UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

February 19, 2010

EA-09-332

Mr. Barry Allen
Site Vice President
FirstEnergy Nuclear Operating Company
Davis-Besse Nuclear Power Station
5501 North State Route 2, Mail Stop A-DB-3080
Oak Harbor, OH 43449-9760

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION COMPONENT DESIGN BASES INSPECTION (CDBI), INSPECTION REPORT 5000346/2009007

Dear Mr. Allen:

On January 14, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed a Component Design Bases inspection at your Davis-Besse Nuclear Power Station. The enclosed inspection report documents the inspection findings, which were discussed on November 20, 2009, with you and on January 14, 2010, with Mr. Clark Price and other members of your staff.

The 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.

Based on the results of this inspection, one finding associated with two apparent violations was identified and is being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html). Specifically, in July 1999 your staff submitted a License Amendment Request to, in part, eliminate the requirement to perform as-found containment local leak rate testing of the fuel transfer tube blind flange assemblies. Your staff justified the elimination of the testing based on the then-installed double O-ring seal configuration with a history of no test failures from September 1991 through May 1998. On March 28, 2000, the NRC approved the license amendment based, in part, on this information. However, your staff did not capture this licensing basis information as part of the Updated Safety Analysis Report for your facility. This failure represents an apparent violation of 10 CFR 50.71(e). In November 1999, your staff initiated a change to the fuel transfer tube blind flange assembly seal configuration from the double O-ring design described in the license amendment request to a flat gasket design which did not have an established as-found test history. This change negated the basis for the NRC approved amendment, which removed the requirement for performing as-found testing. The fuel transfer tube gasket configuration was subsequently modified during the May 2000 outage. The failure to translate the licensing basis into the design at time of installation represents an apparent violation of 10 CFR Part 50, Appendix B, Criterion III. Since the March 2000 approval of the license amendment, the configuration of the fuel transfer tube blind flange seals has changed three times.

In addition, during the January 2008 refueling outage, questions arose concerning the seal configuration and associated installation. Despite the initiation of five Condition Reports and associated investigations, your staff did not identify that the existing seal configuration did not meet the current licensing basis.

The successful as-left local leak rate tests performed during the prior refueling outage (Refueling Outage 15) provided reasonable assurance for continued operation. The circumstances surrounding this finding and the apparent violations, the significance of the issues, and the need for lasting and effective corrective action were discussed with members of your staff at the inspection exit meeting on January 14, 2010.

Before the NRC makes its enforcement decision, we are providing you an opportunity to either: (1) respond to the apparent violations addressed in this inspection report within 30 days of the date of this letter; or (2) request a predecisional enforcement conference. If a conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference. Please contact Jamie Benjamin at 630-829-9753 within 10 days of the date of this letter to notify the NRC of your intended response.

If you choose to provide a written response, it should be clearly marked as a "Response to Apparent Violations in Inspection Report No. 05000346/2009007; EA-09-332," and should include for each apparent violation: (1) the reason for the apparent violation, or, if contested, the basis for disputing the apparent violation; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further violations; and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate response is not received within the time specified or an extension of time has not been granted by the NRC, the NRC will proceed with its enforcement decision or schedule a predecisional enforcement conference.

In addition, please be advised that the number and characterization of apparent violations described in the enclosed inspection report may change as a result of further NRC review. You will be advised by separate correspondence of the results of our deliberations on this matter.

Additionally, based on the results of this inspection, four NRC-identified findings of very low safety-significance were identified. The findings 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 issues as Non-Cited Violations (NCVs), in accordance with Section VI.A.1 of the NRC Enforcement Policy. These NCVs are described in the subject inspection report. If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the 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; and the Resident Inspector Office at the Davis-Besse Nuclear Power Station. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region III, and the NRC Resident Inspector at the Davis-Besse Nuclear Power Station. The information that you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Anne T. Boland, Director
Division of Reactor Safety

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

Enclosure: Inspection Report 05000346/2009007
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-346
License No:	NPF-3
Report No:	05000346/2009007(DRS)
Licensee:	FirstEnergy Nuclear Operating Company (FENOC)
Facility:	Davis-Besse Nuclear Power Station
Location:	Oak Harbor, OH
Dates:	November 3, 2009 through January 14, 2010
Inspectors:	R. Langstaff, Senior Reactor Inspector, Lead N. Valos, Senior Reactor Analyst, Operations L. Jones, Reactor Engineer, Mechanical D. Mas, Reactor Engineer, Electrical B. Sherbin, Mechanical Contractor S. Kobylarz, Electrical Contractor
Observer:	A. Shaikh, Reactor Engineer
Approved by:	Anne T. Boland, Director Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000346/2009007; 11/03/2009 – 01/14/2010; Davis-Besse Nuclear Power Station; Component Design Bases Inspection.

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

A. NRC-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Green. A finding of very low safety-significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” was identified by the inspectors for the failure to evaluate worst case motor loads for emergency diesel generator and alternating current power system loading under postulated accident conditions. Specifically, the licensee did not use vendor guaranteed motor efficiency data in Calculation C-EE-015.03-008. As a result, motor efficiencies under postulated accident conditions were non-conservatively determined by the licensee for the high pressure injection, decay heat, and containment spray motors. This violation was entered into the licensee’s corrective action program. To demonstrate operability, the licensee performed additional analysis.

  The finding was determined to be more than minor because if left uncorrected, the failure to accurately determine loading upon the emergency diesel generators could result in overloading an emergency diesel generator due to the addition of loads. The inspectors determined that the finding was of very low safety-significance because the finding was a design or qualification deficiency confirmed to not result in a loss of operability or functionality. This finding has a cross-cutting aspect in the Resources component of Human Performance because the licensee did not ensure personnel and other resources were adequate to assure nuclear safety. [H.2(b)] (Section 1R21.3.b(3))

- Green. A finding of very low safety-significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” was identified by the inspectors for the failure to take interim corrective actions to address potential tornado missile damage to unprotected structures, systems, and components (SSCs) such as the emergency diesel generator (EDG) exhaust vent stacks. The licensee initiated a procedure change to procedure KA-EP-02810 to provide guidance for plant assessment following a tornado, and prepared an operations order to address the diesel storage tank vent lines. This violation was entered into the licensee’s corrective action program.

The finding was determined to be more than minor because tornado missile damage to certain SSCs, such as the EDG exhaust vent stacks, could adversely affect availability, reliability, and capability of systems necessary for safe shutdown, such as the EDGs. Based on a Phase 3 analysis, the inspectors determined that the finding was of very low safety-significance because of low initiating event frequency and conservative assumptions with regards to mitigating capability. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action, in that, the licensee failed to thoroughly evaluate problems, such that the resolutions address causes and extent of conditions, as necessary. [P.1(c)] (Section 1R21.4.b(1))

Cornerstone: Barrier Integrity

- TBD. A finding associated with two Apparent Violations of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and 10 CFR 50.71(e) was identified by the inspectors. Specifically, the licensee failed to implement design control measures which assured that the design basis, as specified in the license application, was correctly translated into specifications, drawings, procedures, and instructions and failed to correctly update the Updated Safety Analysis Report (USAR) to reflect the safety analyses associated with License Amendment 240. As a result of these failures, the current fuel transfer tube blind flange seal configuration was contrary to the licensing basis. The successful as-left local leak rate tests performed during the prior refueling outage (Refueling Outage 15) provided reasonable assurance for continued operation. The finding and apparent violations were entered into the licensee's corrective action program.

  The inspectors assessed the preliminary significance of the finding using the traditional enforcement policy. The inspectors determined that had the information been complete and accurate at the time of amendment approval, the NRC would have reconsidered the regulatory position or initiated substantial further inquiry. This finding has a cross-cutting aspect in the area of Human Performance Resources, because the licensee did not have complete, accurate and up-to-date design documentation, procedures, and work packages. This cross-cutting aspect is considered reflective of current performance because the procedures in place at the time of this inspection, in addition to the procedures in place during the 1999-2000 timeframe, did not provide adequate guidance. [H.2(c)] (Section 1R21.3.b(1))

- Green. A finding of very low safety-significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to ensure that the bonding material used to join bulk O-ring ends together for the fuel transfer tube seal was suitable for the containment penetration application. Specifically, the licensee failed to review the suitability of the bonding material used for connecting the ends of bulk O-rings used in the fuel transfer tube blind flanges. The bonding material used had a safety-related function of maintaining containment integrity. The licensee determined the current configuration resulted in an operable but non-conforming condition. This violation was entered into the licensee's corrective action program.

  The finding was determined to be more than minor because the use of the unqualified bonding material resulted in the indeterminate condition of one of two seals for the fuel transfer tube blind flanges. The inspectors determined that the finding was of very low safety-significance because the finding did not represent an actual open pathway in the physical integrity of reactor containment. This finding has a cross-cutting aspect in the area of Human Performance Resources because the licensee did not have complete, accurate and up-to-date design documentation, procedures, and work packages. [H.2(c)] (Section 1R21.3.b.(2))

- Green. A finding of very low safety-significance and associated Non-Cited Violation of Technical Specification (TS) Section 5.4.1, “Procedures,” was identified by the inspectors for the failure to provide adequate procedural direction to respond to a large loss of coolant accident (LOCA) outside containment. Specifically, emergency operating procedure DB-OP-02000, “RPS, SFAS, SFRCS Trip, or SG Tube Rupture,” was inadequate, in that, procedural direction for a large LOCA outside containment was not provided.

  The finding was determined to be more than minor because the failure to provide adequate procedural direction for a large LOCA event outside containment affected the cornerstone objective of providing reasonable assurance that the physical design barrier of containment is maintained to protect the public from radionuclide releases caused by accidents or events. A Phase 3 analysis was performed, which determined that the issue was of low safety-significance based on the relatively low initiating event frequency and credit for recovery. The inspectors did not identify a cross-cutting aspect associated with this finding because this was a legacy design issue, therefore was not reflective of current performance. (Section 1R21.4.b.(5))

B. Licensee-Identified Violations

No violations of significance were identified.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, and Barrier Integrity

1R21 Component Design Bases Inspection (71111.21)

.1 Introduction

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

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

.2 Inspection Sample Selection Process

The inspectors selected risk-significant components and operator actions for review using information contained in the licensee's PRA and the Davis-Besse Standardized Plant Analysis Risk (SPAR) Model, Revision 3P. In general, the selection was based upon the components and operator actions having a risk achievement worth of greater than 1.3 and/or a risk reduction worth greater than 1.005. The operator actions selected for review included actions taken by operators both inside and outside of the control room during postulated accident scenarios. In addition, the inspectors selected operating experience issues associated with the selected components.

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

This inspection constituted 27 samples as defined in Inspection Procedure 71111.21-05.

.3 Component Design

a. Inspection Scope

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

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

The following 18 components were reviewed:

- Emergency Diesel Generator (EDG) Fuel Oil System: The inspectors reviewed the system hydraulic calculations including net positive suction head (NPSH) and vortexing to ensure that the diesel fuel transfer pumps were capable of providing sufficient flow such that the day tanks remained filled during diesel operation. Fuel oil consumption calculations were reviewed by the inspectors to determine their adequacy to meet the design basis EDG operating conditions. The inspectors also reviewed calculations and drawings to ensure the sizing of the EDG fuel oil system were adequate to meet facility license requirements. The EDG fuel oil chemistry tests were reviewed to verify testing was in accordance with facility procedure and license requirements and that the results were consistent with the assumptions contained in the consumption calculation. The inspectors performed a review of system normal operating procedures and surveillance test procedures to ensure component operation and alignments were consistent with design licensing bases assumptions. Field walkdowns were conducted for the EDG day tank rooms, and EDG storage tanks to assess the material condition and to verify that the as-built condition was consistent with the design. In addition, design change history, corrective actions, surveillance results, and trending data were reviewed to assess potential component degradation and impact on design margins.

- <u>Emergency Diesel Generator (1-2)</u>: The inspectors reviewed the EDG loading calculation and vendor ratings for conformance with design basis load requirements. The inspectors reviewed selected pump brake horsepower requirements for design basis accident load conditions. The inspectors also reviewed diesel generator vendor de-rating requirements for potential impact on design basis loading and operating procedures to determine that de-rating requirements were incorporated appropriately. The inspectors reviewed surveillance testing to determine whether design basis load requirements were satisfactorily demonstrated during periodic load testing to satisfy TS. The inspectors also reviewed surveillance tests for devices that trip the diesel generator during design basis conditions for impact on component reliability or availability. A walkdown was conducted to obtain diesel generator nameplate rating information and to verify that the installed configuration supports design basis load ratings.

- <u>Motor Driven Feedwater Pump Control Valve (FV6459)</u>: The inspectors reviewed the system description to determine design basis characteristics and requirements. The inspectors reviewed operational schematic, loop and connection diagrams, installation drawings and distribution panel schedules for conformance with design bases. Valve solenoid current load and voltage were reviewed to determine functional capability during design basis conditions. A review of selected maintenance tests and corrective action history was performed to confirm that adverse conditions are being appropriately identified and addressed. A walkdown was conducted to assess observable material condition and to obtain nameplate information.

