June 14, 2005

Mr. Mark B. Bezilla
Vice President-Nuclear, Davis-Besse
FirstEnergy Nuclear Operating Company
Davis-Besse Nuclear Power Station
5501 North State Route 2
Oak Harbor, OH 43449-9760

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION
NRC SAFETY SYSTEM DESIGN AND PERFORMANCE CAPABILITY
INSPECTION 05000346/2005004(DRS)

Dear Mr. Bezilla:

On May 6, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed a baseline inspection at your Davis-Besse Nuclear Power Station. The enclosed report documents the inspection findings which were discussed on May 6, 2005, with Mr. B. Allen and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and to compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. Specifically, this inspection focused on the design and performance capability of the direct current (DC) power and auxiliary feedwater systems.

Based on the results of this inspection, three NRC-identified findings of very low safety significance were identified, 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 in accordance with Section VI.A.1 of the NRC's 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, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Davis-Besse Nuclear Power Station.

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Sincerely,

/RA/

Steven A. Reynolds, Chairman
Davis-Besse Oversight Panel

Docket No. 50-346
License No. NPF-3

Enclosure: Inspection Report 05000346/2005004(DRS)
w/Attachment 1: Supplemental Information
Attachment 2: Technical Specifications Table 4.8-1

cc w/encl: The Honorable Dennis Kucinich
G. Leidich, President - FENOC
J. Hagan, Senior Vice President
Engineering and Services, FENOC
L. Myers, Chief Operating Officer, FENOC
Plant Manager
Manager - Regulatory Compliance
D. Jenkins, Senior Attorney, FirstEnergy
Ohio State Liaison Officer
R. Owen, Administrator, Ohio Department of Health
Public Utilities Commission of Ohio
President, Board of County Commissioners
of Lucas County
J. Papcun, President, Ottawa County Board of Commissioners

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-346
License No:	NPF-3
Report No:	05000346/2005004(DRS)
Licensee:	FirstEnergy Nuclear Operating Company (FENOC)
Facility:	Davis-Besse Nuclear Power Station
Location:	5501 North State Route 2 Oak Harbor, OH 43449-9760
Dates:	April 18, 2005, through May 6, 2005
Inspectors:	A. Dunlop, Senior Reactor Engineer, Lead Inspector R. Langstaff, Senior Reactor Engineer S. Shaeffer, Senior Project Engineer H. Walker, Senior Reactor Engineer A. Dahbur, Reactor Engineer M. Munir, Reactor Engineer
Approved by:	Ann Marie Stone, Chief Engineering Branch 2 Division of Reactor Safety (DRS)

Enclosure

SUMMARY OF FINDINGS

IR 05000346/2005004(DRS); 04/18/2005 - 05/06/2005; Davis-Besse Nuclear Power Station; Safety System Design and Performance Capability.

The inspection was a three-week baseline inspection of the design and performance capability of the auxiliary feedwater and DC power systems. The inspection was conducted by regional engineering inspectors. Three Green Non-Cited Violations were identified. 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

- Green. The inspectors identified a Non-Cited Violation of Technical Specification 6.8.1, "Procedures and Programs," regarding an inadequate procedure related to transferring the suction source for the motor-driven feedwater pump from the condensate storage tank to the backup service water supply. Specifically, implementation of the procedure would have placed a significant quantity of air into the suction piping for the pump, potentially degrading the pump or making it inoperable. After the inspectors' identification, the licensee initiated an operations standing order to adequately fill the affected section of piping prior to transferring the suction supply.

  The issue was more than minor because it was associated with the attribute of equipment performance, which affected the mitigating systems cornerstone objectives of ensuring the availability, reliability, and capability of systems and components that respond to initiating events. The finding was of very low safety significance based on the results of the SDP Phase 1 screening worksheet. (Section 1R21.2.b.1)

- Green. The inspectors identified a Non-Cited Violation of Technical Specifications Table 4.8-1 for the failure to identify that a battery cell float voltage reading was below the required 2.13 volts minimum value. Based on Table 4.8-1, note (2), this required an action (i.e., equalize charge) within 7 days to restore the voltage such that the battery would remain operable, which was not accomplished. This was considered a past operability issue. Subsequent readings on the battery cell were within the Technical Specification required value, which addressed present operability concerns.

This finding was more than minor because it was associated with the attribute of human performance, which affected the mitigating systems cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. The human performance finding also had a cross-cutting aspect because the licensee failed to identify a voltage reading that did not meet acceptance criteria during the surveillance. The finding was of very low safety significance based on the results of the SDP Phase 1 screening worksheet. (Section 1R21.2.b.2)

- Green. The inspectors identified a Non-Cited Violation of Technical Specification 6.8.1, "Procedures and Programs," regarding an inadequate maintenance procedure related to battery charging. Specifically, the maintenance procedure did not ensure that adequate electrical isolation was maintained when a non-Class 1E single cell battery charger was used to charge a single battery cell.

  This finding was more than minor because it was associated with the attribute of equipment performance, which could have affected the mitigating systems cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. The finding was of very low safety significance based on the results of the SDP Phase 1 screening worksheet. (Section 1R21.2.b.3)

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Mitigating Systems and Barrier Integrity

1R21 Safety System Design and Performance Capability (71111.21)

Introduction: Inspection of safety system design and performance verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected systems to perform design bases functions. As plants age, the design bases 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 safety system design and performance capability 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 auxiliary feedwater (AFW), including the motor-driven feedwater pump (MDFP), and direct current (DC) power systems (two samples). 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 (TS);
- applicable Updated Safety Analysis Report (USAR) sections; and
- the systems' design documents.

