UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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NOV 0 2 2009

Joseph Kowalewski, Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC PLANT, UNIT 3 - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000382/2009009

Dear Mr. Kowalewski:

On September 18, 2009, the US Nuclear Regulatory Commission (NRC) completed a component design bases inspection at your Waterford Steam Electric Plant, Unit 3. The enclosed report documents our inspection findings. On September 18, 2009, an exit meeting was conducted with you 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 team reviewed selected procedures and records, observed activities, and interviewed cognizant plant personnel.

Based on the results of this inspection, the NRC has identified six findings that were evaluated under the risk significance determination process. Violations were associated with five of the six findings. The six findings were found to have very low safety significance (Green) and the violations associated with these findings are being treated as noncited violations, consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any of the noncited violations, or the significance of the violations you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the US Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, US Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Waterford Steam Electric Plant, Unit 3. 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 IV, and the NRC Resident Inspector at the Waterford Steam Electric Plant, Unit 3. The information you provide will be considered in accordance with Inspection Manual Chapter 0305. In accordance with Code of Federal Regulations, Title 10, Part 2.390 of the NRC's

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

Sincerely,

Ray Kellar, P.E., Chief
Engineering Branch 1
Division of Reactor Safety

Dockets: 50-382
License: NPF-38

Enclosure:
Inspection Report 05000382/2009009
w/Attachments: 1 - Supplemental Information

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ENCLOSURE
U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	50-382
License:	NPF-38
Report Nos.:	05000382/2009009
Licensee:	Entergy South
Facility:	Waterford Steam Electric Plant, Unit 3
Location:	Hwy. 18 Killona, Louisiana
Dates:	August 24-28, 2009 and September 8-18, 2009
Team Leader:	Ronald A. Kopriva, Senior Reactor Inspector, Engineering Branch 1
Inspectors:	J. Adams, Ph.D., Reactor Inspector, Engineering Branch 1 K. Clayton, Senior Operations Engineer, Operations Branch B. Correll, Reactor Inspector, Engineering Branch 2
Accompanying Personnel:	J. Chiloyan, Electrical Contractor M. Yeminy, Mechanical Contractor
Others:	M. Runyan, Senior Reactor Analyst
Approved By:	Ray Kellar, P.E., Chief Engineering Branch 1 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000382/2009009; August 24-28 and September 8-18, 2009; Waterford Steam Electric Plant, Unit 3: baseline inspection, NRC Inspection Procedure 71111.21, "Component Design Basis Inspection."

The report covers an announced inspection by a team of four regional inspectors, and two contractors. Six findings were identified. All of the findings were of very low safety significance. The final significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process." Findings for which the significance determination process 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 Findings

Cornerstone: Mitigating Systems

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee did not account for reduction of flow from the emergency feedwater system when analyzing the flow rate to the steam generators and establishing the acceptance criteria for the performance of the motor-driven emergency feedwater pumps. The factors associated with the loss of flow included the emergency diesel generator under-frequency of 0.3 Hertz allowed by technical specifications, and not accounting for accepted reverse flow (back leakage) of 25 gpm through the turbine-driven discharge check valve. The pumps had a documented analyzed margin of 55 gpm. The margin was reduced by 24 gpm due to allowed diesel under-frequency. Another reduction was attributed to the accepted reverse flow (back leakage) of 25 gpm through the turbine-driven discharge check valve. This left the combined margin of both emergency feedwater motor-driven pumps at 6 gpm. The licensee entered this issue into the corrective action program as Condition Reports CR-WF3-2009-04731, CR-WF3-2009-04528, and CR-WF3-2009-05043, and performed an operability assessment for each of these factors.

  This finding is more than minor because it affected the mitigating systems cornerstone attribute of design control to ensure the availability, reliability, and capability of safety systems that respond to initiating events to prevent undesirable consequences. This finding closely parallels Inspection Manual Chapter 0612, Appendix E, Example 3.j, "Not Minor: If the engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component, or if significant programmatic deficiencies were identified with the issue that could lead to worse errors if uncorrected." This finding is of very low

safety significance (Green) because it was not a design issue resulting in loss of function, did not represent an actual loss of a system safety function, did not result in exceeding the Technical Specification allowed outage time, and did not affect external event mitigation. Some margin in total flow still remained to compensate for the reduced pump performance if operated at the reduced-frequency. The inspectors determined that the finding has a cross cutting aspect in the area of Problem Identification and Resolution, associated with Operating Experience. The licensee had received NRC Information Notice 2008-02, which specifically identified the diesel under-frequency as a potential problem for ac motor-operated pumps, and test acceptance criteria concerns which would have ensured the capability of the equipment to perform its function under the most limiting conditions. The licensee failed to identify the applicability of these potential problems to the emergency feedwater motor-operated pumps and take proper actions [P.2(a).] (Section 1R21.b.1.1).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," with three examples.

