February 13, 2007

Mr. Paul A. Harden
Site Vice President
Nuclear Management Company, LLC
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: PALISADES NUCLEAR PLANT NRC COMPONENT DESIGN BASES INSPECTION (CDBI) REPORT 05000255/2006009(DRS)

Dear Mr. Harden:

On December 15, 2006, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Palisades Nuclear Plant. The enclosed report documents the inspection findings which were discussed on December 15, 2006 and January 29, 2007, with you 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 calculations, design bases documents, 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, 11 NRC-identified findings of very low safety significance were identified, ten of which involved violations of NRC requirements. 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 (NCV) 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 with a basis for your denial, within 30 days of the date of this inspection report, 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 NRC Resident Inspector at the Palisades facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and 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 component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

Docket No. 50-255
License No. DPR-20

Enclosure:
Inspection Report 05000255/2006009
w/Attachment: Supplemental Information

cc w/encl: J. Cowan, Executive Vice President
and Chief Nuclear Officer
R. Fenech, Senior Vice President, Nuclear
Fossil and Hydro Operations
D. Cooper, Senior Vice President – Group Operations
L. Lahti, Manager, Regulatory Affairs
J. Rogoff, Vice President, Counsel and Secretary
A. Udrys, Esquire, Consumers Energy Company
S. Wawro, Director of Nuclear Assets, Consumers Energy Company
Supervisor, Covert Township
Office of the Governor
State Liaison Office, State of Michigan
L. Brandon, Michigan Department of Environmental Quality -
Waste and Hazardous Materials Division

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

Sincerely,

/RA/

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

Docket No. 50-255
License No. DPR-20

Enclosure:
Inspection Report 05000255/2006006 and
0500025/2006012
w/Attachment: Supplemental Information

cc w/encl: J. Cowan, Executive Vice President
and Chief Nuclear Officer
R. Fenech, Senior Vice President, Nuclear
Fossil and Hydro Operations
D. Cooper, Senior Vice President – Group Operations
L. Lahti, Manager, Regulatory Affairs
J. Rogoff, Vice President, Counsel and Secretary
A. Udrys, Esquire, Consumers Energy Company
S. Wawro, Director of Nuclear Assets, Consumers Energy Company
Supervisor, Covert Township
Office of the Governor
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L. Brandon, Michigan Department of Environmental Quality -
Waste and Hazardous Materials Division

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-255

License No: DPR-20

Report No: 05000255/2006009

Licensee: Nuclear Management Company, LLC

Facility: Palisades Nuclear Plant

Location: Covert, MI

Dates: November 13, 2006, through December 15, 2006
and January 29, 2007

Inspectors: P. Lougheed, Senior Engineering Inspector (lead)
J. Neurauter, Senior Engineering Inspector
C. Brown, Engineering Inspector
K. Walton, Operations Inspector
D. Passehl, Senior Reactor Analyst
G. Skinner, Electrical Contractor
M. Yeminy, Mechanical Contractor
J. Ayala, License Renewal Project Manager (Training)
V. Meghani, Engineering Inspector (Training)

Approved by: A. M. Stone, Chief
Engineering Branch 2
Division of Reactor Safety (DRS)

Enclosure

SUMMARY OF FINDINGS

IR 05000255/2006009; 11/13/2006 – 12/15/2006; Palisades Nuclear Plant; Component Design Basis 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 regional engineering inspectors and two consultants. Eleven findings of very low safety significance were identified with ten associated Non-Cited Violations (NCVs). The significance of most findings is 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.

A. NRC-Identified and Self-Revealed Findings

Non Significance Determination Process

- SL IV. The inspectors identified a finding of very low safety significance and an associated Severity Level IV NCV of 10 CFR 50.73 (a)(2). Specifically, the licensee failed to analyze past operability and submit a licensee event report when the startup transformer 1-2 tap changer control was found to be non-operational. Once analyzed, the licensee determined that one of the two required circuits from the offsite power supply was inoperable on at least three non-consecutive occasions between May 17 and May 22, 2006. The primary cause of this violation was related to the cross-cutting area of problem identification and resolution.

  Because violations of 10 CFR 50.73 are considered to be violations that potentially impede or impact the regulatory process, they are dispositioned using the traditional enforcement process instead of the significance determination process (SDP). The performance deficiency met Supplement I.D.4, "Failure to Make a Required Licensee Event Report" for a Severity Level IV violation. (Section 1R21.3.b.1)

Cornerstone: Initiating Events

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee failed to evaluate the potentially adverse effects that a modification which added an automatic load tap changer to the startup transformer would have on the independence of the two circuits from the offsite power supply to the Class 1E Buses required by technical specifications and on the fast transfer capabilities described in the final safety analysis report. Following discovery, the licensee performed preliminary calculations to assess the issue. The primary cause of this violation was related to the cross-cutting area of human performance.

This issue was more than minor based on review of IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," Example 3a, because the failure to perform a calculation resulted in a modification to the plant which was not in accordance with the design basis and the modification required revision to ensure the design basis was met. 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)

Cornerstone: Mitigating Systems

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee failed to include the voltage drop across control power transformers, did not account for loading due to auxiliary equipment such as relays and indicating lights, did not consider increased cable resistance due to increased temperature in accident environments, used a unverified assumption that calculations for motor control centers 1 and 2 bounded other safety related motor control centers, and failed to account for previously identified non-conservatism in associated voltage calculations. Following discovery, the licensee performed preliminary calculations verify operability of the circuits.

  This issue was more than minor based on review of IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," Example 3j, because the errors had more than a minimal effect on the outcome of the calculation, considerably impacting the available margin of the system such that further evaluation needed to be performed in order to demonstrate that the equipment could perform its safety function. Although, by the end of the inspection, the licensee was able to demonstrate operability; at the time of discovery there was reasonable doubt on the operability of the circuits. Therefore this performance deficiency also impacted the Mitigating Systems Cornerstone objective of ensuring the capability of the circuits. 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.3)

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee failed to consider the effects of accident temperatures on cable resistance in voltage drop calculations. Following discovery, the licensee performed preliminary calculations to verify operability of the circuits.

  This issue was more than minor based on review of IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," Example 3j, because the errors had more than a minimal effect on the outcome of the calculation, considerably impacting the available margin of the system such that further evaluation needed to be performed in order to demonstrate that the equipment could perform its safety function. Although, by the end of the inspection, the licensee was able to demonstrate operability; at the time of discovery, there was reasonable doubt on the operability of the circuits. Therefore this performance deficiency also impacted the Mitigating Systems

Cornerstone objective of ensuring the capability of the circuits. 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.4)

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control" for the licensee's failure to ensure that the molded-case circuit breaker (MCCB) testing program remained current with industry and NRC operating experience thus ensuring that the installed safety related and important-to-safety MCCBs did not degrade and would perform satisfactorily in service. Following discovery, the licensee entered the issue into its corrective action program and was evaluating an update to the testing program.

  This issue 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 equipment performance and affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events. Specifically, the testing program did not ensure the reliability of the installed MCCBs because the program did not include test methods or failure assessment that would accurately and conclusively demonstrate MCCB continued operability. 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.5)

- Green. The inspectors identified a finding having very low significance and an associated NCV of Technical Specification Surveillance Requirement 3.8.4.4. Specifically the licensee failed to verify that the 125V DC battery cable-to-terminal plate connections (cells 1, 35, 36, and 59) were coated with anti-corrosion material. Following discovery, the licensee coated all the terminal plate connections with an anti-corrosion material.

  This issue was more than minor in accordance with IMC 0612, Appendix B, because the finding was associated with the Mitigating Systems cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the reliability of the DC power system. The purpose of the technical specification surveillance was to ensure good electrical connections and to reduce terminal deterioration. Specifically, corrosion in connections could potentially result in unacceptable connection resistance and decreased battery capacity, rendering the DC system incapable of performing its required safety function. 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.6)

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee failed to take into account the effect of emergency diesel generator frequency variation in the diesel loading calculations. Following discovery, the

licensee performed preliminary calculations and determined that emergency diesel generator 1-2 was still within its load rating.

This issue was more than minor based on review of IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," Example 3j, because the failure to account for frequency variations had more than a minimal effect on the outcome of the calculation; specifically it resulted in reducing the available margin for the two hour loading on emergency diesel generator 1-2 by approximately 75 percent. Although, by the end of the inspection, the licensee was able to demonstrate operability; at the time of discovery there was reasonable doubt on the operability of the diesels. Therefore this performance deficiency also impacted the Mitigating Systems Cornerstone objective of ensuring the capability of the diesels. 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.7)

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee failed to verify that eight components involved with transferring diesel fuel to the emergency diesel generators were rated for the temperature in which they had to operate. Following discovery, the licensee performed a preliminary calculation to demonstrate that the equipment would function if called upon. The primary cause of this violation was related to the cross-cutting area of human performance.

  This issue was more than minor in accordance with IMC 0612, Appendix B because the finding was associated with the equipment performance (availability and reliability) 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 equipment that was required for the function of automatically transferring fuel to the emergency diesel generator belly tanks was not initially rated for the temperature in which it was required to operate, hence affecting the capability of the emergency diesel generators to respond to an initiating event. 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.8)

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee incorrectly interpreted a graph used to determine the percent air ingestion as a function of the Froude number, resulting in a non-conservative air entrainment value for the high pressure safety injection pumps when taking suction from the safety injection refueling water tank at the point of switching over to the containment sump. Following discovery, the licensee performed preliminary calculations to show that the pumps would continue to operate with the corrected air entrainment value.

  This issue was more than minor based on review of IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," Examples 3i and 3j,

because the calculation error was significant enough to require re-analysis of the accident analysis setpoint, including requesting the pump manufacturer to analyze the capability of the pumps to perform at the higher percent of air entrainment, and required the engineers to re-analyze the pumps safety function in light of the reduced net positive suction head, as well as reduced flow and discharge head at the time the vortex formed. Additionally, the error appeared to be programmatic as a similar error was made in calculating the air entrainment to the auxiliary feedwater pumps. Therefore this performance deficiency impacted the Mitigating Systems Cornerstone objective of ensuring the capability of the high pressure safety injection pumps. 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.9)

- Green. The inspectors identified a finding having very low significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control." Specifically, the licensee failed to to establish a proper setpoint for safety injection and refueling water tank level switch such that, when instrument uncertainty was taken into account, the setpoint could be set outside the technical specification limits. Following discovery, the licensee verified the actual setpoints.

  This issue was more than minor in accordance with IMC 0612, Appendix B because, if left uncorrected, the technical specification limit for the safety injection refueling water tank level setpoints could have been exceeded without the licensee being aware of it. 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.10)

Cornerstone: Barrier Integrity

- Green. The inspectors identified a finding having very low significance. Specifically, the licensee failed to correctly apply the effect due to pressure locking in the valve actuator capability margin to open for the boric acid gravity feed motor operated valves MO-2169 and MO-2170. Following discovery, the licensee performed preliminary calculations to ensure valve operability. The primary cause of this finding was related to the cross cutting area of human performance.

  This issue was more than minor in accordance with IMC 0612, Appendix B because, if left uncorrected, then motor operated valve actuators would have deteriorated over time without being detected, resulting in the valves being unable to perform their required functions. 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." No violation of NRC requirements occurred. (Section 1R21.3.b.11)

B. <u>Licensee-Identified Violations</u>

None

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.

In addition, the inspectors reviewed several licensee audits and self-assessments to assess how effective licensee personnel were at self-identifying problems. The assessment was accomplished by comparing licensee-identified problems with problems that the inspectors identified during this inspection. The sample included a self-assessment in preparation for the inspection and selected assessments of the engineering design control program.

.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 Palisades Standardized Plant Analysis Risk Model, Revision 3.21. In general, the selection was based upon the components and operator actions having a risk achievement worth of greater than 2.0 and/or a risk reduction worth of 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.

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 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 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 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 the report.

.3 Component Design

a. Inspection Scope

The inspectors reviewed the Final Safety Analysis Report (FSAR), 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 Code, the Institute of Electrical and Electronics Engineers Standards and the National Electric Manufacturers Association (NEMA), to evaluate acceptability of the systems' design. 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 and licensee corrective action program documents (action requests). 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 sixteen components were reviewed (16 inspection samples):

- 2400V Buses (1C and 1D): The inspectors reviewed alternating current (AC) load flow calculations to determine whether the 2400 Volt (V) system had sufficient capacity to support its required loads under worst case accident loading and grid voltage conditions. The inspectors reviewed bus and load protective relaying to determine whether it afforded adequate protection to the buses, and whether there would be any adverse interactions within the protection scheme that would reduce system reliability. The inspectors also reviewed a modification package for the replacement of startup transformer to determine whether there was any effect on the availability or reliability of the transformer as source of power to the 2400V buses. The inspectors reviewed system operating procedures to determine whether they were adequate to assure reliable sources of power to the buses, and to determine whether the results of design calculations and modifications had been properly incorporated. The inspectors performed walkdowns of the switchgear to assess materiel condition and

presence of hazards. In addition, the inspectors reviewed system health data and selected corrective action documents to determine whether there were any adverse equipment operating trends.

- 2400V Circuit Breakers: The inspectors reviewed the control logic for the 2400V bus feeder breakers to determine whether load shed, protective relaying, and bus transfer schemes would perform as described in the design and licensing bases. The inspectors reviewed elementary wiring diagrams for bus feeder and load breakers to determine whether system control logic was consistent with system design requirements stated in the FSAR. The inspectors reviewed maintenance history and corrective action documents to determine whether there were any adverse equipment performance trends. The inspectors performed walkdowns of the 2400V circuit breakers and their environs to assess materiel condition and presence of hazards.