.1 System Requirements

a. Inspection Scope

The inspectors reviewed the USAR, TS, system design basis documents, system descriptions, drawings, and other available design basis information, to determine the performance requirements of AFW and DC power 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 and MDFP would supply the required amount of water to the steam generators in order to remove heat from the reactor following normal transients and design basis events.

Energy Sources: This attribute needed to be reviewed to ensure that the AFW system and MDFP would start when called upon, and that appropriate valves would have sufficient power to change state when so required. This attribute also needed to be reviewed to ensure that the DC power system was sufficiently sized to provide power to the components it supplied.

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.

Operations: This attribute was reviewed because the emergency operating procedures permitted the operators to manually control AFW and MDFP operations to maintain desired steam generator water level. The MDFP was manually initiated, which required a number of actions to align the system for operation. Therefore, operator actions played an important role in the ability of the AFW and MDFP systems to achieve its functions.

Heat Removal: This attribute required review to ensure that the heat generated while the AFW system was running can be effectively removed and that the temperature in the battery rooms would be maintained within the batteries' design requirements.

b. Findings

No findings of significance were identified.

.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 USAR and TS. The inspectors compared the information in these documents to applicable electrical, instrumentation and control, 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, including the MDFP, 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; physical separation; provisions for seismic and other pressure transient concerns; and the conformance of the currently installed configuration of the systems with the design and licensing bases.

Operation: The inspectors performed a procedure walk-through of selected manual operator actions to confirm that the operators had the knowledge and tools necessary to accomplish actions credited in the design basis.

Design: The inspectors reviewed the mechanical, electrical, and instrumentation design of the AFW, including the MDFP, and DC power 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 setpoints based on the required equipment function. Additionally, the inspectors performed limited analyses in several areas 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 automatic initiations occurred within required times and that testing was consistent with design basis information.

b. Findings

Three findings of very low safety significance associated with Non-Cited Violations (NCVs) were identified.

b.1 Air Void in Suction to MDFP When Aligned to Service Water

Introduction: The inspectors identified a finding involving an NCV of TS 6.8.1, having very low safety significance (Green) for an inadequate procedure related to the transferring of the suction source for the MDFP from the condensate storage tank (CST) to the backup service water (SW) supply. Implementation of the procedure would have placed a significant quantity of air into the suction piping for the pump, potentially degrading the pump or making it inoperable.

Discussion: On May 2, 2005, during an NRC walkdown of the piping associated with the MDFP, review of Procedure DB-OP-06225, “MDFP Operation,” and questioning of the suction piping configuration susceptibility to air entrapment, the inspectors identified that

the configuration of suction piping from the SW alternate suction supply would align approximately 11 feet of voided 6-inch piping to the pump. The subject voided section was located approximately 60 feet from the MDFP suction inlet. Upon implementing the SW lineup to the MDFP, per DB-OP-06225, Section 5.3, "Transferring MDFP Suction from the CST to Service Water," the voided line would be lined up to the suction of the pump and could have potentially caused significant damage to the pump.

Procedure DB-OP-06225, Section 5.3, re-aligns the suction for the MDFP from the CST to the SW supply by closing drain valve SW336 and then opening the normally closed manually operated SW supply valves SW6391 and SW6392. The piping in between these valves was normally maintained drained by opened valve SW336 to preclude potential leakage through SW6391 from being inadvertently supplied to the steam generators, which could adversely affect SG chemistry. Section 5.3 of DB-OP-06225 was determined to be inadequate, in that, implementation of the procedure as written would line up an approximate 11-foot section of the voided piping to the suction of the MDFP.

The licensee documented the concern in condition reports (CRs) 05-02526 and 05-02522 and promptly issued an Operations Standing Order 05-005 that would adequately fill the affected section of MDFP suction piping prior to transferring the MDFP to the backup SW suction supply. At the end of the inspection period, the licensee was evaluating past operability of the MDFP and reviewing corrective actions for the CR, including procedure revisions to DB-OP-06225 to preclude potentially damaging the MDFP due to air ingestion.

Analysis: The inspectors determined that the failure to ensure piping between the two isolation valves for the SW connection to the MDFP was filled prior taking a suction from the SW system was a performance deficiency and a finding. The volume of air in the voided section of SW piping could have adversely affected the MDFP if the SW system was used as a suction source. The inspectors determined that the finding was more than minor in accordance with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Disposition Screening," in that the finding was associated with the attribute of equipment performance, which affected the mitigating systems cornerstone objectives of ensuring the availability, reliability, and capability of systems and components that respond to initiating events to prevent undesirable consequences. Specifically, implementation of Section 5.3 of DB-OP-06225 as written would have placed a significant quantity of air into the suction piping for the pump, potentially degrading the pump. This finding was only applicable to those events where the CST and off-site power would be unavailable (e.g., external events such as seismic and severe weather events).

The inspectors evaluated the finding using IMC 0609, "Significance Determination Process," Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations," Phase 1 screening, and determined that the finding screened as Green because it was not a design issue resulting in loss of function per Generic Letter (GL) 91-18, did not represent an actual loss of a system's safety function, did not result in exceeding a TS allowed outage time, and did not affect external event mitigation. Although the finding was associated with a seismic event, the finding was determined not to be potentially risk significant based on the seismic screening criteria, Question 3.

For the purpose of significance determination, the inspectors conservatively assumed that the function of the MDFP would be failed. The finding only affected one train of a multi-train safety system (MDFP considered one train of AFW function to provide water to the steam generators), such that the finding did not result in the total loss of a safety function. This resulted in the finding screening as Green.

