of testing conducted at Dresden. In October 1994, the licensee tested a total of nine breakers which showed minimum required pickup voltage readings ranging from 37.8 to 58 volts. The licensee indicated that the condition of the breakers was not recorded at that time; however, the results of these tests and the acceptance criteria of 58 volts were documented in calculation 9630-13-19-1. During the inspection, the licensee informed the team that the acceptability of 58 volt as the acceptance criteria for the minimum pickup voltage was further substantiated with the identification of additional testing subsequently conducted in 1999 by the Boiling Water Reactor (BWR) Owners’s Group. GE Nuclear Energy conducted tests in 1999 for the BWR Owner’s Group, documented in Report Number PDS9906, on the Life Cycle Management Evaluation of D6A15A1 Grease in Magne-Blast circuit breakers for a total of three different breakers types. The GE report, stated, that in addition to the normal post overhaul functional testing, each breaker was tested to determine the minimum breaker closing and opening voltages over the simulated 40-year aging of the circuit breakers with D6A15A1 grease. The test collected 135 data points on the three circuit breakers with the minimum closing voltage ranging from 32.5 volts to 48.5 volts. The voltages were monitored as indicators of increasing friction due to degradation of the lubricant.

Following discovery, the licensee obtained a letter from GE Nuclear Energy, dated May 17, 2007, regarding the reduced control voltage for closing of Magne-Blast circuit breakers installed at Dresden Station. GE indicated in this letter, that based on the test conducted by GE in 1999 for the BWR Owner’s Group and additional testing on May 16, 2007 on one of Dresden’s AMH 4.76-250-0D circuit breakers that was sent to GE to perform the 16-year service life maintenance, it was reasonable to conclude that the currently installed Dresden AMH 4.76-250 safety-related circuit breakers will close (under worst case design basis conditions) at the 58 Vdc acceptance criteria, provided the breakers were maintained in manner consistent with the recommendations

specified in test report PDS9906. The licensee also indicated in their Operability Evaluation 07-005 completed for this issue, that corrective actions were initiated to revise procedures to assure that future 4KV Magne-Blast AMH4.76 circuit breaker Preventive Maintenance (PM) and overhaul testing will require testing of the circuit breakers ability to close at a maximum of 58 Vdc rather than 90 Vdc. Spare circuit breakers will also be tested to assure closure at a maximum voltage of 58 Vdc prior to installation into service. The licensee also indicated that evaluation of options to restore battery margin has been entered into the Dresden Low Margin Database and its being tracked by ACIT 629308-06.

Analysis: The inspectors determined that the failure to assure and verify by testing that adequate control voltage was available to energize the closing coils for the 4160 breakers was a performance deficiency because the operability of safety-related equipment was not adequately verified and could have resulted in a loss of function during a design basis accident.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, “Issue Disposition Screening,” because the finding was associated with the Mitigating Systems cornerstone attribute of design control and affected the cornerstone objective of ensuring capability and reliability of systems that respond to initiating events. Specifically, the failure to assure and verify that adequate control voltage was available to close the 4160 breakers could have affected the capability of emergency diesel generators and other safety-related equipment to respond to initiating events. Although, by the end of the inspection, the licensee provided a letter from the manufacturer which indicated it was reasonable to conclude that the currently installed Dresden AMH 4.76-250 safety-related circuit breakers would close at the 58 Vdc acceptance criteria, at the time of discovery there was reasonable doubt as to the operability of the circuits.

The inspectors screened the finding using IMC 0609, Appendix A. The finding screened as Green because it was not a design issue resulting in loss of function per Part 9900, did not represent an actual loss of a system safety function, did not result in exceeding a TS allowed outage time, and did not affect external event mitigation.

The inspectors did not identify a cross-cutting aspect to this finding.

Enforcement: Title 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.

Contrary to the above, as of May 17, 2007, the licensee’s design control measures failed to verify the adequacy of design of control voltage for safety-related 4160 circuit breakers. Specifically, the licensee failed to adequately assure or verify by testing that the 4160 Volts GE Type AMH 4.76-250 safety-related circuit breakers will close, under worst case design basis LOOP/LOCA conditions, at the 58 Vdc minimum voltage acceptance criteria. The licensee’s design calculation credited a one time test (conducted in 1994) value of 58 volts and did not periodically verify that breakers would close at this voltage value.

The licensee entered the finding into their corrective action program as AR 00629308. Because this violation was not willful, was of very low safety significance and was entered into the licensee's corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy.
(NCV 05000237/2007006-02; 05000249/2007006-02 (DRS))

.4 Operating Experience

a. Inspection Scope

The team reviewed five operating experience issues (5 samples) to ensure these issues, either NRC generic concerns or identified at other facilities, had been adequately evaluated and addressed by the licensee. The operating experience issues listed below were reviewed as part of this inspection effort:

- IEB 88-04 Potential Safety-Related Pump Loss;
- IN 1989-08 Pump Damage Caused by Low Flow Operation;
- IN 1997-90 Use of Non-conservative Acceptance Criteria in Safety-Related Pump Surveillance Tests;
- SC 06-01 Worst Single Failure for Suppression Pool Temperature Analysis; and
- LER 87-013 Effects of Water Hammer on IC Components.

b. Findings

No findings of significance were identified.