- <u>Steam and Feed Rupture Control System (SFRCS) Signal Monitor (LY-SP9A6)</u>: The inspectors reviewed the system description to determine design basis characteristics and requirements. The inspectors reviewed operational schematics and loop diagrams for functional requirements and conformance with design basis. The inspectors reviewed the calculation for the low and high level trip setpoints for instrument uncertainties, including process effects and outside influences on the calculated values. The inspector selectively reviewed calibration and test procedures and a sample of surveillance test results to confirm the signal monitor was performing in accordance with functional requirements, and that corrective actions were being identified and dispositioned when necessary. A walkdown of the SRFCS cabinet was performed to assess observable material condition. Maintenance and corrective action history were reviewed to evaluate whether component degradation was being identified and corrected at the appropriate threshold and interval.

- <u>Emergency Core Cooling System (ECCS) Pump Room Cooler Fan Motor (C31-4)</u>: The inspectors reviewed motor sizing and fan brake horsepower (BHP) requirements and vendor ratings for conformance with design basis load conditions. The inspectors also reviewed load flow analysis to determine the adequacy of voltage at motor terminals during degraded voltage conditions and the adequacy of feeder cable sizing. The motor and feeder cable protective device coordination curves were reviewed to determine the adequacy of protection and coordination for electrical components. The motor and fan preventive maintenance were reviewed to determine the effectiveness of condition monitoring for mechanical components. Maintenance and corrective action history were reviewed to evaluate whether component degradation was being identified and corrected at the appropriate threshold and interval. A walkdown of the fan motor was performed to assess visible material condition and to obtain motor nameplate information.

- 125/250 Vdc Battery (DC MCC 2): The inspectors reviewed the methodology, design inputs and assumptions, and results for the battery and charger sizing and voltage study for the 2P and 2N batteries. The battery voltage study was reviewed to verify adequate voltage was available to selected critical components. Battery performance surveillance test results were reviewed to verify adequate battery capability in accordance with design basis requirements. Battery corrective action and maintenance history were reviewed to determine whether component degradation was identified and anomalies were addressed and corrected. A field walkdown was performed to assess observable material conditions of the batteries and chargers and to obtain nameplate information.

- Fuel Transfer Tubes (Penetrations 23 and 24): The Fuel Transfer Tubes servers as a passageway between containment and the spent fuel pool and also serves as a containment isolation barrier during plant operations. The inspectors reviewed the TS, the USAR, system description, License Amendments, Equipment Replacement Request documents, USAR Change Notices (UCNs) and Engineering Change Notifications (ECNs). Preventive and corrective maintenance records were reviewed to ensure the fuel transfer tubes were properly maintained. Additionally, the inspectors reviewed corrective action documents to ensure problems associated with the transfer tubes were appropriately identified and corrected. Due to the location of the transfer tubes, the inspectors reviewed Work Order (WO) Work In Progress (WIP) logs to account for equipment conditions.

- Borated Water Storage Tank (T10): The borated water storage tank (BWST) is a safety-related, seismic category tank that provides water to the ECCS pumps during the injection phase of a LOCA. The inspectors reviewed the TS, the USAR, tank level instrumentation, supporting calculations, and drawings to assess the potential for vortexing in the ECCS pumps' suction lines from the BWST. Preventive and corrective maintenance records were reviewed to ensure the BWST was properly maintained. Seismic qualification records were reviewed to ensure the tank and mounting bolts are qualified for seismic loadings. Additionally, the inspectors reviewed corrective action documents to ensure problems associated with the pump were appropriately identified and corrected. The inspectors performed a walkdown of the BWST area to observe material conditions.

- 4160V Bus "C1": The inspectors reviewed the plant TS, USAR, and associated system descriptions to establish an overall understanding of the design bases of the component. Voltage and short circuit calculations, as well as switchgear test, maintenance and operational procedures were reviewed to verify that design bases and design assumptions have been appropriately translated into design calculations and procedures. Testing procedures and recent results were reviewed to verify that acceptance criteria for tested parameters are supported by calculations or other engineering documents to ensure that design and licensing bases are met and to verify that individual tests and/or analyses validate component operation under accident/event conditions. The inspectors conducted a walkdown and performed alignment verifications to verify that the component configuration will support its design basis function under accident/event conditions and that the equipment is properly protected. Control wiring diagrams and direct current (DC) loading calculations were reviewed to verify that component inputs and outputs are suitable for application and will be acceptable under accident/event conditions. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/equipment qualification life. Environmental qualification documents were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions.

- <u>Condensate Storage Tanks (T31-1 and T31-2)</u>: The inspectors selected the condensate storage tanks because of their function as the preferred source of water for the auxiliary feedwater pumps and the motor driven feedwater pump. The two condensate storage tanks are non-safety-related, non-seismic, and are sized to provide sufficient decay heat removal capability to place the RHR system into operation. During plant operation, both condensate storage tanks are connected by an open cross-tie line. The inspectors reviewed the feedwater system description, the TSs, the USAR, level instrumentation, and tank sizing calculations. Additionally, the inspectors reviewed drawings and discussed with design engineers the potential for air entrainment due to vortexing in the auxiliary feedwater pumps and the motor driven feedwater pump suction lines from the condensate storage tanks. The inspectors performed a walkdown of the condensate storage tank area to observe material conditions.

- <u>Component Cooling Water (CCW) Pump (P43-3)</u>: The inspectors reviewed design documents, including drawings, calculations, procedures, and the system description to determine the design requirements for the CCW Pump. Hydraulic analyses were reviewed to verify adequacy of NPSH and verify adequacy of surveillance test acceptance criteria for pump minimum discharge pressure at required flow rate. Inservice testing (IST) results were reviewed to verify acceptance criteria were met and performance degradation would be identified. The inspectors reviewed room heat load and ventilation calculations to ensure room temperature is maintained within equipment qualification limits of the CCW pump lubrication and motor. The inspectors performed a walkdown of the CCW pump area and CCW expansion tank area to assess the material conditions of the pump, motor driver, and expansion tank. Preventive and corrective maintenance records were reviewed to ensure the CCW pump was properly maintained. Coordination and motor starting curves were reviewed, along with short circuit calculations, and maintenance and testing procedures, to verify that design assumptions have been appropriately translated into design calculations and procedures. Control wiring diagrams and DC loading calculations were reviewed to verify that component inputs and outputs are suitable for application and will be acceptable under accident/event conditions. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/equipment qualification life. The inspectors reviewed the capability of the motors to support the design function of the pumps. This included review of available power supply under worst case conditions, BHP requirements for the pump motors, ampacity calculations for the pump motors cables, testing, setting and coordination of protective devices and vendor recommendations for motor installation and maintenance. Environmental qualification documents and procurement specifications were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions. Finally, the inspectors reviewed corrective action documents to ensure problems associated with the pump were appropriately identified and corrected.

- Motor-Driven Feedwater Pump (P241): The motor driven feedwater pump is not safety-related, but is used as a backup to the steam driven auxiliary feedwater pumps, if required. The inspectors reviewed design documents, including drawings, calculations, procedures, and the design basis document to determine the design requirements for the diesel driven auxiliary feedwater pump. Hydraulic analyses were reviewed to verify adequacy of net positive suction head and verify adequacy of surveillance test acceptance criteria for pump minimum discharge pressure at required flow rate. Maintenance testing results were reviewed to verify acceptance criteria were met and performance degradation would be identified. The inspectors performed a walkdown of the motor driven feedwater pump area and supporting equipment to determine whether the alignment was in accordance with design basis and procedural requirements, and to assess the material condition of the pump and motor driver. The inspectors reviewed the operating procedures that are entered when aligning the motor driven feedwater pump as a source for auxiliary feedwater to ensure the pump would operate in accordance with its design basis. Preventive and corrective maintenance records were reviewed to ensure the feedwater pump and motor driver were properly maintained. Coordination and motor starting curves were reviewed, along with short circuit calculations, and maintenance and testing procedures, to verify that design assumptions have been appropriately translated into design calculations and procedures. Control wiring diagrams and DC loading calculations were reviewed to verify that component inputs and outputs are suitable for application and will be acceptable under accident/event conditions. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/ equipment qualification life. The inspectors reviewed the capability of the motors to support the design function of the pumps. This included review of available power supply under worst case conditions, BHP requirements for the pump motors, ampacity calculations for the pump motors cables, testing, setting and coordination of protective devices and vendor recommendations for motor installation and maintenance. Environmental qualification documents and procurement specifications were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions. Finally, the inspectors reviewed corrective action documents to ensure problems associated with the motor driven feedwater pump were appropriately identified and corrected.

- High Pressure Injection (HPI) Pump (P58-1): The inspectors reviewed design basis documents, including hydraulic calculations, Technical Specifications, accident analyses and drawings to verify that the HPI pump was capable of meeting system functional and design basis requirements. The review included verifying adequate NPSH is available when pump suction is aligned to the BWST. Adequate pump NPSH was also verified for accident conditions when the pumped fluid is from the containment sump. The inspectors also reviewed HPI pump surveillance test results, and corrective action documents to determine whether HPI pump design margins were adequately maintained and to verify that the licensee entered problems that could affect system performance into their corrective action program. The inspectors reviewed operating and emergency operating procedures to assess whether sufficient BWST inventory existed to inject water into the reactor vessel during a postulated accident, and to verify whether pump suction swap-over occurred before the onset of vortexing at the BWST outlet piping. To assess the general condition of the pump, the inspectors performed walkdowns of the HPI pump area. The inspectors reviewed HPI pump and motor cooling systems and HPI pump minimum flow requirements to assess the ability of the HPI pump to operate under design basis conditions. Coordination and motor starting curves were reviewed, along with short circuit calculations, and maintenance and testing procedures, to verify that design assumptions have been appropriately translated into design calculations and procedures. Control wiring diagrams and DC loading calculations were reviewed to verify that component inputs and outputs are suitable for application and will be acceptable under accident/event conditions. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/equipment qualification life. The inspectors reviewed the capability of the motors to support the design function of the pumps. This included review of available power supply under worst case conditions, BHP requirements for the pump motors, ampacity calculations for the pump motors cables, testing, setting and coordination of protective devices and vendor recommendations for motor installation and maintenance. Environmental qualification documents and procurement specifications were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions.

- E1 480V Unit Substation: The inspectors reviewed the plant TS, USAR, and associated system descriptions to establish an overall understanding of the design bases of the component. The inspectors verified bus loading limits, voltage adequacy, short circuit capability, breaker coordination, and satisfactory operation of connected loads by reviewing schematic diagrams. The review included verifying alternating current (AC) voltage calculations to assure satisfactory voltage to the bus under worst case conditions, verifying that bus loading did not exceed bus rating, and reviewing short circuit calculations to verify that a condition did not exist which could exceed the switchgear and breaker ratings. The inspectors reviewed the breaker test program and results to verify trip and close accuracy and the maintenance program and history. Control wiring diagrams and DC loading calculations were reviewed to verify that component inputs and outputs are suitable for application and will be acceptable under accident/event conditions. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/equipment qualification life. Environmental qualification documents were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions. The inspectors conducted a walkdown and performed alignment verifications to verify that the component configuration will support its design basis function under accident/event conditions and that the equipment is properly protected.

- <u>ECCS Pump Room Cooler Fan (C31-4)</u>: The ECCS pump room cooler fan circulates warm room air over finned-coils cooled by service water. The inspectors reviewed recent fan air flow testing, room heat load calculations, and ECCS pump room cooler thermal performance calculations to verify the fan is capable of supplying sufficient cooling air flow to the room cooler coils. The inspectors performed a walkdown of the fan cooler area to assess material conditions.

- <u>F11A Motor Control Center</u>: The inspectors reviewed the plant TS, USAR, and associated system descriptions to establish an overall understanding of the design bases of the component. The inspectors verified bus loading limits, voltage adequacy, short circuit capability, breaker coordination, and satisfactory operation of connected loads by reviewing schematic diagrams. The review included verifying AC voltage calculations to assure satisfactory voltage to the bus under worst case conditions, verifying that bus loading did not exceed bus rating, and reviewing short circuit calculations to verify that a condition did not exist which could exceed the switchgear and breaker ratings. The inspectors reviewed the breaker test program and results to verify trip and close accuracy and the maintenance program and history. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/equipment qualification life. Environmental qualification documents were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions. The inspectors conducted a walkdown and performed alignment verifications to verify that the component configuration will support its design basis function under accident/event conditions and that the equipment is properly protected.

- <u>AC1CE11 (Breaker from C1 Bus to XCE1-1 Transformer)</u>: The inspectors reviewed the plant TS, USAR, and associated system descriptions to establish an overall understanding of the design bases of the component. Also, the inspectors reviewed the breaker test program and results to verify trip and close accuracy and the maintenance program and history. Short circuit calculations were reviewed to verify that a condition did not exist which could exceed the breaker rating. In addition, control wiring diagrams and DC loading calculations were reviewed to verify that component inputs and outputs are suitable for application and will be acceptable under accident/event conditions. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/equipment qualification life. Environmental qualification documents were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions. The inspectors conducted a walkdown and performed alignment verifications to verify that the component configuration will support its design basis function under accident/event conditions.