Enforcement: Technical Specification 6.8.1, "Procedures and Programs," required, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, "Quality Assurance Program Requirements," Appendix A. This included procedures related to plant operations such as DB-OP-06225, Section 5.3, which implemented actions to place SW in the suction supply for the MDFP.

Contrary to this requirement, on May 6, 2005, Section 5.3 of DB-OP-06225 was determined to be inadequate, in that, implementation of the procedure as written would align a significant amount of voided piping to the suction of the MDFP, potentially degrading the pump due to air ingestion. Because this finding is of very low safety significance and has been entered into the licensee's corrective action program (CR 05-02526), it is being treated as an NCV, consistent with Section VI.A of the NRC's Enforcement Policy (NCV 05000346/2005004-01). The licensee's initial corrective action included issuance of an operations standing order to address the voided section of piping.

b.2 Battery Cell Float Voltage Less Than 2.13 Volts

Introduction: The inspectors identified a finding involving an NCV of TS Table 4.8-1, having very low safety significance (Green) for the failure to recognize that battery cell float voltage was below the TS Table 4.8-1 Category B minimum limit. As a result, the licensee did not perform an equalizing charge to restore the battery to within the TS limits.

Description: Technical Specification 4.8.2.3.2.b required verifying that battery parameters in Table 4.8-1 meet Category B limits. The float voltage for each connected station battery cell was required to be greater than or equal to 2.13 volts. Note (2) of Table 4.8-1, stated that "any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that they are within their allowable values and provided the parameter(s) are restored within limits within 7 days." The allowable value was 2.07 volts (see Attachment 2). The licensee incorporated these requirements into the acceptance criteria of procedure DB-ME-03001, "Station Batteries Quarterly Surveillance."

In response to questions regarding the battery TS requirements, the licensee performed a review of battery surveillance data (completed since 2003) to verify past battery operability. During the review, the licensee identified that the voltage reading from surveillance DB-ME-03001 for Battery 2N, completed on December 5, 2003, showed that the float voltage for cell #60 was 2.114 volts, which was below the 2.13 volts minimum TS limit identified in Table 4.8-1 Category B limits. However, no actions were taken by the licensee to assure that the cell was restored within 7 days as required by the TS and the surveillance procedure. The inspectors verified that the measured float

voltage obtained during the surveillance was above the allowable value (2.07 volts) as identified in TS Table 4.8-1 for Category B limits, and also verified that the float voltage for this cell obtained during subsequent surveillances were within the TS limit. The licensee entered this issue into the corrective action program (CR 05-02415) and determined the issue was reportable based on the failure to meet a TS requirement. The licensee intended to initiate a Licensee Event Report within 60 days of discovery for the TS violation.

Analysis: The inspectors determined that the failure to recognize that the measured float voltage during a TS surveillance for Cell #60 of Battery 2N was below TS Table 4.8-1 Category B limits and not taking appropriate actions as specified in the TS was a performance deficiency and a finding. 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 human performance, which affected the mitigating systems cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. Specifically, the low float voltage could have potentially challenged the functionality of Battery 2N. The finding also had a cross-cutting aspect because the licensee failed to identify a voltage reading that did not meet acceptance criteria during the surveillance.

The inspectors evaluated the finding using IMC 0609, "Significance Determination Process," Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," Phase 1 screening, and determined that the finding was not a design issue resulting in loss of function per Generic Letter (GL) 91-18, did not represent an actual loss of a system's safety function and did not affect external event mitigation. With respect to question 3, although the violation occurred, the low float voltage of cell #60 did not represent an actual loss of safety function of the DC power system. Therefore, the inspectors determined that the finding has a very low safety significance (Green). Subsequent surveillance tests on the battery cell were within the TS limits. No additional voltage reading outside limits were identified.

Enforcement: Technical Specification 4.8.2.3.2.b required verifying that battery parameters in Table 4.8-1 meet Category B limits. Note (2) of Table 4.8-1 stated that "For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that they are within their allowable values and provided the parameter(s) are restored to within limits within 7 days." The Category B limit for battery cell float voltage was 2.13 volts.

Contrary to this requirement, on December 5, 2003, the float voltage for cell #60 of Battery 2N did not meet the TS Category B limits during the performance of surveillance DB-ME-03001. The measured voltage value was 2.114 volts, which was less than the minimum value of 2.13 volts, and no actions were taken by the licensee to assure that the cell was restored within limits within 7 days. However, because this violation was of very low safety significance and because the issue was entered into the licensee's corrective action program (CR 05-02415), this violation is being treated as an NCV, consistent with Section VI.A.1 of the Enforcement Policy (NCV 05000346/2005004-02). The licensee's initial corrective action included ensuring the batteries met the TS operability requirements.

b.3 Single Cell Battery Charger

Introduction: The inspectors identified a finding involving an NCV of TS 6.8.1, "Procedures and Programs," having very low safety significance (Green) for an inadequate maintenance procedure related to battery charging. The procedure did not ensure that 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.

Description: Section 8.1.5 of USAR, "Power System Design Bases," listed IEEE Standard 308, "Criteria for Class 1E Electrical Systems for Nuclear Power Generating Stations," as one of the documents implemented in the design of the electrical systems. The IEEE Standard stated that non-Class 1E circuits shall be independent and shall have proper isolation from Class 1E systems and components. This isolation could have been provided and ensured by utilizing Class 1E fuses or breaker.