  Example 1: The licensee did not use the correct size emergency feedwater system suction piping in calculation MNQ10-12 "Net Positive Suction Head Available for Emergency Feedwater Pumps." The motor-driven pump suction piping is 4 inches in diameter but the licensee nonconservatively used 6-inch piping in the calculations. The licensee has entered this issue into their corrective action program as Condition Report CR-WF3-2009-04729 and performed an operability assessment for the issue.

  Example 2: Calculation ECM91-001, Revision 3, "Emergency Diesel Generator Fuel Oil Transfer Pump Recirculation and Discharge Flow," arbitrarily assumed that the suction strainer of the fuel oil transfer pump would only be 10 percent clogged. The licensee could not justify the 10 percent clogging assumption or find any justification for selecting the 10 percent value. Also, there is no discussion or any physical comparison to ensure that the mesh of the installed "Leslie" strainer was the same as that of the "Hayward" strainer identified in an attachment to the calculation. The licensee has entered this issue into their corrective action program as Condition Report CR-W3-2009-04812 and performed an operability assessment for the issue.

  Example 3: Calculation EC-I01-003, Revision 0, "IST Instrumentation Uncertainties," determines the adequacy of permanent plant instrumentation for inservice testing use. The calculation determined that some specific instruments shall not be used for inservice testing applications. Contrary to the calculation requirements, procedure OP-903-014, used for the inservice testing comprehensive test of the emergency feedwater pumps, specified that the forbidden flow instruments shall be used for verification of emergency feedwater system flow rate. The licensee has entered this issue into their corrective action

program as Condition Report CR-W3-2009-04811. These findings are more than minor because they affected the mitigating systems cornerstone attribute of design control to ensure the availability, reliability, and capability of safety systems that respond to initiating events. Also, using Inspection Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix B, Section 1-3, "Screen for More than Minor – ROP," question 2, the finding is more than minor because if left uncorrected, the performance deficiencies would have the potential to lead to more significant safety concerns. Using Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, the finding was determined to have very low safety significance (Green) because it was not a design issue resulting in loss of function, did not represent an actual loss of a system safety function, did not result in exceeding the Technical Specification allowed outage time, and did not affect external event mitigation.

The inspectors determined that the finding has a crosscutting aspect in the area of Problem Identification and Resolution, Self and Independent Assessment. The licensee conducted a Waterford 3 Component Design Basis Assessment, April 20-23, 2009, that included the emergency feedwater turbine-driven pump and the emergency diesel generator fuel oil transfer pump in the "Scope of Components to be Reviewed During CDBI Assessment," and failed to identify any of these three issues [P.3.(a).] (Section 1R21.b.1.6).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" pertaining to the emergency diesel generator fuel oil transfer pump. Criterion V states, in part, "activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings." Specifically, the licensee did not have operating procedures for accomplishing the transfer of fuel oil from one storage tank to the opposite train feed tank (day tank) using the opposite train fuel oil transfer pump, as designated in the USAR Table 9.5-2, "Failure Mode and Effects Analysis." Also, License Amendment Number 157 (TAC Number MA4940) was granted, in part, for having the capability to transfer fuel oil from one storage tank to the opposite train feed tank using the opposite transfer pump. The licensee specified this capability as part of the justification for having an insufficiently sized fuel oil storage tank. Moreover, the Safety Evaluation Report associated with License Amendment Number 157 specifically referred to this capability at Waterford 3, and specified that procedures were available for accomplishing the transfer of fuel oil. The licensee has entered this finding in their corrective action program as Condition Report CR-WF3-2009-04950, and performed an operability assessment for the issue.

  This finding is more than minor because it affected the mitigating systems cornerstone attribute of equipment performance to ensure the availability, reliability, and capability of safety systems that respond to initiating events. Also,

using Inspection Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix B, Section 1-3, "Screen for More than Minor – ROP," question 2, the finding is more than minor because if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. Using Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, the finding was determined to have very low safety significance (Green) because the failure to have an operating procedure did not result in loss of function, did not represent an actual loss of a system safety function, did not result in exceeding a technical specification allowed outage time, and did not affect external event mitigation. This finding was reviewed for crosscutting aspects and none were identified (Section 1R21.b.1.7).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Specifically, the licensee failed to analyze the effects of the acceptable back leakage of 25 gpm from the emergency feedwater pump discharge check valves on the integrity of the emergency feedwater pumps and the integrity of its suction piping. The acceptable back leakage could possibly cause the pump to reverse rotate, and provide a path for high pressure fluid to go through the pump and pressurize low pressure suction piping. The licensee has entered this item in their corrective action program as Condition Report CR-WF3-2009-04528 and performed an operability assessment for this issue.