.5 Modifications

a. Inspection Scope

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

- EC 5512, "Addition of Seal Water System and Replacement of Pump Thrust Bearings for CCSW Pumps";
- EC 340723, "Installation of New 138kV Feed to Dresden Unit 2 138kV Reserve Auxiliary Transformer 22 (RAT 22)"; and
- EC 351392, "Reroute of 24" HPCI Suction Line."

b. Findings

No findings of significance were identified.

.6 Risk Significant Operator Actions

a. Inspection Scope

The inspectors performed a detailed review of five risk significant, time critical operator actions (five samples). These actions were selected from the licensee's PRA rankings of human action importance based on risk achievement worth (RAW) values. Where possible, operator response time criteria were determined by the review of the assumed design basis and UFSAR response times and performance times documented by job performance measures results. For the selected operator actions, the inspectors observed simulator performance of associated procedures with plant operator's to assess operator's knowledge level, adequacy of procedures, and use of any special equipment required. The following operator actions were reviewed:

- Actions to link busses 24 and 24-1 in response to a Loss of Offsite Power (LOOP);
- Actions to depressurize the reactor pressure vessel (RPV) during a transient, not including an Anticipated Transient Without Scram (non-ATWS);
- Actions to recognize and respond to an RPV leakdown (cognitive recognition);
- Actions to initiate Isolation Condenser (IC) shell side makeup within 20 minutes of IC actuation; and
- Actions to start and align the Station Blackout diesel following a LOOP.

b. Findings

One Green NCV was identified.

Failure to Procedurally Control Regulatory Guide 1.97 Control Board Labeling

Introduction: The team identified a NCV of TS 5.4.1, "Administrative Controls," having very low safety significance (Green) involving lack of procedural controls for labeling RG 1.97 post-accident indications on the control panels.

Description: UFSAR 13.11.1.3 described an NRC submittal of Dresden Station's RG 1.97 instruments dated August 1, 1985. This letter committed the licensee to identifying post-accident instruments per RG 1.97 as part of the Detailed Control Room Design Review (DCRDR). Dresden Station procedures TSG, "Technical Support Guidelines," and DEOP 0010-00, "Guidelines for the Use of Dresden Emergency Operating Procedures and Severe Accident Management Guidelines," describe these identification markings as a black dot placed on the panel next to the indicator. The

markings indicate qualification for reliability during degraded conditions when multiple indications conflict, stating that the operator should prefer these indications.

The team identified that the markings existed for numerous indicators on both unit's control panels and in the simulator. When questioned about the method of controlling these markings, the licensee stated that the markings were controlled informally as part of the PASSPORT database panels. However, when asked for a list of marked instruments, the licensee was unable to provide an accurate list due to a large number of RG 1.97 instruments in PASSPORT that were not control room indicators. In addition, several instruments which were marked as RG 1.97 instruments did not meet the criteria to be limited to Types A, B, and C, and Categories 1 and 2, as required.

To address the team's concern regarding the accuracy of the markings, the licensee walked down the panels and informally reviewed the source documents and PASSPORT further. It was determined that there were errors and potential inconsistencies, in both Control Rooms and the simulator. These included the following:

- Control Room indicator, 2-1640-13B, Unit 2 wide range drywell pressure/torus level indicator, was not labeled with a black dot;

- Control Room indicator, 3-2540-9A, Unit 3 ACAD drywell pressure indicator, was not labeled with a black dot;

- A total of 5 simulator labels were not labeled with black dots, including 2-1640-13B, Unit 2 wide range drywell pressure/torus level indicator;

- 2(3)-0263-100A and B, reactor level medium range instruments, were not required to have black dots; however, licensee planned to re-evaluate; and

- Numerous PASSPORT database RG 1.97 instrument identification errors.

The licensee determined that it was not clear in all cases why the markings were added or omitted, and wrote AR 00628000 with actions to Design Engineering to evaluate the basis for including certain Category 3 instruments as enhancements, determining the basis for why certain Category 1 instruments were omitted, and initiating a Design Change Request (DCR) to correct the PASSPORT issues identified.

To address missing instrument markings in the simulator, the licensee initiated AR 00629141, and planned to have Design Engineering complete a review of the common nameplate with one black dot found on both the Control Room and simulator labeling for instruments 2-1640-10B and 2-1640-11B. Although 2-1640-10B was not specifically listed as a RG 1.97 instrument, the 2-1640-13B recorder from the same instrument was listed. Though this issue was previously identified during a 1990 walkdown by Sargent and Lundy, no changes to Control Room labeling were made.

Analysis: The team determined that the licensee's failure to provide adequate procedural controls was a performance deficiency and a finding warranting a significance evaluation. The team determined that the finding was greater than minor because it could become a more significant safety concern if left uncorrected.

Inaccurately labeled control room indications for Regulatory Guide 1.97 post-accident instrumentation could lead to confusion and hamper the response of operators if conflicting indications occurred due to accident conditions.