The inspectors identified that Procedure DB-ME-09200, "Station Battery Maintenance Guidelines," used to perform single cell charging on station batteries, was inadequate in that the procedure did not ensure that adequate electrical isolation was maintained between non-Class 1E equipment and the safety-related batteries. Specifically, Section 8.5, "Individual Cell Charging," did not ensure adequate electrical isolation fuses were used between the non-Class 1E single cell battery charger, Alber Model PSC-10A, and the associated safety-related station batteries. Enclosure 3 of the procedure, "Individual Cell Charging Hook-up," specified 15 amp fuses to be used for electrical isolation between the single cell charger and the single cell safety-related battery. The procedure did not indicate that the fuses were to be Class 1E. In response to question from the inspectors, it was determined that the fuses used in this connection were non-Class 1E, 15 amp, Gould Shawmut, Type ATM.

Without proper isolation capability, an electrical fault on the non-Class 1E battery charger could have been transferred without interruption into the station battery.

In response to this deficiency, the licensee initiated CR 05-02455, indicating that single cell charging should not be performed on the station batteries until Procedure DB-ME-09200 has been revised to require Class 1E fuses for isolation between the single cell battery charger and the safety-related station batteries.

Analysis: The inspectors determined that the failure to have an adequate maintenance procedure to ensure proper electrical isolation when a non-Class 1E single cell battery charger was used to charge a single cell on the safety-related batteries was a performance deficiency and a finding. 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, which affected the mitigating systems cornerstone objective of ensuring the availability and reliability of the DC power system to respond to initiating events to prevent undesirable consequences. Specifically, inadequate electrical isolation fuses between the non-Class 1E single cell battery charger and safety-related battery may fail to interrupt a fault on the non-Class 1E charger, which could potentially render the safety-related battery incapable of performing its required safety function.

The inspectors evaluated the finding using IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," Phase 1 screening, and determined that the finding screened as Green because it was not a design issue resulting in loss of function per GL 91-18, did not represent an actual loss of a system's safety function, did not result in exceeding a TS allowed outage time, and did not affect external event mitigation. In addition, there was no actual fault on the non-Class 1E charger that resulted in rendering any of the station batteries incapable of performing their required safety function.

Enforcement: Technical Specification 6.8.1a required, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33. Appendix A, Item 9.a., stated that maintenance that can affect the performance of safety-related equipment should be performed in accordance with written procedures appropriate to the circumstances. This included procedures such as DB-ME-09200, Section 8.5, which implemented actions to install the non-Class 1E charger.

Contrary to this requirement, inspectors identified that Procedure DB-ME-09200 was not appropriate to the circumstances in that Class 1E electrical isolation devices between the non-Class 1E single cell battery charger and safety-related battery were not required or established. However, because this violation was of very low safety significance and because the issue was entered into the licensee's corrective action program (CR 05-02455), this violation is being treated as an NCV, consistent with Section VI.A.1 of the Enforcement Policy (NCV 05000346/2005004-03). The licensee's initial corrective action included not performing single cell charging on the station batteries until the procedure was been revised.

.3 Components

a. Inspection Scope

The inspectors examined the AFW, including the MDFP, and DC power systems to ensure that component level attributes were satisfied. Specifically, the following attributes of the AFW and DC power systems were reviewed:

Equipment/Environmental Qualification: This attribute verifies that the equipment is qualified to operate under the environment in which it is expected to be subjected to under normal and accident conditions. The inspectors reviewed design information, specifications, and documentation to ensure that the AFW, including the MDFP, and DC power components were qualified to operate within the temperatures specified in the environmental qualification documentation.

Equipment Protection: This attribute verifies that the AFW, including the MDFP, and DC power 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 DC power systems were adequately protected from those hazards identified in the USAR which could impact their ability to perform their safety function.

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 AFW, including the MDFP, and DC power 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

Section 1R21.2.b.2 described a human performance finding that had a cross-cutting aspect because the licensee failed to identify a voltage reading that did not meet acceptance criteria during a surveillance test.

4OA6 Meetings, Including Exits

.1 Exit Meeting

The inspectors presented the inspection results to Mr. B. Allen and other members of licensee management at the conclusion of the inspection on May 6, 2005. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
B. Allen, Plant Manager
N. Barron, Mechanical Design Engineering
M. Bezilla, Site Vice President
A. Bless, Regulatory Compliance
B. Boles, Manager, Plant Engineering
R. Carritte, I&C/Electrical Design Engineering
J. Grabnar, Manager, Design Engineering
J. Hartigan, Mechanical Design Engineering
R. Hovland, Manager, Technical Services
P. Jacobsen, I&C/Electrical Design Engineering
E. Johnson, DC System Engineer
J. Kendall, I&C/Electrical Design Engineering
S. Loehlein, Director, Station Engineering
D. Nassar, Mechanical Design Engineering
K. Ostrowski, Manager, Plant Operations
M. Parker, Supervisor, Plant Engineering
C. Price, Manager, Regulatory Compliance
R. Smith, AFW System Engineer
J. Sturdavent, Regulatory Compliance
F. Swanger, Nuclear/Analysis Design Engineering

Nuclear Regulatory Commission
A. M. Stone, Chief, Engineering Branch 2, Division of Reactor Safety
C. Thomas, Senior Resident Inspector
M. Williams, Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened/Closed

05000346/2005004-01	NCV	Inadequate Procedure Places Air Void in Suction to MDFP When Aligned to Service Water (Section 1R21.2.b.1)
05000346/2005004-02	NCV	Battery Cell Float Voltage Less Than TS Minimum of 2.13 Volts (Section 1R21.2.b.2)
05000346/2005004-03	NCV	Inadequate Electrical Isolation When Using a Single Cell Battery Charger (Section 1R21.2.b.3)

LIST OF DOCUMENTS REVIEWED

The following is a list of licensee documents reviewed during the inspection, including documents prepared by others for the licensee. Inclusion on this list does not imply that 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 in this list does not imply NRC acceptance of the document, unless specifically stated in the inspection report.