- Undervoltage Relays (127-1, 127-2, 127-7, 127-8): The inspectors reviewed calculations and drawings to determine if the design of the undervoltage protection scheme was as described in the design and licensing bases. The inspectors reviewed relay accuracy calculations to determine whether appropriate tolerances had been applied. The inspectors reviewed setpoint and time delay calculations to determine whether relays afforded proper undervoltage protection to safety related equipment, and whether settings were adequate to prevent spurious separation of Class 1E buses from the preferred (offsite) power supply. The inspectors reviewed relay scheme logic to determine whether it would respond as described in the design and licensing bases, and whether there was a potential for adverse interaction with other control schemes such as fast bus transfer. The inspectors reviewed calibration procedures and records for undervoltage relays to determine whether the relays were maintained as required and whether there were any adverse performance trends.

- 480 V AC Motor Control Center: The inspectors reviewed calculations and drawings to determine if the size of the 480V motor control centers were within equipment ratings. The inspectors reviewed the adequacy and appropriateness of design assumptions and calculations related to in-feed transformer protection and relay coordination. On a sample basis the inspectors reviewed maintenance and test procedures and acceptance criteria to verify that the 480V motor control center was capable of supplying power necessary to ensure proper operation of connected equipment during normal and accident conditions. The inspectors also reviewed the ratings, maintenance, and testing of the circuit breakers; related condition reports and system health reports; and operating experience related information. The inspectors performed a walkdown of the 480V AC motor control centers to verify the as-built configuration.

- 125V DC Safety Related Batteries (ED-01 and ED-02) : The inspectors reviewed various electrical documents for the 125V direct current (DC) batteries, including battery load and margin calculations, battery float and equalizing voltages, overall battery capacity, performance discharge test (initial acceptance test), weekly battery surveillance tests and quarterly battery surveillance tests.

The inspectors also reviewed the battery charger sizing calculation, testing data, environmental qualifications and preventative maintenance documents. The inspectors performed a walkdown of batteries ED-01 and -02 and their associated chargers to verify the as-built configuration.

- 125 V DC Buses (EA-11 and EA-12): The inspectors reviewed short circuit calculations for the distribution panels, breaker interrupting ratings and electrical coordination, and electrical schematics for selected Appendix R circuits to ensure that coordination existed between the upstream and the downstream fuses. The inspectors also reviewed the ratings, maintenance, and testing of the circuit breakers; related condition reports and system health reports; and operating experience related information. The inspectors performed a walkdown of the 125V DC distribution panels to verify the as-built configuration.

- Emergency Diesel Generators: The inspectors performed a limited review of the emergency diesel generator design to determine whether the diesels were being operated within their required ratings. The inspectors reviewed calculations and procedures to determine whether appropriate loads, performance tolerances and operating practices would assure application of the diesel engines within their required load rating.

- Emergency Diesel Generator Fan (VC-24C): The inspectors reviewed the emergency diesel room heat up calculations, assessing the validity of assumptions, design inputs, and results, including fan flow rates, fan blade pitch angle, humidity, temperature, pressure, flow path, room louvers, and an operability recommendation issued to assess the capability of safety related equipment in the diesel generator rooms to withstand elevated temperatures. In addition, the inspectors reviewed the suction flow path of the room cooling fans to verify that their screens are not obstructed with debris. The inspectors also reviewed the validity of a calculation written for up-rating the capacity of the equipment in the room to operate properly at elevated temperatures.

- Auxiliary Feedwater Pump (P-8C): The inspectors reviewed analyses, operating procedures, test procedures and test results associated with the operation of the auxiliary feedwater pump. The evaluation considered test and accident conditions. The analyses included hydraulic performance, vortex limits, net positive suction head, minimum flow, and the capability to automatically trip the pumps upon a low level of water in the condensate storage tank, as well as a manual action required to trip the operating pump in case a condition exists where the automatic trip function is not functioning. The inspectors reviewed piping and instrumentation diagrams, pump lineup, pump capacity, and pump ability to withstand air entrainment. The control logic and power supply, including motor protection were also reviewed during the inspection.

- High Pressure Safety Injection Pump (P-66A): The inspectors reviewed analyses, operating procedures, test procedures, and test results associated with the operation of the high pressure safety injection pumps. The evaluation considered both test and accident conditions. The analyses included hydraulic

performance, vortex limits, net positive suction head, minimum flow, and the capability to transfer suction from the normal source (the safety injection and refueling water tank) to the containment sump. The inspectors reviewed piping and instrumentation diagrams, pump line up, pump capacity, and ability to withstand air entrainment, including a manufacturer's assessment of pump loss of head and flow rate. The control logic and power supply, including motor protection were also reviewed during the inspection.

- Service Water Pump (P-7B): The inspectors reviewed piping and instrumentation diagrams, pump line up, pump capacity, number of pumps required for accident mitigation, as well as the correlation between calculated requirements and test acceptance criteria as well as test results. Also, the inspectors reviewed calculations related to pump flow, head, and net positive suction head requirements to ensure the pumps were capable of functioning as required. A modification that replaced the pump was reviewed as well as design change history, to assess potential component degradation and impact on design margins. The inspectors reviewed the control and power design drawings to verify the availability of both control and electrical power required for operability. The inspectors also reviewed the water supply (suction) path, and the possibility of plugging.

- Condensate Storage Tank (T-2): The inspectors reviewed plant calculations, drawings, and operating procedures associated with the condensate storage tank. The inspectors assessed the tank's volume, capacity, levels, and setpoints with respect to auxiliary feedwater pump suction.

- Safety Injection and Refueling Water Tank (T-58): The inspectors reviewed plant calculations, drawings, and operating procedures associated with the safety injection refueling water tank, the normal source of water for the high pressure safety injection pumps. The inspectors assessed the tank's volume, capacity, and setpoints with respect to high pressure safety injection suction. This assessment considered safety injection refueling water tank level margins with respect to engineering analyses.

- Air-Operated Valves (CV-0522B, CV-3006, CV-3027, CV-3056, and CV-3070): The inspectors reviewed the current air operated valve program health status report, design calculations, preventive maintenance tasks, corrective maintenance history, problem history, and operating history to ensure the valves were capable of performing their required functions under required conditions. Test results were reviewed to verify acceptance criteria were met and performance trended such that degradation would be identified. Walkdowns were performed to ensure that the installed configuration was consistent with design configurations and that the physical condition of the valves was appropriate.

- Check Valves (SW-402, FW-726, FW-741 and FW-743): The inspectors reviewed the current check valve program health status report, licensee actions taken as a response to industry operating experience, preventive maintenance

tasks, corrective maintenance history, problem history, and operating history to ensure the valves were capable of performing their required functions under required conditions. Test results were reviewed to verify acceptance criteria were met and performance trended such that degradation would be identified. Walkdowns were performed to ensure appropriate physical condition and installed configuration.

- Motor Operated Valves (MO-2169 and MO-2170): These valves provide an emergency boration path used in the licensee's emergency operating procedures. The inspectors reviewed the motor operated valve program health status and trend summary reports, design calculations, applicable NRC generic letters, preventive maintenance tasks, corrective maintenance history, problem history, and operating history to ensure the valves were capable of performing their required functions under required conditions. Test results were reviewed to verify acceptance criteria were met and performance trended such that degradation would be identified. Walkdowns were performed to ensure that the installed configuration supported a gravity-fed flow path from the concentrated boric acid tanks to the charging pumps. Walkdowns also ensured appropriate physical condition of the valves.

b. Findings

The team identified 11 findings of very low safety significance with ten associated NCVs. Three unresolved items were also identified.

1. **Startup Transformer not Evaluated for Past Operability and Reportability**

Introduction: The inspectors identified a finding of very low safety significance and an associated Severity Level IV NCV of 10 CFR 50.73 (a)(2). Specifically, the licensee failed to analyze past operability and submit a licensee event report (LER) when the startup transformer 1-2 tap changer control was found to be non-operational. Once analyzed, the licensee determined that one of the two required circuits from the offsite power supply was inoperable on at least three non-consecutive occasions between May 17 and May 22, 2006.

Description: During the Spring 2006 refueling outage the licensee installed a new startup transformer with an automatic load tap changer feature under modification EC-157. The transformer was declared operable on May 2, 2006. On May 17, 2006, plant operators notified the control room that the load tap changer had not counted any tap changes over the last 24 hours. Plant operators made identical notifications over the next five days, until, on May 22, 2006, engineering personnel were requested to evaluate why the load tap changer had not been counting taps. The system engineer investigated and discovered that the relay that controlled the tap changer movement was stuck. The transformer was declared inoperable and the plant entered the appropriate action statements, pursuant to TS 3.8.1, for one offsite circuit inoperable. The licensee issued action request (AR) 01031654 to document the event and evaluate the issue. As part of the AR, a maintenance rule evaluation was performed which noted that no movement of tap changer occurred between May 16 and May 22, 2006.

The inspectors noted that the AR did not document performance of a review for past operability and reportability, in accordance with 10 CFR 50.73 (a)(1). Based on the information in the AR, the inspectors determined that a malfunctioning tap changer control had possibly rendered the startup transformer circuit inoperable for greater than the technical specification allowed interval. Since this condition would be reportable under 10 CFR 50.73 (a)(2)(i)(B), the inspectors ascertained that the licensee should have conducted an investigation to determine the actual duration of the inoperable circuit and made the appropriate notification. In response to the inspector's questions the licensee issued AR 01067467 and performed the required investigation.

The licensee's investigation determined that operator logs recorded the voltage on the startup transformer two or three times a day, approximately eight hours apart. On May 17 and 18, 2006, readings were taken at 0800 (8 a.m.) and 1600 (4 p.m.). On May 19 through May 22, readings were taken at 0000 (midnight) as well as at 0800 and 1600. On three non-consecutive occasions over the six day period (May 18 at 0800, May 19 at 0000, and May 22 at 0000) the readings were below the 2420 volts which the licensee determined was the minimum voltage necessary for the transformer to power accident loads, should it have been required to do so. Therefore, the licensee acknowledged that it had not met TS requirement 3.8.1 required action statement A.1: to perform surveillance requirement (SR) 3.8.1.1 within an hour of the circuit being inoperable and once every eight hours thereafter. Because the TS action statement was not met within the required completion time, the licensee acknowledged that a LER should have been submitted. The licensee stated that it planned to submit an LER to address the failure to meet a required action statement within the allowable time.

Analysis: The inspectors determined that the failure to evaluate the potential inoperability of a qualified offsite source and whether the required actions were taken within the time allowed by the technical specifications was a performance deficiency as it led to the licensee failing to make a required submittal to the NRC. 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 plant operators had reported the lack of tap changes to the control room approximately 24 hours before the voltage on the startup transformer dropped below the point such that the transformer would not have been capable of carrying design basis accident loads which provided the licensee an opportunity to enter the TS action statement. The licensee also had an opportunity to foresee the need to review past operability when it finally did declare the transformer inoperable on May 22, 2006.

Because violations of 10 CFR 50.73 are considered to be violations that potentially impede or impact the regulatory process, they are dispositioned using the traditional enforcement process instead of the SDP. The inspectors reviewed the Enforcement Policy and determined that the performance deficiency met Supplement I.D.4, “Failure to Make a Required Licensee Event Report” for a Severity Level IV violation.

The inspectors determined a contributing cause of this finding was related to the cross-cutting area of problem identification and resolution. The licensee failed to thoroughly evaluate the impact of the failed relay on the operability of the startup transformer.

Enforcement: The 10 CFR 50.73(a)(1) requires, in part, that a licensee submit a written LER within 60 days of an event after discovery of the event. The 10 CFR 50.73(a)(2)(i)(B) requires, in part, for a licensee to report any operation or condition which was prohibited by the plant's TS except when:

(1) The TS is administrative in nature;

(2) The event consisted solely of a case of a late surveillance test where the oversight was corrected, the test was performed, and the equipment was found to be capable of performing its specified safety functions; or

(3) The TS was revised prior to discovery of the event such that the operation or condition was no longer prohibited at the time of discovery of the event.

Technical Specification Limiting Condition for Operation 3.8.1 a. requires, in part, that two qualified circuits between the offsite transmission network and the onsite Class 1E AC electrical power distribution system be operable when the plant is in Modes 1, 2, 3, and 4.

Action Statement 3.8.1.A requires that, if one offsite circuit is inoperable, then (1) the licensee is to perform SR 3.8.1.1 (offsite source check) for the operable offsite circuit within one hour and once per eight hours thereafter.

Contrary to the above, on or about May 17, 2006, until May 22, 2006, the automatic load tap changer feature of the startup transformer 1-2 did not function due to a stuck relay. This resulted in one of the qualified circuits between the offsite transmission network and the onsite Class 1E AC electrical power distribution system being inoperable for three distinct periods: on May 18 from 0800 to 1600, May 19 from 0000 to 0800 and on May 22 from 0000 to 0800. The TS 3.8.1 limiting condition for operation was not entered until May 22, 2006, and the required actions under TS action statement 3.8.1.A were not completed, although the control room operators were informed that the automatic tap changer feature did not appear to be working. As of July 22, 2006, i.e., 60 days from discovery of the stuck relay, the licensee had not submitted an LER for the missed TS action statement and the exclusions in 10 CFR 50.73(a)(2)(i)(B) did not apply.