The team evaluated the finding using IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," Phase 1 screening, and determined that the finding screened as Green because it was not a design issue resulting in loss of function per Part 9900, Technical Guidance, did not represent an actual loss of a system's safety function, did not result in exceeding a TS allowed outage time, and did not affect external event mitigation.

The team did not identify a cross-cutting aspect to this finding.

Enforcement: Technical Specification 5.4.1 requires that written procedures be established and implemented for activities provided in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Procedures specified in Regulatory Guide 1.33 include Administrative Procedures for Equipment Control. Equipment Control includes procedures that provide a method to control and maintain labeling to secure and identify equipment per UFSAR 13.1.3.2.

Contrary to the above, the team identified that the licensee failed to control labeling of control panels when uniquely identifying Regulatory Guide 1.97 equipment. Specifically, the licensee failed to adequately control the labeling on both unit's control panels and the simulator, resulting in improperly marked post-accident indicators. However, because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000237/2007006-03; 05000249/2007006-03 (DRS))

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution

.1 Review of Condition Reports

a. Inspection Scope

The team reviewed a sample of the selected component problems that were identified by the licensee and entered into the corrective action program. The team reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions related to design issues. The specific corrective action documents that were sampled and reviewed by the team are listed in the attachment to this report.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exits

.1 Exit Meeting Summary

The team presented the inspection results to Mr. D. Bost and other members of licensee management at the conclusion of the inspection on May 18, 2007. Additionally, the resolution of an unresolved issue was discussed on June 27, 2007 via telecom with Mr. J. Griffen. Proprietary information was reviewed during the inspection and was handled in accordance with NRC policy.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
D. Bost, Site Vice President
D. Wozniak, Plant Manager
D. Galanis, Design Engineering
J. Strasser, Engineering
J. Gates, Operations
M. Kluge, Engineering
J. Fox, Engineering
D. Knox, Engineering
J. Griffin, Regulatory Assurance
J. Kovach, Engineering
M. Martinovich, Engineering
K. Robbins, Corporate Engineering
B. Rybak, Regulatory Assurance
I. Rivera, Switchyard System Manager
S. Tutich, Maintenance
B. Surawski, Engineering
L. Mallavarapu, Engineering
J. Steinmetz, PRA
O. Shogar, Engineering
D. Lee, Engineering
N. Zaczek, Engineering

NRC
L. Kozak, RIII Senior Reactor Analyst
C. Pederson, Director, Division of Reactor Safety
C. Phillips, Senior Resident Inspector
M. Sheikh, Resident Inspector
A. Stone, RIII Engineering Branch 2, Chief

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000237/2007006-01; 05000249/2007006-01	NCV	Inadequate Acceptance Criteria in 125 VDC Station Battery Service Test Procedures (Section 1R21.3.b.1)
05000237/2007006-02; 05000249/2007006-02	NCV	Adequate Control Voltage for 4160 Breaker's Closing Coil was not Assured (Section 1R21.3.b.2)
05000237/2007006-03; 05000249/2007006-03	NCV	Failure to Procedurally Control Regulatory Guide 1.97 Control Board Labeling (Section 1R21.6.b)

Discussed

None

LIST OF DOCUMENTS REVIEWED

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CALCULATIONS

Number	Description or Title	Date or Revision
DRE03-0025	Baseline Calculation for 125VDC ELMS-DC Conversion to DCSDM	Revision 0
5569-31-19-1	Unit 2 - 125V DC Fault Currents	Revision 4
DRE96-0126	Motor Terminal Voltage Calculation for Dresden 250 VDC Motor Operated Valves	Revision 001B
DRE96-0178	Sizing of the Unit 2, 125 VDC Battery Charger 2 and 2A	Revision 000A
DRE07-0021	Determination of Battery Intercell Connectors Resistance Limits	March 22, 2007
8256-73-19-1	DC Distribution Room Heat Load Under Station Blackout (SBO) and LOOP/LOCA Conditions	Revision 0
DRE96-0124	Dresden HPCI NPSH Temperature Limits	1
DRE96-0206	HPCI Pump Discharge Pressure for 5000 gpm Flow to Reactor Vessel	0
DRE96-0214	Determination of the Differential Pressure Between the HPCI and CCSW Sides of the CCSW Heat Exchangers for Various CCSW Flows	3
DRE96-0215	Pressure Drop Analysis for HPCI Exhaust Steam Piping	0
DRE97-0171	Determination of Acceptance Criteria for CCSW One and Two Pump NPSH Testing	0
DRE98-0030	Determination of Setpoint of CST Low-Low Level Switches to Prevent Potential Air Entrainment from Vortexing During HPCI Operation Essential Calc	0B
DRE99-0012	Frictional Pressure Losses in HPCI Turbine Steam Supply Piping	0
DRE99-0013	Hydraulic Performance of the HPCI System	2C
DRE00-0054	Condensate Storage Tank Level Analysis	0