1R21 Safety System Design and Performance Capability

Calculations

Number	Title	Revision
Bechtel Calc. 05.038	Pressure Temperature Analysis of the Auxiliary Feedwater Pump Rooms	Revision 0
Bechtel Calc. 25.005	Aux Feed Pump Room Vent	Revision 1
Bechtel Calc. 54.008	Auxiliary Feed Pump Discharge Line Break	Revision 0
Bechtel Calc. 58.8	Flood Level in AFP Rooms Due to Various Line Breaks	Revision 0
C-EE-002.01-010	Battery and Charger Sizing, Short Circuit and Voltage Drop	Revision 29
C-EE-002.01-011	Low Voltage Coordination	Revision 6
C-EE-002.01-013	125/250 Vdc Distribution System Ground Detection	Revision 0
C-EE-002.01-014	DC System Ampacity Calculation	Revision 0
C-EE-002.01-015	250/125 Vdc Battery Discharge Relay Setting	Revision 0
C-EE-006.01-009	Protective Relay Setpoints for Battery Charger (Bkr. BE1190)	Revision 1
C-EE-015.03-008	AC Power System Analysis	Revision 3
C-EE-050.01-004	Cable Resistance for MV38700 and MV01060	Revision 0
C-ICE-002.02-001	Battery Room Ventilation Fan Setpoints	Revision 0
C-ICE-030.01-001	Low Voltage Switchgear Rooms Emergency HVAC Fan Setpoints	Revision 2
C-NSA-000.00-012	AFW System Model	Revision 0
C-NSA-000.02-011	Analyzed Postulated HELBs in the Turbine Building	Revision 1
C-NSA-050.30-007	Evaluation of Damaged Watertight Door 215	Revision 0
C-NSA-50.03-013	Auxiliary Feedwater (AFW) System Curve	Revision 1

Calculations

Number	Title	Revision
C-NSA-50.03-028	Auxiliary Feedwater (AFW) Minimum Performance	Revision 0
C-NSA-50.03-125	Auxiliary Feedwater Pumps (AFP) P14-1 and P14-2 Pump Performance Curves	Revision 0
CE-ME-011.01-121	Required Torque for SW1382 and SW1383	Revision 3
CE-ME-050.01-004	Component Level Review Calculation for AOV MS5889A/B	Revision 2
CE-ME-050.03-112	Target Thrust for AF608	Revision 8
CE-ME-050.03-113	EN-DP-01082 Target Thrust AF3869	Revision 5
CE-ME-050.03-115	EN-DP-01082 Target Thrust AF3871	Revision 4
CE-ME-050.03-120	Target Thrust for AF3870	Revision 4
C-ME-050.03-126	AFW Low Suction Pressure Time Delay Relay Setting Evaluation for PSL4930X1, PSL4930X2, PSL4931X1, and PSL4931X2	Revision 0
C-ME-83.01-229	EN-DP-01082 Calculation of Target Thrust For MS106	Revision 6
DB-1-066	EQ Electrical Equipment Qualification, Section G, Reese Indication Lights	Revision 5
DB-1-084	EQ Electrical Equipment Qualification, Target Rock Valves	Revision 0
DB-1-085	EQ Electrical Equipment Qualification, Amerace-Agastate Control Relay	Revision 0
EN-DP-00355	Determination of Allowable Operating Transient Cycles (AFW nozzles)	Revision 2
MPR-876	Davis-Besse Auxiliary Feed Pumps Evaluation of Automatic Transfer of Suction to the Service Water System	10/1985
PC-ECS-050.03-001	Thermal Lag Analysis for the Target Rock ECMS in AFWP rooms 237 and 238	
69.029	Auxiliary Feedwater Pump Time to Loss of Suction - FCR No. 80-074	Revision 1
69.036	Auxiliary Feedwater Pump Recirculation	Revision 0

Condition Reports Generated Due to the Inspection

Number	Title	Date
05-02275	Drawing Change Was Overlooked in Completion of an ECR	4/18/2005
05-02276	Fuse Panels D3602 and D3603 Were Not Shown One Line Diagram	4/18/2005
05-02278	Fuse Receipt Inspecting and Testing Practices	4/19/2005
05-02281	Typo in C-EE-002.01-015	4/19/2005
05-02283	Operations Training Lesson Plan - OPS-SYS-1409.04	4/19/2005
05-02310	As-build Scaffold in Contact with AFW System Piping	4/19/2005
05-02311	PCR Correction Service Water System Description	4/20/2005
05-02313	Instrument Tubing Downstream of MS310 Did Not Maintain Continuous Slope	4/18/2005
05-02314	Instrument Tubing Downstream of MS2653 Did Not Maintain Continuous Slope	4/20/2005
05-02320	Lack of PM to Perform Periodic Inspection of the CST	4/20/2005
05-02322	Update References for Min Terminal Voltage MS106 and AF3870	4/20/2005
05-02324	Wrong Reference Used in C-EE-002.01-014	4/20/2005
05-02325	Inconsistent Number of Operators Utilized to Perform Time Critical Operation per DB-OP-02501	4/20/2005
05-02327	AFW Minimum Flow Requirements at Speeds Above 3600 RPM	4/20/2005
05-02328	AFW Strainer Inspection and Blowdown Instruction	4/20/2005
05-02351	ISI Testing Program Valve Test Table Not Consistent with Basis	4/21/2005
05-02353	Improvement for Maintaining Time Critical Steps for AFW	4/21/2005
05-02356	Error in C-EE-006.01-026, Voltage Drop for GL 89-10 MOVs	4/21/2005
05-02359	Math Error in C-EE-002.01-01 Revision 6	4/21/2005
05-02369	Compliance With T.S. Table 4.8-1 Note (b)	4/27/2005
05-02415	Acceptance Criteria Not Met During Battery Quarterly Test -12/03	4/25/2005
05-02455	Single Cell Battery Charging	4/27/2005
05-02503	Elevated Temperatures of SW1382 and SW1383	4/29/2005
05-02515	FW126 Identified as Open Instead of Closed	5/2/2005