  This finding is more than minor because it affected the mitigating systems cornerstone attribute of design control to ensure the availability, reliability, and capability of safety systems that respond to initiating events. This finding closely parallels Inspection Manual Chapter 0612, Appendix E, Example 3.j, "Not Minor: If the engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component, or if significant programmatic deficiencies were identified with the issue that could lead to worse errors if uncorrected." This finding was determined to be of very low safety significance (Green) because this design issue did not result in loss of function, did not represent an actual loss of a system safety function, did not result in exceeding the Technical Specification allowed outage time, and did not affect external event mitigation.

  The inspectors determined that the finding has a crosscutting aspect in the area of Problem Identification and Resolution, Self and Independent Assessment. The licensee conducted a Waterford 3 Component Design Basis Assessment, on April 20-23, 2009, that included the emergency feedwater AB turbine-driven pump in the "Scope of Components to be Reviewed During CDBI Assessment", and failed to identify the impact of reverse flow on the integrity of the pump and its suction piping [P.3.(a)] (Section 1R21.b.1.8).

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control." The calculation EE2-14-3 "Diesel Generator

Overcurrent Protection," Revision 1, does not document sufficient design bases for the setting of the IGCV-51 overcurrent with voltage control relays for the emergency diesel generators. Specifically, the licensee failed to perform an adequate evaluation of new setpoint values identified in Engineering Report ER-W3-99-0174-00-00, which provided the bases for relay tap setpoint changes for emergency diesel generator overcurrent protection while the diesel was in test mode. The primary purpose of the IGCV-51V relays was to protect the emergency diesel generator against external faults and prevent the output breaker from closing following a breaker trip associated with a fault. If the faulted bus had been isolated by the operation of the under-voltage relays instead of the IGCV-51 relays, the emergency diesel generator output breaker would be allowed to electrically reclose onto this faulted bus and potentially damage the emergency diesel generator and the associated switchgear. The issue has been entered into the licensee's corrective action program as Condition Report CR-WF3-2009-04780.

The failure to have sufficient design bases for the emergency diesel generator overcurrent protection IGCV-51V relays without an adequate verification of the setpoint modification for the IGCV-51V relay, Voltage Controlled, Time-Overcurrent Relay, for emergency diesel generator overcurrent protection while the diesel was in test mode, was a performance deficiency. Specifically, failure to verify the adequacy of a design modification for the IGCV-51V relay could result in reduced reliability of the emergency diesel generators. The finding was determined to be greater than minor because it affected the mitigating systems cornerstone attribute of design control to ensure the availability, reliability, and capability of safety systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609.04, the finding was determined to have a very low safety significance (Green) because the failure did not result in loss of operability or functionality and because the finding did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding was reviewed for crosscutting aspects and none were identified (Section 1R21.b.1.12).

Cornerstone: Initiating Events

- Green. The team identified a finding for failure to translate design basis criteria into a design basis document for the start-up transformer '3A' 51G relay to support the settings listed in Calculation EC-E90-012, "Protective Relays Settings for Main Generator and Transformers," Revision 1. Without the design basis criteria for the 51G relay, the setpoint values could not be established. Specifically, the team determined that the relay settings listed in Calculation EC-E90-012 had not been effectively implemented since the required current transformer ratio of 600/5, upon which the settings were based, was never installed. The issue has been entered into the licensee's corrective action program as Condition Report CR-WF3-2009-04813.

This finding was more than minor because the failure to provide adequate relay setting coordination could result in an unnecessary separation of the safety buses from the electrical grid and an ensuing plant transient (initiating event). The team noted that this finding also applies to 51G relay in the 'B' train which could challenge the single failure criterion. The team determined this finding was of very low safety significance (Green) because the issue would not prevent the safety buses from being reenergized by the emergency diesel generators. Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. This finding was reviewed for crosscutting aspects and none were identified (Section 1R21.b.1.10).

B. Licensee-Identified Violations.

None.

REPORT DETAILS

1 REACTOR SAFETY

Inspection of component design bases verifies the initial design and subsequent modifications and provides monitoring of the capability of the selected components and operator actions to perform their design bases functions. As plants age, their design bases may be difficult to determine and important design features may be altered or disabled during modifications. The plant risk assessment 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.