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CALCULATIONS

Number	Description or Title	Date or Revision
DRE03-0025	Baseline Calculation for 125VDC ELMS-DC Conversion to DCSDM	Revision 0
DRE04-0020	Calculation Demonstrating that Full HPCI Turbine Flow is Achievable with 2(3)2301-5 Valve 50 percent Open	0
1.1	HRA Calculation	February, 2007
5.1	HRA Calculation	February, 2007
43.1	HRA Calculation	February, 2007
50.1	HRA Calculation	February, 2007
53.1	HRA Calculation	February, 2007
89.1	HRA Calculation	April 16, 2007
DR05010	MAAP Calculation	April 16, 2007
DR05014	MAAP Calculation	April 16, 2007
DR05015	MAAP Calculation	April 16, 2007
DR05016	MAAP Calculation	April 16, 2007
DR05025	MAAP Calculation	April 16, 2007
DR05026	MAAP Calculation	April 16, 2007
DRE06-0041	Unit 2 Turbine Building MCC Thermal Overload Relay Heater Sizing for AC Loads at Post LOCA Temperature	000
8684-48-19-2	Revising the Circuit Breaker Settings for Switchgear 29 Cubicles 293D and 294C	0001A
DRE05-0082	Dresden Unit 2 MCC Breaker Setting for Continuous Duty Motors and Motor Operated Valves	000B
9215-99-19-1	Voltage Starting Requirements, 3HP CCSW Motor	2
DRE98-0031	Unit 2 Reactor Building MCC Thermal Overload Relay Heater Sizing for AC Loads at Post LOCA Temperature	0001C
004-E-032	Dresden Units 2 and 3 Thermal Overload Review	2
DRE07-0034	Medium Voltage Breaker Settings	0
C9198-18-19-1	Replacement RMS-9 Trip Device Settings for 480V Switchgear 25, 26, 27, 28, and 29 Medium Voltage Breaker Settings	000A
C9198-18-19-2	480V MCC feeders	0003A

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CALCULATIONS

Number	Description or Title	Date or Revision
DRE03-0025	Baseline Calculation for 125VDC ELMS-DC Conversion to DCSDM	Revision 0
DRE04-0019	Auxiliary Power Analysis for Dresden Unit 3	000
7927-98-19-1	480V Bus Undervoltage Relay Settings	0
DRE00-0029	Loss of Voltage Relay Setpoint for Buses 23-1, 24-1, 33-1, and 34-1	1
DRE03-0047	Replacement of Bus 29 Undervoltage Auxiliary Relay	001
7027-98-19-1	480V Bus Undervoltage Relay Settings	0
8231-05-19-1	Swing Bus (MCC'S 28-7/29-7) Relay Settings	001
DRE02-0034	Motor Operated Valve AC Motor Terminal voltage Calculation for Dresden System 1501, Unit 3	00B
DRE02-0038	Motor Operated Valve AC Motor Terminal voltage Calculation for Dresden Unit 2 System 1501	00A
COE264.0200.02	Calculation of Dresden Bus 28 and 29 Relay Settings (revised as CIE264,0200.03 on 11/28/04)	1
7927-98-19-1	Bus Under Voltage Relay Settings	000
NED-M-MSD-135	Methodology to Calculate Terminal Voltage for AC MOV Motors	0
DRE96-0267	480 V MCC Circuit Protection for: 125 VDC Battery Chargers (2, 2A, 3, 3A), 250 VDC Battery Chargers (2, 2/3, 2/3 Reserve...)	0
MAD 91-0053	Dead Heading Evaluation of HPCI Pumps	1
NED-M-MSD-45	Dresden Unit 2 HPCI Heat Exchanger Mode C Heat Exchanger Duty Calculation	0
DRE96-0211	HPCI System Derivation of System Resistance Curves, Pump Curves, and Comparison to LOCA Analysis	6
DRE97-0021	Dresden LPCI/Core Spray NPSH Temperature Limits	2
DRE97-0145	Maximum Flow through the HPCI and HPCI Pump Minimum Flow Lines	0

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CALCULATIONS

Number	Description or Title	Date or Revision
DRE03-0025	Baseline Calculation for 125VDC ELMS-DC Conversion to DCSDM	Revision 0
NED-I-EIC-0085	Low Pressure Coolant Injection (HPCI) Flow Accuracy	2
DRE98-0010	Dresden LPCI/Core Spray NPSH Analysis Post-DBA LOCA: Long Term Design Basis	4
DRE98-0012	Dresden LPCI/Core Spray NPSH Analysis Post-DBA LOCA: Short Term Design Basis	3
DRE98-0030	Determination of Setpoint of CST Low-Low Level Switches to Prevent Potential Air Entrainment from Vortexing During HPCI Operation	0
DRE98-0117	HPCI Heat Exchanger K-Factor	0
DRE98-0018	ECCS Strainer Head Loss Estimates for Dresden Station Units 2 and 3	03A
GE-NE-A22-00103-08-01	Dresden and Quad Cities Extended Power Uprate - Containment System Response	1
DRE00-0077	Dresden Extended Power Uprate - Containment Cooling Heat Exchanger Performance and HPCI Temperature Analysis	00A
DRE00-0082	HPCI Header Flow Uncertainty	0
DRE01-057	Comparison of EPU (Extended Power Uprate) and Pre-EPU NPSH Analysis with Old and New Strainers for Short and Long Term Events Assuming One Strainer 100 percent Blocked and Remaining Three Strainers Clean	0
TIN 2004-1071	Evaluation of Dresden Nuclear Power Station Low Pressure Coolant Injection Heat Exchanger Thermal Performance Test Containment Cooling Service Water Surface Sensor Methodology Systematic Uncertainty	2