Condition Reports Generated Due to the Inspection

Number	Title	Date
05-02522	DB-OP-06225 SW to MDFP Not Vented During Transfer	5/2/2005
05-02525	DB-OP-06233 Lacks Direction for Fill and Vent of AFW System	5/2/2005
05-02526	Air Void in Suction to MDFP When Aligned to Service Water	5/2/2005
05-02541	Comprehensive Review for Gas Intrusion in Safety Systems	5/3/2005
05-02545	Incomplete Update of Affected Documents	5/3/2005
05-02549	Clarification for OPS Training Lesson Plan OPS-SYS-1409	5/3/2005
05-02550	Enhancement to MOV Program Manuel	5/3/2005
05-02551	AFW Target Rock Solenoid Inlet Orifice	5/3/2005
05-02552	Error in Cable Length in Calculation C-EE-002.01-010 DC Calc	5/5/2005
05-02353	Benchmark Utilities on Tracking of Time Critical Operator Actions	5/3/2005
05-02558	Lack of Discussion Regarding Pullout Efficiency for MOVs	5/4/2005
05-02566	Scaffold Concern Identified	5/4/2005
05-02574	System Engineering Equipment Trending Benchmarking	5/4/2005
05-02582	Error in Calculation C-ICE-02.02-001	5/4/2005
05-02585	Errors in Engineering Products (Lack of Engineering Rigor)	5/4/2005
05-02587	PM for Circuit Breaker D118, EBOP Feed	5/3/2005
05-02588	Kaowool Barriers in the End of Battery Cable Conduit	5/3/2005
05-02589	Conduit Not Properly Secured in Battery Room One	5/3/2005
05-02605	Potential Errors in ATMNT 35 of Calc C-EE-002.01-011	5/5/2005
05-02627	FW786 Conduit on Declutch Lever	5/5/2005
05-02628	Accumulation Found in Service Water Supply to AFP Trains 1 and 2	5/5/2005
05-02629	Inlet Cooling Water Piping Hanger to SUFP Has Only Two Bolts	5/5/2005

Condition Reports Reviewed During the Inspection

Number	Title	Date
2000-2418	AFW System Description System States the Limiting Particle Diameter to the AFW Bearing Cooler Is Less Than 0.131 Inches	10/6/2000

Condition Reports Reviewed During the Inspection

Number	Title	Date
01-02192	RIS 2001-15; DC Powered MOV Actuator Performance Prediction	8/23/2001
01-03001	Errors in AFW DC Powered MOV Voltage Drop Calculations	11/8/2001
02-04227	No Capacitor Replacement Program on Station Battery Chargers	8/14/2002
02-04669	LIR-AFW-Allowable Minimum CST Temperature is 40F	8/20/2002
02-04673	Auxiliary Feedwater Strainers Limiting Particle Size	8/21/2002
02-05244	1993 Battery Charger Failure	8/29/2002
02-05294	Procurement Package 891758 for Battery Charger Capacitors	8/30/2002
02-05639	USAR 9.2.7.2 states “The Limiting Size Particle Diameter to the Pumps Is 0.131 Inch, Which Is the Diameter of the Orifices...”	9/7/2002
02-05691	LIR-AFW-Minimum Temperature to the AFWS SG Nozzles	9/6/2002
02-06830	SHRR: Fuse Control	9/27/2002
02-06861	AFW System Not Able to Meet its Accident and Mitigating Functions Due to Potential Clogging of AFW Strainers	9/7/2002
02-07210	No PM Tasks Were Found for AFW strainers	10/1/2002
02-08575	OE14809 - Anomalous Bearing Temperature Indications	10/24/2002
02-08925	Design Issues Identified During (SHRR) Review of DC System	10/31/2002
03-06576	Auxiliary Feedwater Components Should be in GL 89-13 Program	8/14/2003
03-07879	AFW System Train 1 Low Steam Pressure Interlock Test Failure	9/19/2003
03-08243	MS5889A Open Delay Time Does Not Meet Acceptance Criteria	9/27/2003
03-09548	New Motor Operated Valve Terminal Voltage	11/5/2003
04-00589	IN 2004-01: AFW Pump Recirc Line Orifice Fouling-Potential Common Cause Fail	1/22/2004
04-02576	AFPT2 Outboard Bearing Metal Temp Rising During Testing	4/8/2004
04-02767	AF6451 Stroked Outside the Expected Range but Not Retested	4/19/2004
04-02948	Non-conservative Assumption Applied to Calc 25.005	4/26/2004
04-05070	Cable Resistance Incorrect in C-EE-002.01-010 DC Calc.	8/12/2004
04-07121	No Firm Basis for Ground Detection Alarm	11/18/2004
04-07663	Aux Feed Pump 2 Cooling Water to Suction Header Check Valve	12/15/2004