In accordance with the Enforcement Policy, this violation of the requirements of 10 CFR 50.73 is classified as a Severity Level IV violation. The licensee entered the finding into their corrective action program as AR 01067467. 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 05000255/2006009-01(DRS)).

2. **Reduction in Fast Bus Transfer Capability**

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance (Green) involving a modification to replace the startup transformer. Specifically, the inspectors identified

that the licensee replaced the startup transformer with a similar transformer equipped with an automatic load tap changer, and failed to evaluate the potentially adverse effects the modification would have on the independence of the two circuits from the offsite power supply to the Class 1E Buses required by TS and on the fast transfer capabilities described in the FSAR.

Description: During the Spring 2006 refueling outage, the licensee implemented modification EC-157 which replaced the existing fixed tap startup transformer with a similar transformer which featured an automatic load tap changer. The inspectors identified that the licensee had not evaluated the ability of the replacement transformer to handle an automatic fast transfer, as described in the FSAR, Chapter 8.6.2. Specifically, the inspectors noted that no calculations were performed to demonstrate that the modified startup transformer could still meet the following FSAR described functions:

- Upon loss of the first immediate access circuit (safeguards transformer), a fast transfer is provided to the second immediate access circuit (startup transformer).

- When connected to the station power transformer, a reactor and/or generator trip will also result in a fast transfer to the second immediate access circuit.

  The inspectors acknowledged that the licensee did not normally configure the electrical distribution system such that the 2400 V AC buses were connected to the station power transformer.

The inspectors performed some rough calculations which showed that the electrical distribution system could not reliably accomplish these transfers during either normal operation or accident conditions, based on the standard operating condition of the startup transformer. This was based on the normal configuration of the startup transformer in a no load condition prior to the transfer; therefore, the load tap changer would adjust to maintain voltage for the no load condition. The inspectors determined that when the transferred loads are connected, Class 1E buses 1C and 1D would experience a transient voltage drop due to inrush currents during reacceleration of motors, and a steady state voltage drop due to the voltage drop across the now heavily loaded transformer. The inspectors calculated that the transient voltage drop would cause the voltage to dip below the degraded voltage relay drop out setpoint (92.7 percent nominal), such that voltage would need to recover above the relay reset setpoint (93.2 percent nominal, 94.4 percent maximum), prior to expiration of the nominal 6.5 second time delay. Preliminary licensee calculations, performed during the inspection, showed that the steady state voltage could be below the relay reset setpoint.

The inspectors determined that the startup transformer tap changer controller had an inverse time delay characteristic that reduced the time delay for tap adjustment for larger voltage deviations. For instance, for a sudden voltage decrease of 5 percent, the time delay before tap movement would be reduced from the nominal setpoint of 12 seconds, to approximately 2 seconds. The time for physical tap changer movement was typically 1 to 2 seconds per tap, with each tap improving the voltage by 5/8 percent or 15V. Based on this data, the inspectors concluded that while the transfer would

succeed under most conditions, the transfer function could also fail, depending on the magnitude of the load transferred and relay tolerances. Therefore the fast transfer function was not considered by the inspectors to be reliable based on existing controller and relay setpoints, and allowable loading configurations.

The inspectors noted that, in the case of a transfer failure, Class 1E Buses 1C and 1D would transfer to their respective emergency diesel generator. Operators could then manually transfer the buses back to the offsite power supply via startup transformer. However, the initial failure to transfer would be considered by operators to be an anomalous condition, and transfer back to the startup transformer would not occur until the cause of the transfer failure was diagnosed. Since the failure of one circuit from the offsite power supply could precipitate the automatic separation of the Class 1E buses from the second required circuit, and reconnection to the second circuit was not expected to be prompt, the inspectors questioned whether the licensee met the design basis as described in FSAR Section 8.3.2.2. The licensee initiated ARs 01061932 and 01067063 to resolve these issues and performed some initial calculations to determine the likelihood of the fast transfer properly occurring.

Analysis: The inspectors determined that failure to properly evaluate the effects that the addition of an automatic load tap changer to the startup transformer was a performance deficiency because operation of the automatic load tap changer under its nominal setpoints could result in the FSAR-described fast transfer failing to occur. The inspectors further determined that the issue was within the licensee's ability to foresee and correct, and that it could have been prevented had the licensee performed calculations to evaluate the effect of the modification on the FSAR-described design feature.

The inspectors reviewed the performance deficiency against Inspection Manual Chapter (IMC) 0612, “Power Reactor Inspection Reports,” Appendix E, “Examples of Minor Issues,” Example 3a. Specifically, the performance deficiency satisfied the more than minor criteria because the failure to perform a calculation resulted in a modification to the plant which was not in accordance with the design basis and the modification required revision to ensure the design basis was met.

The inspectors performed an IMC 0609, Appendix A, “Significance Determination of Reactor Inspection Findings for At-Power Situations,” Phase 1 screening, and determined that the finding should be evaluated under the Initiating Events Cornerstone as it increased the likelihood of a loss of offsite power. The inspectors determined that the finding screened as Green because, although the modification increased the likelihood of a plant trip upon loss of the safeguards transformer, all mitigating equipment was expected to function, albeit on the emergency diesel generators rather than on the second qualified source of offsite power.

The inspectors determined a contributing cause of this finding was related to the cross-cutting area of human performance. The licensee failed to conduct an effective review of a safety related modification and did not identify possible unintended consequences that might affect operability.

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, on May 2, 2006, the licensee failed to ensure that the design basis, as defined in FSAR Sections 8.3.2.2 and 8.6.2, were correctly translated into modification EC-157. The modification to the startup transformer, which installed an automatic load tap changer, failed to ensure that the FSAR-described fast transfer function could still be performed following the modification to the plant.

The licensee entered the finding into their corrective action program as AR 01067491. 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 05000255/ 2006009-02(DRS)).

3. **Non-Conservative Voltage Drop Calculations for Motor Control Center Control Circuits**

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 voltage drop calculations for 480V motor control center (MCC) control circuits. Specifically, the inspectors identified that the licensee failed to include the voltage drop across control power transformers, did not account for loading due to auxiliary equipment such as relays and indicating lights, did not consider increased cable resistance due to increased temperature in accident environments, used a unverified assumption that calculations for MCCs 1 and 2 bounded other safety related MCCs, and failed to account for previously identified non-conservatisms in associated voltage calculations. The cumulative effect of these factors resulted in a substantial reduction in margin in voltage available for safety-related control equipment.

Description: The inspectors noted that calculation EA-RTD-91-01 only considered voltage drop in the control cables and did not consider the voltage drop across the control power transformers, which could more than triple the total voltage drop in the circuit. In addition, the calculation did not consider the loading and associated voltage drop due to parallel loads including auxiliary relays and indicating lights. Also, the calculation only analyzed circuits for MCCs 1 and 2, based on an unverified assumption that the maximum 2.5 percent voltage drop for those MCC's would be bounding for all other safety related MCCs. In addition, as discussed below, the calculations did not consider increased cable resistance due to accident temperature effects.

In response to the inspector's questions the licensee issued AR 01062531 and its associated operability recommendation (OPR). The inspectors noted that the OPR was also non-conservative because it took credit for margin derived from periodic testing; however, this margin had already been credited in other voltage calculations. The OPR also failed to consider a reduction in margin previously identified by the licensee relating to non-conservative assumptions regarding load distribution on safety related buses.

The licensee acknowledged these deficiencies and issued AR 01067804 to document non-conservative OPR 01062531. The OPR for AR 01067804 provided preliminary calculations for the MCC control circuits that showed approximately zero margin for some circuits, a considerable loss of design margin.

Analysis: The inspectors determined that the failure to account for the actual voltage drops on the cables feeding the 480V control power transformers was a performance deficiency because the failure to assure that safety related loads have adequate voltage to operate under degraded voltage conditions could cause loss of function during a design basis accident. 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 reanalyzed the circuits in 1991.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix E, Example 3j, because the errors had more than a minimal effect on the outcome of the calculation, considerably impacting the available margin of the system such that further evaluation needed to be performed in order to demonstrate that the equipment could perform its safety function. Although, by the end of the inspection, the licensee was able to demonstrate operability; at the time of discovery there was reasonable doubt on the operability of the circuits. Therefore this performance deficiency also impacted the Mitigating Systems Cornerstone objective of ensuring the capability 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, Technical Guidance, “Operability Determinations, and Functionality Assessments for Resolution of Degraded, or Nonconforming Conditions Adverse to Quality or Safety,” 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 determined that there was not a cross-cutting aspect to this finding.

Enforcement: The 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 November 17, 2006, the licensee’s design control measures failed to verify the adequacy of the design, in that the methodology and design inputs used in licensee calculations failed to include significant factors that adversely affected control circuit voltage. Specifically, the inspectors identified that the licensee failed to include the voltage drop across control power transformers, did not account for loading due to auxiliary equipment such as relays and indicating lights, used a unverified assumption that calculations for MCCs 1 and 2 bounded other safety related MCCs, and failed to account for previously identified non-conservatisms in associated voltage calculations. The cumulative effect of these factors resulted in a significant reduction in margin in voltage available for safety-related control equipment.

The licensee entered the finding into their corrective action program as ARs 01062531 and 01067804 and performed preliminary calculations to ensure that all circuits remained operable. 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 05000255/2006009-03(DRS)).

4. **Effect of Accident Temperatures on Cable Resistance Not Evaluated**

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance (Green) for failure to consider the effects of accident temperatures on cable resistances in voltage calculations. Specifically, voltage drop calculations used a value for cable resistance based on a maximum conductor temperature of 90 degrees Celsius (°C), instead of a higher resistance based on accident environment temperatures that could exist in areas where safety related cables were routed.

Description: The inspectors noted that calculations for both AC and direct current (DC) MCC control circuit voltage drops assumed a maximum cable temperature of 90°C and had not considered increased cable resistance due to higher temperatures in accident environments. The inspectors questioned whether other voltage calculations employed the same non-conservative assumption. Of particular concern were circuits using small gauge wire, where resistance is the predominant component of cable impedance. The licensee confirmed that, with the exception of calculations for motor operated valve power circuits, the 90°C assumption had been used in Palisades voltage drop calculations. The licensee evaluated this issue in AR 01063336 and its associated OPR, and provided a reasonable assurance of operability for 480V AC power cables and 120V AC circuits supplied by Preferred AC buses. The inspectors noted, however, that the justification for the 125V DC circuits was non-conservative because it did not account for the reduced battery voltage as documented in the design basis calculation for battery sizing, EA-ELEC-LDTAB-009. The inspectors noted that, based on the information available, that it appeared that there would not be sufficient voltage for DC circuits inside containment under accident conditions when the reduced battery voltages were taken into account. The licensee issued AR 01067802 to document the non-conservative OPR 01063336 and performed a second operability assessment.

Analysis: The inspectors determined that the failure to use the correct conductor temperature and the failure to account for reduced battery voltage in DC voltage drop calculations was a performance deficiency because the failure could have resulted in a loss of function during a design basis accident. 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 reanalyzed the circuits in 1991 and in 2000.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix E, Example 3j, because the errors had more than a minimal effect on the outcome of the calculation, considerably impacting the available margin of the system such that further evaluation needed to be performed in order to demonstrate that DC equipment remained operable and could perform its safety

function. Although, by the end of the inspection, the licensee was able to demonstrate operability; at the time of discovery there was reasonable doubt on the operability of the circuits. Therefore this performance deficiency also impacted the Mitigating Systems Cornerstone objective of ensuring the capability of the circuits. The inspectors also noted that this was a programmatic concern as both AC and DC calculations did not properly account for the voltage drop under high temperature conditions.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening. The finding screened as Green because it was not a design issue resulting in loss of function, 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 determined that there was not a cross-cutting aspect to this finding.

Enforcement: The 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to the above, as of December 15, 2006, the licensee's design control measures failed to verify the adequacy of design of safety related DC electrical circuits. Specifically, the inspectors identified that the licensee failed to use the proper cable resistance and battery voltage in DC voltage drop calculations for safety related electrical circuits located in accident environments.

The licensee entered the finding into their corrective action program as ARs 01063336 and 01067802. 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 05000255/2006009-04(DRS)).

5. **Molded-Case Circuit Breaker Testing Program Deficiencies**

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," having a very low safety significance (Green), for the licensee's failure to ensure that the molded-case circuit breaker (MCCB) testing program remained current with industry and NRC operating experience thus ensuring that the installed safety related and important-to-safety MCCBs did not degrade and would perform satisfactorily in service.

Description: The inspectors reviewed the licensee's procedure and the results of the licensee's MCCB testing program. The inspectors determined that the test was based on an withdrawn NEMA standard. Specifically, the licensee was using NEMA standard AB 2-1984 which was replaced in the mid-80's by NEMA standard AB 4, "Guidelines for Inspections and Preventative Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications." The latest version of AB-4 was issued in 2003.

The inspectors noted that NEMA AB 2-1984 required the licensee to perform a trip test by gradually increasing the testing until the breaker tripped. This testing method relied on the skill of the technician performing the test and was not repeatable. The NEMA AB 4-2003 standard required breaker testing to be completed in conditions close to the original laboratory test. This included using a standard length and gauge of wire for a specific breaker size, requiring a non-trip test at 80 percent of the instantaneous trip value and using a repetitive method for testing to eliminate test results being affected by skill of the technician. The NEMA AB 4-2003 standard also expanded the definition of breaker failures to include a failure to trip or reset after tripping or opening as breaker failures and required tracking and trending of breaker performance.