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CALCULATIONS

Number	Description or Title	Date or Revision
DRE03-0025	Baseline Calculation for 125VDC ELMS-DC Conversion to DCSDM	Revision 0
TIN 2004-1072	Evaluation of DNPS HPCI HX Thermal Performance Test HPCI Surface Sensor Methodology Systematic Uncertainty	1
TIN 2004-1078	Evaluation of DNPS HPCI HX 2-1503A and 3-1503B Thermal Performance Test Data Evaluation and Uncertainty Analysis	2
TIN 2004-1096	Evaluation of DNPS HPCI HX Thermal Performance Test HPCI Flow Measurement Systematic Uncertainty	2
TIN 2004-1098	Evaluation of DNPS HPCI HX Thermal Performance Test Containment Cooling Service Water Flow Measurement Systematic Uncertainty	1
TIN 2005-1078	Evaluation of DNPS HPCI HX 2-1503A Thermal Performance Test Data Evaluation and Uncertainty Analysis	1
OPTIMA2-TR021-LOCA	Dresden 2 and 3 and Quad Cities 1 and 2 LOCA Analysis for SVEA-96 Optima Fuel	1
DRE 03-0015	HPCI MOV Design Basis Document and Differential Pressure Calculation	0A
DRE 03-0011	Isolation Condenser System Combined DBD and Differential Pressure Calculation	0
DRE 2-1301-3	MIDACALC Results DC MOV Calculation	3
CE-DR-003	MOV Weak Link Evaluation (2-1301-3)	1
DRE 03-0013	HPCI Combined DBD and Differential Pressure Calculation	0
CE-DR-11	Weak Link Analysis for Crane 10" Gate Valve 2-2301-3	0
DRE 2-2301-8	MIDACALC Results DC MOV Calculation	5
CE-DR-031	Weak Link Analysis for Crane 14" 900 No. Gate Valve 2-2301-8	0
DRE 97-0063	HPCI Turbine Pump Room Cooling Load	1A

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CALCULATIONS

Number	Description or Title	Date or Revision
DRE03-0025	Baseline Calculation for 125VDC ELMS-DC Conversion to DCSDM	Revision 0
DRE 98-0077	HPCI Room Thermal Response With Reduced Room Cooler Capacity	1A
CE-091.0208	MOV Structural Integrity Calculation 2-2301-08, 2-1301-03	2
CE-DR-11	Weak Link Analysis for Crane 10" Gate Valve 2-2301-3	0

CORRECTIVE ACTION PROGRAM DOCUMENTS

Number	Description or Title	Date or Revision
IR617931	Procedure Revision Required for U2 125V Alternate Battery Equalize Voltage	April 16, 2007
IR618898	Potable Man Lift Parked Close to MCC	April 18, 2006
IR629308	CDBI - 4KV Breaker Closing Coil Voltage Acceptance Criteria	May 14, 2007
IR630678	CDBI - Enhancement Opportunity for Battery Discharge Tests	May 17, 2007
IR630890	CDBI - Battery Service Test Criterion Requires Revision	May 17, 2007
IR630901	CDBI - Minimum Battery Terminal Voltage for Cell Sizing	May 17, 2007
AR 00594935	Issues Noted with the Maintenance of Batteries	February 22, 2007
AR 00533168	Visible Corrosion Found on 125 Main Battery Connections	September 19, 2006
IR00630423	Power Cable Diagnostics	May 16, 2007
CCA 151882	Problems associated with the 2A Instrument Air System Issue Report (IR) 137188 and the Common Cause Analysis for Breaker Trips and Failures	July 3, 2003
IR 605077	HRA Calculation 89.1 issue	April 16, 2007
AR 00628000	Labeling and PASSPORT Discrepancies	May 10, 2007
AR 00629141	Reg. Guide 1.97 Simulator Labels	May 14, 2007
IR 622767	Potential Enhancement to DAP 07-16 and PASSPORT data	April 27, 2007
TR 07-793	Regional Guide 1.97 “Black Dot” Training Request	May 17, 2007