Drawings

Number	Title	Revision
E-6 Sheet 1	480 V AC MCC (Essential) One Line Diagram	Revision 80
E-6 Sheet 2	480 V AC MCC (Essential) One Line Diagram	Revision 88
E-6, Sheet 3	250/125V DC , MCC No. 1 (Essential) Single Line Diagram	Revision 34
E-7	250/125V DC and Instrumentation AC One Line Diagram	Revision 34
E-44B Sheet 14A	Feedwater System AFP Disch to SG	Revision 11
E-44B Sheet 14B	Feedwater System AFP Disch to SG	Revision 10
E-44B Sheet 15	Feedwater System AFP Disch to SG	Revision 14
E-44B Sheet 20	Feedwater System AFP Disch to SG	Revision 20
E-46B Sheet 4A	Steam and Condensate Aux FD PMPS TURBS MN STM IN ISO VLVS	Revision 23
E-46B Sheet 4B	Steam and Condensate Aux FD PMPS TURBS MN STM IN ISO VLVS	Revision 22
E-46B Sheet 46A	Steam and Condensate SG AFPT ISO VLVS	Revision 19
E-46B Sheet 46B	Steam and Condensate SG AFPT ISO VLVS	Revision 17
E-46B Sheet 54A	Steam and Condensate Aux FD PMPS TURBS MN STM IN ISO VLV	Revision 12
E-46B Sheet 54B	Steam and Condensate Aux FD PMPS TURBS MN STM IN ISO VLV	Revision 16
E-52B Sheet 3	Reactor Cooling System RCP DC Oil Lift Pump	Revision 11
E-60B Sheet 4B	Station Heating Ventilation and Cooling Systems, Low Voltage Switchgear Room Vent Fan 1-2	Revision 12
E-60B Sheet 4D	Station Heating Ventilation and Cooling Systems, Low Voltage Switchgear Room Vent Fan 1-1	Revision 1
E-2014	Fuse Table	Revision 5
M-003C	Main Steam and Reheat System, Sheet 3	Revision 57
M-006D	Auxiliary Feedwater System	Revision 49
M-006E	Condensate System	Revision 26
M-007A	Steam Generator Secondary System	Revision 45
M-007B	Steam Generator Secondary System	Revision 51

Drawings

Number	Title	Revision
OS-012A	Main Feedwater System, Sheet 1	Revision 23
OS-017A	Auxiliary Feedwater System, Sheet 1	Revision 20
OS-017B	Auxiliary Feedwater Pumps and Turbines, Sheet 1	Revision 23
OS-060 Sheet 1	250/125V DC and 120V Instrument AC System	Revision 12
OS-060 Sheet 2	250/125V DC and 120V Instrument AC System	Revision 12

Instrument Calibration Records

Number	Title	
Tab 7, Sheet 63	Relay Setting Manual Book 1 of Volume 1	Revision 6
Tab 19, Sheet 110	Relay Setting Manual Book 2 of Volume 1	Revision 3
Tab 19, Sheet 111	Relay Setting Manual Book 2 of Volume 1	Revision 7
TS-5315	Low Voltage Switchgear Room 428 Temperature Switch	
TS-5318	Low Voltage Switchgear Room 429 Temperature Switch	
TS-5597	Battery Room 428A Temperature Switch	
TS-5598	Battery Room 429B Temperature Switch	

Miscellaneous Documents

Number	Title	Revision or Date
85-143	Safety Evaluation	Revision B, Supplement 6
86-0330	Improve AFW Flow Control	Revision B
87-0036	TS Bases Change to Reduce AFW Flow Requirement	Original
Standing Order No. 05-005	Placing the Motor Driven Feedwater Pump in Service with Suction from the Service Water System	Revision 00
E-18Q-17-12	Instruction Manual for Stationary Battery Installation (Vendor Manual)	2/2004
E-20-89	Cyberex Inc. Manual Battery Chargers Installation, Operation and Servicing	
	480 V Breaker/Fuse Coordination Design and Licensing Basis	11/18/2003

Miscellaneous Documents

Number	Title	Revision or Date
	Ferraz Shawmut Catalog Cut Sheet on Form 600 Amp Trap A2Y/A6Y Fuses	
	Davis-Besse System Health Report - Auxiliary Feedwater System, Fourth Quarter, 2004	
	Davis-Besse System Health Report - 125/250 Vdc System, Fourth Quarter, 2004	
	250/125 Vdc System Review and Test Program Report	
	System Health Readiness Review of 125/250 Vdc System	Revision 0, Amendment 2
	Time-line Study for Appendix R Operator Actions	Revision 2
	Davis-Besse Nuclear Power Station Unit 1 Third Ten Year Inservice Testing Program Plan -	Revision 3
	Pump and Valve Basis Document Volume I - Valve Basis (AFW)	Revision 2
	Pump and Valve Basis Document Volume II - Pump Basis (AFW, MDFP)	Revision 0
	IST Trend Data for AFW Pumps (2001-2005)	

Modifications

Number	Title	Date
93-5012	Increase High Speed Stop From 3600 RPM to 3700 RPM	8/17/1993
95-0060	AFW Pump Turbine Main Steam Minimum Flow Lines	8/6/1997
03-0074-00	Install 0.0625" Mesh Size Strainer Baskets in S203 and S204	1/31/2003

Procedures

Number	Title	Revision
DB-ME-03000	Station Battery and Charger Weekly Surveillance	Revision 10
DB-ME-03001	Station Batteries Quarterly Surveillance	Revision 9
DB-ME-03002	Station Battery Service and Performance Discharge Test	Revision 7
DB-ME-03003	Station Battery Charger Test	Revision 5
DB-ME-09200	Station Battery Maintenance Guidelines	Revision 5