The inspectors noted that considerable industry experience was available regarding MCCB problems, including NRC Information Notices (INs) 93-26 and 93-64 which identified generic concerns with aging MCCBs. In particular, IN 93-64 stated that detecting or assessing degradation could only be accomplished through appropriate periodic testing and monitoring. The IN also noted that tests such as individual pole resistance, 300-percent thermal overload, and instantaneous magnetic trip tests were found to be effective along with the additional techniques of infrared temperature measurement and vibration testing. The inspectors determined that, while the licensee took actions to address equipment concerns, the licensee did not address the testing concerns raised in the IN. The inspectors ascertained that the licensee's testing program to ensure continued operability of the MCCBs did not meet current testing guidelines. The licensee initiated AR 01064671 to evaluate changing the test procedure from a 20 year old one to a new version incorporating current standards. The inspectors noted that the licensee had completed replacement of the 125V DC and 480V AC MCCBs during the 2006 refueling outage and, therefore, did not have any operability concerns with the currently installed MCCBs.

The inspectors reviewed the breaker setting sheets for the past two cycles (about 3 years) and found that about 20 percent (39/197) of the MCCBs had failed the as-found testing and had to be reset or replaced. The licensee stated that offsite personnel performed the testing and initiated deficiency notices and that site personnel then reviewed the deficiency notices and initiated an AR. The inspectors identified two failures which did not have deficiency notices initiated and seven deficiency notices which were not captured in the corrective action program. The licensee initiated AR 01065608 to address this concern. The inspectors also noted that the remaining ARs were closed to "trend;" however, the licensee had not performed any trending evaluation. Therefore, the licensee had not assessed the impact of the failures on the non-tested MCCBs. The licensee initiated AR 01066264 to address the trending concern.

Analysis: The inspectors concluded that the failure to ensure the MCCB program was using industry standards was a performance deficiency because use of an withdrawn standard could result in MCCBs testing not being repeatable or in not all failures being recognized. 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 NRC had provided generic communications about breaker testing; specifically INs 93-24 and 93-64.

The inspectors determined that the finding 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 equipment performance and affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events. Specifically, the testing program did not ensure the reliability of the installed MCCBs because the program did not include test methods or failure assessment that would accurately and conclusively demonstrate MCCB continued operability.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening. The finding screened as Green because it was not a design issue resulting in loss of function, 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 determined there was not a cross-cutting aspect to this finding.

Enforcement: The 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," states, 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, as of December 15, 2006, the licensee failed to assure that the written test procedures for MCCB testing incorporated the requirements and acceptance limits contained in applicable design documents. Specifically, procedure PD-11 relied upon a design standard, NEMA AB 2, which had been withdrawn and was no longer applicable to MCCB testing.

The licensee entered the finding into their corrective action program as AR 01064671. 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 05000255/2006009-05(DRS)).

6. **Battery Terminals Not Coated with Anti-Corrosion Material**

Introduction: The inspectors identified a NCV of TS Surveillance Requirement 3.8.4.4, having a very low safety significance (Green), for the licensee's failure to verify that the 125V DC battery terminal connections were coated with anti-corrosion material. The inspectors identified that the cable-to-terminal plate connections (cells 1, 35, 36, and 59) were not coated with anti-corrosion material from the battery installation in 1995 and were not verified to be coated during performance of the quarterly battery checks.

Description: During a walkdown of the 125V DC safety related batteries, the inspectors noted that the cable to terminal plate connections at cells 1, 35, 36, and 59, did not have visible anti-corrosion material (grease). The purpose of the anti-corrosion material was

to prevent the buildup of corrosion on all lead-coated and copper surfaces in the battery current path.

The inspectors noted that TS SR 3.8.4.4 required the licensee to verify visible terminal corrosion and to verify battery cell to cell and terminal connections were coated with anti-corrosion material. The inspectors determined that the TS requirements included all bolted connections to and through the battery, including the cable connections bolted to the terminal plates (all current carrying connections). The TS Bases for this surveillance stated that the anti-corrosion material was used "to help ensure good electrical connections and to reduce terminal deterioration." Further, the inspectors noted that TS SR 3.8.4.5 required the licensee to measure battery connection resistance for inter-rack connections. The cable to terminal plate connections were in the current-carrying path being measured by this surveillance.

The inspectors reviewed several completed quarterly (QE-35) and monthly (ME-12) surveillance procedures and noted that the cable to terminal plate connections were not verified as being coated with anti-corrosion material.

The licensee initiated AR 01064804 and took immediate actions including verifying the resistance readings of the suspect connections, examining the connections for evidence of anti-corrosion grease, and applying anti-corrosion grease to the outside of the cable to terminal plate connections. The licensee determined the batteries were operable based on no change in the resistance readings and previously acceptable surveillance results.

After further review and consultation with the battery vendor, the licensee stated that TS SR 3.8.4.4 did not require greasing of the cable to terminal plate connections because these connection points were not originally greased by the manufacturer during installation. The licensee noted that corrosion develops when gases escaping from the battery react with exposed copper material. The licensee believed that the connections were of sufficient distance from the effects of gases; therefore, anti-corrosion material was not necessary. The inspectors discussed this issue with members of the Electrical Engineering and Technical Specification Branches in the Office of Nuclear Reactor Regulation who concluded that the cable to terminal plate connections were included in the scope of the cell to cell and terminal connections of the battery. Therefore, TS SR 3.8.4.4 was applicable to the cable to terminal plate connections.

Analysis: The inspectors determined that the failure to verify the battery terminal connections were coated with anti-corrosion material was a performance deficiency because the failure to complete a TS surveillance requirement could lead to battery degradation. 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 verified presence of anti-corrosion material for the cell-to-cell connections on a quarterly basis, allowing multiple opportunities to catch the lack of anti-corrosion material on the terminal connections.

The inspectors determined that the finding was more than minor in accordance with IMC 0612, Appendix B, because the finding was associated with the Mitigating Systems

cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the reliability of the DC power system. The purpose of the TS surveillance was to ensure good electrical connections and to reduce terminal deterioration. Specifically, corrosion in connections could potentially result in unacceptable connection resistance and decreased battery capacity, rendering the DC system incapable of performing its required safety function.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening. The finding screened as Green because it was not a design issue resulting in loss of function, 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 determined there was not a cross-cutting aspect to this finding.

Enforcement: Technical Specifications Surveillance Requirements 3.8.4.4 requires that the licensee remove visible terminal corrosion and verify battery cell-to-cell and terminal connections are coated with anti-corrosion material. This surveillance has a 12 month frequency.

Contrary to the above, between July 31,1995, to November 30, 2006, a period in excess of 12 months, the licensee failed to complete TS SR 3.8.4.4. Specifically, the licensee failed to verify the presence of anti-corrosion material coating on the cable to terminal plate connections, a connection covered by the TS.

The licensee entered the finding into their corrective action program as AR 01064804. 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 05000255/ 2006009-06(DRS)).

7. **Diesel Generator Frequency Variation not Considered in Loading Calculations**

Introduction: The inspectors identified a finding of very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III. Specifically, the licensee failed to take into account the effect of emergency diesel generator (EDG) frequency variation in the diesel loading calculations.

Description: Calculation EA-ELEC-LDTAB-005 determined diesel loading based on maximum loads during a large break loss of coolant accident. The loading was based on nominal 60 Hertz operation of pumps and fans, and did not account for the +2 percent variation allowed by TS 3.8.1.2. Mechanical affinity laws show that power demanded by centrifugal pumps and fans increases by the cube of the ratio of the speeds. Since the EDG accident loading was comprised primarily of centrifugal loads, the inspectors determined this phenomenon should have been considered in loading calculations. In response to the inspector’s question, the licensee provided preliminary calculations that showed that diesel loading would increase by approximately three percent. Calculation EA-ELEC-LDTAB-005 showed that the maximum accident loading was approximately 96 percent of the two hour load rating for EDG 1-2. Consequently,

when the maximum allowed frequency variation was included, the majority of the available margin for the EDG 1-2 two hour load rating was removed. This issue was entered into the licensee's corrective action program as AR 01067491.

Analysis: The inspectors determined that failure to properly account for the effect of frequency variation on diesel generator loading was a performance deficiency because the failure could cause degradation and loss of function of the EDGs when they were called upon. 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 revised the diesel loading calculation multiple times and had an on-going issue where a limitation on diesel frequency had been factored into the EDG testing procedures.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix E, Example 3j, because, based on preliminary calculations, the failure to account for frequency variations had more than a minimal effect on the outcome of the calculation; specifically it resulted in reducing the available margin for the two hour loading on EDG 1-2 by approximately 75 percent. Although, by the end of the inspection, the licensee was able to demonstrate operability; at the time of discovery there was reasonable doubt on the operability of the diesels. Therefore this performance deficiency also impacted the Mitigating Systems Cornerstone objective of ensuring the capability of the diesels.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening. The finding screened as Green because it was not a design issue resulting in loss of function, 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 determined there was not a cross-cutting aspect to this finding.

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, as of December 13, 2006, the licensee did not adequately translate design basis information into the diesel generator loading calculation. Specifically, Calculation EA-ELEC-LDTAB-005 did not properly account for the TS allowable diesel generator +2 percent frequency variation. The licensee failed to consider how the frequency variation could affect the design and licensing basis of the diesel engines.

The licensee entered the finding into their corrective action program as AR 01067491. 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 05000255/2006009-07(DRS)).

8. **Emergency Diesel Generator Automatic Fuel Transfer Equipment not Rated for Expected Maximum Temperature**

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance (Green) for failure to verify that all equipment in the EDG rooms was rated for the temperature in which it had to operate. Specifically, eight components involved with transferring diesel fuel to the EDGs were not rated to operate under the design basis temperatures that could be experienced in the EDG rooms.

Description: On July 26, 2005, the licensee wrote AR 00870121 to address a concern with operator guidance on actions to take if outside temperatures exceeded the design basis maximum of 95°F. The licensee completed OPR 00870121-01 on August 11, 2006; the OPR assessed the qualification of safety related electrical equipment located inside the EDG rooms. However, the OPR failed to assess eight components because the OPR assumed that manual operator action could be credited to replace the automatic action. As the eight components were used as part of the automatic fuel transfer system from the day tank to the EDG belly tank, the inspectors questioned the acceptability of these manual actions. The licensee determined that Section 4.4.3 of SOP-22 stated that the fuel transfer system for a diesel generator was considered inoperable when it was unable to perform the automatic level control function for the engine belly tank. Therefore, the inspectors concluded that the OPR was inadequate.

The inspectors noted that the design outside air temperature for the Palisades plant was 95 degrees Fahrenheit (°F). Therefore, the inspectors questioned whether these eight components were qualified for their design environment. The inspectors also noted that AR 00870121 indicated that the outside temperature had exceeded 95°F on July 24, 2005. Furthermore, the inspectors determined that the local weather station in South Haven, Michigan had recorded a maximum temperature for July 24, 2005, as 96.8°F. The inspectors also identified that the inlet screens appeared to be partially blocked while the licensee identified, due to an inspection question, that one fan appeared to have less than design airflow. Therefore, the inspectors questioned whether these components were operable during the two hour period when it appeared that the site outside temperature exceeded the design basis maximum temperature.

The licensee performed calculation EA-EC9600-01 and concluded that all the equipment in the diesel generator rooms could survive 104.5 days at 121°F before age degraded failures would begin to occur. The inspectors noted that the assumptions in this calculation only addressed components failing to thermal aging. The inspectors again questioned the operability of the components as the analysis did not address whether all the equipment in the rooms would function properly with the required accuracy. After the inspector's inquiry, the licensee reassessed the electrical components in the room and rated them to a maximum temperature of 120°F, which accounted for the outside temperature being at the design maximum of 95°F and the room heat up while the EDGs were operating, with some margin for degradation. Therefore the inspectors concluded that the eight components had remained operable for the two hour period on July 24, 2005 when the site design temperature was reached and exceeded.

Analysis: The inspectors determined that the failure to ensure that components in the diesel generator fuel transfer system were rated for the temperature in which they had to function was a performance deficiency because the failure of the equipment could have compromised the ability of the EDG to function. The inspectors further determined that the issue was within the licensee's ability to foresee and correct, and that it could have been prevented had the OPR been critically reviewed because the OPR specifically determined that the equipment was not qualified to operate at the expected elevated temperatures.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B, because the finding was associated with the equipment performance (availability and reliability) 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 equipment that was required for the function of automatically transferring fuel to the EDG belly tanks was not initially rated for the temperature in which it was required to operate, hence affecting the capability of the EDGs to respond to an initiating event.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening. The finding screened as Green because, by the end of the inspection, the licensee was able to show that there was not a design issue resulting in loss of function of the EDGs; because the finding 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 determined a contributing cause of this finding was related to the cross-cutting area of human performance. The licensee failed to conduct an effective review of the operability decision to verify the validity of the underlying assumptions; specifically that some components were outside their temperature ratings but that operability was not assessed.

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, on August 11, 2005, and again on November 30, 2006, the licensee did not correctly translate design basis information into specifications, drawings, procedures or instructions. Specifically, the maximum temperature at which EDG automatic fuel transfer system equipment was rated was incorrectly translated into OPR 00870121-01 and calculation EA-EC9600-01.

The licensee entered the finding into their corrective action program as AR 01066273. Additional ARs written to cover aspects of this issue were 01062304 and 01066913. 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 05000255/2006009-08(DRS)).