Number	Description or Title	Date or Revision
PIF D1998-03219	U3 Loose IC Components Due to Water Hammer	May 5, 1998
PIF D1998-03228	U3 Loose IC Components Due to Water Hammer	May 5, 1998
PIF D1998-03229	U3 Loose IC Components Due to Water Hammer	May 5, 1998
IR 89443	Pressure perturbation when re-aligning Isolation Condenser to Normal.	January 8, 2002
IR 110575	Field Operators reported that system piping appeared to move when opening valve 3-1301-3 while placing the IC in standby	June 4, 2002
IR 620668	POTENTIAL PROCEDURE ENHANCEMENT TO DOP 1300-01	April 30, 2007
IR 629141	Reg Guide 1.97 Labels Not Designated As Such In Simulator	May 14, 2007
00618667	Editorial Error in DOS 2300-07	4/18/07
00618820	U3 HPCI Turbine Speed Gauge Needs Calibration	4/18/07
00622617	Procedure Enhancement for DOS 2300-10	4/27/07
00624317	CCSW Surv Procedure Issue and Enhancements	5/2/07
00624942	ATI Closure Criteria Not Met	5/3/07
00628028	DRE96-0214 Not Using Current IST Data	5/10/07
00628511	IST Variance Documentation Issue	5/11/07
00629904	Issue With IST Reference Values	5/15/07
00630870	Overreaching Procedure Issue Identification	5/17/07
00011557	Verify Adequacy of Pressure Drop in HPCI Steam Line	5/24/99
00531681	Need to Update CST Vortex Calc Methodology	9/15/06
00559381	Faulty/Dirty Contacts on HPCI Relay	11/17/06
IR00619637	Discrepant HPCI/HPCI Minimum Flow Values ID'd During CBDI	04/20/07
IR00621123	NRC CBDI Inspector Identifies Typos in Calc DRE97-0117	04/23/07
IR00630156	CBDI NRC IDS Large Difference in Calculated HPCI Min Flows	05/15/07
IR00630617	CBDI - Obsolete Statement in HPCI Surveillance Procedure	05/17/07
AR148901	3B HPCI Pump Remains in Alert Range	03/13/03
AR 157349	3B HPCI Pump Performance	05/05/03
AR158978	Potential Part 21 Issue of New HPCI Pump Impeller	05/15/03
AR543829	3A HPCI Pump Differential Pressure Decreasing	10/13/06
AR556633	3B HPCI HX Inspection Finds Unexpected Amount of Clam Shells	11/11/06

DRAWINGS

Number	Description or Title	Date or Revision
12E-2322B	Overall Key Diagram - 125V DC Distribution Centers	K
12E-2322	Key Diagram - Turbine Building 125V DC Main Bus 2A-1 Distribution Panel	AD
12E-2432	Schematic Control Diagram, Core Spray Motor Operated Valves	AB
12E-2441, SH.1	Schematic Control Diagram, LPCI/Containment Cooling System Motor Operated Valves	2
12E-2441, SH.2	Schematic Control Diagram, LPCI/Containment Cooling System Motor Operated Valves	AA
12E-2440, SH.1	Schematic Control Diagram, LPCI/Containment Cooling System Motor Operated Valves	AD
12E-2440, SH.3	Schematic Control Diagram, LPCI/Containment Cooling System Motor Operated Valves	AC
12E-2346, SH.1	Schematic Diagram 4160V Bus 24-1 Standby Diesel 2 Feed and 34-1 Tie Breaker	AK
12E-2346, Sh. 2	Rev. AQ, Schematic Diagram 4160V Bus 24-1 Standby Diesel 2 Feed	AQ
12E-2301, Sh 1	Single Line Diagram	AM
12E-2301, Sh 2	Single Line Diagram, 4160V Bus 21, 22, 23, 24, 480V Swgr 20, 25, 26, 27	AH
12E-2301, Sh 3	Single Line Diagram	AS
12E-9B, Sh 3	One Line Relay and Instrument Diagram for 138kV Bus	A
12E-2303, Sh 2	Key Diagram 4160V Switchgears 23 and 24	V
12E-2303, Sh 3	Key Diagram 4160V Switchgears 23 and 24	B
12E-2304	Key Diagram 4160 Switchgears 23-1 and 24-1	U
12E-2302	Station Key Diagram 4160 and 480V Switchgears, 480V MCCs	W
12E-2320	Key Diagram Reactor Building 480 V Motor Control Centers 29-4, 28-7 and 29-7 Single Line Diagram	AD
12E-2306	Key Diagram Reactor Building 480 V AC Switchgear 28 and 29 Single Line Diagram	AD
12E-2307	Key Diagram Turbine Building Motor Control Centers 25-1 and 26-4 and New Laundry Motor Cont. Ctr. 7A-1	A1
12E-2308	Key Diagram Turbine Building Motor Control Center 25-2	AD
12E-2311	Key Diagram Turbine Building Motor Control Centers 28-2 and 29-2	AQ
12E-2333	Relaying and Metering Diagram Reserve Auxiliary Transformer 22 and 4160V Swgr 23 and 24	O

Number	Description or Title	Date or Revision
12E-2322B	Overall Key Diagram - 125V DC Distribution Centers	K
12E-2322	Key Diagram - Turbine Building 125V DC Main Bus 2A-1 Distribution Panel	AD