- BCE11 (Breaker from XCE1-1 transformer to E1 Unit substation): The inspectors reviewed the plant TS, USAR, and associated system descriptions to establish an overall understanding of the design bases of the component. Also, the inspectors reviewed the breaker test program and results to verify trip and close accuracy and the maintenance program and history. Short circuit calculations were reviewed to verify that a condition did not exist which could exceed the breaker rating. In addition, control wiring diagrams and DC loading calculations were reviewed to verify that component inputs and outputs are suitable for application and will be acceptable under accident/event conditions. Component maintenance history and licensee corrective action program reports were reviewed to verify that potential degradation is monitored or prevented and the component replacement is consistent with in service/equipment qualification life. Environmental qualification documents were reviewed to verify that equipment qualification is suitable for the environment expected under all conditions. The inspectors conducted a walkdown and performed alignment verifications to verify that the component configuration will support its design basis function under accident/event conditions.

b. Findings

(1) Inappropriate Change of Fuel Transfer Tube Seal Configuration

Introduction: A finding with two Apparent Violations of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and 10 CFR 50.71(e) was identified by the inspectors. The licensee failed to ensure the current fuel transfer tube blind flange seal configuration was in accordance with the licensing basis. As a result, the licensee failed to implement design control measures which assured that the design basis, as specified in the license application, was correctly translated into specifications, drawings, procedures, and instructions and failed to correctly update the USAR to reflect the safety analyses associated with License Amendment 240. As a result of these failures, the current fuel transfer tube blind flange seal configuration was contrary to the licensing basis.

Description: The inspectors questioned the process by which Equivalent Replacement Review (ERR) 60-0003-070 changed the seal configuration for the fuel transfer tube blind flange assemblies. The fuel transfer tube blind flange assemblies formed part of the containment boundary. On March 6, 2000, the licensee approved ERR 60-0003-070 to permit the use of a flat gaskets in lieu of O-rings for the fuel transfer tube seal configuration. The 10 CFR 50.59 screening review associated with ERR 60-0003-070 did not identify any impacts on the USAR or TS. The licensee deemed the change appropriate because the USAR contained two differing descriptions of a sealing profile for this penetration. Section 9.1 mentioned "Gasket" (which was incorrect) and Section 6.2 mentioned "O-Ring" (which was correct at that time). The discrepancy had existed since the initial start-up. The original design called for use of a spiral wound gasket. However, spiral wound gaskets were never used for the installation due to concerns associated with asbestos, and the USAR section referring to a gasket installation was not corrected. When the USAR was updated in 1976, the licensee only updated Section 6.2 of the USAR, which previously referred to spiral wound gaskets leaving the Section 9.1 with an incorrect seal configuration referenced.

Subsequent to the approval of ERR 60-0003-070, License Amendment 240 was approved by the NRC to eliminate the requirement to perform as-found local leak rate testing on certain containment penetrations, including the fuel transfer tube blind flange assemblies.

The NRC approved License Amendment 240 by letter dated March 28, 2000. The NRC based its approval of eliminating as-found local leak rate testing for the fuel transfer tube blind flange assembly upon the licensee amendment request submitted on July 26, 1999. In that request, the licensee described the fuel transfer tube blind flange assembly seal configuration as being a double O-ring seal installed on the inside of the containment vessel. In addition, the licensee stated a review of surveillance test history from September 1991 through May 1998 showed no test failures for the fuel transfer tube blind flange assemblies. The NRC Safety Evaluation Report for License Amendment 240 specifically took credit for the surveillance test history with no failures. The inspectors considered the double O-ring seal configuration and associated surveillance test history of no failures to become part of the licensing basis with the approval of License Amendment 240.

During the refueling outage, which ended May 18, 2000, (after License Amendment 240 had been approved), the licensee installed double flat gaskets, which had been permitted by ERR 60-0003-070, in the fuel transfer tube blind flange assemblies. The inspectors noted that this modification negated the licensing basis which became effective with the approval of License Amendment 240. Specifically, the double flat gasket installation did not have proven as-found local leak rate test history of no failures and no testing program had been initiated to establish an acceptable as-found testing history. No evaluation of the change to the licensing basis, such as through a 10 CFR 50.59 process, was performed. Since the 2000 refueling outage, the licensee has installed different configurations involving a combination of flat gaskets and O-rings for the fuel transfer tube blind flange seals. Based on review of surveillance test history of as-left local leak rate testing for the 2000 through 2008 refueling outages and discussions with the licensee’s lead engineer for containment local leak rate testing, the inspectors noted that there was an adverse trend, though no failures, in the leak rate testing results.

Based on discussions with the licensee, the inspectors learned that ERR 60-0003-070 was performed by procurement engineering personnel. The procurement engineering personnel were not aware that, at the time ERR 60-0003-070 was initiated, a license amendment associated with the fuel transfer tube blind flange assemblies had been requested and was under review by the NRC. Conversely, licensing engineering personnel were not aware that a change in fuel transfer tube blind flange assembly seal configuration was being processed concurrent with the license amendment. The design control process, in the 1999-2000 timeframe, failed to ensure the relevant organizations were aware of the license amendment request and the seal configuration changes in progress. In addition, the design control process failed to ensure that the licensing basis, which became effective with the approval of License Amendment 240, was incorporated into the design (i.e., ERR 60-0003-070). Based on discussion with licensee engineering management, the inspectors acknowledged that the design control processes in place during the inspection had improved considerably since the 1999-2000 timeframe. As a result of such improvements, a “program owner” would likely have been aware of both seal configuration changes and relevant license amendments in process. As such, there would have been a greater likelihood that a discrepancy would have been identified and corrected. As a result of the inspectors’ identification that ERR 60-0003-070 had inappropriately evaluated the gasket configuration for suitability, the licensee entered the issue into their corrective action program as Condition Report (CR) 09-67480.

In response to License Amendment 240, the licensee had prepared and approved UCN 99-0037 to update Sections 3.8.2.1.9, 3D.1.45, 3D.1.46, 6.2.1.4.1, and 6.2.1.4.1 of the USAR. The updates to the USAR sections primarily reflected that containment leak rate testing was controlled by the Containment Leak Rate Testing Program rather than TS. The USAR sections updated by UCN 99-0037 did not reference License Amendment 240 and the associated license amendment request submittal. More significantly, the updated sections did not include information regarding the safety analysis, which supported the change to eliminate the requirement to eliminate as-found testing. Specifically, the updated USAR sections did not discuss the change being approved for the fuel transfer tube blind flange assemblies based on the successful as-found test history associated with the double O-ring seal configuration. As a result of this omission, the licensee failed to perform a 10 CFR 50.59 safety evaluation, which addressed the test history of the double O-ring seal configuration for the fuel transfer tubes and associated licensing basis when the configuration was changed to a different configuration.

The inspectors reviewed the procedure in place during the 1999-2000 timeframe for controlling USAR changes, Procedure NG-NS-00806, “Preparation and Control of USAR Changes,” Revision 1. The inspectors were unable to identify any guidance within Procedure NG-NS-00806 that outlined the content of a USAR change, especially for changes made to incorporate changes to the licensing basis as the result of a license amendment. The inspectors reviewed the current procedure during this inspection for controlling USAR changes, Procedure NOP-LP-4008, “Licensing Documents Change Process,” Revision 1 and noted the following guidance:

> “The USAR must be updated to reflect the following effects, as applicable, of changes implemented under 10 CFR 50.90 or 10 CFR 50.59, including supporting safety evaluations; any new regulatory requirements; activities supporting new regulatory requirements, and changes made pursuant to other regulations.”

The inspectors did not identify additional guidance with respect to the specific content to be included for changes made to incorporate the effects of a license amendment. The inspectors noted that the industry guidance document Nuclear Energy Institute (NEI) 98-03, “Guidelines for Updating Final Safety Analysis Reports,” was only referenced within the body of Procedure NOP-LP-4008 for addressing temporary modifications installed beyond a refueling outage. Although NEI 98-03 Revision 1 was endorsed by Regulatory Guide 1.181, “Content of the Updated Final Safety Analysis Report in accordance with 10 CFR 50.71(e),” it was not referenced as guidance for determining the specific content to provide in updates to the USAR. The inspectors considered the guidance provided by Procedure NOP-LP-4008 to be lacking.

As the result of the inspectors’ identification associated with the updating the USAR to reflect License Amendment 240, the licensee entered the issue into their corrective action program as CR 09-68029, “CDBI 2009: Potential Violation of 10 CFR 50.71,” dated November 19, 2009. The inspectors reviewed the preliminary investigation for CR 09-68029 and noted that the only corrective action was to correct the USAR. The condition report investigation did not identify any weaknesses associated with the implementing procedures for incorporating USAR changes. The inspectors considered the licensee’s initial investigation to be ineffective. Based on the inspectors’ observations, the licensee initiated actions to review CR 09-68029 to understand and correct the issue more fully.

During this inspection, the inspectors contacted the Office of Nuclear Reactor Regulation (NRR) to ascertain whether the change in seal configuration for the fuel transfer tube blind flange assemblies was of concern considering that the double O-ring seal configuration was a basis for approval of License Amendment 240. The NRR reviewers stated that the configuration change was material in the decision to eliminate as-found testing requirement and had the reviewers been aware of the change, additional questions or testing would likely been required prior to the elimination of the testing. The inspectors did not identify any evidence that the change in the fuel transfer tube was considered when the licensee submitted the July 26, 1999, license amendment request to eliminate the requirement for as-found testing. The inspectors concluded the July 26, 1999, license amendment request was complete and accurate at the time of submittal; therefore, the requirements of 10 CFR 50.9, “Completeness and Accuracy of Information” were met. Nonetheless, the change in seal configuration for the fuel transfer tube blind flange assembles did adversely impact the regulatory process.

Based on review of Draft Regulatory Guide DG-1220, “Performance-Based Containment Leak-Test Program,” dated April 2009, the licensee believed that the regulatory process had not been significantly impacted. Specifically, the licensee believed that NRC policy proposed by Draft Regulatory Guide DG-1220 would permit them to eliminate as-found local leak rate testing without seeking a license amendment. Draft Regulatory Guide DG-1220 included the language “The NRC does not consider removing local leakage-rate-testable manway covers or flanges a maintenance action requiring as as-found test unless the scheduled (base or extended interval) local leak-rate test is due or unless their leakage integrity is suspect.” The inspectors conferred with NRR staff and determined the intent of this statement was to communicate an agency position that as-found testing was not required when an adequate history of testing had been established. The staff noted that modifying a gasket arrangement or profile would cause the integrity for the joint being tested to be suspect because there would not be an established history. Confirmatory testing would need to be performed in order to meet the requirements for implementing the performance-based option of 10 CFR Part 50, Appendix J. The inspectors noted that the licensee had not performed confirmatory testing when the seal configuration had been changed from the double O-ring configuration.

The inspectors determined that the successful as-left local leak rate tests performed during the prior refueling outage (Refueling Outage 15) provided reasonable assurance for continued operation and that there was no immediate safety concerns.

<u>Analysis</u>: The inspectors determined that failure to ensure the current fuel transfer tube blind flange seal configuration was in accordance with the licensing basis was a performance deficiency. This performance deficiency resulted in the licensee’s failure to address the licensing basis associated with License Amendment 240 and failure to correctly update the USAR to reflect the safety analyses associated with License Amendment 240 which appear to be contrary to 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” and 10 CFR 50.71(e). Because the issue impacted the regulatory process, the inspectors assessed the significance of the finding using the traditional enforcement process.

The inspectors reviewed the Enforcement Policy Supplements and concluded that escalated enforcement should be considered based on the determination that, had the NRC been informed at the time of its review of License Amendment 240, that a design change was being made, further questions or testing would have been required.

This finding has a cross-cutting aspect in the area of Human Performance Resources because the licensee did not have complete, accurate, and up-to-date design documentation, procedures, and work packages. Specifically, the licensee procedures for updating the USAR were not complete in that, they did not provide adequate guidance for determining the appropriate content for updating the USAR. This cross-cutting aspect is considered reflective of current performance because the procedures in place at the time of this inspection, in addition to the procedures in place during the 1999-2000 timeframe, did not provide adequate guidance. (H.2(c))

Enforcement: The following two Apparent Violations (AV 05000346/2009007-01) were identified:

- The licensee's November 15, 2000, USAR update did not include the effects of all safety analyses and evaluations performed by the licensee in support of an approved license amendment. The licensee failed to identify that the surveillance test history from September 1991 through May 1998 using a double O-ring configuration, showed no test failures, and that this information was used to support approval of a March 28, 2000, license amendment. This appears to be inconsistent with the requirements of 10 CFR 50.71(e) and is considered an Apparent Violation.

- In ERR 60-0003-070, the licensee allowed the fuel transfer tube blind flange seal configuration to change from a double O-ring configuration having a test history of no as-found local leak rate test failures to a flat gasket configuration without a comparable test history. This appears inconsistent with the licensing basis, which became effective March 28, 2000, through approval of a license amendment. This appears to be inconsistent with the requirements of 10 CFR Part 50, Appendix B, Criterion III and is considered an Apparent Violation.

(2) Unqualified Bonding Agent Used for Containment Penetration Seal

Introduction: A finding of very low safety-significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to ensure that the bonding material used to join bulk O-ring ends together for the fuel transfer tube seal was suitable for the containment penetration application.

Description: The inspectors identified discrepancies between the materials listed as being used for WO 20029890, "Install Remove Transfer Tube Flanges," dated January 23, 2008, and the materials prescribed per procedure DB-MM-09186 Revision 3, "Fuel Transfer Tubes Blind Flanges Removal and Reinstallation," dated March 3, 2006. The work order and procedure were used to provide seal installation instructions for the fuel transfer tube blind flanges during the 2008 refueling outage. At the time of the 2008 refueling outage, the seal consisted of a flat gasket installed in conjunction with an O-ring to form a double barrier seal. The fuel transfer tube blind flange seals formed part of the containment pressure boundary and would be subjected to containment accident conditions.