9. **High Pressure Safety Injection Pump Vortex Limit Calculation Inaccuracies**

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance (Green) because the vortex limit calculation for the high pressure safety injection pumps was non-conservative. Specifically, the inspectors identified that the licensee incorrectly interpreted a graph used to determine the percent air ingestion as a function of the Froude number. This resulted in a non-conservative air entrainment value for the high pressure safety injection pumps when taking suction from the safety injection refueling water (SIRW) tank at the point of switching over to the containment sump.

Description: The inspectors determined that the licensee incorrectly derived the percentage of air entrainment in calculation EA-C-PAL-95-0877D. The licensee accurately calculated the Froude Number. However, the licensee then went to a graph in Knauss, “Swirling Flow Problems at Intakes,” and incorrectly chose an air entrainment value based upon a test data point rather than using the graph envelope line. The inspectors noted that the envelope line was developed in order to account for test uncertainties and differences between actual test conditions and analytical situations. The inspectors determined that, for the SIRW tank, the amount of air entrainment increased from 3.2 percent to 4.2 percent. The inspectors identified an additional error in the calculation which further increased the amount of air entrainment which would be experienced at established tank action levels. Specifically, the inspectors noted that the calculation did not take into account the additional effect on tank level due to stroking of the valves involved in switching the high pressure safety injection suction sources from the SIRW tank to the containment sump.

For the high pressure safety injection pumps, the licensee issued AR 01062278 and performed an OPR. As part of the OPR, the licensee contacted the vendor who responded that performance deterioration would occur, but that the pump would continue to function with up to 5 percent air, although there would be deterioration of up to 10 to 15 percent in head and up to 7 to 10 percent in flow. The licensee further reviewed the effect of performance deterioration and concluded that the amount of air entrainment and the short duration associated with air entrainment and reduced performance would have a negligible effect on the accident analyses. However, the inspectors noted that the accident analysis calculations would need to be redone to ensure that the effects of the valve stroking was considered and to confirm the assumptions made in the OPR. The inspectors also noted that other safety related emergency core cooling system pumps would be affected by this error as the calculation EA-C-PAL-95-0877D also addressed those pumps.

Analysis: The inspectors determined that failure to properly calculate the correct safety injection refueling water tank level required to prevent excessive air entrainment was a performance deficiency, because the failure resulted in high pressure safety injection pump degradation. 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 because the NRC had issued IN 2006-21, specifically alerting licensees to the possible entrainment of air into emergency core cooling system pumps and because the

licensee performed a self-assessment prior to the inspection which looked at high-risk components such as the high pressure safety injection pumps.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix E, Example 3i and 3j, because, the calculation error was significant enough to require re-analysis of the accident analysis setpoint, including requesting the pump manufacturer to analyze the capability of the pumps to perform at the higher percent of air entrainment, and required the engineers to reanalyze the pumps safety function in light of the reduced net positive suction head, as well as reduced flow and discharge head at the time the vortex formed. The inspectors noted that the error appeared to be programmatic as a similar error was made in calculating the air entrainment to the auxiliary feedwater pumps. Therefore this performance deficiency impacted the Mitigating Systems Cornerstone objective of ensuring the capability of the high pressure safety injection pumps.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening. The finding screened as Green because it was not a design issue resulting in loss of function, although it did cause degradation of the function; 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 determined there was not a cross-cutting aspect to this finding.

Enforcement: The 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, as of November 16, 2006, the licensee did not adequately translate design basis information into the vortex limit calculation for the high pressure safety injection pumps. Specifically, calculation EA-C-PAL-95-0877D did not properly account for the amount of air entrainment that the pumps would experience when the safety injection tank was at its lowest level prior to switching to the containment sump during a design basis accident.

The licensee entered the finding into their corrective action program as AR 01062278. 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 05000255/2006009-09(DRS)).

10. **Potential for Safety Injection Refueling Water Tank Level Switch Setpoints to be Outside Technical Specification Limit**

Introduction: The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," having very low safety significance (Green) for failure to consider the effects of instrument uncertainty when establishing test acceptance criteria. Specifically, the licensee failed to establish a proper setpoint for

SIRW tank level switch such that, when instrument uncertainty was taken into account, the setpoint could be set outside the TS limits.

Description: The inspectors noted that procedure RI-14 conflicted with TS Surveillance SR 3.3.3. The TS required that the SIRW tank level be between 21 and 27 inches above the tank bottom. The test procedure allowed the testing value to be between 22 and 26 inches above tank bottom. However, the test procedure also noted that the total test setup accuracy was ±1.88 inch of water. When the instrument accuracy was taken into account, the test's allowable range could result in the level switch being outside the TS limits.

The licensee checked the actual setting and determined that RI-14 was last performed on April 19, 2006. For level switch LS-0329, the as-left setpoint was at 25.17 inches above tank bottom. When the standard instrument accuracy of 1.88 inches was added, then the resultant level was 27.05 inches above tank bottom, outside the TS limit. The licensee issued AR 01061965 to evaluate the issue. The licensee determined that the instrument accuracy value contained a factor to account for temperature drift between the time of transmitter calibration and level switch position testing. The licensee ascertained that the transmitter was calibrated approximately 21 days prior to the position testing and that the temperature differential was only 18°F as compared to the 25°F used in establishing the instrument accuracy. Therefore, the licensee determined that, for LS-0329, the maximum potential instrument inaccuracy was 1.65" and the actual setpoint was within the TS allowable.

Analysis: The inspectors determined that failure to properly incorporate instrument accuracy into the SIRW tank level switch testing was a performance deficiency because the level switches could have been set outside the TS limits. 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 revised the test procedure on multiple occasions.

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix E, and Appendix B, because, if the procedure deficiency was left uncorrected, the TS limit for the SIRW tank level setpoint could have been exceeded without the licensee being aware of it.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening, and determined that the finding should be evaluated as under the Mitigating Systems Cornerstone as it affected the availability and reliability of mitigating equipment. The finding screened as Green because it was not a design issue resulting in loss of function, 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 determined there was not a cross-cutting aspect to this finding.

Enforcement: The 10 CFR Part 50, Appendix B, Criterion XI, "Test Control" requires, in part, that a test program 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, as of November 15, 2006, procedure RI-14, which established the setpoints for the SIRW tank level setpoints, did not incorporate the requirements and acceptance limits contained in applicable design documents. Specifically, the procedure allowed the level setpoints to be set outside TS 3.3.3 limits, when instrument accuracy was taken into account.

The licensee entered the finding into their corrective action program as AR 01061965. The licensee verified that the actual setpoints were within TS limits and initiated a procedure change request to revise the surveillance to ensure instrument accuracy was properly taken into account when establishing the setpoints. 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 05000255/2006009-10(DRS)).

11. **Failure to Correctly Apply Pressure Locking Thrust in Motor Operated Valve Performance Test Procedures**

Introduction: The inspectors identified a finding of very low safety significance (Green). Specifically, the valve actuator capability margin to open calculated for the boric acid gravity feed motor operated valves (MOVs) MO-2169 and MO-2170 as part of the valve static performance test procedure did not correctly apply the effect due to pressure locking.

Description: As part of their response to Generic Letter 95-07, the licensee conservatively calculated the minimum required thrust to open determination for MO-2169 and MO-2170 in calculation EA-PLTB-00. While thermal binding was determined not to be a concern, the licensee determined that an additional actuator thrust was required to overcome the effect of pressure binding; this was calculated to be approximately 774 pounds-force for both MO-2169 and MO-2170.

The inspectors determined that the licensee failed to correctly apply the thrust due to pressure locking when measuring the motor actuator capability margin to open in static performance tests performed under procedures EM-28-07 and MSE-E-21. The licensee compared the test results to acceptance criteria incorrectly derived from calculation EA-PLTB-00. Specifically, the licensee did not recognize that the pressure locking effect was not present during the MOV static performance test but was included in the acceptance criteria. Therefore, the acceptance criteria were non-conservative such that valve actuator deterioration might not be corrected before the valve actuator exceeded its capability to function. This issue generically applied to all MOVs susceptible to the pressure locking phenomenon. The licensee corrected the error, reviewed the test results, and determined that MO-2169 and MO-2170, as well as the other MOVs, had sufficient actuator capability margin to open when the effect of pressure locking was properly included. The licensee determined that actuator deterioration was occurring on

valve MO-2170 such that the actuator capability margin to open for MO-2170 was reduced from 5.3 percent to 3.2 percent.

Analysis: The inspector determined that this issue was a performance deficiency since the licensee did not correctly evaluate the impact of the additional MOV actuator thrust required to overcome the effect of pressure locking. 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 revised the calculation and test procedures on multiple occasions, each of which provided an opportunity to recognize that the test acceptance criteria misapplied the calculation results

The inspectors determined that the performance deficiency was more than minor in accordance with IMC 0612, Appendix B because, if left uncorrected, the finding could become a more significant safety concern. Specifically, the inspectors determined that if the error had not been identified by the inspectors and corrected, the MOV actuators would have deteriorated over time without being detected, resulting in the valves being unable to perform their required functions.

The inspectors performed a IMC 0609, Appendix A, Phase 1 screening, and determined that the finding should be evaluated as under the Barrier Integrity Cornerstone as it affected fuel integrity by ensuring safe shutdown of the reactor through addition of concentrated boric acid. In accordance with the SDP Phase 1 guidance, findings affecting fuel integrity barrier screen as Green.

The inspectors determined the cause of the finding was related to the cross-cutting area of human performance because the valve performance test procedure did not provide adequate guidance on how to evaluate the additional thrust required to overcome the effect of pressure locking.

Enforcement: This finding was not subject to NRC enforcement because the portion of the chemical volume and control system in which valves MO-2169 and MO-2170 are located has been reclassified as non-safety related. The licensee entered the issue into their corrective action program as AR 01067047 (FIN 05000255/2006009-11(DRS)).

12. **Potential Common Mode Failure Mechanism Due to Out of Phase Transfer**

Introduction: The inspectors identified an unresolved item regarding the ability of the plant to perform a fast transfer.

Description: The Palisades electrical distribution system features two circuits from the offsite power supply to the 2400V Class 1E Buses. The first is through safeguards transformer and the intermediate 2400V safeguards bus, and the second is directly through the startup transformer. During power operation, the Class 1E buses may also be supplied from the main generator through station power transformer through the 2400V safeguards bus; however, this is not a normal station lineup. Class 1E buses 1C and 1D and Non-Class 1E bus 1E are normally connected to the 2400V safeguards bus. The FSAR, Section 8.3.2.2, states that, if the source of power to the 2400V safeguards bus is lost, Class 1E buses 1C and 1D are transferred to the startup transformer.

For transfers between the safeguards transformer and the startup transformer, the inspectors determined that intermediate relaying between the trip relays and closing relays introduced time delays that could allow adverse effects to occur. In addition, the inspectors determined that the time delays had not been measured or analyzed, and that there was limited experience from actual transfers to provide confidence that adverse effects would not occur. The inspectors noted that redundant Class 1E Buses 1C and 1D were interconnected for a majority of the "dead bus" time during a transfer, and would experience similar voltage and frequency variations during the transfer. Consequently, the inspectors were concerned that an out of phase transfer could adversely affect loads on both redundant buses, and present a common mode failure mechanism.

In response to the inspectors questions, the licensee provided engineering analysis EA-A-PAL-90-129 that analyzed an actual transfer event from the safeguards transformer to the startup transformer in early 1993. The EA evaluated the transfer based on data from the actual 1993 event, including estimated relay operating times. The EA modeled the conditions existing during the actual event, and a hypothetical case where Buses 1C and 1D were carrying design basis accident loads. Results of the plant event simulation agreed reasonably well with the system response observed during the actual event, thereby lending credibility to the model. However, results of the design basis simulation showed unsatisfactory performance. These results showed that the voltage/Hertz (V/Hz) ratio considerably exceeded the 1.33 per unit acceptance criterion contained in standard ANSI C50.41, "Polyphase Induction Motors for Power Generating Stations"; the V/Hz ratio was calculated to be 1.72 for Bus 1C and 1.51 for Bus 1D. Additionally the EA determined that excessive transformer current would occur and that both safety buses would trip due to excessive acceleration times for motors.

The licensee concluded that exceeding the 1.33 V/Hz acceptance criteria was acceptable as the value was set based upon preventing cumulative damage due to fatigue of motor shafts and the infrequency of transfers from the safeguards would prevent cumulative damage. However, the inspectors noted that the licensee's values were sufficiently above the 1.33 acceptance criteria and were concerned that the damage could be immediate rather than cumulative.

The EA justified the tripping of the Class 1E buses by stating that this condition did not deviate from the single failure criteria stated in the FSAR because the emergency diesel generators would still be available to power the buses and because the safety related loads would be sequenced back on the diesel, even if they had tripped off due to overcurrent or undervoltage. The EA concluded that the fast transfer scheme should be improved, but that the improvements should follow the normal design engineering planning and scheduling process. However, this recommendation was not entered into the corrective action system, modifications were not implemented, and a commitment to the NRC was withdrawn.

The inspectors questioned the licensee's basis for withdrawal of the commitment. The licensee responded that they had determined that the scenario of a loss of coolant accident along with a single failure of the safeguards transformer was outside their design and licensing basis. The inspectors questioned this conclusion as the

safeguards transformer was installed as a modification in 1988. The original plant design, as described in the FSAR, included a fast transfer from the station power transformer to the startup transformer. The FSAR specified an allowable number of cycles to complete the fast transfer from the station power transformer, as well as an allowable dead bus time. A fast transfer occurring within these parameters did not result in dropping of non-safety related loads or start of the EDGs, much less potential tripping of the safety-related 2400V buses. The inspectors also noted that the fast transfer from the safeguards transformer was described in the FSAR, although without specifying allowable cycles or dead bus time.