1R21 Component Design Bases Inspection (71111.21)

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than two or a Birnbaum value greater than 1E-6.

a. Inspection Scope

To verify that the selected components would function as required, the team reviewed design basis assumptions, calculations, and procedures. In some instances, the team performed calculations to independently verify the licensee's conclusions. The team also verified that the condition of the components was consistent with the design bases and that the tested capabilities met the required criteria.

The team reviewed maintenance work records, corrective action documents, and industry operating experience records to verify that licensee personnel considered degraded conditions and their impact on the components. For the review of operator actions, the team observed operators during simulator scenarios, as well as during simulated actions in the plant.

The team 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 issues, margin reductions because of modifications, and margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results; significant corrective actions; repeated maintenance; 10 CFR 50.65(a)1 status; operable, but degraded, conditions; NRC resident inspector input of problem equipment; system health

reports; industry operating experience; and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in-depth margins.

The inspection procedure requires a review of 20 - 30 risk-significant and low design margin components, 3 to 5 relatively high-risk operator actions, and 4 to 6 operating experience issues. The sample selection for this inspection was 18 components, 5 operator actions, and 7 operating experience items.

.1.0 Results of Detailed Reviews for Components

.1.1 Emergency Feedwater System Pump 'A':

a. Inspection Scope:

The team reviewed the safety function, modifications, safety analysis, system drawings, specification, test data, system health, as well as operating and surveillance procedures. The team reviewed the pump vendor manual and related vendor correspondence, pump drawings, and the UFSAR to identify design, maintenance, and operational requirements related to pump flow rate, developed head, achieved system flow, net positive suction head (NPSH), vortex formation and prevention, minimum flow requirements, and runout protection. These requirements were reviewed for pump operation with the source of water originating from the Condensate Storage Pool. Design calculations as well as documentation of periodic surveillance tests, were reviewed to verify that design performance requirements were met. The team also performed alternate calculations to assess the adequacy of calculations assessing vortex limits and magnitude of air ingestion. Maintenance, in-service testing, corrective actions, and design change histories were reviewed to assess the potential for component degradation and resulting impact on design margins and performance. The team also evaluated the adequacy of the suction piping of the pump with respect to its low design pressure of 50 psig, and its vulnerability to back flow due to check valve leakage or due to a stuck open check valve.

In addition, the team walked down portions of the emergency feedwater system to verify that the installed configuration was consistent with design basis information and visually inspected the material condition of the pumps.

The team concentrated its efforts on the pump's capability of performing its safety function, i.e., delivering the required flow rate to the steam generators at the prescribed design pressure. The team has analyzed the cumulative impact of this inspection's findings on available pump margin as follows:

- The pump had a documented analyzed margin of 55 gpm.

- The margin was reduced by 24 gpm due to the finding where the licensee did not account for allowed diesel under-frequency
- A reduction of 25 gpm is attributed to the finding where the licensee did not account for the turbine driven discharge check valve acceptance criterion of 25 gpm reverse flow (back leakage) measured in the pump recirculation line
- This left the combined margin of both emergency feedwater motor-driven pumps at 6 gpm (55-24-25=6)
- The licensee's process to test the back leakage through the turbine-driven pump check valve did not account for all potential back leakage

The licensee quantified back leakage through the check valve based on a flow meter installed on the pump's recirculation line. However, some of the back flow will be reverse directed through the idle turbine-driven pump and its suction line reducing flow to the steam generators.

b. Findings:

Introduction. A noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified for failure to account for reduction of flow from the emergency feedwater system to the steam generators. Specifically, the licensee failed to account for significant flow differences from the emergency feedwater system which would be diverted from reaching the steam generators from the following sources: (1) emergency diesel generator under-frequency, (2) 25 gpm acceptance criterion for back leakage through the turbine driven discharge check valve and the pump recirculation line, and (3) not analyzing (quantifying) the reverse flow through an idle turbine-driven emergency feedwater pump and its suction piping while testing the back leakage of the turbine-driven pump's discharge check valve.

Description. The licensee failed to consider the effects of operating the motor-driven emergency feedwater pumps during loss of offsite power when the emergency diesel generators supply the electrical power to each motor-driven pump. Technical Specification 4.8.1.1.2 allows the range of frequency of AC power provided by the emergency diesel generators to be as low as 59.7 Hz, a reduction of 0.5 percent from 60 Hz. This reduction in frequency would result in a 0.5 percent reduction in flow rate and 1 percent reduction in discharge pressure. The combined loss of pressure and flow rate will result in a loss of 24 gpm to the steam generators. This reduction in flow was not accounted for in the analyses of flow rate to the steam generators nor was it accounted for in establishing acceptance criteria for pump performance. This scenario only affects the motor-driven pumps because of their sensitivity to emergency diesel generator frequency. Prior to the inspection, the pump had a narrow analyzed flow rate margin of 55 gpm (analyzed 630 gpm vs. required 575 gpm). As a result of this failure, the margin was reduced to 31 gpm (55-24=31).