Neither WO 20029890 nor procedure DB-MM-09186 provided instructions for O-ring seal fabrication because the licensee considered seal fabrication to be a skill of the craft activity. The inspectors noted that the O-rings used were of a bulk O-ring material, which required that O-rings be cut to length and joined using a bonding agent to form appropriately sized O-rings. Neither WO 20029890 nor procedure DB-MM-09186 specified what material was to be used for the bonding agent to join the O-ring ends together. Based on additional discussions with procurement engineering and maintenance personnel, the inspectors determined the material which had been used as the bonding agent had been evaluated and qualified for use from a chemical control perspective. However, the bonding agent material had not been evaluated for suitability under accident conditions. Specifically, the bonding agent had not been specifically evaluated for post-loss of coolant accident postulated temperature and radiation conditions.

The inspectors were concerned because the function of the double seal as described in USAR Section 6.2.4.2 is to remain functional and fulfill its 10 CFR Part 50, Appendix J, “Primary Reactor Containment Leakage Testing for Water Cooled Power Reactors,” requirement to maintain containment integrity. The purpose of the double barrier seal was so that, no single credible failure or malfunction of an active component could result in loss of isolation. This penetration met its exception to NRC General Design Criterion 56 by having the blind flange with a double seal installed on the inside of the containment vessel, thus providing a double barrier. Since the bonding agent was used to join the O-ring material ends together, it formed part of the containment pressure boundary along with the O-rings. The inspectors were concerned that the bonding agent could fail under accident conditions resulting in a leakage pathway in at least one of the double barriers which formed the seal.

In response to questions from the inspectors, the licensee documented the issue in CR 09-68742, “Qualification of Fuel Transfer Tube Blind Flange O-Ring Bonder Material,” and initiated Prompt Operability Determination 2009-02. For operability, the licensee took credit for the outer seal, which used a gasket forming a contiguous barrier. However, the licensee did consider the seal to be non-conforming because the USAR required that the fuel transfer tube containment penetrations have a double barrier seal.

<u>Analysis</u>: The inspectors determined that the failure to ensure that the bonding material used to join bulk O-ring ends together for the fuel transfer tube seal was suitable for the containment penetration application was contrary to 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” and was a performance deficiency. The finding was determined to be more than minor because the finding was associated with the barrier integrity cornerstone attribute configuration control and affected the cornerstone objective of maintaining containment design parameters to provide reasonable assurance that physical design barriers will protect the public from radionuclide releases caused by accidents or events. Specifically, the use of the unqualified bonding material resulted in the indeterminate condition of one of two seals for the fuel transfer tube blind flanges.

The inspectors determined the finding could be evaluated using the Significance Determination Process (SDP) in accordance with IMC 0609, “Significance Determination Process,” Attachment 0609.04, “Phase 1 - Initial Screening and Characterization of findings,” Table 4a for the barrier integrity cornerstone. The finding screened as Green because the finding did not represent an actual open pathway in the physical integrity of reactor containment.

This finding has a cross-cutting aspect in the area of Human Performance Resources because the licensee did not have complete, accurate, and up-to-date design documentation, procedures, and work packages. Specifically, the procedure and the work order used for installing O-ring seals in the fuel transfer tube did not specify a bonding agent which had been evaluated and qualified for use inside containment. (H.2(c))

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related function of structures, systems, and components.

Contrary to the above, as of November 20, 2009, the licensee failed to establish design control measures for the selection and review for suitability for application of materials that are essential to the safety-related function of structures, systems, and components (SSCs). Specifically, the licensee failed to review the suitability of the bonding material used for connecting the ends of bulk O-rings used in the fuel transfer tube blind flanges. The bonding material used had a safety-related function of maintaining containment integrity. Because this violation was of very low safety-significance and it was entered into the licensee's corrective action program as CR 09-68742, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy.
(NCV 05000346/2009007-02)

(3) Non-Conservative Calculation of Induction Motor Load on AC Power System:

Introduction: A finding of very low safety-significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to evaluate worst case motor loads for emergency diesel generator and AC power system loading under postulated accident conditions.

Description: The inspectors reviewed the motor data for selected large safety-related motors (high pressure injection, decay heat, and containment spray) that were used by the licensee in their AC power system analysis (ETAP) to determine whether the motor loads on the emergency diesel generators were conservatively developed. The inspectors determined that the vendor guaranteed motor efficiency data at full (100 percent (%)) load was not used by the licensee in the analysis. Instead, the licensee determined motor efficiency at full load by performing a calculation that used motor nameplate full load amperes, nameplate horsepower, rated voltage, and the vendor guaranteed power factor as input parameters. As such, the inspectors determined that the licensee calculated full load motor efficiency was overstated in comparison to the vendor guaranteed efficiency data. In the case of the high pressure injection pumps, the efficiency value calculated by the licensee was 2.68 percent higher than the vendor guaranteed data.

The inspectors questioned how the licensee determined the motor efficiency for motors that were assumed to be operated at greater than full load during design basis loss of coolant accident (LOCA) conditions, such as the high pressure injection, decay heat, and containment spray pump motors. Based on discussions with the licensee, the inspectors learned that the ETAP software generated a curve for efficiency and power factor at greater than 100 percent load conditions by extrapolating the data that was entered (or calculated) for the 50 percent, 75 percent, and the 100 percent load conditions. For the high pressure injection, decay heat, and containment spray motors, the 75 percent and 100 percent data for power factor and the 75 percent data for efficiency were entered into ETAP analysis from vendor provided guaranteed motor data. However, the licensee had calculated the 100 percent values for motor efficiency used as the 100 percent data points in the ETAP extrapolated motor efficiency curves. The inspectors noted that extrapolating data in this manner was non-conservative in the cases of the high pressure injection, decay heat, and containment spray pump motors because the 100 percent load motor efficiency data used in ETAP was overstated by as much as 2.68 percent in comparison to the vendor guaranteed data. Additionally, the inspectors noted that the motor efficiency curve at greater than full load typically drops off at some point (versus steadily increasing) above 100 percent of rated load.

The licensee initiated Condition Report 09-68025 to evaluate the use of potentially non-conservative extrapolation of motor efficiency and power factor data in ETAP software on the AC power system analysis calculation, Calculation C-EE-015.03-008, "AC Power System Analysis," Revision 4, Addendum 01, performed in May 2008. The licensee's evaluation on CR 09-68025 determined that the increase in load in the AC power system for the high pressure injection, decay heat, and containment spray pump motors, during postulated design basis LOCA conditions, was 49 kilowatts (kW) and 55 kilovoltamps (kVA), based on an assumed value of motor efficiency equal to the vendor guaranteed efficiency at 100 percent load. The inspectors reviewed the licensee's initial assessment of the issue and determined that the licensee had not evaluated for operability the impact of additional load increase upon the protective relaying for the motors. In response to additional questions by the team, the licensee determined that the circuit breakers for the high pressure injection, decay heat, and containment spray pump motors would not inadvertently trip as a result of the calculated load increases.

Although the licensee was able to determine that the additional loads were within the capability of the emergency diesel generators, the inspectors was concerned that, if the issue had not been identified by the NRC, future loads could have been added which could have cause the emergency diesel generator capacities to be exceeded without the licensee recognizing it. In addition, the inspectors noted that the licensee had to evaluate the impact upon protective relaying, in addition to emergency diesel generator loading, in order to demonstrate operability. The inspectors considered the finding to be a result of misapplication of ETAP software and to be an indication of weaknesses in licensee engineering staff knowledge.

<u>Analysis</u>: The inspectors determined that the failure to evaluate worst case motor loads for emergency diesel generator and AC power system loading under postulated accident conditions was contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and was a performance deficiency.

The finding was determined to be more than minor because, if left uncorrected, the finding would become a more significant safety concern. Specifically, the failure to accurately determine loading upon the emergency diesel generators could result in overloading an emergency diesel generator due to the addition of loads. Therefore, the inspectors concluded this finding was associated with the Mitigating Systems Cornerstone. The inspectors also determined the finding was similar to IMC 0612, Appendix E, Example 3.j because, although the licensee was able to demonstrate operability of the high pressure injection pumps, decay heat pumps, and the containment spray pumps; at the time of discovery, there was a reasonable doubt on the operability of the high pressure injection pumps, decay heat pumps, and the containment spray pumps due to the impact of loads upon protective relaying.

The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of findings," Table 4a for the Mitigating Systems Cornerstone. The inspectors determined that the finding was of very low safety-significance (i.e., Green) because the finding was a design or qualification deficiency confirmed to not result in a loss of operability or functionality.

This finding has a cross-cutting aspect in the area of Human Performance Resources because the licensee did not ensure personnel and other resources were adequate to assure nuclear safety. Specifically, training of engineering personnel was not adequate to ensure that ETAP software was correctly used for calculation of motor efficiencies within the limitations of the software. (H.2(b))

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

Contrary to the above, as of November 20, 2009, the licensee failed to establish measures to assure that applicable regulatory requirement and the design bases were correctly translated into specifications, drawings, procedures, and instructions. Specifically, the licensee did not use vendor guaranteed motor efficiency data in Calculation C-EE-015.03-008. As a result, motor efficiencies under postulated accident conditions were non-conservatively determined by the licensee for the high pressure injection, decay heat and containment spray motors. The non-conservative determination of motor efficiencies resulted in an estimated 49 kW and 55 kVA loading upon the emergency diesel generators not being identified by the licensee. Because this violation was of very low safety-significance and it was entered into the licensee's corrective action program as CR 09-68025, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000346/2009007-03).

.4 Operating Experience

a. Inspection Scope

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

- Bulletin 88-04, Safety-Related Pump Loss;
- Information Notice 96-31, Cross-Tied Safety Injection Accumulators; and
- Regulatory Issue Summary 2008-14, Use of TORMIS Computer Code for Assessment of Tornado Missile Protection.

b. Findings

(1) Failure to Take Interim Corrective Actions to Address Structures, Systems, and Components Unprotected from Tornados

Introduction: A finding of very low safety-significance and associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the inspectors for the failure to take interim corrective actions to address structures, systems, and components (SSCs) unprotected from tornados.

Description: The inspectors reviewed the licensee's actions related to NRC Regulatory Issues Summary (RIS) number 2008-014, "Use of TORMIS Computer Code for Assessment of Tornado Missile Protection." The Tornado Missile Risk Evaluation Methodology (TORMIS) is an NRC-approved method for addressing identified deficiencies in complying with a plant's current licensing basis for tornado missile protection. The methodology provides licensees the option of revising the plant's licensing basis for tornado missile protection from a purely deterministic methodology to one that includes limited use of a probabilistic approach.

The licensing basis for tornado generated missiles was discussed in Sections 3.3 and 3.5 of the USAR. Section 3.5.1(1)c of the USAR identified that protection was provided for potential missiles that could jeopardize functions necessary to bring the reactor to a safe shutdown condition during normal and abnormal conditions as a design basis. Section 3.5.1 specifically stated that the containment structures, auxiliary building, intake structure, and valve rooms 1 and 2 were designed to withstand internal and external missiles. Table 3.3-1 of the USAR listed the essential systems that are contained in these buildings and are required for a safe shutdown in the event of a tornado. The emergency diesel generators were among the systems listed as an essential system within Table 3.3-1. Section 3.3.3 of the USAR explicitly stated that the equipment was located within the protective boundary provided by barriers such as the auxiliary building. Additionally, the last paragraph on page 3.5-4 of USAR states, in part, that "All seismic Class I structures are designed to withstand an end-on impact of the missiles as outlined in Tables 3.5-1 and 3.5-2."

In 2002, the licensee identified deficient or missing tornado missile protection on EDG exhaust pipes and lack of missile shields on certain auxiliary building doors (CRs 02-04147, 02-04146, 02-04700, and 02-05590). The licensee had evaluated the non-conforming conditions using a computer code (TORMIS) discussed in Electric Power Research Institute (EPRI) Topical Report NP-2005, "Tornado Missile Risk Evaluation Methodology," Volumes I and II, August 1981. Based on use of this code, the licensee performed an analysis (documented in Calculation C-CSS-099.20-026, "Probability of Tornado Missile Damage to Davis Besse Missile Exposed Targets," Revision 0) and determined that the probability of the unprotected areas being struck by a tornado missile was relatively low. Table 7.1-2 of Calculation C-CSS-099 20-026, "Probability of Tornado Missile Damage to Davis-Besse Missile Exposed Targets," Revision 0, identified potential targets, and whether the targets were protected or no SSCs were required for safe shutdown. Based on review of Table 7.1-2, the inspectors noted that there were over 70 targets, which were identified as not being protected and for which, there were SSCs necessary for safe shutdown, which could potentially be affected by a tornado.

The licensee initially used Calculation C-CSS-099.20-026 as a basis for not protecting SSC's. During 2004, the licensee received two Non-Cited Violations (documented in Inspection Report 05000346/2003010, issued March 5, 2004; ADAMS Accession Number ML040680070; and Inspection Report 05000346/2004010, issued August 3, 2004, ADAMS Accession Number ML042160297) of 10 CFR 50.59 for not properly evaluating the lack of tornado protection for certain SSCs. On January 11, 2005, the licensee submitted a license amendment request to the NRC requesting that the licensing basis be modified to not require protection of certain SSCs based on their analysis. On January 26, 2007, the licensee withdrew their license amendment request due to technical issues identified during discussions with NRC staff.