This issue has been forwarded to the Office of Nuclear Reactor Regulation to determine the design and licensing basis applicability. Pending resolution, this item will be tracked as an unresolved item (URI 05000255/2006009-12(DRS)).

13. **Incorrect Auxiliary Feedwater Vortex Limit Calculation**

Introduction: The inspectors identified an unresolved item involving the vortex limit calculations for the auxiliary feedwater (AFW) pumps when taking suction from the condensate storage tank (CST). Specifically, the inspectors identified that the licensee misinterpreted a graph used to determine the percent air ingestion as a function of the Froude number, which resulted in a non-conservative value for pump air entrainment being used in the calculations.

Description: The inspectors determined that the licensee incorrectly derived the percentage of air entrainment in calculation EA-FC-954-03. While the licensee accurately calculated the Froude Number, the licensee then went to a graph in Knauss, "Swirling Flow Problems at Intakes," and incorrectly chose an air entrainment value based upon a test data point rather than using the graph envelope line. The inspectors noted that the envelope line was developed in order to account for test uncertainties and differences between actual test conditions and analytical situations. The inspectors determined that, for the CST, the amount of air entrainment increased from four percent to six percent. The inspectors also identified that the licensee had not included the auxiliary feedwater (AFW) pipe which protruded into the CST by 1.25 inches. This further increased the amount of air entrainment which would be experienced at established tank action levels.

For the AFW pumps, the licensee issued AR 01062644 but at first determined that operability of the pumps was not affected. The inspectors noted that the vendor's information did not address operation of the AFW pumps at six percent air entrainment. Furthermore, while one of the AFW pumps was identical to the high pressure injection pumps, the other two were slightly different. Therefore, the inspectors questioned this operability call and requested information to show that the pumps would operate with the amount of expected air entrainment. The licensee contacted the vendor, who was unwilling to guarantee pump operation with six percent air entrainment. Therefore, the licensee determined that an OPR was necessary. The licensee issued OPR 01062644-03 on December 15, 2006, and determined the AFW pumps were operable. On December 19, 2006, the licensee reissued the operability determination declaring the pumps operable but non-conforming.

The inspectors noted two areas where the OPR appeared deficient. First, the OPRs assumed that five percent air entrainment would be acceptable for the AFW pumps. The inspectors reviewed the information provided during the inspection and noted that the licensee had never provided any information regarding vendor acceptance of five percent air entrainment. As the licensee had initially, in AR 01062644, assumed the pumps were operable with six percent air entrainment, the inspectors requested that the licensee confirm that five percent air entrainment would not cause damage to the pumps. On January 10, 2007, the vendor responded to the licensee noting that they would support an air entrainment value of four percent, with the caveat that there would be significant degradation of hydraulic performance and the AFW pumps would not meet their design duty point. The vendor stated that the pump would continue to operate, and the post transient performance should not be affected. The licensee issued the third revision to the OPR on January 16, 2007. The inspectors noted that there appeared to be insufficient time for the operator to take action to stop the pumps before the air entrainment value exceeded four percent. Additionally, the OPR did not make any specific allowance for degradation of hydraulic performance at four percent air entrainment, although it did conservatively assume full AFW flow.

Second, the inspectors noted that the OPR eliminated tornado missiles based on a probabilistic argument. NRC guidance in Part 9900 Section C.6 states that the use of PRA or probabilities of occurrence of accidents or external events is not consistent with the assumption that the event occurs, and is not acceptable for making operability decisions. Therefore, the inspectors requested that the licensee provide further discussion as to why tornado damage to the CST did not need to be evaluated.

Pending resolution of the outstanding questions on the OPR, this issue will remain unresolved (URI 05000255/2006009-13(DRS)). The inspectors did not have any immediate safety concerns for the auxiliary feedwater based on the licensee's compensatory actions.

14. **Addition of Manual Operator Action Not Evaluated in Accordance with 10 CFR 50.59**

Introduction: The inspectors identified an unresolved issue involving an inadequate evaluation of a change to the facility under 10 CFR 50.59. Specifically, the licensee introduced a manual operator action to trip the AFW pumps to prevent excessive air entrainment and pump damage and did not perform an evaluation under 10 CFR 50.59.

Description: In LER 95-006, the licensee described an issue with the low suction pressure trip setpoints for the AFW pumps. In order to resolve the issue, in 1996, the licensee added a new low-low level alarm to the main control room panel C13, annunciator K11, window 15. In addition, alarm response procedure ARP-7 was revised to add a manual trip of the operating AFW pump whenever the CST level reached 5 percent. The LER noted that, in lieu of tripping the pumps, the operators could restore flow to the design flow rate, such that the low suction pressure trips would be adequate to protect the pumps.

The inspectors identified a number of errors with the calculation which determined the minimum CST level to prevent excessive air entrainment in the AFW pumps. Due to these errors, the licensee acknowledged that the low suction pressure trips would no longer protect the pumps, even if the flow was restored to the design flow rate. Additionally, the inspectors determined that the procedure for calibrating the CST low-low level setpoint incorrectly calculated the instrument uncertainty associated with the setpoint, such that the 7.5 percent indicated flow might be as low as 4.5 percent actual tank level. This could result in the manual trip of the pumps not occurring until the actual tank level was 2 percent.

The inspectors reviewed the 10 CFR 50.59 evaluation performed in 1996 as part of the setpoint change. The inspectors noted that the 10 CFR 50.59 only described making a change to ensure that the 100,000 gallons required by the TS were available and did not address the addition of the low-low level setpoint, although that was one of the changes implemented by the setpoint change. The inspectors determined that the question as to whether the setpoint change involved a change to the facility as described in the FSAR should have been answered yes as the low suction pressure AFW pump trip was described in FSAR Section 7.4.3.2. Furthermore, the licensee acknowledged, at that the FSAR stated that the purpose of the switches was to trip the pumps on low CST water level. As the licensee now planned to credit the manual operator action in lieu of the automatic low suction pressure trip in order to prevent damage to the AFW pumps, the inspectors asked if further evaluation under 10 CFR 50.59 was necessary. In response, the licensee prepared evaluation 06-0202. The inspectors noted that the initial version of the 10 CFR 50.59 evaluation did not address the errors that the inspectors had identified in the calculations. The next revision assumed that the AFW pumps could withstand 5 percent air entrainment, similar to the argument used in OPR 01062644-03.

In reviewing the 10 CFR 50.59 evaluations, the inspectors noted that the licensee had negatively answered all the questions. The inspectors noted that in response to question 2, “Does the proposed activity result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the FSAR” with a response addressing the four questions addressed in Nuclear Energy Institute (NEI) Standard 96-07, “Guidelines for 10 CFR 50.59 Implementation,” Section 4.3.2, Example 4:

- The action (including required completion time) is reflected in plant procedures and operator training programs;

- The licensee has demonstrated that the action can be completed in the time required considering the aggregate affects, such as workload or environmental conditions, expected to exist when the action is required;

- The evaluation of the change considers the ability to recover from credible errors in performance of manual actions and the expected time required to make such a recovery; and

- The evaluation considers the effect of the change on plant systems.

However, the inspectors noted that the response to the first question did not reflect actual plant procedures and training as the required completion time was not included in ARP-7, which discussed the required operator action, and the operators were not specifically trained on the urgency of tripping the AFW pumps. Also, for the design basis flow rate, the inspectors determined that the operators would have less than 10 minutes to perform the action without error. Additionally, the response to the third question did not include any evaluation of the expected time required to recover from a credible error.

Also, the inspectors questioned whether NEI 96-07, Section 4.3.2, Example 4, was an appropriate example for the condition being evaluated. Specifically, the inspectors noted that NEI 96-07, Section 4.3.2, Example 4 stated that it was to evaluate "a new or modified operator action that supports a design function credited in safety analyses" while Example 7 evaluated changes that would (permanently) substitute manual action for automatic action for performing an FSAR-described design function. As the licensee was indicating that the manual AFW pump trip was now necessary because the automatic pump trip would not protect the pumps due to the errors discussed above, the inspectors deemed that the manual action was now substituting for performance of a FSAR described design function, rather than supplementing it as it previously was thought to do in 1996. Therefore, the inspectors concluded that a license amendment was necessary. On January 23, 2007, the licensee stated that, based on review of the licensing basis at the time of the modification, they agreed that a license amendment was needed in order to credit the manual action.

Because findings involving 10 CFR 50.59 are considered to be issues that potentially impede or impact the regulatory process, they are dispositioned using the traditional enforcement process instead of the SDP. However, the underlying technical issue is evaluated under the SDP and a severity level is assigned based on that issue. Because the underlying technical issue, as described in Section 1R21.3.b.13, is still unresolved, the 10 CFR 50.59 issue is also unresolved. This issue was entered into the licensee corrective action program as AR 01067550 (URI 05000255/2006009-14(DRS)).

.4 **Operating Experience**

a. Inspection Scope

The inspectors reviewed seven operating experience issues (7 samples) 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 effort:

- BL 88-04 Potential Safety-Related Pump Loss
- GL 95-07 Pressure Locking and Thermal Binding of Safety-Related Power Operated Gate Valves
- IN 91-57 Operational Experience on Bus Transfers

- IN 93-26 Grease Solidification Causes Molded Case Circuit Breaker Failure to Close
- IN 93-64 Periodic Testing and Preventive Maintenance of Molded Case Circuit Breakers
- IN 06-21 Operating Experience Regarding Entrainment of Air into Emergency Core Cooling and Containment Spray Systems
- NSAL 06-3 Aging Issues and Subsequent Operating Issues for Breakers at Their 20 Year Design/Qualified Lives

b. Findings

No findings of significance were identified.

.5 **Modifications**

a. Inspection Scope

The inspectors reviewed six permanent plant modifications related to the selected risk significant components to verify that the design bases, licensing bases, and performance capability of the components have not been degraded through modifications. One interim and one temporary modification were reviewed to ensure that current plant conditions met the design basis and that non-conforming conditions were being resolved within the guidance of RIS 2005-20, "Revision to Guidance Formerly Contained in NRC Generic Letter 91-18, 'Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability'." The modifications listed below were reviewed as part of this inspection effort:

- EC-157 Replace Startup Transformer 1-2
- EC-8757 Condensate Storage Tank Water Loss During Postulated Tornado Event
- EC-8866 Temporary Modification to Condensate Storage Tank Lid
- EAR-98-0423 Service Water Pump 1B Rebuild
- EAR-99-0081 Chemical and Volume Control System Declassification
- EAR-2000-0064 Capping Steam Supply Line to Auxiliary Feedwater Turbine from Steam Generator B
- FES-95-206 Station Battery Replacement
- SC-94-102 Set Transformer Taps to 2340/480V AC Setting

b. Findings

A finding related to modification EC-157 is discussed in Section 1R21.3.b.2.

.6 **Risk Significant Operator Actions**

a. Inspection Scope

The inspectors performed a margin assessment and detailed review of six risk significant, time critical operator actions (6 samples). These actions were selected from the licensee's PRA rankings of human action importance based on risk achievement worth and Birnbaum values. Where possible, margins were determined by the review of the assumed design basis and FSAR response times and performance times documented by job performance measures results. For the selected operator actions, the inspectors performed a walk through of associated procedures 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:

- Manually close atmospheric dump valves post steam generator tube rupture;
- Manually align non-safety related diesel generator post station blackout;
- Enabling essential recirculation valves to close post recirculation actuation signal;
- Local operator makeup to the condensate storage tank post loss of feedwater;
- Local operator switches auxiliary feedwater suction from the condensate storage tank to the fire water system post loss of feedwater; and
- Operators isolate main feedwater and auxiliary feedwater to faulted steam generator post steam generator tube rupture.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution

.1 Review of Condition Reports

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. The specific corrective action documents that were reviewed by the inspectors are listed in the attachment to this report.

b. Findings

A finding related to a past operability determination is discussed in Section 1R21.3.b.1.