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Number	Description or Title	Date or Revision
12E-2347	Schematic Control Diagram 480V Trans. 25 and Bus 25 Main Breakers	L
12E-2349, SH.2	Schematic Diagram 480V Bus 29 Main Feed Breaker, Bus Tie 28-29 and bus tie 29-28 Breaker	AG
12E-2349, SH .3	Schematic Diagram 480V Bus 29 Main Feed Breaker and bus 28 Main Feed Breaker	AF
12E-2674F	Wiring and Schematic Diagram 480V. A.C. Reactor Building MCC 28-1, 2-7828-1, Part 6	Q
M-28	Unit 2 Diagram of Isolation Condenser Piping	LK
M-359	Unit 3 Diagram of Isolation Condenser Piping	BG
ISI-203	High Pressure Coolant Injection Piping	D
ISI-204	Reactor Water Cleanup and Reactor Feedwater Piping	D
M-29, sheet 1	L.P. Coolant Injection System	CF
M-29, sheet 2	L.P. Coolant Injection System	AZ
M-51	High Pressure Coolant Injection Piping	CK

PROCEDURES

Number	Description or Title	Date or Revision
MA-AA-725-110	Preventive Maintenance of GE Type AKF-25 Circuit Breakers	0
MA-AB-725-110	Preventive Maintenance of GE Type AK-25 Circuit Breaker	2
MA-DR-725-113	Inspection and Maintenance Of General Electric 4KV MAGNE-BLAST Circuit Breakers Types AMH4.76-250 (Horizontal Drawout)	0
DOA6500-11	4V Bus Overvoltage	5
DOA6500-07	Unit 2 4kV Emergency Bus Degraded Voltage Operations	10
DOP 6100-27	Transferring Transformer 22 Feed During Operation	3
DOA6500-08	Bus 24-1 to Bus 34-1 Tie Breaker Operation	14
DEP 0040-27	Megger and Bridge Testing and Acceptance Criteria	3
DEOP 0010-00	Guidelines for the Use of Dresden Emergency Operating Procedures and Severe Accident Management Guidelines	12
TSG	Technical Support Guidelines	3
LAP-1600-15	Region Guide 1.97 Instruments	6
QTCS 0340-06	Region Guide 1.97 Instrumentation Review	1
DOP 1300-02	AUTOMATIC OPERATION OF ISOLATION CONDENSER	21
DOP 1300-03	MANUAL OPERATION OF ISOLATION CONDENSER	26
DOP 6620-05	POWERING UNIT 2 4KV BUSES VIA SBO D/G 2	12
DOP 6620-06	POWERING UNIT 3 4KV BUSES VIA SBO D/G 3	15
DEOP 100	RPV Control	10

PROCEDURES

Number	Description or Title	Date or Revision
MA-AA-725-110	Preventive Maintenance of GE Type AKF-25 Circuit Breakers	0
DEOP 200-1,	Primary Containment Control	10
DEOP 300-1	Secondary Containment Control	7
DEOP 300-2	Radioactivity Release Control	2
DEOP 400-1	RPV Flooding	7
DEOP 400-2	Emergency Depressurization	6
DEOP 400-3	Steam Cooling	5
DEOP 400-5	Failure to Scram	15

PROCEDURES

Number	Description or Title	Date or Revision
MA-AA-725-110	Preventive Maintenance of GE Type AKF-25 Circuit Breakers	0
DGA-12	Partial or Complete Loss of AC Power	57
DSSP 0100-CR	Hot Shutdown Procedure- Control Room Evacuation	32
DOA 2300-02	HPCI Fast Startup	2
DOP 2300-03	High Pressure Coolant Injection System Manual Startup and Operation	36
DOS 1400-07	ECCS Venting	19
DOP 1500-01	Preparation of Low Pressure Coolant Injection for Automatic Start	13
DOP 1500-02	Torus Water Cooling Mode of Low Pressure Coolant Injection System	53
DOP 1500-03	Containment Spray Cooling Mode of Low Pressure Coolant Injection System	29
DIS 1500-02	Unit 2 HPCI Flow Channel Calibration and EQ Maintenance Inspection	24
DEOP 100	RPV Control	10
DEOP 200-01	Primary Containment Control	10

REFERENCES

Number	Description or Title	Date or Revision
S.O. 280685	Cavitation Test Report, 12x14x14.5 CVDS Pump	05/22/68
Doc ID No. DG96-002213, Letter to SEM Dresden Station	Discussion of Bingham Cavitation Test Report Applicability to Dresden HPCI an Core Spray Pumps	12/23/96