Procedures

Number	Title	Revision
DB-MS-01637	Scafolding Erection and Removal	Revision 8
DB-OP-00005	Operator Logs and Rounds	Revision 12
DB-OP-02001	Electrical Distribution Alarm Panel 1 Annunciators	Revision 10
DB-OP-02010	Feedwater Alarm Panel	Revision 6
DB-OP-02000	RPS, SFAS, SFRCS Trip, or SG Tube Rupture	Revision 15
DB-OP-02501	Serious Station Fire	Revision 8
DB-OP-02508	Control Room Evacuation	Revision 3
DB-OP-06225	MDFP Operating Procedure	Revision 10
DB-OP-06233	Auxiliary Feedwater System	Revision 18
DB-OP-06321	250/125 Vdc Station DC Switching Procedure	Revision 6
DB-PF-03064	Check Valve Visual Inspections	Revision 1
DB-PF-03080	AFW Check Valves AF1, AF2, AF15, and AF16 Reverse Flow Test	Revision 1
DB-SS-03090	Motor Driven Feed Pump Monthly Valve Verification	Revision 6
DB-SP-03151	AFP#1 Quarterly Test	Revision 13
DB-SP-03153	AFW Train 1 Monthly Valve Verification	Revision 5
DB-SP-03162	AFW Train 2 Monthly Valve Verification	Revision 5
DB-PF-03153	AFW Train 1 Check Valve Test	Revision 7
DB-PF-03154	AFW Train 1 Valve Testing	Revision 6
DB-PF-03163	AFW Train 2 Valve Testing	Revision 5
DB-PF-03251	AFP 1 Baseline Test	Revision 3
DB-PF-03735	MS735 Reverse Flow Tests	Revision 1
DB-PF-06704	Pump Performance Curves	Revision 15
DB-SS-03091	Motor Driven Feed Pump Quarterly Test	Revision 6
DB-SS-03092	Motor Driven Feed Pump Refueling Test	Revision 6
OPS-JPM-039	Re-energize D2 Bus from SBODG and Start MDFP	Revision 1

Surveillances (completed)

Number	Title	Date performed
DB-ME-03000	Station Battery and Charger Weekly Surveillance for 1N, 1P, 2N, and 2P	4/12/2005
DB-ME-03001	Station Batteries Quarterly Surveillance for 1N	2/15/2005, 11/22/2004
DB-ME-03001	Station Batteries Quarterly Surveillance for 1P	2/15/2005, 11/22/2004
DB-ME-03001	Station Batteries Quarterly Surveillance for 2N	2/7/2005, 11/23/2004, 3/4/2004, 12/4/2003
DB-ME-03001	Station Batteries Quarterly Surveillance for 2P	2/11/2005, 2/7/2005, 11/23/2004
DB-ME-03002	Station Battery Performance and Service Discharge Test for 1N, 1P, 2N, 2P	1/26/2005, 1/25/2005, 12/3/2003, 12/2/2003
DB-ME-03003	Station Battery Charger Test for DBC1N, DBC1P, DBC1PN, DBC2N, DBC2P, and DBC2PN	6/15/2004, 5/28/2004, 3/16/2004, 1/23/2004
DB-SP-03151	AFP#1 Quarterly Test	11/3/2004, 8/10/2004, 5/22/2004, 1/6/2004
DB-SP-03157	AFP 1 Response Time Testing	2/5/2004
DB-SP-03160	AFP#2 Quarterly Test	3/9/2005, 12/4/2004, 9/22/2004, 2/4/2004
DB-SS-03091	Motor Driven Feed Pump Quarterly Test	11/16/2004, 8/24/2004, 6/1/2004
DBSC 4274	SBODG Dead Bus Load Test	3/2/2003

Work Orders

Number	Title	Date/Revision
01-000321-000	Main Stm Ln 1 to Aux FD PMP Turb 1-1 Sply Ln Ck Vlv	3/2/2002
01-000703-000	PM 5072 SW260 *INSP* Service Wtr Piping of SW260	Revision 0
02-007420-000	PM 5089 *CLN/INSP* Srv Wtr Piping - SW261	Revision 0
200000361	Erect Scaffolding for Low Voltage Switchgear Room 429 Vent Damper Operation	4/18/2005

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
AFW	Auxiliary Feedwater
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
CR	Condition Report
CST	Condensate Storage Tank
DC	Direct Current
DRS	Division of Reactor Safety
GL	Generic Letter
IMC	Inspection Manual Chapter
IEEE	Institute of Electrical and Electronics Engineers
IST	Inservice Testing
MDFP	Motor-driven Feedwater Pump
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
SDP	Significance Determination Process
SW	Service Water
TS	Technical Specifications
USAR	Updated Safety Analysis Report

TABLE 4.8-1

BATTERY SURVEILLANCE REQUIREMENTS

Parameter	CATEGORY A[1]	CATEGORY B[2]	
	Limits for each designated pilot cell	Limits for each connected cell	Allowable[3] value for each connected cell
Electrolyte Level	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark[d]	>Minimum level indication mark, and ≤ ¼" above maximum level indication mark[d]	Above top of plates, and not overflowing
Float Voltage	≥2.13 volts	≥2.13 volts[b]	>2.07 volts
Specific Gravity[a]	≥1.200[c]	≥1.195	Not more than .020 below the average of all connected cells
		Average of all connected cells >1.205	Average of all connected cells ≥1.195[c]

(a) Corrected for electrolyte temperature and level. If the level is between the high and low marks and the temperature corrected specific gravity is within the manufacturer's nominal specific gravity range, it is not necessary to correct for level.
(b) Corrected for average electrolyte temperature.
(c) Or battery charging current, following a service, performance discharge, or modified performance discharge test, is less than two amps, when on a float charge.
(d) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.
(1) For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours all the Category B measurements are taken and found to be within their allowable values, and provided all parameter(s) are restored to within limits within the next 6 days.
(2) For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that they are within their allowable values and provided the parameter(s) are restored to within limits within 7 days.
(3) Any Category B parameter not within its allowable value indicates an inoperable battery.