.2 Review of Licensee Event Reports

a. Inspection Scope

The inspectors reviewed a sample of LERs that were submitted by the licensee to the NRC. The inspectors reviewed these reports as part of the component review to verify that the corrective actions specified had been completed and to evaluate the effectiveness of the corrective actions related to the identified design issues. The LERs reviewed by the inspectors were:

- LER 1995-006-00 Inadequate Auxiliary Feedwater Pump Low Suction Pressure Trip Setpoints
- LER 2003-003-00 Loss of Shutdown Cooling and Emergency Diesel Generator Start
- LER 2003-005-00 Emergency Diesel Generators Start on Low Voltage Condition
- LER 2005-002-00
LER 2005-002-01 Emergency Diesel Generator 1-2 Excessively Loaded In Certain Postulated Post-Accident Scenarios
- LER 2005-007-00 Inoperable Diesel Generator For a Period Longer Than Permitted by Technical Specifications
- LER 2006-901 Invalid System Actuation Of Emergency Core Cooling System Components

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exits

Exit Meeting Summary

The inspectors presented the inspection results to Mr. Harden and other members of licensee management at the conclusion of the inspection on December 15, 2006. A second telephone exit was conducted on January 29, 2007, to inform the licensee of changes to the findings discussed during the exit meeting on December 15, 2006. 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
G. Baustian, Training Manager
B. Berles, System Engineering Manager
T. Blake, Nuclear Safety Assurance Manager
A. Blind*, Design Engineering Manager
B. Brogan*, Design Engineering, Technical Lead
J. Broschak, Engineering Director
D. Cooper, Chief Nuclear Officer
B. Dotson, Regulatory Compliance
J. Erickson, Design Engineering
T. Fouty*, Programs and Analysis Programs Supervisor
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G. Hettel, Plant Manager
D. Kennedy*, Design Engineering
L. Lahti, Licensing Manager
D. Malone, Regulatory compliance supervisor
M. Nordin*, Configuration Management Supervisor
P. Russell, Engineering Programs Manager
W. Scott*, Electrical and Instrumentation and Controls Supervisor
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* Inspection team contacts

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

0500255/2006009-01	NCV	Startup Transformer not Evaluated for Past Operability and Reportability
0500255/2006009-02	NCV	Reduction in Fast Bus Transfer Capability
0500255/2006009-03	NCV	Non-Conservative Voltage Drop Calculations for Motor Control Center Control Circuits
0500255/2006009-04	NCV	Effect of Accident Temperatures on Cable Resistance Not Evaluated
0500255/2006009-05	NCV	Molded-Case Circuit Breaker Testing Program Deficiencies
0500255/2006009-06	NCV	Battery Terminals Not Coated with Anti-Corrosion Material
0500255/2006009-07	NCV	Diesel Generator Frequency Variation not Considered in Loading Calculations
0500255/2006009-08	NCV	Emergency Diesel Generator Automatic Fuel Transfer Equipment not Rated for Expected Maximum Temperature
0500255/2006009-09	NCV	High Pressure Safety Injection Pump Vortex Limit Calculation Inaccuracies
0500255/2006009-10	NCV	Potential for Safety Injection and Refueling Water Tank Level Switch Setpoints to be Outside Technical Specification Limit
0500255/2006009-11	FIN	Failure to Correctly Apply Pressure Locking Thrust in Motor Operated Valve Performance Test Procedures
0500255/2006009-12	URI	Potential Common Mode Failure Mechanism Due to Out of Phase Transfer
0500255/2006009-13	URI	Incorrect Auxiliary Feedwater Vortex Limit Calculation
0500255/2006009-14	URI	Addition of Manual Operator Action Not Evaluated in Accordance with 10 CFR 50.59

Closed

0500255/2006009-01	NCV	Startup Transformer not Evaluated for Past Operability and Reportability
0500255/2006009-02	NCV	Reduction in Fast Bus Transfer Capability
0500255/2006009-03	NCV	Non-Conservative Voltage Drop Calculations for Motor Control Center Control Circuits
0500255/2006009-04	NCV	Effect of Accident Temperatures on Cable Resistance Not Evaluated
0500255/2006009-05	NCV	Molded-Case Circuit Breaker Testing Program Deficiencies
0500255/2006009-06	NCV	Battery Terminals Not Coated with Anti-Corrosion Material
0500255/2006009-07	NCV	Diesel Generator Frequency Variation not Considered in Loading Calculations

0500255/2006009-08	NCV	Emergency Diesel Generator Automatic Fuel Transfer Equipment not Rated for Expected Maximum Temperature
0500255/2006009-09	NCV	High Pressure Safety Injection Pump Vortex Limit Calculation Inaccuracies
0500255/2006009-10	NCV	Potential for Safety Injection and Refueling Water Tank Level Switch Setpoints to be Outside Technical Specification Limit
0500255/2006009-11	FIN	Failure to Correctly Apply Pressure Locking Thrust in Motor Operated Valve Performance Test Procedures

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 or 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.

Action Requests Reviewed During the Inspection

D-PAL-93-016; Loss of 1-1 Safeguards Transformer and "F" Bus During Performance of QO-1; January 28, 1993
D-PAL-93-226; Inadequate Safeguards Bus Transfer Scheme; October 5, 1993
C-PAL-94-1072; Loss of Switchyard "F" Bus; November 23, 1994
CAP021914; 2400V Bus Fast Transfer/Faulted Cable; January 16, 1996
CAP030519; Lack of Automatic Fast Transfer from Station Power Transformer 1-2 to Start-Up Transformer 1-2 on Safeguards Bus Differential Relay Operation; April 26, 2002
CAP034500; Loss of Offsite Power that Results in a Loss of Shutdown Cooling; March 26, 2003
CAP040196; Calculated Short Circuit Currents Greater Than 480V AC Breaker Interrupt Rating; February 25, 2004
CAP046059; Incorrect Closure Times for Breakers 252-302 and 252-402; January 11, 2005
CAP047963; Evaluate Impact of Installed Dilution Water Pump Motors on 2400V Fast Transfer; May 19, 2003
00216513; Received Alarm EK-0518, 2400V Bus Ground 1C, 1D or 1E Ground; February 16, 2000
00218414; Component Cooling Water P-52C Tripped on Time Overcurrent; January 2, 2000
00257227; Received Alarm EK-0518, 2400V Bus Ground 1C, 1D, and/or 1E Ground Unexpectedly; July 11, 2002
00257994; Breaker 72-132 Trip; June 10, 2002
00269523; Unexpected Alarms due to Bus 1E Ground; September 19, 2002
00418814; Station Battery Charger #1 Output Breaker 72-15 Trip; March 17, 2003
00463992; Breaker 72-234 Was Found Out of Tolerance During Testing; July 24, 2003
00463997; Breaker 72-228 Was Found Out of Tolerance During Testing; July 24, 2003
00463999; Breaker 72-219 Was Found Out of Tolerance During Testing; July 24, 2003
00464001; Breaker 72-231 Was Found Out of Tolerance During Testing; July 24, 2003
00758546; DC Breaker 72-119 Failure; September 29, 2004
00776683; Breaker 72-123 Fails As-Found Setting Test; November 16, 2004
00776691; Breaker 72-130 Fails As-Found Setting Test; November 16, 2004
00832070; Control Room Heating, Ventilation and Air Conditioning Went to Emergency Mode When Deenergizing Control Power with Breaker 72-408; April 12, 2005
00858068; Re-evaluate Conservatism in EA-CA-025644-01; June 16, 2005
00870121; Inadequate Guidance for Operations when Outside Air Temperature Exceeds 95°F; July 26, 2005
01002363; Declining Service Water P-7B Performance; October 31, 2005

01004981; Turbo Charger Mounting Bolt Broken on K-6B, 1-2 Emergency Diesel Generator; November 22, 2005
01004994; 1-2 EDG Turbo Charger Mounting Bolt Torque Discrepancy; November 23, 2005
01012578; Emergency DG Performance Indicates an Adverse Trend ; January 30, 2006
01013397; Concern on Auxiliary Feedwater Suction Pressure Trip; February 3, 2006
01014535; Design Basis Potentially Not Fully Met for Condensate Storage Tank T2 and Auxiliary Feedwater Pumps; February 13, 2006
01016573; Replacement of Relays 383-11 and 383-12 Removed from EC157 Scope; April 24, 2006
01021713; Battery Test Software Locked Up During RE-83A; April 2, 2006
01024313; 72-211; DC Breaker Will Not Reset; April 16, 2006
01024377; Report Could Not Be Generated for RE-83B; April 17, 2006
01024455; DC Breaker 72-208 As-Found Reading Out of Tolerance; April 17, 2006
01024462; DC Breaker 72-216 As-Found Readings Out of Tolerance; April 17, 2006
01027656; 151X Lockout Protective Relay Very Slow to Operate; June 4, 2006
01031654; Stuck Load Tap Changer; May 22, 2006
01036648; 1-2 Diesel Generator Started Outside Acceptance Criteria; June 22, 2006
01045526; 1-2 EDG Slow to Start; August 21, 2006
01050711; Delta Observed between EDG 1-2 and EDG 1-1 Fuel Oil Pressure; September 17, 2006
01051796; Received Alarm EK-0333 and EK-0518 Unexpectedly; September 23, 2006
01054496; Revise Procedure SPS-E-8; October 9, 2006
01056230; Corrosion Observed Twice on ED-02 Cell 25; October 17, 2006
01056723; Work Order on Hold due to Improperly Issued Engineering Change Request; October 19, 2006
01057946; Error in Load Calculation for EC-9049 Assumption; October 24, 2006
01058843; Motor Operated Valves in Chemical and Volume Control System Removed from MOV Program; October 31, 2006
01059476; High Pressure Safety Injection Pump Alignment Key Configuration Incorrect; November 2, 2006
01060868; Air Operated Valve Capability Calculations Not Updated with Field Test Data; November 9, 2006
01061082; Auxiliary Feedwater Pump P-8A Leakage out of Overflow Pipe; November 10, 2006
01061084; Auxiliary Feedwater Pump P-8B Taper Pin Configuration; November 10, 2006
01061104; Alignment Blocks on Auxiliary Feedwater Pump P-8A Missing Taper Pins; November 10, 2006
01061110; Two Nuts on Valve MO-2169 Not Fully Engaged; November 10, 2006
01061383; Setpoint Calculation for 127-1 and 127-2 Does Not Exist; November 13, 2006

Action Requests Generated As a Result of the Inspection

01059464; Loose Nut on Nitrogen Station 1 Bottle Clamp; November 2, 2006
01060387; Superceded Calculations Identified as Active; November 8, 2006

01061576; Incorrect Information Given to NRC Team During Design Inspection; November 14, 2006
01061586; Emergency Operating Procedure Basis Not Updated for Diesel Generator 1-3; November 14, 2006
01061641; Revise Procedure SPS-E-8 to Show Correct Breaker Number; November 14, 2006
01061758; Errors in Flow Acceptance Criteria Service Water Test RO-216; November 15, 2006
01061838; Revise Procedure RI-14 and Associated Basis Document to Correctly Account for Instrument Accuracy; November 15, 2006
01061904; Seismic Qualification Utility Group Analysis of Condensate Storage Tank Not Microfilmed; November 15, 2006
01061932; Evaluate Use of Station Power Transformer 1-2 to Feed 2400V Buses in Modes 1-4; November 15, 2006
01061939; Discussion of Second Steam Line to Turbine Driven Auxiliary Feedwater Pump K-8 Turbine Still in Design Basis Document; November 15, 2006
01061965; Safety Injection Refueling Water Tank Level Switch LS-0329 Set Above Upper Limit; November 15, 2006
01061968; Hasp Missing from Coupling Guard on K-8A Auxiliary Feedwater Pump; November 16, 2006
01062183; Operating Experience Received on Cable Ties; November 16, 2006
01062256; Supplemental Diesel Generator Cold Weather Check List Verification; November 16, 2006
01062278; Non-Bounding Air Entrainment Value Supporting the Low End of the Recirculation Actuation System Setpoint Band; November 16, 2006
01062304; All Emergency Diesel Generator Room Cooling Room Intake Louver Screens are Dirty; November 16, 2006
01062307; Emergency Diesel Generators K-6A and K-6B Exhaust Tailpipe Corrosion; November 16, 2006
01062314; Debris Noted in Emergency Diesel Generator 1-1 Air Intake/Exhaust Cubicle Roof Drain; November 16, 2006
01062531; Discrepancy in Calculation EA-RTD-91-01; November 17, 2006
01062628; Errors in Service Water Pump Curve Used for T-216 Acceptance Criteria; November 18, 2006
01062644; Error in Air Entrainment Calculation for Auxiliary Feedwater Trip Setpoint; November 18, 2006
01063336; Impact of Elevated Temperatures on Cable Resistance; November 22, 2006
01064038; Evaluate Differences in Calculation Project Documentation; November 28, 2006
01064043; Supplemental Diesel Generator Temperature Limits; November 28, 2006
01064671; Circuit Breaker Test Procedure Not Up to Industry Standards; November 30, 2006
01064772; Incorrect Statement in Final Safety Analysis Report Section 7.4.3.1.2; November 30, 2006
01064804; Failure to Perform Technical Specification Surveillance Requirement; November 30, 2006
01064944; Inadequate Trending of Molded Case Circuit Breaker Operational and Test Failures; December 1, 2006

01065328; Possible Enhancements to SOP-30, Station Power; December 4, 2006
01065608; Breaker Testing Failure Not Captured in Corrective Action Program; December 5, 2006
01065641; Misapplication of Uncertainty Method when Calculating Instrument Uncertainties; December 5, 2006
01066193; Incorrect Calculation Revision Referenced for Component Design Basis Inspection Request for Information 69; December 7, 2006
01066264; Replaced Molded Case Circuit Breaker Deficiencies Trending; December 7, 2006
01066273; Excluded Required Equipment in Operability Recommendation 108 for Greater than 95°F Ambient Air; December 7, 2006
01066349; Minor Uncertainty Value Error for VHX-1 in RO-216 Basis Document; December 8, 2006
01066422; Station Battery ED-02 Possible Corrosion; December 8, 2006
01066444; Minor Administrative Error in EA-C-PAL-99-1209B-01, Revision 1; December 8, 2006
01066618; Corrosion Found on ED-01 and ED-02 Main Station Batteries; December 9, 2006
01066913; Diesel Generator Cooling Fan V-24 Discrepancies; December 11, 2006
01067047; MOV Procedures Inadequately Apply Pressure Locking Loads; December 12, 2006
01067063; Fast Transfer From Safeguard Transformer 1-1 to Startup Transformer 1-2 May Result in a Loss of Offsite Power; December 14, 2006
01067467; Past Operability not Requested or Performed for AR 01031654; December 12, 2006
01067491; Calculation Does not Consider Frequency Variation in Calculating Loading; December 13, 2006
01067508; Create Engineering Analysis of Auxiliary Feedwater Room Heat up Considering P8B Steam Trap Leak; December 13, 2006
01067550; Specification Change 96-012 Should Have Had 50.59 Evaluation; December 13, 2006
01067585; Incorrect Conclusion Statement in EA-DTE-797-01; December 13, 2006
01067728; Component Design Basis Inspection Issues Aggregate Review; December 14, 2006
01067779; Lack of Lockout Relays for Bus 1C and 1D Breakers; December 14, 2006
01067792; Potential Need to Reperform Calculation on 2400V Bus Transfer; December 14, 2006
01067802; Overestimate of Design Margin in OPR of AR 01063336; December 14, 2006
01067804; Overestimate of Design Margin in Operability Recommendation for AR 01062531; December 14, 2006
01067805; Non-Conservative Electrical Loads Used in System Load Flow Analysis; December 14, 2006
01067886; Potential Motor Shaft Damage During 2400 V AC Fast Transfer; December 15, 2006
01068503; Operability Recommendation Conclusion is Incorrect; December 15, 2006
01073680; Operability Recommendation Inappropriately Refers to a Non-Implemented Calculation; January 24, 2007
01074263; Prior NRC Approval Required for Manual Action; January 26, 2007

Calculations

1C/108-J9400/127-7; Bus 1C Second Level Undervoltage Relays; Revision 3
1D/203-J9401/127-8; Bus 1D Second Level Undervoltage Relays; Revision 3
DCP-090188-1; Range of Station Power Voltages; Revision 0
DCP-122887-1; Optimize Emergency Diesel Generator Sequencer Times; Revision 0
EA-A-PAL-90-129; Analysis of 2400 Volt System Bus Transfer; Revision 0
EA-A-PAL-94-279-004; Seismic Analysis Rreport for 4" ANSI Class 150 Forged Stainless Steel Bolted Bonnet Motor Operated Gate Valve; Revision 0
EA-AOVCAP-ESS-02; Actuator Capability Review for Air Operated Valves with Air Cylinder – Spring Return Fail Close Actuators in the Engineered Safeguards System; Revision 0
EA-AOVCAP-ESS-03; Actuator Capability Review for Fail Open Air Operated Valves with Direct Acting Diaphragm Actuators in the Engineered Safeguards System; Revision 0
EA-AOVCAP-GATE-ESS-01; Actuator Capability Review for Air Operated Gate Valves in the Engineered Safeguards System; Revision 1
EA-AOVCAP-MSS-02; Actuator Capability Review for Air Operated Valves with Double Acting Air Cylinder – Spring Return Fail Close Actuators in the Main Steam System; Revision 1
EA-AOVT/T-UNBALANCED-01; Thrust Requirements for Palisades Unbalanced Disk Air Operated Globe Valves with Compressible Flow; Revision 2
EA-AOV-WKLINK-02; Weak Link Calculation for Air Operated Valves CV-3027 and CV-3056 from Crane Valve; Revision 0
EA-APR-95-004; 10 CFR Part 50 Appendix R Safe Shutdown Associated Circuits Analysis for Common Power Supply and Common Enclosure; Revision 4
EA-APR-95-005; 10 CFR Part 50 Appendix R High Impedance Fault Analysis; Revision 2
EA-C-PAL-95-0053B-01; Incorporation of a Higher Auxiliary Feedwater Pump Suction Pressure Trip Setpoint into the T-2/T-81 Inventory Calculations Using the RETRAN Program; July 19, 1995
EA-C-PAL-95-0877D; Evaluation of the Potential for Excessive Air Entrainment Caused by Vortexing in the Safety Injection Refueling Water Tank During a Loss of Coolant Accident; Revision 0
EA-C-PAL-96-0329-01; Investigation of Circuit Breaker and Fuse Coordination for Safety Related 125V DC Distribution Panels; Revision 2; April 15, 2004
EA-C-PAL-99-1209B-01; Generation of Flow Rate Acceptance Criteria for Technical Specification Surveillance Test RO-216; Revision 1
EA-C-PAL-01-03563-01; Engineered Safeguards System Recirculation Mode Net Positive Suction Head and Flow Rates with Modified Containment Sump Check Valves Using Pipe-Flo; Revision 2
EA-CA023959-01; Acceptance of Gothic Room Heat-Up Analysis; Revision 0
EA-CA025644-01; Evaluation of the Impact of 110% Emergency Diesel Generator Overload Operating Condition on Ambient Temperature; Revision 0
EA-DBD-1.04-002; Electrical and Mechanical Failure Analysis for the Chemical and Volume Control System; Revision 0
EA-DTE-797-01; Degradation of Mobil DTE-797 Lubricant as Related to the Loss of Ventilation in Auxiliary Feedwater Pump Room; May 15, 1987
EA-E-ELEC-VOLT-06; Determine the Terminal Voltage at the 46 Safety Related Motor Operated Valves; Revision 1

EA-EAR-2000-0302-01; Installation of Permissives and Interlocks on Emergency Core Cooling System (ECCS) Valves CV-3001, CV-3002, CV-3070 and CV-3071; Revision 1
EA-EAR-2001-0333-01; Generation of Engineered Safeguards System Pump Performance Curves for Use with the Pipe-Flo Engineering Safeguards System Hydraulic Model; Revision 2
EA-EC9600-01; Functionality of Equipment in Emergency Diesel Room at Elevated Temperature of 121°F; November 30, 2006
EA-EC-8083-01; Evaluation of Condensate Storage Tank for Tornado Wind and Depressurization Loads; Revision 0
EA-ELEC-08-03; Instrument Uncertainty Calculation for Service water System Installed Process Flow Instrumentation Channels; Revision 0
EA-ELEC-FLT-005; Short Circuit for the Palisades Class 1E Station Batteries D01 and D02; Revision 1; December 22, 1999
EA-ELEC-LDTAB-005; Emergency Diesel Generator 1-1 and 1-2 Steady State Loading; Revision 7, Addendum EAR2003-0270
EA-ELEC-LDTAB-009; Battery Sizing for the Palisades Class 1E Station Batteries 001 and 002; December 29, 1999, and January 20, 2000
EA-ELEC-VOLT-013; Palisades Loss of Cooling Accident With Offsite Power Available; Revision 1; Minor Revision 000A
EA-ELEC-VOLT-017; Second Level Undervoltage Relay Setting to Adequately Protect 2400 and 480V Class 1E Equipment from Degraded Voltage; Revision 0
EA-ELEC-VOLT-026; Voltage Drop Model for the Palisades Class 1E Station Batteries 001 and 002; Revision 1; January 17, 2000
EA-ELEC-VOLT-033; Second Level Undervoltage Relay Setpoint; Revision 0
EA-ELEC-VOLT-037; Palisades Degraded Voltage Calculation for the Safety-Related Motor Operated Valves; Revision 3
EA-FC-866-1; Turbine Driven Auxiliary Feedwater Pump K-8 Steam Trap Design; Revision 0
EA-FC-954-02; Low Pressure Suction Trip on Auxiliary Feedwater Pump Setpoint Change; Revision 3
EA-FC-954-03; Auxiliary Feedwater Pump Minimum Intake Submergence Requirements and Suction Line Hydraulic Losses Using PipeFlo; Revision 0
EA-GL-8910-01; Generic Letter 89-10 Motor Operated Valve Thrust Window Calculations; Revision 10
EA-GL-8910-10; Periodic Verification of Generic Letter 89-10 Motor Operated Valve Operating Margins Using Static Diagnostic Test Results; Revision 3
EA-MOD-2005-004-03; Engineering Safeguards System Flow Rates and Pump Net Positive Suction Head During Recirculation Mode with Containment Spray System Throttling; Revision 1
EA-PAL-90-129; Analysis of 2400 Volt System Bus Transfer; Revision 0
EA-PLTB-00; Pressure Locking and Thermal Binding for Power Operated Gate Valves in Response to Generic Letter; Revision 4
EA-SC-96-012-01; Revise Auxiliary Feedwater Pump Inventory Level and High Temperature Alarm Setpoints; August 1, 1997
EA-SDW-95-001; Generation of Minimum and Maximum High/ Low Pressure Safety Injection Systems Performance Curves Using Pipe-Flo; Revision 2
EA-SP-20033-15; Generic Seismic Technical Evaluation of Replacement Molded Case Circuit Breakers; Revision 0; November 4, 1996
SUT1-2/SUT1-2/ALTC; Startup Transformer 1-2 Load Tap Changer Automatic Controls; Revision 0

Correspondence

Consumers Power Company to Nuclear Regulatory Commission; Submittal of Switchgear Room, Cable Spreading Room and Auxiliary Feedwater Pump Room Test Results; November 8, 1982
Consumers Power Company to Nuclear Regulatory Commission; Ventilation Systems; April 4, 1986
Consumers Power Company to Nuclear Regulatory Commission; 0C0788-0058-NL04: Response to NRC Bulletin 88-04 – Potential for Safety Related Pump Loss; July 7, 1988
Consumers Power Company to Nuclear Regulatory Commission; Update to Electrical Distribution System Functional Inspection Fast Bus Transfer Schemes – NRC Concern 8; January 7, 1994
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PL-OPS-06C-001L; Auxiliary Operator News; July 19, 2006
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FES-95-206-ED01; ED-01 Station Battery Replacement; Revision 4; July 21, 1995
FES-95-206-ED02; ED-02 Station Battery Replacement; Revisions 1 & 2; July 25, 1995 and July 31, 1995
FES-96-139; Replace Overcurrent Relay on High Pressure Safety Injection Pump Breaker (canceled); Revision 0
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SC-94-102; Set Transformer Taps to 2340/480V AC Setting; Revision 0

Operability Recommendations Reviewed During the Inspection

024557; Resolve Operability Condition of Motor Control Center Short Circuit Currents Greater Than 480V AC Breaker Interrupt Rating; July 2, 2004
000051; Calculated Short Circuit Currents Greater Than 480V AC Breaker Interrupt Rating; February 25, 2004
00870121-01; Operability Recommendation for Outside Air Temperature in Excess of 95°F; August 11, 2005
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AP-9.20; Technical Specification Surveillance and Special Test Program; Revision 22
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EM-28-02; Check Valve Program; Revision 5
EM-28-03; Air and Solenoid Operated Valve Program; Revision 7
EM-28-04; Motor Operated Valve (MOV) Periodic Verification and Trending Program; Revision 4
EM-28-07; MOV Diagnostic Test Engineering Acceptance; Revision 0
EOP 3.0; Station Blackout Recovery; Revision 14
EOP 4.0; Loss of Coolant Accident Recovery; Revision 17
EOP 5.0; Steam Generator Tube Rupture Recovery; Revision 14
EOP 7.0; Loss of All Feedwater Recovery; Revision 14
EOP 9.0, HR-2; Functional Recovery, Primary Coolant System and Core Heat Removal; Revision 19
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EOP Supplement 28; Supplementary Actions for Loss of Power; Revision 6
EOP Supplement 42; Pre and Post Recirculation Actuation System Actions; Revision 5
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ONP-12; Acts of Nature; Revision 23
OWA 06-02; Operator Work Around, Identification and Disposition; February 21, 2006
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RE-138; Calibration of Bus 1D Undervoltage and Time Delay Relays; Revision 2
RE-83A; Service Test – Battery ED-01; Revision 12
RE-83B; Service Test – Battery ED-01; Revision 12
RI-14; Safety Injection Refueling Water Tank Level Switch Interlocks Test; Revision 10
RO-147; Comprehensive Pump Test Procedure – High Pressure Safety Injection Pumps P-66A and P-66B and Engineered Safeguards System Check Valve Operability Test; Revision 0
RO-216; Service Water Flow Verification; Revision 6
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00293158; 151X, Preventive Maintenance on Lockout Relay; July 19, 2006
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24612555; CK-FW741: Non-Intrusive Check Valve Test; September 9, 1996
24612662; High Pressure Safety Injection Pump P-66A Breaker; July 18, 1996
24714776; CV-3071 Static Test; September 24, 1998
24801903; CK-SW402: Disassembly and Inspection; September 14, 1988
24901947; CK-FW743: Disassembly and Inspection, SOER 86-03; October 12, 1989
24902600; CK-FW726: Disassembly and Inspection, SOER 86-03; October 24, 1989
24902652; CK-FW741: Disassembly and Inspection, SOER 86-03; October 12, 1989
24913804; CK-FW743: Body to Bonnet Leak; July 25, 2000

LIST OF ACRONYMS USED

AC	Alternating Current
ADAMS	Agency-Wide Document and Management System
AFW	Auxiliary Feedwater Pump
AR	Action Request
ARP	Alarm Response Procedure
CDBI	Component Design Basis Inspection
CFR	Code of Federal Regulations
CST	Condensate Storage Tank
DC	Direct Current
DRS	Division of Reactor Safety
EDG	Emergency Diesel Generator
FIN	Finding
FSAR	Final Safety Analysis Report
IMC	Inspection Manual Chapter
IN	Information Notice
LER	Licensee Event Report
MCC	Motor Control Center
MCCB	Molded Case Circuit Breaker
MOV	Motor Operated Valve
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NEMA	National Electric Manufacturers Association
NRC	Nuclear Regulatory Commission
OPR	Operability Recommendation
PRA	Probabilistic Risk Assessment
SDP	Significance Determination Process
SIRW	Safety Injection Refueling Water
TS	Technical Specification
URI	Unresolved Item
V	Volts
V/HZ	Voltage/Hertz
°C	Degree Celsius
°F	Degree Fahrenheit