Based on discussions with the licensee, the inspectors determined some of the targets had a degree of protection from intervening structures and components such as the turbine pedestal and condenser. However, not all of the identified targets were afforded such protection. In addition, the licensee presented the argument that targets greater than 60 feet above ground level, such as the diesel generator exhaust stacks, were not required to be protected as part of their licensing basis. The inspectors agreed that USAR Sections 3.3 and 3.5 listed maximum heights for a number of credible missiles. However, the USAR did not list a maximum height for two of the credible external missiles listed in USAR Table 3.5-2, "Credible External Missiles." Specifically, the USAR specified no maximum heights for: (a) a missile equivalent to a 12 foot long piece of wood 8 inches in diameter traveling on end at a speed of 367 feet per second; and (b) a 12 inch schedule 40 pipe 15 feet long traveling at a speed of 153 feet per second. As such, the inspectors determined that the licensing basis required protection for essential SSCs, such as the EDG exhaust stacks, without regard to elevation for these two credible external missiles.

The inspectors noted the licensee was in the process of re-performing an analysis using the TORMIS methodology and planned to submit a license amendment request by the end of 2010. For addressing long-term licensing basis issues, the inspectors considered this approach reasonable. However, the inspectors noted that addressing the licensing basis issues spanned a period in excess of six years at the time of the inspection. During this interim period, the licensee had taken few, if any, interim corrective actions to address the issue pending resolution of the licensing basis. Specifically, the licensee had neither updated operating procedures to provide mitigating strategies in the event of tornado damage to identified targets nor provided some form of protection for identified unprotected SSCs, such as the EDG exhaust stacks, necessary for safe shutdown in the event of a tornado. For example, the inspectors reviewed procedure KA-EP-02810, "Tornado," Revision 7, and determined that the procedure did not include any mitigating actions in the event of a tornado. With respect to the EDG vent stacks, the inspectors noted that a tornado missile could damage the stacks such that diesel exhaust flow would be restricted and adversely affect EDG capability.

As a result of questions by the inspectors, the licensee initiated a procedure change to procedure KA-EP-02810 to provide guidance for plant assessment following a tornado, and prepared an operations order (Standing Order 09-0015, "Interim Guidance for Emergency Diesel Week Tank issues during an on site Tornado Event," Revision 0) to address the diesel storage tank vent lines.

The inspectors noted that the licensee had previously identified the issue concerning the diesel storage tank vent lines on June 10, 2010, through review of operating experience (CR 09-60361). However, in resolving the condition report, the licensee incorrectly concluded that the diesel storage tank vent lines had no probability of damage. Although Calculation C-CSS-099.20-026 identified the diesel storage tanks and associated diesel storage tank vent lines as having a zero probability of damage, the determination of "zero" probability was due to weaknesses associated with the calculational methods used for Calculation C-CSS-099.20-026. The inspectors noted that as the vent lines were exposed and unprotected, it was readily discernable that there was some probability of damage to due missile damage from a tornado. Damage to the diesel storage tank vent lines could result in reducing the net positive suction head available to the diesel fuel oil transfer pumps and affecting long-term fuel supply to the diesel generators.

Analysis: The inspectors determined that the failure to take prompt corrective actions to address SSCs unprotected from tornados was contrary to 10 CFR Part 50, Appendix B, Criterion XVI and was a performance deficiency. The finding was determined to be more than minor because the finding was associated with the Mitigating System cornerstone attribute of Protection Against External Events and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, tornado missile damage to certain SSCs, such as the EDG exhaust vent stacks, could adversely affect availability, reliability, and capability of systems necessary for safe shutdown, such as the EDGs.

The inspectors determined the finding could not be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of findings," Tables 4a and 4b for the Mitigating Systems Cornerstone because damage from tornado missiles could affect two or more trains of a multi-train safety system. Consequently, the finding was evaluated by a Senior Reactor Analyst (SRA) as a Phase 3 analysis. The SRA evaluated the finding using the licensee's calculation for the probability of tornado missile damage (i.e., Calculation C-CSS-099.20-026). A local region tornado probability of 6.3×10^{-04} per year (as specified in USAR Section 2.3.1.2.) was used in the calculation. The calculation also assumed no damage due to missiles generated by wind speeds below 70 miles per hour. The calculation determined that the cumulative probability of a tornado missile strike on exposed plant equipment targets was 6.57×10^{-07} per year. Using the very conservative assumption that any tornado generated missile strike results in a core damage event, the core damage frequency due to tornado generated missiles is bounded by 6.57×10^{-07} per year. The inspectors noted that the NRC did not accept the results of calculation C-CSS-099.20-026 due to technical issues when the licensee had submitted a license amendment request based, in part, upon the calculation. However, the inspectors determined that the calculation, when the conservatisms discussed above are considered, to be of sufficient quality to support significance determination (as opposed to supporting a change to the licensing basis). Based on the Phase 3 analysis, the inspectors determined that the finding was of very low safety-significance (Green).

This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action. The licensee failed to thoroughly evaluate problems such that the resolutions address causes and extent of conditions, as necessary. Specifically, the licensee failed to correctly evaluate the potential of tornado damage to the diesel storage tank vent lines and, as a consequence, failed to take appropriate corrective actions. (P.1(c))

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected.

Contrary to the above, as of November 20, 2009, the licensee failed to promptly correct a condition adverse to quality regarding the lack of tornado missile protection for SSCs required to be protected as described in Section 3.5 of USAR. Specifically, on March 5, 2004, and August 3, 2004, the NRC issued Non-Cited Violations to the licensee concerning the lack of tornado missile protection for certain SSCs, including the EDG exhaust stacks and the diesel storage tank vent lines. Although the licensee had initiated actions to address the long-term licensing basis aspects concerning the lack of tornado missile protection, the licensee had failed to take corrective actions such as providing mitigating strategies or providing a form of interim tornado protection, for a number of SSCs, including the EDG exhaust stacks and diesel storage tank vent lines, which required protection from tornado generated missiles. Because this violation was of very low safety-significance and it was entered into the licensee's corrective action program as CR 10-69971, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000346/2009007-04).

.5 Risk-Significant Operator Actions

a. Inspection Scope

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

The following operator actions were reviewed:

- Action to Trip Reactor Coolant Pumps Following Loss of Seal Cooling;
- Action to Initiate Low Pressure Recirculation Following a LOCA;
- Action to Respond to Loss of All Feedwater;
- Action to De-energize Motor Generator Sets and to Emergency Borate During an Anticipated Transient Without Scram;
- Action to Close Decay Heat Removal (DHR) System Discharge Valve to Isolate Interfacing System Loss of Coolant Accident (ISLOCA); and
- Action to Respond to Fire in Area Q Following a Serious Station Fire;

b. Findings

(1) Inadequate Procedure for a Loss of Coolant Accident Outside Containment

Introduction: A finding of very low safety-significance and associated NCV of TS Section 5.4.1, "Procedures," was identified by the inspectors for the failure to provide adequate procedural direction to respond to a large LOCA outside containment. Specifically, emergency operating procedure DB-OP-02000, "RPS, SFAS, SFRCS Trip, or SG Tube Rupture," was inadequate in that procedural direction for a large LOCA outside containment was not provided.

Description: On October 22, 2009, while reviewing licensee procedures associated with an ISLOCA outside containment, the inspectors identified that a procedure did not exist to address a large ISLOCA event outside containment (e.g., a break associated with the

10 inch DHR discharge piping due to back leakage through two DHR system discharge check valves).

For a large ISLOCA, a reactor trip and Safety Features Actuation System (SFAS) actuation would occur that would require entry into emergency operating procedure (EOP) DB-OP-02000, “RPS, SFAS, SFRCS Trip, or SG Tube Rupture.” Procedure DB-OP-02000 addressed actions associated with reactor coolant system (RCS) leaks due to LOCAs inside containment or steam generator (SG) tube ruptures. In addition, the Supplemental Actions of DB-OP-02000 addressed using abnormal operating procedures (AOPs) if plant conditions indicated that AOP usage was required. One of the AOPs was DB-OP-02522, “Small RCS Leaks,” which provided direction to identify, and if possible, isolate small RCS leaks. However, specific guidance to isolate leakage on the DHR system was not provided in DB-OP-02522. In addition, DB-OP-02522 was not intended to address a RCS leak large enough to result in a loss of pressurizer level. For this case, DB-OP-02522 directed an operator to go to EOP DB-OP-02000, “RPS, SFAS, SFRCS Trip, or SG Tube Rupture.” Thus, for a large LOCA event outside containment, the applicable procedures would not provide guidance to mitigate the event.

During a simulator scenario performed on November 3, 2009, a break of approximately 1200 gallons per minute (i.e., a small LOCA) was simulated on the DHR Train 2 discharge piping. The simulator scenario was performed in accordance with Simulator Guide ORQ-SIM-S190, Revision 0, titled “2009 CDBI Scenarios.” During the event, the simulator operations crew initially entered procedure DB-OP-02522, “Small RCS Leaks.” With pressurize level and RCS pressure continuing to decrease, the crew then initiated a manual Reactor Trip and entered procedure DB-OP-02000. At a decreasing RCS pressure of 1600 pounds per square inch gauge, an SFAS Level 2 signal automatically actuated and the ECCS pumps automatically started. The simulator operations crew performed the applicable steps of procedure DB-OP-02000, while the extra reactor operator (RO) was instructed by the Shift Supervisor (i.e., a Senior Reactor Operator) to continue performing procedure DB-OP-02522. After the initial operator actions of procedure DB-OP-02000 were completed, the Shift Supervisor and ROs continued to implement procedures DB-OP-02000 and DB-OP-02522 to attempt to identify the RCS leak location (which the procedures were not helping to identify). While the Shift Supervisor and ROs were implementing the EOP and the AOP for Small RCS Leaks, the Shift Manager, acting independent of the EOP/AOP procedure network, observed that the “DH CLR 2 Outlet Temp Hi” annunciator was in the alarm condition. The Shift Manager determined, by looking at an Operational Schematic drawing, that the alarm setpoint for the high temperature annunciator was 280 degrees (°) Fahrenheit (F). Based on this temperature setpoint, the Shift Manager diagnosed that a temperature exceeding 280°F could only be coming from RCS water, since the water in the BWST was at a nominal ambient temperature. The Shift Manager then determined, again acting independent of the EOP/AOP network, from the applicable Operational Schematic drawing that closing DHR Train 2 discharge motor-operated valve DH1A should isolate the RCS leak. The simulator shift operations crew was then directed to close valve DH1A, which isolated the RCS leak approximately 22.5 minutes after the initiation of the DHR system leak.

Although during the simulator scenario, the shift operations crew was able to identify and isolate the small RCS leak on the DHR Train 2 discharge piping, the crew identified and isolated the RCS leak independent of the EOP/AOP procedure network. From observation of the scenario, it was apparent that the procedures and training associated with an RCS leak outside containment on the DHR system were not adequate. In addition, since the DHR system is the only system that could have a large LOCA outside containment (due to piping size), the ability of a crew to identify and isolate a large break LOCA outside containment without adequate procedural guidance was in question.

Analysis: The inspectors determined that the failure to provide adequate procedural direction to address a large LOCA event outside containment was contrary to TS 5.4.1, "Procedures," and was a performance deficiency. The finding was determined to be more than minor because the finding was associated with the Barrier Integrity Cornerstone attribute of Procedure Quality and affected the cornerstone objective of providing reasonable assurance that the physical design barrier of containment is maintained to protect the public from radionuclide releases caused by accidents or events. Specifically, the licensee failed to provide adequate procedural direction for a large LOCA event outside containment.

The inspectors initially reviewed the significance of the finding using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of findings," Table 4a for the Barrier Integrity (Containment Barrier) Cornerstone. However, the inspectors determined that the Table 4a Phase 1 screening questions were not applicable to the finding and, as such, may not appropriately characterize the significance of the finding. Consequently, an SRA performed a Phase 3 analysis to ensure that the significance was appropriately evaluated.

The SRA evaluated the finding using the SPAR Model 3.46 for the Davis-Besse Nuclear Power Station and NUREG/CR-6883, "The SPAR-H Human Reliability Analysis Method." From the SPAR model for Davis-Besse, the initiating event frequency for the failure rate of the two series RCS to DHR system check valves was 2.3×10^{-5} per year. A failure probability of 0.1 was used in the SPAR model for failure of the DHR piping to withstand RCS pressure. Thus, the failure probability of the DHR discharge piping due to failure of the two series RCS to DHR system check valves was 2.33×10^{-6} per year. The SPAR-H method was used to estimate a human error probability (HEP) associated with identifying and isolating the ISLOCA for this event. A time of approximately 2.77 hours was used for the time to the onset of core damage for the event based on an analysis (PRA-DB1-09-037-R000, "MAAP 4.0.6 Calculation for Time to Core Damage After a ISLOCA in the Low Pressure Injection Line") performed by the licensee. For the evaluation of the Performance Shaping Factor (PSF) for "Diagnosis" using the SPAR-H method, the PSF for "Available Time" was set to "Extra Time," the PSF for "Stress" was set to "High," the PSF for "Complexity" was set to "Moderately Complex," and the PSF for "Procedures" was set to "Available, But Poor." For the evaluation of the PSF for "Action," the PSF for "Available Time" was set to "Time Available Greater Than or Equal to 5 Times the Time Required," the PSF for "Stress" was set to "High," and the PSF for "Procedures" was set to "Not Available." The total HEP was thus determined to be 3×10^{-2} using the SPAR-H method. The change in Core Damage Frequency (ΔCDF) was thus determined to be (2.3×10^{-6} per year) × (3×10^{-2}) = 6.9×10^{-8} per year. An ISLOCA event was evaluated to have a probability of 1.0 of being a Large Early Release Frequency (LERF) event, and thus, the change in LERF (ΔLERF) value was calculated as ΔLERF = 6.9×10^{-8} per year. Based on the relatively low initiating event frequency and credit for recovery, the Phase 3 analysis determined that the finding was of very low safety-significance (Green).

The inspectors determined there was no cross-cutting aspect associated with this finding as it was not reflective of current performance.

Enforcement: Technical Specification Section 5.4.1 states, in part, that "Written procedures shall be established, implemented, and maintained covering the following activities: The applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978." Paragraph 6 of this Regulatory Guide stated, in part, that procedures shall be written for combating emergencies and other significant events, including a procedure for a large loss of coolant accident outside primary containment.

Contrary to the above, as of November 20, 2009, procedure DB-OP-02000, "RPS, SFAS, SFRCS Trip, or SG Tube Rupture," was inadequate in that it failed to provide adequate procedural direction for a large LOCA event outside containment. As part of its corrective actions, the licensee planned to strengthen the alignment between the PRA process used to assess plant risk and the operations procedures so that operator actions assumed in the PRA analysis are appropriately captured in operations procedures. Because this violation was of very low safety-significance and because it was entered into the licensee's corrective action program as CR 09-66474, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000346/2009-05).

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

.1 Review of Items Entered Into the Corrective Action Program

a. Inspection Scope

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

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 (Closed) Unresolved Item (URI) 05000346/2009004-03: Concerns With Analysis Supporting The Modification Of Gaskets Used In The Fuel Transfer Tube Blind Flanges

This issue is considered an Unresolved Item pending further review of maintenance records, confirmation of actual installation, and the license bases. The inspectors reviewed this material as discussed in Section 1R21.3.b.(1). This URI is considered closed and the issue will be tracked as a finding with associated Apparent Violations (AV 05000346/2009007-01).

4OA6 Management Meetings

.1 Exit Meeting Summary

On January 14, 2010, the inspectors presented the inspection results to Mr. Clark Price, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee
B. Allen, Site Vice-President
B. Boles, Director, Site Operations
K. Byrd, Manager, Design Engineering
G. Halnon, Director, Fleet Licensing
V. Kaminskas, Director, Site Engineering
T. Lentz, Manager, Fleet Licensing
S. Plymale, Manager, Plant Engineering
C. Price, Director, Site Performance Improvement
D. Wuokko, Manager, Regulatory Compliance
G. Wolf, Supervisor, Regulatory Compliance
K. Zellers, Supervisor, Design Engineering

Nuclear Regulatory Commission
J. Rutkowski, Senior Resident Inspector
A. Wilson, Adam, Resident Inspector
A. Stone, Branch Chief, Division of Reactor Safety
S. West, Director, Division of Reactor Projects

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000346/2009007-01	AV	Inappropriate Change of Fuel Transfer Tube Seal Configuration

Opened and Closed

05000346/2009007-02	NCV	Unqualified Bonding Agent Used for Containment Penetration Seal
05000346/2009007-03	NCV	Non-Conservative Calculation of Induction Motor Load on AC Power System
05000346/2009007-04	NCV	Failure to Take Interim Corrective Actions to Address Structures, Systems, and Components Unprotected from Tornados
05000346/2009007-05	NCV	Inadequate Procedure for a Loss of Coolant Accident Outside Containment

Closed

05000346/2009004-03	URI	Concerns With Analysis Supporting The Modification Of Gaskets Used In The Fuel Transfer Tube Blind Flanges

Discussed

None

LIST OF DOCUMENTS REVIEWED

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

CALCULATIONS

Number	**Description or Title**	**Revision**
16.015	Emergency Diesel Generator Fuel Supply	
C-CSS-099.20-026	Probability of Tornado Missile Damage to Davis Besse Missile Exposed Targets	00
C-EE-002.01-010	DC Calc – Battery and Charger Sizing, Short Circuit, and Voltage Drop	31
C-EE-003.02-011	Protective Relay Setpoint for Transformer AC (Breaker HAAC) and Transformer BD (Breaker BAAD)	02
C-EE-004.01-009	Protective Relay Setpoint for High Pressure Injection Pump Motor 1-1 (AC111)	04
C-EE-004.01-030	Protective Relay Setpoint for 4.16KV Feeder Ground Relays	03
C-EE-004.01-038	Protective Relay Setpoint for Incoming to Transformer CE1-1	04
C-EE-004.01-039	Protective Relay Setpoint for Incoming to Transformer CE1-2	02
C-EE-004.01-047	Protective Relay Setpoint for Phase Fault Protection – 4.16KV Buses C1 & C2	02
C-EE-005.01-027	Protective Relay Setpoint for Incoming to MCC F11A	01
C-EE-005.01-036	Protective Relay Setpoint for Unit Substation E1 Undervoltage Relay	00
C-EE-006.01-029	Motor Thermal Overload Relay Heater Selection	03
C-EE-015.03-007	Operating Load Limits for AC Power Systems Analysis, Addendum A01	00
C-EE-015.03-008	AC Power System Analysis	04
C-EE-015.07-004	4.16 & 13.8 KV Cable Ampacities (Motor Loads)	04
C-ICE-011.01-002	Service Water Flow/Pressure Indications	00
C-ICE-026.02-002	EDG Day Tank Level	00
C-ICE-037-.01-001	CST Level Instrument Uncertainty	01
C-ICE-048.01-004	BWST Level Uncertainty	08
C-ICE-052.01-001	HPI Flow Indications for Pump Testing	00
C-ICE-083.03-001	SFRCS Low and High Level Setpoints	17
C-ME-016.05-001	CCW Pump Room Ventilation	05
C-ME-016.05-002	CCW Room Ventilation with Reverse Flow of Fan	00
C-ME-024.01-005	Verification of EDG Fuel Supply	00
C-ME-026.02-001	Tank Level Curve Calculation	01

C-ME-026.02-002	Tank Level Curve Calculation Addendum 1	01
C-ME-037.01-003	CST Tank and Level Curve Calculation	02
C-ME-045.02-005	MDFP Surveillance Test	01
C-ME-49.01-078	BWST Tank Level Curve Calculation	01
C-ME-50.03-124	Hydraulic Analysis of AFW to Steam Generators via the Motor Driven Feedwater Pump	00
C-NSA-011.01-016	Service Water System Design Basis Flowrate Analysis and Testing Requirements	01
C-NSA-016.04-001	CCW Allowable Pump Degradation	01
C-NSA-016.04-004	CCW Pump NPSH Requirements	01
C-NSA-028.01-007	Control Room, LPZ, and EAB Radiation Doses due to ECCS Leakage to the BWST and Auxiliary Building	00
C-NSA-032.02-006	ECCS Pump Room Heatup During Post LOCA	00
C-NSA-032.02-007	ECCS Pump Room Cooler UA	00
C-NSA-037.01-001	CST Capacity for Decay Heat and Sensible Heat Removal	01
C-NSA-049.01-004	Vortex Formation with ECCS Pump Suction from the BWST	02
C-NSA-049.02-048	LPI, CS, and HPI Pumps NPSH with Suction from the BWT	00
C-NSA-052.01-003	HPI Pump Test Acceptance Criteria	08
C-NSA-052.01-011	HPI Pump NPSH on Containment Emergency Sump Recirculation	01
C-NSA-099.16-097	CCW Room Heatup Without Ventilation	00
File F9, Calc Number 22	Seismic Check for 0.20 G, Borated Water Storage Tank	00
File S25, Calc. Number 1	Seismic Analysis of Borated Water Tank	02
PRA-DB1-09-036-R000	Calculation of BWST Gravity Drain Through VL ISLOCA Break	00
PRA-DB1-09-037-R000	MAAP 4.0.6 Calculation for Time to Core Damage After a ISLOCA in the Low Pressure Injection Line	00
PRA-DB1-09-037-R000	MAAP 4.0.6 Calculation for time to core damage after a ISLOCA in the Low Pressure Injection Line	
PRA-DB1-09-039-R000	Evaluation of Human Failure Event for ISLOCA Through CF30/31 and DH76/77	00

CORRECTIVE ACTION PROGRAM DOCUMENTS

Number	**Description or Title**	**Date**
CR 02-05149	ORR-System Condition Report for Motor Driven Feedwater Pumps	04/22/02
CR 02-06062	EDG Duplex Fuel Oil Filters Procedure Revision	12/31/02
CR 04-00028	XCE1-1 Tap- Changer	02/03/04
CR 04-04685	NRC MOD/50.59: Use of 1E-6 in 50.59 Evaluation Questioned	07/21/04
CR 05-02526	Air Void Concerns in MDFP Suction Line	02/20/05

CORRECTIVE ACTION PROGRAM DOCUMENTS

Number	Description or Title	Date
CR 05-02924	Undervoltage Relay	06/05/05
CR 05-06000	DB-ME-03045- PER Step 8.7.11, The Target for Relay 27-3 failed to operate. This is not acceptance criteria.	07/02/05
CR 06-00223	C1 Bus Undervoltage Testing	03/06/06
CR 06-00476	Undervoltage Relay Testing Targets did not Operate.	04/25/06
CR 06-07224	Ultra Low Sulfur Diesel Fuel Evaluation for DB	10/04/06
CR 07-18098	Relay Calibration Failure	10/06/07
CR 07-18394	Relay Calibration Failure	10/08/07
CR 07-29188	Calculation C-NSA-049.01-004 Deficiencies	06/01/07
CR 08-32482	Fuel Transfer Tube Blank Flanges Improperly Sealed	01/02/08
CR 08-32815	Incorrect Gaskets Ordered for Fuel Transfer Tube Blank Flanges	01/08/08
CR 08-33846	DB-PA-08-01: DB-MM-09186 Procedural Quality/Compliance Issues	01/19/08
CR 08-34027	DB-PA-08-01: Transfer Tube Blank Flanges Were Installed with 2 O-Rings	01/02/08
CR 08-34209	Rework Fuel Transfer Tube Blank Flanges	01/23/08
CR 08-40528	Lack of Corrective Action to Track License Amendment Approval	
CR 08-46052	M065-1 Experiencing Reverse Air Flow Conditions	09/10/08
CR 08-46827	CE1-1 Found with Negative Pressure	10/12/08
CR 08-47229	Snapshot Self-Assessment of the DB Emergency Operating Procedure	10/2/08
CR 08-47930	EDG #2 (MP195-2) FUEL OIL TRANSFER PUMP MOTOR - LOW POLARIZATION INDEX READINGS	10/15/08
CR 08-49737	DB SCWE Survey Results for August 2008, Red Indicator For Q17, Cost over Safety	12/19/08
CR 08-49740	2008 Annual Safety Culture Assessment	11/19/08
CR 09-53715	High Pressure Injection Pump 1 Vibrations	08/01/09
CR 09-62912	Relay Needed Calibration during C1 Undervoltage testing	11/23/09
CR 09-63907	Evaluate An Unanalyzed Load De-Rating Condition On The Emergency Diesel Generators	09/15/09
CR 09-64193	CDBI Self-Assessment-No Calcs Exist for BWST/CST/FWST to Vent	09/09/09
CR 09-64386	NRC CDBI 2009 Self-Assessment- Periodic Testing of DC Motor Starter	09/14/09
CR 09-64991	CDBI SA-CCW Pump Room Ventilation Short Circuit	09/25/09
CR 09-65145	EDG Fuel Oil Transfer Function Not Tested	09/29/09
CR 09-65251	ECCS Pump Room Coolers 1, 2, and 5 Not Meeting Acceptance Criteria	09/30/09
CR 09-66750	DB-FV6459 Solenoid Load Is Shown As 3.6 Watts, Should Be 3.9 Amperes On Drawing E-640A, Sh. 3A.	10/27/09

CORRECTIVE ACTION PROGRAM DOCUMENTS

Number	**Description or Title**	**Date**
CR 09-67219	Relay Setting Sheet 1-08-068 Shows MC31-4 And MC31-5 As The Same Horsepower But Different Full Load Amp And A Different Size Thermal Overload Heater	11/04/09
CR 09-67479	Horsepower in C-NSA-032.02-006 Different Than ETAP Analysis C-EE-015.03-008	11/09/09
CR 09-67480	2009 CDBI: Inadequate Equivalency Justification Provided in ERR 60-0003-070	11/09/09
CR 09-67892	Vortexing Not Considered In EDG Day Tank Unusable Volume	11/17/09
CR 09-67978	Non-Conservative EDG Loading Value In Integrated SFAS Test	11/18/09
CR 09-68025	Induction Motor Efficiency And Power Factor In ETAP	11/19/09
CR 09-68063	DC Aux Lube Oil Pump For Make-Up Pump	11/19/09
NOTIFICATION: 600445692	DB-MM-09186 Procedure Revision	02/15/08
NOTIFICATION: 600580984	Work in Progress Log WO# 200291696	11/20/09