REFERENCES

Number	Description or Title	Date or Revision
ER-AA-321	Dresden IST Surveillance Acceptance Criteria Manual, (for Unit 2(3) HPCI DOS 1500-10, and 1500-18)	05/10/96, 05/09/03, 06/16/05
ER-AA-321	Administrative Requirements for Inservice Testing	8
Letter, Exelon to NRC	RS-01-033, Supplement to GE-14 Fuel License Amendment Request	03/01/01
Letter, NRC to Exelon	Issuance of Amendments (TAC NOS. MB0170, MB0171, MB1337, MB1338, MB2715, AND MB2716)	11/02/01
EC 363558	Evaluation of As-Found Condition of the 3B HPCI Heat Exchanger from the November 7, 2006 Inspection	01/08/07
Ltr No. 89-417	NRC Information Notice 89-08: Pump Damage Caused by Low-Flow Operation	5/22/89
DRE262LN003	Training Module, Configuration of switchyard connections to TR86 and 138 kV switchyard	January 2, 1900
M-29	PandID, Diagram of L.P. Coolant Injection Piping	CF, AZ
ESC-284	Electrical Engineering Reference for Relays and Current Transformers for Medium Voltage Switchgear, by Sargent and Lundy	1-26-79
SL-4500	Nuclear Safety-Related Overcurrent Protective Device Coordination Study, Dresden Station-Units 2 and 3	3/24/89
RPS-TG-3	Relay Planning Section – Technical Guide #3 (4 kV and 6.9 kV) Switchgear in Nuclear Generating Stations	6
LT116	Simulator Exercise Guide	
295L-02	Dresden EOP Introduction	4
Letter	Dresden DCRDR Supplement to Volume 1	January 31, 1986
GENE-A22-00103-08-01	TASK T0400: CONTAINMENT SYSTEM RESPONSE DRESDEN AND QUAD CITIES EXTENDED POWER UPRATE	1
09-0590-0149	Impell Report: Water Hammer	June, 1988
LER 87-013	Isolation Condenser Water Hammer	August 7, 1987
188292	Test Report - GNB NCX-21 Series Cell - Short Circuit Tests	May 06, 1992
PDS9906	Final Results for the Simulated Life Cycle Management Evaluation of D6A15A1 Grease in Magne-Blast Circuit Breakers	May 11, 1999
	Nutherm Test Specification TPG-7505, Baseline	2
NTL No. 7042	Test of Overload Relay, ST Data for 2PP-7W; 1PP-7W	
TID-E/I&C-03	Thermal Overload Heater Selection for Continuous Duty Motors	0

SURVEILLANCES (completed)

Number	Description or Title	Date or Revision
DIS 2300-04	HPCI System Logic System Functional Test Without HPCI Turbine Accessories	11/17/06
DOS 1500-12	Containment Cooling Service Water Loop Flow Verification	11/26/05
DOS 1500-17	Containment Cooling Service Water IST Comprehensive / Preservice Pump Test	3/20/07
DOS 2300-03	High Pressure Coolant Injection System Operability and Quarterly IST Verification Test	11/22/06
DOS 2300-10	High Pressure Coolant Injection System IST Comprehensive/Preservice Pump Test	3/15/07, 3/22/07
DOS 2300-07	High Pressure Coolant Injection Fast Initiation Test	4/7/06, 3/21/07
DOS 1500-10	HPCI System Pump Operability and Quarterly Test With Torus Available and Inservice Testing (IST) Program	03/20/07, 03/91/07, 12/22/06, 09/17/06, 06/24/06
DOS 1500-15	HPCI System Quarterly Flow Rate Test	03/20/07
DOS 1500-18	HPCI System IST Comprehensive/Preservice Pump Test With Torus Available	06/24/05
DOS 1500-02	HPCI Heat Exchanger Differential Pressure Across Tube Side Divider Plate	3/19/07, 12/21/06, 09/15/06, 06/22/06, 3/21/060
DOS 15000-12	HPCI Heat Exchanger Tube Side Flow Rate and Differential Pressure	10/17/05, 10/30/05
DES 8300-28	Unit 2 125 Volt Main Station Batter Service Test	February 23, 2006
DES 8300-58	Unit 2 125 Volt Main Battery Modified Performance Test	February 09, 2004
EC-AA-104	Unit 2 Weekly Station Battery Inspection	April 19, 2007
DES 8300-51	125 Volt DC Battery Charger Capacity Test for Charger 2-83125-2	April 19, 2007
DOS 8300-16	Unit 2 Monthly Station Battery Inspection	April 11, 2007
DOS 8300-17	Unit 2 Quarterly Station Battery Inspection	March 13, 2007

WORK DOCUMENTS

Number	Description	Revision/Date
99086702	2-2301-8 MOV Diagnostic Testing	April 23, 2003
99181178-01	3-1501-28A MOV Diagnostic Testing	October 27, 2004
386011-01	Perform DP Test on 2-1501-20A	July 18, 2005
372046-01	MOV Votes Testing 2-1301-3	January 3, 2005
R0204955	Clean XFMR 1-TR11A per RT00001355-01	April 2, 2005

LIST OF ACRONYMS USED

ADAMS	Agency-Wide Document Access and Management System
ATWS	Anticipated Transient Without Scram
ASME	American Society of Mechanical Engineers
CCSW	Containment Cooling Service Water
CFR	Code of Federal Regulations
CST	Condensate Storage Tank
DRS	Division of Reactor Safety
EIC	Engineering Change
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EPU	Extended Power Uprate
gpm	gallons per minute
HPCI	High Pressure Coolant Injection
HX	Heat Exchanger
IA	Instrument Air
IC	Isolation Condenser
IMC	Inspection Manual Chapter
IST	Inservice Testing
HPCI	Low Pressure Coolant Injection
LOCA	Loss of Coolant Accident
MCC	Motor Control Center
MOV	Motor-Operated Value
NCV	Non-Cited Violation
NPSH	Net Positive Suction Head
NRC	U. S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
OE	Operating Experience
Pp	Pump
PRA	Probalistic Risk Assessment
RPV	Reactor Pressure Vessel
SBO	Station Blackout
SDP	Significance Determination Process
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink