November 9, 2005

Mr. M. Nazar
Senior Vice President and
Chief Nuclear Officer
Indiana Michigan Power Company
Nuclear Generation Group
One Cook Place
Bridgman, MI 49106

SUBJECT: D. C. COOK NUCLEAR POWER PLANT, UNITS 1 AND 2
NRC SAFETY SYSTEM AND DESIGN PERFORMANCE CAPABILITY
INSPECTION 05000315/2005007(DRS); 05000316/2005007(DRS)

Dear Mr. Nazar:

On September 23, 2005, the U. S. Nuclear Regulatory Commission (NRC) completed a baseline inspection at your D. C. Cook Nuclear Power Plant, Units 1 and 2. The enclosed report documents the inspection findings that were discussed on September 30, 2005, with Mr. D. Fadel and other members of your staff.

This inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. This inspection specifically focused on the 250 Volt direct current power distribution and the auxiliary feedwater systems.

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

If you contest the subject or severity of a Non-Cited Violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001; with copies 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, D.C. 20555-0001; and the NRC Resident Inspector at the D. C. Cook Nuclear Power Plant.

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 (PARS) 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 Nos. 50-315; 50-316
License Nos. DPR-58; DPR-74

Enclosure: Inspection Report 05000315/2005007; 05000316/2005007
w/Attachment: Supplemental Information

cc w/encl: J. Jensen, Site Vice President
L. Weber, Plant Manager
G. White, Michigan Public Service Commission
L. Brandon, Michigan Department of Environmental Quality -
Waste and Hazardous Materials Division
Emergency Management Division
MI Department of State Police
D. Lochbaum, Union of Concerned Scientists

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-315; 50-316
License Nos:	DPR-58; DPR-74
Report No:	05000315/2005007; 05000316/2005007
Licensee:	Indiana Michigan Power Company
Facility:	D. C. Cook Nuclear Power Plant, Units 1 and 2
Location:	One Cook Place Bridgman, MI 49106
Dates:	September 6 through 23, 2005
Inspectors:	P. Lougheed Senior Engineering Inspector, lead Z. Falevits Senior Engineering Inspector T. Bilik Engineering Inspector B. Jose Engineering Inspector G. O'Dwyer Engineering Inspector D. Reeser Operations Inspector
Approved by:	Ann Marie Stone, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000315/2005007(DRS), IR 05000316/2005007(DRS); 09/06/2005-09/23/2005; D. C. Cook Nuclear Power Plant, Units 1 and 2; Safety System Design and Performance Capability.

The inspection was a required biennial baseline inspection of safety system design and performance capability. The inspection specifically reviewed the 250 volt direct current (DC) power distribution and the auxiliary feedwater (AFW) systems. The inspection was conducted by regional engineering inspectors. Five findings having very low safety significance were identified, of which four involved Non-Cited Violations including one assessed as Severity Level IV. 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. Inspector-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Severity Level IV. A finding of very low safety significance was identified by the inspectors associated with a non-cited violation of 10 CFR 50.59(d)(1). The issue involved an inadequate evaluation under 10 CFR 50.59 with respect to introduction of a new manual action in place of a previously automatic action. This issue was entered into the licensee's corrective action system and the licensee prepared a new evaluation in accordance with 10 CFR 50.59.

  This finding was assigned a significance level of very low safety significance based on management review. The violation was categorized as Severity Level IV based on the underlying technical issue for the finding having screened out as having very low significance using the Phase 1 worksheet of Inspection Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." (Section 1R21.1.b)

- Green. A finding of very low safety significance was identified by the inspectors associated with a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XII, "Measuring and Test Equipment." Specifically, the licensee did not calibrate a digital hydrometer over all the temperature ranges under which the hydrometer was used. This issue was entered into the licensee's corrective action system and the licensee was evaluating the necessary corrective actions.

  This finding was more than minor because it could lead to a more serious situation. Specifically, continued reliance on a hydrometer that was not calibrated for the temperatures at which it was being used could reasonably lead to a situation where the actual specific gravity was below the technical specification limits without that being noticed. This finding was of very low safety significance because it screened out using the Phase 1 worksheet of Inspection Manual Chapter 0609, Appendix A. (Section 1R21.2.b1)

- Green. A finding of very low safety significance was identified by the inspectors associated with a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." Specifically, the licensee failed to ensure that adequate battery terminal connection torque values were specified in the AB, CD and N batteries maintenance and surveillance procedures. The licensee entered the issue into its corrective action system, confirmed that the N-train of safety-related batteries were correctly torqued, revised one procedure and was evaluating the additional corrective actions needed.

  This finding was more than minor because the finding was associated with the attribute of equipment performance, which affected the mitigating systems cornerstone objective of ensuring the availability and reliability of the 250 VDC power system to respond to initiating events to prevent undesirable consequences. Specifically, inconsistent torquing requirements specified in maintenance and surveillance procedures used to perform maintenance activities on safety related batteries could potentially result in unacceptable battery terminal connections and render the safety-related battery incapable of performing its required safety function. This finding was of very low safety significance because it screened out using the Phase 1 worksheet of Inspection Manual Chapter 0609, Appendix A. (Section 1R21.2.b2)

- Green. A finding of very low safety significance was identified by the inspectors associated with a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." Specifically, the licensee failed to ensure that procedure 12-IHP-5021-EMP-009 contained adequate verification such that an independent observer could ensure that adequate electrical isolation had been maintained when a non-Class 1E single cell battery charger was used to charge a single battery cell on safety-related batteries. This issue was entered into the licensee's corrective action system and the licensee was evaluating other corrective actions.

  This finding was more than minor in that the finding was associated with the attribute of equipment performance, which affected the mitigating system's cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. Specifically, failure to install a fuse could result in inadequate electrical isolation between the non-Class 1E single cell battery charger and safety-related battery. Without adequate isolation, a fault on the non-Class 1E charger could potentially render the safety-related battery incapable of performing its required safety function. This finding was of very low safety significance because it screened out using the Phase 1 worksheet of Inspection Manual Chapter 0609, Appendix A. (Section 1R21.3.b1)

- Green. A finding of very low safety significance was identified by the inspectors which was not associated with a non-cited violation. Specifically, the licensee failed to ensure that each of the 250 VDC battery chargers was energized for a minimum of eight hours per year. The vendor required this minimum energization in order to ensure the electrolytic capacitors installed in the chargers would meet the qualified replacement life of 10 years. This issue was entered into the licensee's corrective action system and the licensee was evaluating other corrective actions.

This finding was more than minor because it was associated with the attribute of equipment performance, which affected the mitigating system's cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. Specifically, the failure to energize the electrolytic capacitors for at least 8 hours annually could lead to the degradation of the capacitors with resultant degradation of the voltage going to the batteries. This finding was of very low safety significance because it screened out using the Phase 1 worksheet of Inspection Manual Chapter 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." (Section 1R21.3.b2)

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems and Barrier Integrity

1R21 Safety System Design and Performance Capability (71111.21)

Introduction: Inspection of safety system design and performance capability (SSDPC) verifies the initial design, ensures acceptability of subsequent modifications and provides monitoring of the capability of the selected systems to perform their design bases functions. As plants age, the design basis may be lost and important design features may be altered or disabled. The plant risk assessment model is based on the capability of the as-built safety system to perform the intended safety functions successfully. This inspectable area verifies aspects of the mitigating systems and barrier integrity cornerstones for which there are no indicators to measure performance.

The objective of the SSDPC inspection is to assess the adequacy of calculations, analyses, other engineering documents, and operational and testing practices that were used to support the performance of the selected systems during normal, abnormal, and accident conditions. Specific documents reviewed during the inspection are listed in the attachment to the report.

The systems and components selected were the 250 volt direct current (VDC) distribution systems and the auxiliary feedwater (AFW) system. This comprised two samples and completes the baseline requirement for this procedure over the biennial reactor oversight process (ROP) cycle. These systems were selected for review based upon:

- having high probabilistic risk analysis rankings;
- considered high safety significant maintenance rule systems; and
- not having received recent NRC review.

The criteria used to determine the acceptability of the system's performance was found in documents such as:

- licensee technical specifications;
- applicable updated final safety analysis (UFSAR) sections;
- the systems' design documents;
- industry standards; and
- vendor technical manuals.

.1 System Requirements

a. Inspection Scope

The inspectors reviewed the UFSAR, technical specifications, system design basis documents, system descriptions, drawings, and other available design basis information, to determine the performance requirements of the 250 VDC and AFW systems, and their associated support systems. The reviewed system attributes included process medium,

energy sources, control systems, operator actions, and heat removal. The rationale for reviewing each of the attributes was:

Process Medium: This attribute required review to ensure that the AFW system flow path would be available and unimpeded during and following design basis events. To achieve this function, the inspectors verified that the system alignment supported the AFW's operation following postulated accidents and events. The inspectors also verified the availability of both the normal and alternate water sources for the AFW system. For the 250 VDC system, the inspectors verified the adequacy of battery connections both between the batteries and to the terminal lug.

Energy Sources: This attribute required review to ensure that the power supply to the AFW system motor operated valves and other electrical components was adequate for the proper functioning of the valves and other components. This included assuring that the valve power circuits, including circuit breakers and cable, were adequately sized for the application. For the 125/250 VDC system this attribute was reviewed to ensure the batteries and the chargers had adequate capacity to support the worst case plant loading. This review also included ensuring that coordination between the load circuit breakers and the feeder breakers to the buses was maintained.

Controls: This attribute required review to ensure that the automatic controls for the AFW and DC power systems were properly established. Additionally, review of alarms and indicators was necessary to ensure that operator actions would be accomplished in accordance with the design requirements.

Operations: This attribute was reviewed as the operators are required to perform a number of actions during normal, abnormal and emergency operating conditions that have the potential to affect AFW system operation. In addition, the emergency operating procedures (EOPs) require the operators to manually adjust the system flow during and following design basis events.

Heat Removal: This attribute was reviewed to ensure that there was adequate and sufficient heat removal capability for the AFW pump and motor.

b. Findings

Introduction of Manual Action in Station Blackout Response Procedure

Introduction: The inspectors identified a Non-Cited Severity Level IV Violation (NCV) of 10 CFR 50.59, "Changes, Tests, and Experiments." Specifically, the licensee failed to recognize that a modification had introduced a manual action in place of a previously automatic action during performance of an evaluation pursuant to 10 CFR 50.59. Once brought to their attention, the licensee re-performed the 50.59 evaluation using the Nuclear Energy Institute guidance NEI 96-07, "Guidelines for 10 CFR 50.59 Implementation."

Description: The inspectors identified that the licensee introduced a manual action in place of a previously automatic one during a 2000 modification of the Unit 1 AFW system turbine driven pump discharge valves. In order to prevent overfilling the Unit 1

steam generators following a steam generator tube rupture, the design was modified to establish a normally throttled position for the turbine driven pump discharge valves rather than the previous full open position. As part of the modification the licensee evaluated the effect upon a number of different accident scenarios, including the regulatorily imposed station blackout (SBO) scenario. For the SBO scenario, the modification reduced the available AFW flow to around 172 gallons per minute (gpm) as compared to the approximately 480 gpm that would have been available prior to the modification. The licensee determined that no revisions to the SBO analyses were necessary, as the SBO scenario only required computation of condensate storage tank inventory and not any analysis of the effects of the reduced AFW flow on the reactor coolant system.

In performing the 50.59 evaluation, the licensee specifically acknowledged that it was aware of the information in Information Notice 97-78 regarding substitution of manual actions for automatic actions, but concluded that no manual actions had been introduced because the operators maintained the ability to open the valves and were guided to do so by the immediate actions in the EOPs. The licensee further stated that the operators received guidance from the EOPs, that actions following a SBO were specified in an EOP, and that the operators would adjust the total AFW flow to the steam generators to be greater than or equal to 240,000 pounds mass per hour (lbm/hr) or approximately 480 gpm.

The inspectors determined that, approximately one month after completion of the modification evaluation, the licensee revised the SBO EOP and changed "action/expected response" column for Step 4, a non-immediate action step, to require the operators to establish AFW flow greater than 240,000 lbm/hr, including alignment of the discharge throttle valves as necessary. The procedure change only received a screening rather than a full evaluation under 10 CFR 50.59. Prior to this change, the "action/expected response" column for Step 4 of the EOP required the operators to verify that AFW flow was greater than 240,000 lbm/hr, with guidance to the operators to manually align the AFW valves under the "response not obtained" column.

The inspectors noted that following the modification, the licensee had created a manual operator action in place of a previously automatic action. Under the 10 CFR 50.59 guidance available in 2000, substitution of a manual operator action for an automatic action would have required NRC approval prior to implementation because manual actions generally involved higher risk than automatic ones and thus increased the likelihood of a malfunction of equipment important to safety. In late 2001, the NRC revised 10 CFR 50.59 and endorsed industry standard NEI 96-07, "Guidelines for 10 CFR 50.59 Implementation," Revision 1. Section 4.3.2 of the NEI standard provides guidance on when a manual action could be deemed as not requiring prior NRC approval. The guidance generally requires that an action be relatively simple and uncomplicated; that the action is addressed in plant procedures; that the operators have been trained, including having demonstrated that the action can be completed; and that an evaluation was performed that considered the ability to recover from credible errors.

In this particular case, the inspectors determined that the action was relatively uncomplicated and could be performed from the control room; the action was addressed in plant procedures and that the operators had received classroom training on the new

action. However, the inspectors ascertained that the simulator was modeled after the Unit 2 plant where the AFW turbine discharge valves were in a full open position. Based on discussions with a senior reactor operator and a trainer, the inspectors determined that the licensee had not simulated the Unit 1 AFW valve throttled position, such that the operators had not had an opportunity to demonstrate their classroom knowledge. Furthermore, the inspectors noted that all other accident scenarios would require the operators to first verify sufficient AFW flow and then to throttle the discharge valves closed to prevent high steam generator levels. Therefore, the inspectors considered that a credible error existed where the operators might mistakenly close the valves instead of opening them. The inspectors noted that the licensee had not evaluated the likelihood of this event, the likely ability of the operators to recover from the error, and its ultimate effect on the SBO scenario. Consequently, the inspectors concluded that there was a reasonable probability that a 50.59 evaluation performed under the current guidance would also require prior NRC approval.

Following identification of this issue, the licensee wrote condition report (CR) 05266069 and reperformed the 50.59 evaluation, using the latest guidance. The inspectors briefly reviewed the CR and noted that the licensee appeared to have a misunderstanding of 50.59 requirements. The CR stated that the issue was acceptable because the initial SBO evaluation allowed operator actions. However, the inspectors noted that the initial SBO evaluation did not require the operators to take action to establish AFW flow but rather to eventually take action to reduce AFW flow. The inspectors also noted that the licensee had not redone any SBO analyses as a result of the modification. Therefore, what was being evaluated was not the acceptability of the operator action under the initial SBO evaluation but rather the need for NRC review of the acceptability of the modification in accordance with the requirements of 10 CFR 50.59. Following the inspection, the inspectors also reviewed the new 50.59 evaluation and determined that the licensee provided sufficient justification to show that prior NRC approval was not required.

Analysis: The inspectors determined that this issue was a performance deficiency since, in 2000, the licensee failed to seek a required license amendment, in accordance with the 10 CFR 50.59 regulation in force at the time. The inspectors were also not able to determine, during the inspection, whether a license amendment would still be required. The inspectors concluded that the violation was reasonably within the licensee's ability to foresee and correct because there were multiple signatures on the evaluation, because the evaluation was revised to insert additional words regarding the acceptability of using manual actions, and because the procedure actually establishing the manual action was changed under a separate 10 CFR 50.59 screening. Additionally, the licensee acknowledged in the 50.59 evaluation that it was aware of the guidance in Information Notice 97-78 on substitution of manual actions for automatic actions.

Because violations of 10 CFR 50.59 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 finding was determined to be more than minor because the inspectors could not reasonably determine that the modification would not have ultimately required NRC approval in regard to the new operator actions based on the information available to the inspectors at the time of the inspection.

The inspectors completed a significance determination of the underlying technical issue using NRC's inspection manual chapter (IMC) 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations." The team determined from the mitigating systems evaluation in the Phase 1 screening worksheet that all the questions were answered "No;" therefore, the finding was determined to be of very low safety significance (Green). In accordance with the Enforcement Policy, the violation was classified as a Severity Level IV violation. Furthermore, following the inspection, the inspectors determined that the new 50.59 evaluation provided sufficient justification to demonstrate that a license amendment was not required.

Enforcement: Title 10 CFR 50.59(d)(1) requires, in part, that a licensee maintain records of changes in the facility or procedures, and that the records must include a written evaluation which provides the bases for the determination that the change does not require a license amendment pursuant to paragraph 10 CFR 50.59©)(2).

Contrary to the above, on December 11, 2000, the licensee approved an evaluation for a modification, a change to the facility as described in the UFSAR, to the turbine driven AFW pump discharge valves which credited manual operator actions in place of previous automatic actions to open the valves during a SBO event. On January 17, 2001, the licensee approved a screening which revised the SBO emergency operating procedure, a procedure described in the UFSAR, to implement those manual actions. In both cases the licensee failed to include in the written evaluation a basis as to why the newly introduced manual actions would not increase the likelihood of a malfunction of equipment important to safety. In accordance with the Enforcement Policy, the violation was classified as a Severity Level IV violation because the underlying technical issue was of very low risk significance. Because this non-willful violation was non-repetitive and was captured in the licensee's corrective action program as CR 05266069, this violation is being treated as a Non-Cited Violation consistent with Section VI.A of the NRC Enforcement Policy (NCV 05000315/2005007-01; 05000316/2005007-01)

.2 System Condition and Capability

a. Inspection Scope

The inspectors reviewed design basis documents and plant drawings, abnormal and emergency operating procedures, requirements, and commitments identified in the UFSAR and technical specifications. The inspectors compared the information in these documents to applicable electrical, instrumentation and control, and mechanical calculations, setpoint changes, and plant modifications. The inspectors used applicable industry standards, such as the American Society of Mechanical Engineers (ASME) Code and the Institute of Electrical and Electronics Engineers (IEEE), to evaluate acceptability of the systems' design. Select operating experience was reviewed to ensure the issue was adequately evaluated and corrective actions implemented, as necessary. The inspectors also reviewed operational procedures to verify that instructions to operators were consistent with design assumptions.

The inspectors reviewed information to verify that the actual system condition and tested capability were consistent with the identified design bases. Specifically, the inspectors

reviewed the installed configuration, the system operation, the detailed design, and the system testing, as described below.

Installed Configuration: The inspectors confirmed that the installed configuration of the AFW and DC power systems met the design basis by performing detailed system walkdowns. The walkdowns focused on the installation and configuration of piping, components, and instruments; the placement of protective barriers and systems; the susceptibility to flooding, fire, or other environmental concerns; battery physical separation; provisions for seismic stability of the batteries; likelihood of pressure transients on AFW ; and the conformance of the currently installed configuration of the systems with the design and licensing bases. The walkdowns also verified instrument settings and the appropriateness of design input values.

Operation: The inspectors verified that the AFW and DC systems were operated in accordance with design basis documents and station procedures. The inspectors evaluated the consistency of the procedures with the UFSAR, system description, and design basis document as well as consistency between units; the ability of the operators to perform the procedures as written; and the retention of licensee commitments within procedures.

Design: The inspectors reviewed the mechanical, electrical, and instrumentation design of the AFW and DC power distribution systems to verify that the systems and subsystems would function as required under design conditions. This included a review of the design basis, design changes, design assumptions, calculations, boundary conditions, and models as well as a review of selected modification packages. Instrumentation was reviewed to verify appropriateness of applications and set points based on the required equipment function. Additionally, the inspectors performed limited analyses to verify the appropriateness of the design values.

Testing: The inspectors reviewed records of selected periodic testing and calibration procedures and results to verify that the design requirements of calculations, drawings, and procedures were incorporated in the system and were adequately demonstrated by test results. Test results were also reviewed to ensure that testing was consistent with design basis information.

b. Findings

.1 Hydrometer Not Calibrated for Temperatures Seen During Surveillances

Introduction: A finding of very low safety significance (Green) was identified by the inspectors for a violation of 10 CFR, Part 50, Appendix B, Criterion XII, “Measuring and Test Control”. Specifically, the licensee failed to verify that instrumentation used to measure specific gravity of 250 VDC safety-related batteries was calibrated with sufficient accuracy for all operating ranges of temperatures to ensure operability of the safety-related 250 VDC batteries. The licensee entered this issue into their corrective action program as CR 05259048 and was evaluating the necessary corrective actions.

Description: The inspectors noted that the licensee was using a temperature corrected hydrometer to measure the specific gravity of the 250 VDC safety-related batteries. This

hydrometer automatically corrected the specific gravity to a reference temperature of 77 degrees Fahrenheit (°F). While reviewing the vendor catalog for the hydrometer, the inspectors determined that the meter's accuracy differed depending on the temperature. For a temperature range between 50° to 86°F, the accuracy was ±0.002, and for a temperature range from 86° to 122°F, the accuracy was ±0.005. The inspectors reviewed a number of quarterly and 18-month surveillance and determined that, during the summer months, the battery temperatures fairly routinely exceeded 86°F with temperatures reaching as high as 92°F. However, the licensee still applied the ±0.002 accuracy band to these readings. The inspectors reviewed the calibration data for the meter for the past four years and found that the hydrometer was only calibrated to measure specific gravity within a temperature range of 50° to 86°F with an accuracy of ±0.002. The inspectors noted that the calibration sheets specifically noted that the licensee did not require calibration of the hydrometer above 86°F.

The inspectors reviewed surveillance data of the safety-related 250 VDC batteries for the past eight quarters and did not identify any instance of measured specific gravity values falling below technical specification limits although in some cases the actual value was very close to the limit. The inspectors also noted that the summer specific gravity readings increased with increasing temperature although standards, such as Crane Technical Paper 410, "Flow of Fluids Through Valves, Fittings, and Pipe," indicate that the specific gravity would decrease with increasing temperatures. The licensee was still evaluating the reasons for this anomalous trend at the end of the inspection.

Analysis: The inspectors determined that this issue was a performance deficiency since the licensee failed to meet the requirements of 10 CFR Part 50, Appendix B, Criterion XII. Specifically, the licensee failed to calibrate the digital hydrometer used to measure the 250 VDC battery specific gravity for all operating temperature ranges where the hydrometer was used. The cause was reasonably within the licensee's ability to foresee and correct and it could have been prevented had the licensee paid sufficient attention to the hydrometer calibration data, which specifically noted that the hydrometer was not calibrated above 86°F.

The issue was more than minor because it could lead to battery inoperability. Specifically, continued reliance on a hydrometer that was not calibrated for temperature at which it was being used could reasonably lead to a situation where the actual specific gravity was below the technical specification limits without being noticed. The finding screened as having very low safety significance (Green) using IMC 0609, Appendix A, because the inspectors answered "no" to all five questions under the Mitigation Systems Cornerstone Column of the Phase 1 worksheet.

Enforcement: Title 10 CFR, Part 50, Appendix B, Criterion XII, "Measuring and Test Equipment," states, in part, that measures shall be established to assure that tools, gages, instruments and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits.

Contrary to this requirement, from at least April 21, 2004, to September 23, 2005, the licensee failed to take measures to ensure the SBS-2002 digital hydrometer used to measure the specific gravity of the safety-related 250 VDC batteries, an activity affecting

quality, was calibrated for all ranges of operating temperatures in which the hydrometer was used. Because of the very low safety significance and because the issue has been entered into the licensee's corrective action program (CR 05259048), the issue is being treated as an NCV consistent with Section VI.A.1 of the NRC's Enforcement Policy (NCV 05000315/2005007-02, 05000316/2005007-02).

.2 Torquing Requirements in 250 Vdc Safety-Related Battery Procedures

Introduction: The inspectors identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for failure to ensure that adequate battery terminal connection torque values were specified in the AB, CD and N batteries maintenance and surveillance procedures. The finding was considered to be of very low safety significance (Green).

Description: During review of selected 250 Vdc safety-related battery maintenance and surveillance testing activities, the inspectors identified inconsistencies with the battery torque values among the surveillance and maintenance procedures for the batteries. The licensee used the battery vendor manual (VTD-CDBA-0001) as the source document for determining the cell-to-cell connection torque values and an engineering design standard (1-2-EDS-606-11) as the standard to connect the terminal lug to the batteries, if a post extension plate was used. The inspectors also ascertained that the terms "initial" and "maintenance" appeared to be used differently in the various procedures.

Specifically, the battery vendor specified an initial torque value and a lower maintenance torque value in the vendor manual. The licensee transcribed the vendor manual initial torque value into its installation and maintenance procedures and the vendor manual maintenance torque value into its surveillance procedures. The inspectors were concerned that, if the maintenance procedures were used to retorque connections, the battery cell connections would be over torqued. The surveillance and maintenance procedures also listed torque values for the terminal lug to battery connection. The vendor manual specified that the terminal connections should be torqued to the same values as the cell-to-cell connections. However, the procedures contained a different torque value, for the case where the battery used a post extension plate. This value likely came from the design standard.

The inspectors determined that the torque values specified for the N batteries were inaccurate in that the torque value specified for a terminal lug to extension plate connection was approximately a foot-pound higher than the value contained in the design standard. The engineering design standard 1-2-EDS-606-11 specified a value of 84 inch-pounds to connect a 1/4 inch size bolt. However, the installation and maintenance procedures specified an (initial) torque value of 96 inch-pounds for this connection point on the N batteries, and the quarterly and 18 month surveillance procedures specified that the terminal lug to post extension plate connection was to be torqued within a range of 74 to 94 inch-pounds, with a nominal 84 inch-pound value. Therefore, the inspectors were concerned that the N batteries may have been overtorqued, especially as some cells had previously shown a higher resistance value than expected. Having a high resistance value is one indication of overtorquing.

The licensee determined that the N batteries did not have a post extension plate and that the terminal lug was connected directly to a battery cell post. The inspectors confirmed that the installation and surveillance procedure torque values for the terminal lug to cell connection and the cell to cell connections agreed with the torque values in vendor manual VTD-CDBA-0001. However, the battery maintenance procedure, 12-IHP-5021-EMP-008, listed a cell to cell torque value that equated to the initial torque value listed in the vendor manual, and not the lower maintenance torque value. The licensee provided the installation package which had installed the N batteries in 2003 and 2004. The inspectors confirmed that the licensee had not used the terminal lug to post extension plate torque values and that the N batteries were correctly torqued. The inspectors also confirmed that maintenance procedure 12-IHP-5021-EMP-008 had not been used on the N batteries since they were installed.

In regard to the AB & CD batteries, the inspectors confirmed that these batteries had a terminal lug to post extension plate. For this connection, the maintenance procedure used the torque value from the design standard of 480 inch-pounds for the ½" bolts and 180 inch-pound for the 5/16" bolts. However, the quarterly and 18-month surveillance procedures listed a range from 170 to 190 inch-pounds for torquing the terminal lug to the post extension plate. This would result in under-torquing the ½" bolts and over-torquing the 5/16" bolts.

Following identification of this issue, the licensee contacted the vendor and reviewed a sample of past battery connections torquing values, primarily on the N batteries, and concluded the DC batteries and system were operable. The licensee also revised one surveillance procedure and was evaluating additional corrective actions including revision of other maintenance and surveillance procedures.

Analysis: The inspectors determined that this issue was a performance deficiency since the licensee failed to meet the requirements of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings.” Specifically, the maintenance and surveillance procedures for the N batteries contained a torque value for a terminal lug to post extension plate bolt that was neither applicable to the battery nor correct. The cause was reasonably within the licensee’s ability to foresee and correct and it could have been prevented because the batteries were replaced within the last year and the procedures should have been reviewed as part of the replacement.

The inspectors determined that the finding was more than minor in accordance with IMC 0612, Appendix B, “Issue Disposition Screening,” in that the finding was associated with the attribute of equipment performance and affected the mitigating systems cornerstone objective of ensuring the availability and reliability of the 250 VDC power system to respond to initiating events to prevent undesirable consequences. Specifically, inconsistent torquing requirement specified in maintenance and surveillance procedures which are used to perform maintenance activities on safety related batteries could potentially result in unacceptable battery terminal connections and render the safety-related battery incapable of performing its required safety function. The finding screened as having very low significance (Green) using IMC 0609, Appendix A, because the inspectors answered “no” to all five questions under the Mitigating Systems Cornerstone column of the Phase 1 worksheet.

Enforcement: Title 10 CFR, Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that instructions, procedures, or drawings include appropriate quantitative or qualitative acceptance criteria for determining that important activities had been satisfactorily accomplished.

Contrary to this requirement, as of September 23, 2005, the inspectors identified that the torque values specified in 250 Vdc safety-related battery maintenance procedure 12-IHP-5021-EMP-008 and surveillance procedures 12-IHP-4030-082-002 and 12-IHP-4030-082-003 contained a torque value that was neither applicable nor correct for the N batteries. Additionally, the surveillance procedures contained a torque value for the AB & CD batteries values that could result in under-torquing the ½" bolts and over-torquing the 5/16" bolts. Because the violation was of very low safety significance and because licensee personnel entered the finding into the corrective action program (CRs 05264024, 05264093, 05265027 and 05265029), this violation is being treated as a Non-Cited Violation consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000315/2005007-03; NCV 05000316/2005007-03).

.3 Components

a. Inspection Scope

The inspectors examined the AFW and the DC power distribution systems to ensure that component level attributes were satisfied. The inspectors specifically focused on the batteries, battery chargers and transfer panels in the DC system, because these were the highest risk components. To a lesser extent, the inspectors also looked at component level attributes for the AFW pumps and turbine. The following component level attributes of the AFW and DC power distribution systems were reviewed:

Component Degradation: This attribute was reviewed to ensure that components were being maintained consistent with the design basis. The inspectors reviewed AFW and DC battery surveillance tests to ensure that equipment degradation, if present, was within allowable limits. The inspectors also verified that component replacement was within its expected life and that components were not being replaced at an excessive frequency indicative of underlying problems.

Component Inputs/Outputs: The inspectors reviewed component specific inputs and outputs to verify that the components would operate acceptably under accident conditions.

Equipment Protection: This attribute verifies that the AFW and the DC power distribution systems are adequately protected from natural phenomenon and other hazards, such as high energy line breaks, floods or missiles. The inspectors reviewed design information, specifications, and documentation to ensure that the AFW and the DC power distribution systems were adequately protected from those hazards identified in the UFSAR which could impact their ability to perform their safety function.

Operating Experience: This attribute ensures that applicable industry and site operating experience has been considered and applied to the components or systems. To verify this attribute, the inspectors reviewed licensee evaluations of operating

experience and performed physical walkdowns to ensure any operating experience described conditions either did not exist or had been identified and corrected. The inspectors specifically looked at the licensee's actions in response to industry information regarding electrolytic capacitors and over-duty fuses and breakers.

b. Findings

.1 Single Cell Non-Class-1E Battery Charger

Introduction: The inspectors identified a finding involving an NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." having very low safety significance (Green) for an inadequate maintenance procedure related to battery cell charging. Specifically, procedure 12-IHP-5021-EMP-009 did not contain any verification steps to ensure adequate electrical isolation was maintained when a non-Class 1E single cell battery charger was used to charge a single battery cell on safety-related batteries. This issue was entered into the licensee's corrective action program as CR 05266063.

Description: The inspectors identified that Procedure 12-IHP-5021-EMP-009, "Battery Cell Charging," used to perform single cell charging on station batteries, was inadequate in that the procedure did not verify that adequate electrical isolation was maintained between non-Class 1E equipment and the safety-related batteries. The inspectors noted that the "Precautions and Limitations" section of the procedure specified 10 ampere, 25 ampere, and 40 ampere nuclear grade fuses to be used with three specific models of single cell chargers respectively for electrical isolation between the single cell charger and the single cell safety-related battery. However, while the procedure had a step that verified the model of the single cell charger used, it did not have a performance step that verified the use of appropriate safety-related fuses that matched the model of single cell charger used.

The inspectors walked down the storage location of the individual cell chargers and found several single cell chargers. The inspectors identified only one charger which had been modified to incorporate two 40 ampere safety-related fuses at the output. The modified charger, as well as other non-modified chargers, had a model number specified in the procedure as being acceptable for use. The other acceptable model number chargers did not appear to have a normally fused output.

The inspectors reviewed one completed work package that performed a charging activity on a 250 VDC safety-related battery single cell. While the work package contained several pages from the procedure with check marks showing those steps had been completed, the Precautions and Limitations page was not included. Additionally, the maintenance notes did not have any mention that a fuse was installed. Therefore, the inspectors were unable to verify that a safety-related fuse was used to maintain electrical separation. The inspectors noted that maintaining proper isolation between the non-safety-related single cell charger and the safety-related battery cell was a critical activity step. Without proper isolation capability, an electrical fault on the non-Class 1E battery charger could be transferred without interruption into the station battery. The inspectors recognized that the licensee required personnel to follow procedures in their entirety, including all precautions and limitations; however, there was no way to corroborate this

from the completed package. Based on the procedure lacking a step to install a safety-related fuse, the completed work package lacking any evidence of a fuse being installed, and several single cell chargers of the correct model number being available without the appropriate fuses installed in their outputs, the inspectors could not reasonably conclude that the licensee would only use the one single cell charger which had appropriate fuses installed in its output.

Analysis: The inspectors determined that this issue was a performance deficiency since the licensee failed to meet the requirements of 10 CFR Part 50, Appendix B, Criterion V "Instructions, Procedures, and Drawings". Specifically, the licensee failed to incorporate appropriate instructions in procedure 12-IHP-5021-EMP-009 to verify that appropriately sized safety-related fuses suitable for the model of single cell charger were used between the non-Class 1E single cell battery charger, and the associated safety-related station batteries. The cause was reasonably within the licensee's ability to foresee and correct and it could have been prevented because the procedure is used and the lack of verification on the fuse installation could reasonably be expected to be identified by licensee individuals concerned about maintaining electrical separation.

The inspectors determined that the finding was more than minor in accordance with IMC 0612, Appendix B, in that the finding was associated with the attribute of equipment performance, which affected the mitigating system's cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. Specifically, failure to install the fuse could result in inadequate electrical isolation between the non-Class 1E single cell battery charger and safety-related battery. Without adequate isolation, a fault on the non-Class 1E charger could potentially render the safety-related battery incapable of performing its required safety function.

The finding screened as having very low significance (Green) using IMC 0609, Appendix A, because the inspectors answered "no" to all five questions under the Mitigating Systems Cornerstone column of the Phase 1 worksheet. In addition, no non-Class 1E chargers were installed on the safety-related batteries during the time of the inspection that could have rendered any of the station batteries incapable of performing their required safety function.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" required, in part, that activities affecting quality be prescribed by documented procedures of a type appropriate to the circumstances and be accomplished in accordance with these procedures.

Contrary to this requirement, inspectors identified that procedure 12-IHP-5021-EMP-009 was not appropriate to the circumstances in that it permitted a non-Class 1E single cell battery charger to be connected to the safety-related batteries without clear verification that electrical isolation was maintained. This is an activity affecting quality as a fault in the non-Class 1E device could propagate into the Class 1E batteries if proper isolation is not maintained. Because this violation is of very low safety significance and because the issue was entered into the licensee's corrective action program (CR 05266063), this violation is being treated as an NCV, consistent with Section VI.A.1 of the Enforcement Policy (NCV 05000315/2005007-04, 05000316/2005007-04).

.2 Electrolytic Capacitors in Battery Chargers Not Energized Annually

Introduction: The inspectors identified a finding having very low safety significance (Green). Specifically, the licensee did not have a process to ensure that each of the 250 VDC battery chargers was energized for a minimum of eight hours per year. The vendor required this minimum energization in order to ensure the electrolytic capacitors installed in the chargers would meet their qualified life of ten years.

Description: The inspectors noted that the licensee had a preventive maintenance program which replaced the electrolytic capacitors in the 250 V DC battery chargers every ten years. According to the vendor manual, the normal shelf life for electrolytic capacitors is two years. The manual provided for extending the electrolytic capacitor life to ten years by subjecting the capacitors to 250 VDC approximately for eight hours on an annual basis.

Each 250 VDC battery train contained two 300 ampere battery chargers. One charger was normally energized and the other remained as a spare with both input and output breakers open. The inspectors determined that there was no formal process to swap the chargers or otherwise ensure that each charger was energized for at least eight hours on an annual basis; instead the licensee relied upon maintenance activities to swap the chargers. Upon reviewing documentation for the last two years showing when the chargers were swapped, the inspectors identified two instances where the Unit 2 battery chargers remained de-energized for more than a year. The licensee had a planned replacement maintenance schedule of ten years for the electrolytic capacitors and the electrolytic capacitors had last been replaced in 1999. Therefore, the inspectors were concerned that the electrolytic capacitors which had not received an annual 8-hour charge might be degraded.

Upon searching the licensee's corrective action database, the licensee identified a CR written in 1999 (CR P-99-08527) that had previously identified the issue. The CR recommended changing the frequency of the 18 month load test surveillance of the battery chargers to once a year and thereby meeting the vendor recommendation. However, this CR was closed without implementing the recommended corrective action.

The problems associated with electrolytic capacitors have been widely disseminated within the nuclear industry as there have been a number of Part 21 notices, NRC Information Notices 94-33 and 95-10, and several licensee event reports issued due to failures of these capacitors.

Analysis: The inspectors determined that this issue was a performance deficiency since the licensee had not followed the vendor's requirement for energizing the chargers for eight hours on an annual basis in order to extend the life of the electrolytic capacitors. Specifically, the licensee failed to provide a process which ensured that the chargers were energized on a regular basis and depended on maintenance activities on one battery charger to energize the spare charger. The cause of this issue was reasonably within the licensee's ability to foresee and correct and it could have been prevented had the licensee paid sufficient attention to the vendor's requirements, the issue documented in CR P-99-08527 or the industry experience.

The inspectors determined that the finding was more than minor in accordance with IMC 0612, Appendix B, "Issue Disposition Screening", because it was associated with the attribute of equipment performance, which affected the mitigating system's cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. Specifically, the failure to energize the electrolytic capacitors for at least 8 hours annually could lead to the degradation of the capacitors with resultant degradation of the voltage going to the batteries. The finding screened as having very low significance (Green) using IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for the At-Power Situations," because the inspectors answered "no" to all five questions under the Mitigating Systems Cornerstone column of the Phase 1 worksheet.

Enforcement: No violation of NRC requirements occurred. This issue was entered into the licensee's corrective action program as CR 05255055, and was considered a finding of very low safety significance (FIN 05000315/2005007-05, 05000316/2005007-05)

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution

Review of Condition Reports

a. Inspection Scope

The inspectors reviewed a sample of AFW and DC power distribution system problems that were identified by the licensee and entered into the corrective action program. The inspectors reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions related to design issues. In addition, condition reports written on issues identified during the inspection were reviewed to verify adequate problem identification and incorporation of the problem into the corrective action program. The specific corrective action documents that were sampled and reviewed by the inspectors are listed in the attachment to this report.

b. Findings

No findings of significance were identified.

4OA6 Meetings

Exit Meeting

The inspectors presented the inspection results to Mr. D. Fadel and other members of licensee management at the conclusion of the inspection on September 30, 2005. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. While proprietary information was examined during this inspection, it was not retained by the NRC and is not specifically discussed in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
D. Baker, Design Engineering; Technical Contact
D. Fadel, Engineering Vice President
P. Mangan, Configuration Control Manager
R. Meister, Nuclear Regulatory Affairs, Licensing Contact
M. Scarpello, Nuclear Regulatory Affairs Manager
P. Schoepf, Design Engineering Manager
S. Vazquez, System Engineering Manager
L. Weber, Plant Manager

NRC

B. Kemker, Senior Resident
J. Lennartz, Acting Senior Resident

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000315/2005007-01 05000315/2005007-01	NCV	Introduction of Manual Action in Station Blackout Response Procedure
05000315/2005007-02 05000315/2005007-02	NCV	Hydrometer Not Calibrated for Temperatures Seen During Surveillances
05000315/2005007-03 05000315/2005007-03	NCV	Torquing Requirements in 250 Vdc Safety-Related Battery Procedures
05000315/2005007-04 05000315/2005007-04	NCV	Single Cell Non-Class-1E Battery Charger
05000315/2005007-05 05000315/2005007-05	FIN	Electrolytic Capacitors in Battery Chargers Not Energized Annually

LIST OF DOCUMENTS REVIEWED

The following is a list of licensee documents reviewed during the inspection. Inclusion in this list does not imply 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 and used to reach a conclusion about a specific attribute being reviewed. Documents may have been used to evaluate more than one attribute; however, they are listed only once, according to the type of document. Additionally, inclusion in this list does not imply NRC acceptance of any part of any document, unless this is stated in the body of the inspection report or it is a document which has received specific NRC approval under another process.

Calculations

1-2-UNC-114 CALC1; 250 VDC Battery Voltage; Revision 0
1-2-UNC-144 CALC1; Auxiliary Feedwater and Emergency Service Water Pump Room Temperature Uncertainty Calculation; March 3, 2000
1-DCP-0286; Auxiliary Feedwater Suction from Emergency Service Water; Revisions 0 and 0A
1-E-N-ELCP-250-006; 250 VDC Battery 1CD System Analysis; Revision 0
1-E-N-ELCP-250-007; 250 VDC Battery 1AB System Analysis; Revision 0
1-E-N-ELCP-250-008; 250 VDC Battery 1N System Analysis; Revision 0
2-E-N-ELCP-250-001; Calculation Change Sheet for 2-DCP-5301 – Fuse Changes; Revision 0; Change Sheet 2
2-E-N-ELCP-250-006; 250 VDC Battery 2CD System Analysis; Revision 0
2-E-N-ELCP-250-007; 250 VDC Battery 2AB System Analysis; Revision 0
2-E-N-ELCP-250-008; 250 VDC Battery 2N System Analysis; Revision 0
DCC-PV-12-MC01-F; Floor Drain Flow Capacities, IE Notice 83-41; February 2, 1988
DC-D-3053S-430; Generic Calculations of Minimum Thread Engagement Criteria for Evaluation of Various Thread Engagement Concerns; Revision 0
ECP 1-2-00-14; Emergency Operating Procedure Footnotes; Revision 17
ECP 1-2-V3-13; Emergency Service Water, Auxiliary FeedWater Pump and Battery Rooms' Ventilation System; September 20, 2001
MD-01-Auxiliary Feedwater -041-N; Turbine Driven Auxiliary Feedwater Pump Discharge Valve Position Determination; Revision 1
MD-12-Auxiliary Feedwater -001-N; Auxiliary Feedwater System Design Basis Analysis; Revision 1; 6/1/2005
MD-12-Auxiliary Feedwater -034-N; Auxiliary Feedwater System Analysis for Steam Generator Tube Rupture; Revision 0; 3/22/2000
MD-12-Auxiliary Feedwater -038-N; Minimum Operability Limits for Motor-Driven Auxiliary Feedwater Pumps; Revision 0; 8/18/2000
MD-12-CST-001-N; Add Unusable Volume for Condensate Storage Tank; August 17, 2001
MD-12-CST-002-N; Operation of Auxiliary Feedwater System Using Condensate Storage Tank of Other Unit; Revision 0
MD-12-HV-018-N; Auxiliary Feedwater Pump Room and Hallway Heat Load Calculation; Revision 1; 4/16/00
TH-99-12; Effects on Station Blackout Coping Due to Loss of Control Air Supply to Air Operated Valves for Units 1 and 2; Revision 0, Change Sheet 1; 5/22/2000
TH-99-13; Condensate Storage Tank Inventory; Revision 0, Change Sheet 1; 5/14/2002

Condition Reports Identified as a Result of the Inspection

05250021; NRC Inspector Identified Typographical Error Regarding Referenced Document in Calculation MD-12-AFW-001-N; September 7, 2005

05250042; Spring Can Hanger on U-1 50-psig Auxiliary Steam Header not Centered on Support Plate; September 7, 2005

05251014; Discrepancy Between Calculations MD-12-AFW-01-N, Revision 1, and MD-01-AFW-041-N, Revision 1; September 8, 2005

05252011; Method Used to Reset Auxiliary Feedwater Turbine Driven Pump Trip and Throttle Valve Appeared to Be Personnel Safety Concern; September 9, 2005

05252030; Inadequate Operability Call; September 9, 2005

05252060; Flooding of the Auxiliary Feedwater Pump Rooms; September 9, 2005

05252062; Seismic Qualification of Fire Protection Piping Running Through Auxiliary Feedwater Pump Rooms; September 9, 2005

05252068; Battery Specific Gravity vs Technical Specifications (non conservative); September 9, 2005

05255055; Lack of Procedure for Swapping Battery Chargers; September 12, 2005

05259048; Instrument Accuracy Values in Battery Surveillance Procedures Do Not Envelope Entire Accuracy Ranges Associated with the Digital Hydrometer; September 16, 2005

05264004; NRC Inspector Identified That Calculation MD-12-AFW-038-N, Revision 1, Referenced Superceded Calculation; September 21, 2005

05264024; Torque Values for N Train Battery Terminations Appear to be Incorrect; September 21, 2005

05264045; Errors in Auxiliary Feedwater Design Basis Document Related to Unit 1 Operation with Throttled Turbine Driven Auxiliary Feedwater Pump Discharge Valves; September 21, 2005

05264057; Actions Identified in Condition Report 05089064 Condition Evaluation Were Not Initiated to Revise or Create Recurring Tasks to Test Molded Case Circuit Breakers; September 21, 2005

05264093; Measuring and Test Equipment Documented in Wrong Procedure in Work Order R0221035-01; September 21, 2005

05264094; Several Corrections Required on Various Design Documents and Drawings; September 21, 2005

05265016; Inadequate Calibration of the SBS-2002 Digital Hydrometers; September 22, 2005

05265027; Work Request to Disassemble, Inspect, and Reassemble the Cable Lug to Battery Post Connection on 1-BATT-N; September 22, 2005

05265028; Response to Loss of DC Bus Different Between Units and Between AB and CD Buses in Regard to Steam Generator Power Operated Relief Valve Actions; September 22, 2005

05265029; Work Request to Disassemble, Inspect, and Reassemble the Cable Lug to Battery Post Connection on 2-BATT-N; September 22, 2005

05265036; Issues Identified with UFSAR Section 7.2.1 Concerning Limitations for Control of Auxiliary Feedwater Flow During a Station Blackout Event; September 22, 2005

05266063; 12-IHP-5021-EMP-009 “Battery Cell Charging” needs Revision; September 23, 2005

05266069; Evaluation of Changes Implemented Regarding Unit 1 Turbine Driven Auxiliary Feedwater Pump Discharge Valves Standby Readiness Position and the Requirements for Station Blackout; September 23, 2005

05266072; NRC Concern That Changes to Turbine Driven Auxiliary Feedwater Pump Discharge Valves Standby Readiness Position Might Not Meet 10 CFR 50.63 Requirements; September 23, 2005

05266075; SSDPC Inspector Noticed Fuses That Appeared to Exhibit signs of Corrosion or Dirt; September 23, 2005
05266079; Battery Specific Gravity Readings Varied with Temperature; September 23, 2005
05266081; Inadequate Battery Equivalency Evaluations; September 23, 2005
05266091; Lack of Formal Fuse Sizing Calculation; September 23, 2005
05266098; Cook Plant to Consider Performing Bench Marking the Industry to Assess Calculation Formatting to Meet Industry Expectations; September 23, 2005
05266099; JO 0221035 Has Several Issues Regarding Inadequate Notification on Out-of-Specification Conditions; September 23, 2005
05270047; Question Regarding Recharging Time for Unit 1 CD Safety-Related Batteries; September 27, 2005
05272075; Drawing OP-12003 for Units 1 and 2 Requires an Update; September 29, 2005

Condition Reports Reviewed During the Inspection

94-0401; Aux Steam Support, 1-BAUX-V114; March 3, 1994
P-98-06318; No Freeze Protection for the Condensate Storage Tanks; October 29, 1998
0313032; Tracking Condition Report to Provide Control Room Indication, Post-Restart, That Unit 1 Turbine Driven Auxiliary Feedwater Pump Discharge Valves Are in Correct Position; November 8, 2000
0119028; Turbine Driven Auxiliary Feedwater Pump Suction Strainer Mounting Foot Anchors Have Less Than Flush Thread Engagement; January 18, 2001
04289046; Overall Battery Connection Resistance Reading are Higher than Allowable; October 15, 2004
04307063; Cell 90-91 Interstep Connection on 2-Batt-N Found Out of Specification; November 2, 2004
05089064; Perform Preventive Maintenance Optimization Evaluation on Miscellaneous Critical Molded Case Circuit Breakers; March 30, 2005
05158074; Self Assessment Identified 250 VDC System Calculations Not Getting Updated in Timely Manner; June 7, 2005
5159060; 1-DCP-5002 and 2-DCP-5301 Have Been on Planning Hold 1.5 Years;
05166072; TD Auxiliary Feedwater Pump Steam Exhaust Pipes and Auxiliary Feedwater Piping from the Condensate Storage Tank for Each Unit Can Be Potentially Impacted by Tornado Missiles; July 15, 2005
05177018; Seismic Class I Emergency Service Water System is Backup for Condensate Storage Tank; September 2, 2005

Design Information Transmittals

DIT-B-00758-01; Design Basis Parameters for Turbine Driven Auxiliary Feedwater Pumps (1-PP-4 and 2-PP-4) [applicable to both units]; August 24, 2000
DIT-B-00879-00; 250 VDC Over voltage Evaluation; March 17, 2000
DIT-B-01555-02; Required Auxiliary Feedwater Flow for Unit 1;

Drawings

1-2-AEP-GRAV-L-24990; Detail Drawing of Pipe Posts for 32'-0" Diameter, Hardtop Floating Roof Tank, 3' and 6' Levels; Revision 0
1-5293; Detail Drawing of Support 1-BAUX-V114; July 6, 1971
5-030-02-008-001; 02008 BCF Exchanger-1 PASS; Revision 5
B1303, Sheet 2; Unit 2 250 VDC Distribution Panel; Revision A
BAT CD NODE.DWG; Battery CD One Line Diagram, Calculation 2-E-B-ELCP-250-006; Revision 0

I-700116-C; Zurn Duplex Automatic Backwash Type Pipeline Strainer; Revision 3
L-24989; General Assembly & Orientation Drawing for 52'-0" Diameter, 34'-51/2" High Hardtop Floating Roof Tank; Revision 1
OP-1-12060; DC Auxiliary One-Line 250 VDC Bus AB, Engineered safety system (Train B); Revision 25
OP-1-12061; DC Auxiliary One-Line 250 VDC Bus AB, Engineered safety system (Train B); Revision 13
OP-1-12062; DC Auxiliary One-Line 250 VDC Bus AB, Engineered safety system (Train B); Revision 14
OP-1-12063; DC Aux. One-Line 250 VDC Bus AB, Engineered safety system (Train B); Revision 22
OP-1-12065; DC Aux. One-Line 250 VDC Bus , Engineered safety system (Train N); Revision 10
OP-1-12070; DC Auxiliary One-Line 250 VDC Bus CD, Engineered safety system (Train A); Revision 20
OP-1-12071; DC Auxiliary One-Line 250 VDC Bus CD, Engineered safety system (Train A); Revision 20
OP-1-12072; DC Auxiliary One-Line 250 VDC Bus CD, Engineered safety system (Train A); Revision 17
OP-1-12073; DC Auxiliary One-Line 250 VDC Bus CD, Engineered safety system (Train A); Revision 24
OP-1-5106A-58; Flow Diagram Auxiliary Feedwater Unit 1; Revision 58
OP-1-98055, Sheet1; Elementary Diagram 250 VDC Battery AB, Distribution Schematic Diagram; Revision 21
OP-1-98057, Sheet1; Elementary Diagram, 250 VDC Battery CD, Distribution Schematic Diagram; Revision 17
OP-1-98210; Elementary Diagram, 250 VDC Train N Battery Distribution Schematic Diagram; Revision 15
OP-2-12003-25; 250 VDC Main One-Line Diagram Engineered Safety System (Train AB, N & BOP); Revision 25
OP-2-5106A-53; Flow Diagram Auxiliary Feedwater; Revision 53
OP-2-98055-20, Sheet1; 250 VDC Battery “AB” Distribution Schematic Diagram; Revision 20
OP-2-98057-16, Sheet1; 250 VDC Battery “CD” Distribution Schematic Diagram; Revision 16

Letters

AEP:NRC:0537E; Letter From AEP to NRC – Additional Information For Station Blackout (10 CFR 50.63); March 30, 1990
Letter From AEP to NRC – Station Blackout Analysis, Donald C. Cook Nuclear Plant, Units 1 and 2; October 31, 1991
WPL-AEP-00-260; Westinghouse Project Letter – American Electric Power, Donald C. Cook Nuclear Plant Unit 1, Reduced Turbine Driven Auxiliary Feedwater Flow; November 1, 2000

Miscellaneous Documents

Certified Measuring and Test Equipment Off-site Calibration Data for Digital Hydrometer SBS-2002; April 21, 2004, August 11, 2004, October 19, 2004, December 15, 2004, May 2, 2005, August 3, 2005
D.C. Cook Performance Monitoring Plan 250 VDC Distribution; Revision 3
1-2-EDS-606-11; Nuclear Design Electrical Section Electrical Design Standard; Revision 11

CNP.241; Cook Nuclear Plant Excellence Plan Indicator Calculation Health By System; July 2005
DB-12-AFWS; Design Basis Document for the Auxiliary Feedwater System; Revision 1
Engineering Guide 73; Electric Protective Device Coordination and Setting Criteria; Revision 0
Guideline 85.2; Criteria for Approved Fused Switches and Sizing; Revision 3
SD-12-AUXFD-100; Auxiliary Feedwater System Description; Revision 0

Modifications

EE-99-0037; Equivalency Evaluation for 1-BATT-AB, 2-BATT-AB, 2-BATT-CD; Revision 0
EE-2001-0486; Equivalency Evaluation for 1-BATT-CD; Revision 0
ICP-00813; Changes to ECP 1-2-O0-14, EOP Footnotes, Footnote V.108 and Addition of New Footnote V.115.1 due to 1-DCP-5064; Revision 0
1-DCP-4595; Modification of Auxiliary Feedwater Pump Rooms Ventilation System; Revisions 0, 0A, and 1
1-DCP-4894; Modify “Standby Readiness” Position of Turbine Driven Auxiliary Feedwater Pump Discharge Valves; Revisions 0 and 0A

Procedures

01-OHP-4021-056-001; Filling and Venting Auxiliary Feedwater System; Revision 23
01-OHP-4021-056-002; Transferring Auxiliary Feedwater Pump Suction Strainers; Revision 23
01-OHP-4021-082-006; Operation of 1A & 1CD Battery Chargers; Revision 10
01-OHP-4022-055-003; Loss of Condensate to Auxiliary Feedwater Pumps; Revision 6A
01-OHP-4022-082-002AB; Loss of Power to 250 VDC Bus 1AB; Revision 4
01-OHP-4022-082-002CD; Loss of Power to 250 VDC Bus 1CD; Revision 4
01-OHP-4023-ECA-0.0; Loss of All AC Power (Unit 1); Revisions 5, 10, 11, and 16
01-OHP-4024-113; Annunciator #113 Response: Steam Generators 1 and 2; Revision 8
01-OHP-4024-114; Annunciator #114 Response: Steam Generators 3 and 4; Revision 7
01-OHP-4030-STP-017TV; Turbine Driven Auxiliary Feed Pump Trip and Throttle Valve Operability Test;
02-OHP-4021-056-001; Filling and Venting Auxiliary Feedwater System; Revision 19
02-OHP-4021-056-002; Auxiliary Feed Pump Operation; Revision 16
02-OHP-4021-082-006; Operation of 2A and 2CD Battery Chargers; Revision 11
02-OHP-4021-082-015; Operation of the N Battery System; Revision 7
02-OHP-4022-055-003; Loss of Condensate to Auxiliary Feedwater Pumps; Revision 6B
02-OHP-4022-082-002AB; Loss of Power to 250 VDC Bus 2AB; Revision 4
02-OHP-4022-082-002CD; Loss of Power to 250 VDC Bus 2CD; Revision 4
02-OHP-4023-ECA-0.0; Loss of All AC Power (Unit 2); Revision 15
02-OHP-4024-213; Annunciator #113 Response Steam Generators 1 and 2; Revision 7
02-OHP-4024-214; Annunciator #214 Response Steam Generators 3 and 4; Revision 5
02-OHP-4030-STP-017TV; Turbine Driven Auxiliary Feed Pump Trip and Throttle Valve Operability Test;
12 THP 4030 SP.017; 48 Hour Endurance Test of Auxiliary Feedwater Pumps; Revision 0
12-EHP-5016-MCCB-001; Molded Case Circuit Breaker Maintenance Program; Revision 5
12-EHP-5040-DES-003; Calculations and Reports; Revision 7
12-EHP-5040.MOD.006; Design Change Packages; Revision 5a
12-IHP-4030-082-001; AB, CD and N-Train Battery Weekly Surveillance and Maintenance; Revision 12
12-IHP-5021-EMP-006; Battery Cell/Bank Replacement; Revision 4
12-IHP-5021-EMP-008; Battery Connection Maintenance; Revision 4

12-IHP-5021-EMP-009; Battery Cell Charging; Revision 4
12-OHP-4023-ECA-0.0; Plant Specific Background Document; Revision 9
PMP-5030-001-002; Control of Critical Parameters; Revision 5
PMP-5040-IEE-001; Item Equivalency Evaluations; Revision 3

10 CFR 50.59 Screenings and Evaluations
2000-2234-00; Safety Screening and Evaluation for 1-DCP-4894, "Modify Standby Readiness Position of Turbine Driven Auxiliary Feedwater Pump Discharge Valves" (Valid for Modes 1 through 3); Revisions 00, 01 and 02
2000-2418-00; Safety Screening and Evaluation for 1-DCP-4894 , Revision 0 (Valid for Modes 4 through 6 and Defueled); Revision 00
2001-0013-00; Safety Screening for Revision to 01-OHP-4023-ECA-0.0 "Loss of all AC Power"; Revision 00

Completed Surveillances
01-OHP-4030-156-017T; Turbine Driven Auxiliary Feedwater System Tests; performed on May 21, 2004, February 24, 2005, April 24, 2005 and July 9, 2005
01-OHP-4030-STP-017E; East Motor Driven Auxiliary Feedwater System Tests; performed on April 23, 2005 and May 5, 2005
01-OHP-4030-STP-017R; Turbine Driven Auxiliary Feedwater Pump Time Response Tests performed on; October 17, 2003, March 25, 2005, and April 24, 2005
01-OHP-4030-STP-017W; West Motor Driven Auxiliary Feedwater System Tests; performed on April 21, 2004 April 6, 2005 and June 17, 2005
02-OHP-4030-256-017T; Turbine Driven Auxiliary Feedwater System Test; performed on September 2, 2005
02-OHP-4030-STP-017E; East Motor Driven Auxiliary Feedwater System Tests; performed on November 19, 2004, July 5, 2005 and July 13, 2005
02-OHP-4030-STP-017W; West Motor Driven Auxiliary Feedwater System Tests; performed on June 24, 2005
12-IHP-4030-082-002; 1-AB Battery Quarterly Surveillance and Maintenance; performed on October 9, 2003, December 30, 2003, March 25, 2004, June 17, 2004, September 9, 2004, December 2, 2004, February 25, 2005, May 17, 2005, and August 18, 2005
12-IHP-4030-082-002; 1-CD Battery Quarterly Surveillance and Maintenance; performed on December 18, 2003, March 11, 2004, June 3, 2004, August 27, 2004, November 18, 2004, February 11, 2005, May 3, 2005, and August 4, 2005

Vendor Manuals
VTD-CDBA-0001; C & D Technologies Standby Battery Vented Cell Installation and Operating Instructions; Revision 4
VTD-SSCI-0015; Solid State Controls Instruction and Operating Manual for Model BCS 25300 Battery Charger

Work Orders
02305041; 1-BATT-N Trending Indicates Battery Replacement – Install and Terminate "New" 1-BATT-N Battery Bank; October 8, 2003 and November 1, 2003
03003005; 2-BATT-N; Replace Battery; May 18, 2004
03237020; 1-BC-A Repair Battery Charger; August 26, 2003
04158013; 2-BC-B, Investigate Output Drifting Causing Alarm; June 8, 2004

A0156276; Replace 1-BC-AB1 & 1-BC-AB2 Internal Components; January 15, 1999
C0050401; Replace Condensate Storage Tank Floating Diaphragm Outer Seal; January 8, 2000
C0051164; Replace 1-BATT-CD During Year 2002 Outage; May 24, 2002
R0070899; Perform 1-BATT-CD 60 Month Surveillance; November 7, 2003
R0097449; Perform 2-BATT-AB 60 Month Surveillance; October 14, 2004
R0097449; Perform 2-BATT-AB 60 Month Surveillance; January 23, 2005
R0100148; Inspect, Test, and Clean Motor Control Center 2-EZC-B; February 1, 2000
R0210059; Perform 1-BATT-AB 18 Month Surveillance; October 30, 2003
R0210067; Perform 1-BATT-N 60 Month Surveillance; December 11, 2004
R0221035; Perform 2-BATT-N 18 Month Surveillance; October 14, 2004
R0225003; 2-BC-A, 10-year Component Replacement; October 2, 2003
R0225836; Inspect, Clean and Test Motor Control Center 2-EZC-A; October 4, 2004
R0229001; Perform 1-BC-A & 1-BC-B 549 Day Surveillance; August 28, 2003
R0229229; Perform 1-BC-CD1 & 1-BC-CD2 549 Day Surveillance; September 23, 2003
R0229301; Perform 1-BATT-AB 92 Day Surveillance; August 15, 2002
R0232194; Perform 1-BATT-CD 92 Day Surveillance; August 1, 2002
R0233574; Perform 1-BATT-CD 92 Day Surveillance; October 24, 2002
R0234188; Perform 1-BATT-AB 92 Day Surveillance; November 17, 2002
R0238984; Perform 2-BC-A & 2-BC-B 549 Day Surveillance; May 12, 2004
R0240064; Perform 2-BC-CD1 & 2-BC-CD2 549 Day Surveillance; June 8, 2004
R0240510; Perform 2-BC-AB1 & 2-BC-AB2 549 Day Surveillance; June 22, 2004
R0246811; 2-QT-507 Functional Test Mechanical and Electronic Overspeed; August 14, 2005
R0248279; Perform 1-BC-AB1 & 1-BC-AB2 549 Day Surveillance; November 30, 2004
R0250927; Perform 1-BC-A & 1-BC-B 549 Day Surveillance; January 21, 2005
R0273269; Perform 2-Batt-N 92 Day Surveillance; May 18, 2005
R0275402; Perform 2-Batt-AB 92 Day Surveillance; August 26, 2005
R0277593; Perform 2-Batt-N 7 Day Surveillance; August 12, 2005
R0277594; Perform 2-Batt-CD 7 Day Surveillance; August 12, 2005
R0277595; Perform 2-Batt-AB 7 Day Surveillance; August 12, 2005

LIST OF ACRONYMS USED

ADAMS	Agency-wide Documents and Management System
AFW	Auxiliary Feedwater
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
CR	Condition Report
DC	Direct Current
EOP	Emergency Operating Procedure
FIN	Finding
gpm	Gallons per Minute
IEEE	Institute of Electric and Electronic Engineers
IMC	Inspection Manual Chapter
lbm/hr	Pounds Mass per Hour
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PARS	Publically Available Records
ROP	Revised Oversight Process
SBO	Station Blackout
SDP	Significance Determination Process
SSDPC	Safety System Design and Performance Capability
UFSAR	Updated Final Safety Analysis Report
°F	Degrees, Fahrenheit