CORRECTIVE ACTIONS PROGRAM DOCUMENTS GENERATED AS A RESULT OF INSPECTION

Number	**Description or Title**	**Date or Revision**
CR 09-60361	Fuel Oil Storage Tank Tornado Missile Vulnerability	09/10/09
CR 09-66379	2009 CDBI – Minor Oil Leak on MDFP Motor MP241 Outboard Bearing	10/19/09
CR 09-66391	2009 CDBI Issue – Structural Analysis of the BWST	10/21/09
CR 09-66428	2009 CDBI – USAR Section 3.7.1.7.1 Borated Water Storage Tank	10/19/09
CR 09-66450	2009 CDBI: NRC Inspector Observations at BUS C1 and Transformer XCE1-2	10/22/09
CR 09-66474	2009 CDBI: Procedures for LOCA Outside CTMT	10/22/09
CR 09-66485	CDBI 2009: Ladder Not Restrained & Maintenance Equipment Not Attended At LSH1400	10/22/09
CR 09-66721	2009 CDBI Issue Regarding BWST Vortexting Calculation	10/27/09
CR 09-66739	NRC ISSUE 09-CDBI-0119: Guidance for Installing Fuel Transfer Tube Blind Flanges	10/27/09
CR 09-66750	DB-FV6459 Solenoid Load Is Shown As 3.6 Watts, Should Be 3.9 Amperes On Drawing E-640A, Sh. 3A.	10/27/09
CR 09-66756	2009 CDBI Self-Assessment: CST VACM BKRS not Shown on OS & P&ID's have no VLV #'s	10/27/09
CR 09-67213	2009 CDBI – Transfer Switch Maintenance – License Commitment	11/04/09

CORRECTIVE ACTIONS PROGRAM DOCUMENTS GENERATED AS A RESULT OF INSPECTION

Number	**Description or Title**	**Date or Revision**
CR 09-67219	Relay Setting Sheet 1-08-068 Shows MC31-4 And MC31-5 As The Same Horsepower But Different Full Load Amp And A Different Size Thermal Overload Heater	11/04/09
CR 09-67251	2009 NRC CDBI: Inspection Results of the Breaker Refurb Shop	11/04/09
CR 09-67370	Evaluate PRA Process to Strengthen Alignment with Operations Procedure Writers	11/6/09
CR 09-67479	Horsepower in C-NSA-032.02-006 different than ETAP analysis C-EE-015.03-008	11/09/09
CR 09-67480	2009 CDBI: Inadequate Equivalency Justification Provided in ERR 60-0003-070	11/9/09
CR 09-67533	CDBI 2009: Original EDG Fuel Usage Tests NonConservative with Present Design	11/10/09
CR 09-67892	2009 CDBI ISSUE - Vortexing Not Considered in EDG Day Tank Unusable Volume	11/17/09
CR 09-67978	Non-Conservative EDG Loading Value In Integrated SFAS Test	11/18/09
CR 09-68025	Induction Motor Efficiency And Power Factor In ETAP	11/19/09
CR 09-68029	CDBI 2009: Potential Violation of 10CFR50.71	11/19/09
CR 09-68031	CDBI Question Number 09-CDBI-0290	11/19/09
CR 09-68032	CDBI 2009: DB-PF-4736 Delta P Calcs Do Not Account For Head Differential	11/19/09
CR 09-68063	DC Aux Lube Oil Pump For Make-Up Pump	11/19/09
CR 09-68742	09-CDBI-0302, Qualification of Fuel XFER Tube Blind Flange O-Ring Bonding Mat'l	12/08/09
CR 10-69971	CDBI 2009: In Adequate Corrective Action Taken for Potential Tornado Missiles	01/12/10
Notification 600580984	WIP Log Entry Date Not Representative Of Actual Work Performed On EDG Fuel Transfer Pumps.	11/20/09

DRAWINGS

Number	**Description or Title**	**Revision**
302440	Target Rock Installation Dwg Modulating Valve Models 87J-001 & 87J-002, SH. 2 of 3	09/14/87
C - 72 -229	6000 Gal. Diesel Oil Day Tanks	B
C-034-57	Condensate Storage Tank	
C-34-130-10	Borated Water Storage Tank	B1
D - 76 - 398	Emergency Diesel Generator Oil Storage Tank	C
DCN- M-519-00050-0004	Transfer Tube Assy.	-

DRAWINGS

Number	Description or Title	Revision
Drawing 22040-3	Transfer Tube Assy.	5/21/08
E-1 SH. 3	Station Distribution Transformers Tap Settings	06
E-1 SH.1	A.C. Electrical System One Line Diagram	27
E-18	SFRCS Logic Diagram Logic Channels 1 & 3 and Actuation Channel, SH. 1	06
E-18	SFRCSv Logic Diagram Miscellaneous Circuits, SH. 3	06
E-2	25KV & 13.8KV Metering and Relaying One Line Diagram	11
E-21	13.8KV Relay and Metering Three Line Diagram Bus-A	16
E-22	4.16KV Relay and Metering Three Line Diagram Bus C1 & C2	30
E-3	4.16KV Metering and Relaying One Line Diagram	39
E-34B SH. 16	Elementary Wiring Diagrams 4.16 KV FD BRKRS Bus Essential Unit Substation E1, F1 Control	07
E-34B SH. 3	Elementary Wiring Diagrams 4.16 KV FD BRKRS Bus Tie XFMR BD ABDC1 Control	09
E-34B SH. 5	Elementary Wiring Diagrams 4.16 KV FD BRKRS Buses C1, C2 tie BRKR AC110 Control	10
E-37B SH. 3	Elementary Wiring Diagrams Essential Unit Substations Incoming Feeder Circuit Breakers	07
E-4 SH-1	“E” Buses 480V Unit Substations One Line Diagram	34
E-44B SH. 1B	Elementary Wiring Diagrams Feedwater System Motor Driven FW Pump	08
E-49B SH- 1B	Elementary Wiring Diagrams Treated Water MU PMPS (Charging)	21
E-5	480 Volt MCC (Non-Essential) One Line Diagram, SH. 1	83
E-50B SH. 4B	Elementary Wiring Diagrams Cooling Water System Component Cooling Pump 3(AD108)	17
E-52B SH. 5A	Elementary Wiring Diagrams Reactor Cooling System HPI Pump 1-1	12
E-6	480V.A.C. One Line Diagram	89
E-6	125/250 V.D.C. MCC No. 2 (Essential) Single Line Diagram, SH. 4	28
E-6	480V AC MCC (Essential) One Line Diagram, SH. 1	83
E-60B	Elementary Wiring Diagram, STA Htg, Ventl & Clng Sys ECCS Rm Clr Fans, SH. 3	10
E-630B	Connection Diagram MDFP (SG #1) Modulating Sol. Vlv. FV6459	01
E-640A	Essential 125 VDC Distribution Panel “D1N” Channel-3, SH. 3A	09
E-7	250/125V DC and Instrumentation AC One Line Diagram	39
E-9	240VAC and 120VAC MCC’s (Essential) One line Diagram	17
ESI50603	Duplex Fuel Filter Assembly	-

DRAWINGS

Number	**Description or Title**	**Revision**
Figure 3.8-9	Fuel Transfer Tubes Containment Vessel	00
M - 017A	Diesel Generators	17
M - 036B	Component Cooling Water System	36
M - 036C	Component Cooling Water System	27
M-006D	P&ID, Auxiliary Feedwater System	52
M-006E	P&ID, Condensate System	26
M-017C	EDG Fuel Oil System Piping and Instrument Diagram	27
M-024J	P&ID, Start Up and Motor Driven Feed Pumps	01
M-033A	Piping & Instrument Diagram – High Pressure Injection	41
M-033B	Piping & Instrument Diagram – Decay Heat Train 1	50
M-033C	Piping & Instrument Diagram – Decay Heat Train 2	24
M-036A	Piping & Instrument Diagram – Component Cooling Water System	28
M-036B	P&ID, Component Cooling Water System	36
M-041	Primary Service Water System	63
M-206K	Isometric-Condensate System Auxiliary and Start Up Feed Pump Suction and Recirc.	20
M-411Q-00001-1	Aerofin Type WR Coil	B
M-480N-24-1	Ingersoll Rand Certified Pump Curve number 59786-A, Motor Driven Feed Pump	08/19/85
OS- 041C	Emergency Diesel Generator Diesel Oil System Operational Schematic	16
OS-012A	Operational Schematic Main Feedwater System, SH. 1	23
OS-012A	Operational Schematic Main Feedwater System, SH. 2	27
OS-017A	Operational Schematic Auxiliary Feedwater System, SH.1	22
SF-003A	SFRCS Internal Schematic Diagram Analog Input Circuits Logic Channel 1, SH. 13	07

MISCELLANEOUS

Number	**Description or Title**	**Date or Revision**
	Davis-Besse Probabilistic Risk Assessment Human Reliability Assessment Notebook	01
12501-E-5Q	Technical Specification for Operational Phase for 4.16 KV and 13.8 KV Metal-Clad Switchgear.	03/30/81
600579163	Notification: Revise CST Low Level Transfer	11/10/09
93-00002B	General Electric Instructions for Power Circuit Breakers Types AK-2/2A-15, AK-2/3/2A/3A-25 and AKU-2/3/2A/3A-25	05/04/84
97-01722	Westinghouse Instructions for Porcel-Line Type DH-P Circuit Breakers	07/01/68
DB-055110354	EDG Fuel Oil Procurement Document	00

MISCELLANEOUS

Number	**Description or Title**	**Date or Revision**
DCR 600578193	DB-OP-02522 Enhancements	11/04/09
EXT-88-03678A	General Electric Maintenance Instructions for Low-Voltage Power Circuit Breakers Type AK, AKT, AKU and AKF	10/01/86
G-CS-436-1	Operating and Service Manual PIN 11288860101 Signal Monitor	None
ISTB1	Pump and Valve Basis Document, Vol. 1, Valve Bases	07
ISTB2	Pump and Valve Basis Document, Vol. 2, Pump Bases	10
LAR 06-0003	License Amendment Request for Conversion to ITS	08/03/07
LAR 96-0012	Adopt 10CFR50 Appendix J “Option B” for type B&C testing	00
M-046-00033	Instruction Manual Spare Parts list for Comp Cooling Pumps and Motors	02/29/08
M-410-00710-03	Vendor Manual, Publication No. 5K215AN6769, General Electric Nameplate Data for 7 ½ HP 215T Frame Type K Motor	03/31/75
M-46-33	Instruction Book and Spare Parts List for Component Cooling Pumps and Motors	05
M-480N-00021	Instruction Manual-4X11DA8 Start Up Feed Pump	02/28/08
M-518-00015-05	Instruction Book, Pump Motor Equipment for Babcock & Wilcox	03/01/72
MRPM	Maintenance Rule Program Manual	28
NEO-89-00916	Closeout of IEN 89-54, Potential Overpressurization of the CCW System	09/05/89
NORM-ER-1105	Life Cycle Management Motor Davis Besse	00
NORM-ER-1201	Large Motor Repair Specification	09/24/09
NORM-ER-3102	Motor	04
NORM-ER-3103	FENOC Low and Medium Voltage Switchgear and Motor Control Centers	10/16/07
NUREG 1177	Safety Evaluation Report Related to the Restart of Davis-Besse , Unit 1, Following the Event of June 9, 1985	06/1986
ORQ-SIM-S190	2009 CDBI Scenarios	00
PCAQR No. 96-1172	Davis-Besse Response to NRC Information Notice 96-31: Cross-Tied Safety Injection Accumulators	09/05/96
R-08275	NRC Issuance of LAR 06-0003 (Conversion to ITS)	11/20/08
SD-003A	System Description for The 4160 Volt Auxiliary System	08/23/07
SD-007	System Description for 125/250 VDC and 120 V Instrumentation AC System	11/07/05
SD-009	System Description for Low Voltage System	07/19/05
SD-010	System Description for Steam and Feedwater Rupture Control System	06
SD-015	System Description for Auxiliary Feedwater System	04
SD-038	System Description for High Pressure Injection System	04

MISCELLANEOUS

Number	**Description or Title**	**Date or Revision**
SD-042	System Description for Decay Heat Removal System	04
SD-048	System Description for Makeup and Purification System	04
SD-10	System Description-Steam and Feedwater Line Rupture Control System	06
SD-14	System Description-Main Feedwater System	06
SD-15	System Description-Auxiliary Feedwater System	04
SD-16	System Description-CCW System	05
SD-31	System Description-Condensate Storage System	03
Serial 3351	ITS Conversion LAR No. 06-0003	08/03/07
System 14-01	System Health Report-Main Feedwater	08/26/09
System 15-01	System Health Report-Auxiliary Feedwater	08/26/09
System 16-01	System Health Report-CCW	08/26/09

OPERABILITY EVALUATIONS

Number	**Description or Title**	**Date**
2009-02	Qualification of Fuel Transfer Tube Blind Flange O-Ring Bonding material	12/11/09

PROCEDURES

Number	**Description or Title**	**Revision**
83C-ISLSP9A6	Instrument Information Sheet	15
DB-CH-03044	New EDG Diesel Fuel Oil Analysis (Surveillance test procedure)	00
DB-ME- 09107	Westinghouse DHP Breaker Refurbishment	06
DB-ME-05314	Westinghouse ITH relay Maintenance and Calibration	02
DB-ME-09100	Maintenance of Motor Control Centers	10
DB-ME-09103	GE Type AK-50 Circuit Breaker	08
DB-ME-09104	13.8 KV and 4.16 KV Westinghouse DHP Breakers	09
DB-ME-09108	GE Type AK-50 Breaker Teardown and Reassembly	01
DB-ME-09110	Thermal Overload Relay Testing	06
DB-ME-09114	Molded Case Breaker Inspection and Test	15
DB-ME-09122	Westinghouse DHP Swichgear Maintenance	01
DB-MM-09186	Fuel Transfer Tubes Blind Flanges Removal and Reinstallation	03
DB-MM-09186	Fuel Transfer Tubes Blind Flanges Removal and Reinstallation	04
DB-OP-02000	RPS, SFAS, SFRCS Trip, or SG Tube Rupture	23
DB-OP-02003	ECCS Alarm Panel 3 Annunciators	11
DB-OP-02501	Serious Station Fire	15

PROCEDURES

Number	**Description or Title**	**Revision**
DB-OP-02519	Serious Control Room Fire	15
DB-OP-02522	Small RCS Leaks	09
DB-OP-02523	Component Cooling Water System Malfunctions	07
DB-OP-02543	Rapid Cooldown	07
DB-OP-03004	Locked Valve Verification	15
DB-OP-03063	Component Cooling Water Train 1 Valve Verification Monthly Test	06
DB-OP-03064	Component Cooling Water Train 2 Valve Verification Monthly Test	06
DB-OP-06006	Makeup and Purification System	25
DB-OP-06012	Decay Heat and Low Pressure Injection Operating Procedure	43
DB-OP-06014	Core Flooding System Procedure	17
DB-OP-06225	MDFP Operating Procedure	15
DB-OP-06273	Diesel Fuel Oil Transfer Procedure	00
DB-OP-06316	Diesel Generator Operating Procedure	43
DB-OP-06317	480V System Switching Procedure	17
DB-PF-03205	ECCS Train 1 Valve Test	17
DB-PF-05000	Motor Testing	03
DB-PF-05064	Electrical Machine Testing Using PdMA Motor Tester	08
DB-PF-09308	Routine Maintenance of Electrical Motors and Generators	02
KA-EP-2810	Tornado	07
NG-EN-00304	Safety Review and Evaluation	03
NG-NS-00801	Operating License Amendments	C1
NG-NS-00806	Preparation and Control of USAR changes	01
NOBP-CC-2003	Engineering Changes	14
NOBP-CC-2007	Part/Component Equivalent Replacement Packages	00
NOBP-CC-7002	Procurement Engineering	10
NOBP-CC-7007	Part Interchangeability Evaluation	01
NOBP-LP-4003A	FENOC 10CFR50.59 User Guidelines	06
NOP-LP-4003	Evaluation of Changes, Tests and Experiments	06
NOP-LP-4008	LICENSING DOCUMENTS CHANGE PROCESS	01
NOP-LP-4009	Request for NRC Approval	01

SURVEILLANCES (COMPLETED)

Number	**Description or Title**	**Date or Revision**
02-001442-000	Fuel Transfer Tube Mech Pent	02/22/02
1-89-1146-03	Fuel Transfer Tube Mech Pent	06/11/90
1-91-0444-00	Fuel Transfer Tube Mech Pent	10/21/91

SURVEILLANCES (COMPLETED)

Number	**Description or Title**	**Date or Revision**
1-92-0845-00	Fuel Transfer Tube Mech Pent	05/07/93
1-94-0169-06	Fuel Transfer Tube Mech Pent	11/03/94
1-95-0613-10	Fuel Transfer Tube Mech Pent	05/18/96
1-96-0400-12	Fuel Transfer Tube Mech Pent	05/11/98
200139039	Fuel Transfer Tube Mech Pent	04/16/06
200235667	EDG 2 184 Day Test FA Norm, DB-SC-03077	04/03/08
200281072	SFRCS ACH 1 SG LVL Funct FA NORM, 83C-ISLSP9A6	09/01/09
200282687	EDG 2 Monthly Test FA Norm, DB-SC-03071	09/17/09
200282720	Emergency Diesel Generator 2 Monthly Test,DB-SC-03071	09/17/09
200284072	SFRCS ACH 1 SG LVL Funct FA NORM, 83C-ISLSP9A6	10/01/09
200285663	EDG 2 Monthly Test FA Norm, DB-SC-03071	10/15/09
200294176	EDG 2 184 Day Test FA Norm, DB-SC-03077	01/17/08
20029890	Fuel Transfer Tube Mech Pent	01/23/08
98-000415-000	Fuel Transfer Tube Mech Pent	05/04/00
98-000416-000	Fuel Transfer Tube Mech Pent	04/06/00
DB-PF-03075	CCW Pump 3 Comprehensive Test	06/23/06
DB-PF-03082	HPI Pump Baseline Test	04/03/06
DB-PF-03202	EDG Fuel Oil Storage Tank Transfer Pump 2 Flow Test	10/16/08
DB-PF-03207	HPI Pump Comprehensive and Check Valve Forward Flow Test Train 1	03/21/06
DB-PF-04736	ECCS Room Cooler Monitoring Test	09/25/09
DB-PF-05005	Air Balancing/Testing of ECCS Room Cooler Fan/AHU	10/21/03
DB-SP-03218	HPI Train 1 Pump Surveillance	08/04/09
DB-SP-10018	CCW Loop 1 ESFAS Level 3 and Level 4 Flow Verification	05/02/03
DB-SP-10019	CCW Loop 2 ESFAS Level 3 and Level 4 Flow Verification	09/12/03
DB-SS-03091	MDFP Quarterly Surveillance	09/17/09
PM-5955	Inspect/Clean HBC-43 Line from SW Header Train 1 to SW-6391	01/25/08
PM-6905	Test Vacuum Breaker BW2762 Setpoint	07/24/09
PM-7987	Inspect/Clean/Lube SW-6391	09/26/08

WORK DOCUMENTS

Number	**Description or Title**	**Date or Revision**
00-000958-000	PM for breaker BF210	04/17/00
00-000963-006	PM for breaker BF115	04/17/00
03-000173-000	PM Clean, Inspect and Adjust (as required) MCC Components.	02/11/03

WORK DOCUMENTS

Number	**Description or Title**	**Date or Revision**
200001289	Electrical relay Data Package 50GS	02/27/04
200003820	Electrical relay Data Package 50/51-A, B, C	06/19/03
200007140	DB-ME-09104, 13.8 KV and 4.16 KV Westinghouse DHP Breakers Maintenance, Breaker AD210	10/15/04
200009241	XFER CD9 S.W. Pump 1-3 MP-033	08/11/04
200031947	Electrical relay Data Package 27/ E1	09/07/04
200053504	Electrical Relay Data Pack 50/51, Breaker AC108	10/28/03
200055963	480VAC Substations	05/26/05
200056899	HP INJ PMP 1-2 MP 582	06/11/04
200056966	PM 4817 AD101 *CAL Relays* EDG #2	07/06/04
200063919	DB-ME-09104, 13.8 KV and 4.16 KV Westinghouse DHP Breakers Maintenance	11/24/04
200065078	Electrical Relay Data Package 50/51, AD108	10/28/03
200077923	PM 6007 K5-2 & C3616 *CAL* Prot RLY/INS	10/20/04
200093576	Spare Breaker for Maintenance	07/19/04
200096485	PM 5668 BF1132 & BF 1149 “test” MCC Breakers	08/23/05
200098118	Preventive Maintenance for breaker AC1CE11	04/25/05
200118575	E1 Normal Feeder from C1 VIA Transformer	03/31/06
200125637	PM 6007 K5-2 & C3616 *CAL* Prot RLY/INS	01/16/06
200125751	Electrical Relay Data Pack 50/51, Breaker AC108	04/18/07
200125964	PM 4817 AD101 *CAL Relays* EDG #2	08/25/05
200154815	Electrical Relay Data Pack 50/51-A, B, C	10/30/06
200163510	PM 6007 K5-2 & C3616 *CAL* Prot RLY/INS	03/05/07
200175831	EDG 2 Overspeed Trip Test FA NORM	02/28/07
200197727	Electrical Relay Data Pack 50GS, AC108	03/26/07
200199850	PM 4817 AD101 *CAL Relays* EDG #2	04/16/07
200223034	PM 6007 K5-2 & C3616 *CAL* Prot RLY/INS	10/20/08
200224033	PM 6007 K5-2 & C3616 *CAL* Prot RLY/INS	04/16/08
200224497	PM 4817 AD101 *CAL Relays* EDG #2	09/05/08
200235671	EDG 2 Overspeed Trip Test FA NORM	10/15/08
200242764	Electrical Relay Data Pack 27N, AD101	11/05/08
200242765	Electrical Relay Data Pack 27N, AD103	11/07/08
200244795	Electrical Relay Data Pack 27N, AD103	11/03/08
200282722	Electrical Relay Data Pack 27N, AD103	09/11/09
200284119	Electrical Relay Data Pack 27N, AC101	05/13/09
200285692	Electrical Relay Data Pack 27N, AD101	10/15/09
200368633	Electrical relay Data Package 27N, AD103	05/07/09
200368636	Electrical Relay Data Pack 27N, AD103	05/01/09
200380506	Electrical Relay Data Pack 27N, AD103	08/10/09
3-90-2303-01	MCC F11A clean, inspect, and adjust (as required).	03/17/90

WORK DOCUMENTS

Number	**Description or Title**	**Date or Revision**
3-97-5228-01	Electrical relay Data Package 27/ E1	06/15/98
86-086 Sup. 5	Drawing Change Only 7749-M-519-50-9	04/2/86
ECN 08-0417-001	Fuel Transfer Tube Blind Flanges	09/11/08
ERR 60-0003-07	Existing Blind Flange Gasket Material For Fuel Transfer Tube (P23*CB) is Flexitalic Vendor is Upgrading this Material to EPDM	11/15/99
LA 240	Davis-Besse Nuclear Power Station, Unit 1 - Issuance of Amendment (TAC NO. MA6093)	03/28/00
LAR 95-0017	Request Implementation Of Performance-Oriented And Risk-Based Approach To Containment Leakage Testing	12/12/95
MWO 1747	Fuel Transfer Tube Blind Flanges	09/27/76
ORQ-SIM-S190	2009 CDBI Scenarios	08
S.O. 09-0015	Standing Order; Interim Guidance for Emergency Diesel week tank issues during an on site Tornado Event.	00
Serial Number 2572	License Amendment Application to Revise Technical Specifications for Implementation of 10 CFR Part 50, Appendix J	07/26/99
Serial Number 2629	Supplemental Information for License Amendment Application to Revise Technical Specifications for Implementation of 10 CFR Part 50, Appendix J	12/07/99
UCN 00-014	Standardize the Terminology of “O-ring” and “Gasket”	02/24/00
UCN 99-037	Adopt 10CFR50 Appendix A “Option B” for type B & C Testing	09/14/99
UCN 99-037	RAI from Serial 2572	
WO 98-000415	P23*CB Fuel Transfer Tube Mech Pent	04/07/00

LIST OF ACRONYMS USED

°	Degrees
%	Percent
AC	Alternating Current
AOP	Abnormal Operating Procedure
ASME	American Society of Mechanical Engineers
BHP	Brake Horsepower
BWST	Borated Water Storage Tank
CCW	Component Cooling Water
CDBI	Component Design Bases Inspection
CDF	Core Damage Frequency
CR	Condition Report
DC	Direct Current
DHR	Decay Heat Removal
DRS	Division of Reactor Safety
ECCS	Emergency Core Cooling System
ECN	Engineering Change Notice
EDG	Emergency Diesel Generator
EPRI	Electric Power Research Institute
EOP	Emergency Operating Procedure
ERR	Equivalent Replacement Review
FENOC	FirstEnergy Nuclear Operating Company
FSAR	Final Safety Analysis Report
GL	Generic Letter
HEP	Human Error Probability
IEEE	Institute of Electrical & Electronic Engineers
IMC	Inspection Manual Chapter
IN	Information Notice
IR	Inspection Report
ISLOCA	Interfacing System Loss of Coolant Accident
IST	Inservice Testing
kVA	Kilovoltamperes
kW	Kilowatts
LERF	Large Early Release Frequency
LOCA	Loss of Coolant Accident
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NPSH	Net Positive Suction Head
NRC	U.S. Nuclear Regulatory Commission
NRR	Office Nuclear Reactor Regulation
PARS	Publicly Available Records
PRA	Probabilistic Risk Assessment
PI&R	Problem Identification and Resolution
PSF	Performance Shaping Factor
RIS	Regulatory Information Summary
RO	Reactor Operator
SDP	Significance Determination Process
SFRCS	Steam and Feed Rupture Control System
SG	Steam Generator
SPAR	Standardized Plant Analysis Risk

SRA	Senior Reactor Analyst
SSC	Systems, Structures, and Components
TORMIS	Tornado Missile Risk Evaluation Methodology
TS	Technical Specification
UCN	Updated Safety Analysis Report Change Notice
USAR	Updated Safety Analysis Report
URI	Unresolved Item
WIP	Work In Progress
WO	Work Order

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Sincerely,

/RA/
Anne T. Boland, Director
Division of Reactor Safety

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Letter to Barry Allen from Anne T. Boland dated February 19, 2010.

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION COMPONENT DESIGN BASES INSPECTION (CDBI), INSPECTION REPORT 5000346/2009007

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