The discharge check valve of the turbine-driven emergency feedwater pump has an acceptance criterion of 25 gpm back leakage. When the turbine-driven pump is idle and the two motor-driven pumps are supplying 100 percent of the required flow rate to the steam generators, this 25 gpm will be diverted from reaching the steam generators. But this flow diversion is not accounted for in the analysis of the flow rate to the steam generators, nor in establishing the acceptance criterion for the emergency feedwater motor-driven pumps flow rate. Prior to the inspection, the pumps had a narrow flow rate margin of 55 gpm. During the inspection, the margin was reduced to 31 gpm due to diesel under-frequency. As a result of the failure to account for the back leakage through the turbine-driven pump check valve, the margin was reduced an additional 25 gpm, leaving only 6 gpm of margin.

According to the test line up, some of the back leakage through the discharge check valve of the turbine-driven emergency feedwater pump will be flowing through the pump's recirculation line and the remaining flow will be back flowing through the pump and its suction line. The back flow through the pump and its suction line is not accounted for as flow diversion from the steam generators nor is it accounted for in establishing the acceptance criteria for the motor-driven emergency feedwater pumps flow rate. This will result in an additional reduction of margin, but the amount of this diverted flow rate was not quantified by the inspection team due to unknown pump clearances, number of stages, and the size of the flow restrictor located on the pump's recirculation line. The licensee contacted the pump manufacturer who stated that a back flow rate of 25 gpm through the turbine-driven pump could overcome its inertia and static friction, and could reverse rotate the pump. If the pump starts reverse rotating, the back flow rate through it will be significantly increased. The check valve test does not require the operators to note whether the pump is reverse rotating.

This finding would also affect the discharge check valve of each of the motor-driven pumps that were not analyzed for an accepted back leakage of 15 gpm each, with a combined diversion of 30 gpm from the steam generators. This condition may occur when the motor-driven pumps are idle and the turbine-driven pump supplies 100 percent of the required flow rate to the steam generators. The licensee contacted the pump manufacturer who stated that a back flow rate of 15 gpm through a motor-driven pump will not overcome the pump's inertia and static friction, and therefore is not expected to reverse rotate either of the two motor-driven pumps.

Analysis. The team determined that this finding was more than minor because it affected the mitigating systems cornerstone attribute of design control to ensure the availability, reliability, and capability of safety systems that respond to initiating events to prevent undesirable consequences. This finding closely parallels Inspection Manual Chapter 0612, Appendix E, Example 3.j, "Not Minor: If the

engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component, or if significant programmatic deficiencies were identified with the issue that could lead to worse errors if uncorrected." This finding is of very low safety significance because, although the acceptance criteria established for the emergency feedwater pumps were not conservative with respect to the safety analyses, recent test results show that sufficient margin exists to compensate for the reduced flow to the steam generators due to diesel under-frequency and due to two unanalyzed/unquantified flow paths.

The inspectors determined that the finding had a cross cutting aspect in the area of Problem Identification and Resolution, associated with Operating Experience. The licensee had received NRC Information Notice 2008-02, which specifically identified the diesel under-frequency as a potential problem for ac motor-operated pumps, and test acceptance criteria concerns which would have ensured the capability of the equipment to perform its function under the most limiting conditions. The licensee failed to identify the applicability of these potential problems to the emergency feedwater motor-operated pumps and take proper actions [P.2(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states in part, that "Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions." Contrary to the above: 1) The flow rate and pressure acceptance criteria for the emergency feedwater motor-driven pumps were not properly analyzed because the effects of emergency diesel generator under-frequency on pump flow rate and discharge pressure were not accounted for; 2) The design basis was not correctly translated into the emergency feedwater test procedure, allowing 25 gpm reverse flow through the pump discharge check valve and its recirculation line without analyzing its effect on the remaining flow rate to the steam generators; 3) The design basis was not correctly translated into the emergency feedwater test procedure, establishing a valve line up that allows additional un-quantified diversion of flow from the steam generators through the turbine-driven pump and its suction piping.

The finding is of very low safety significance (Green) and has been entered into the licensee's corrective action program as Condition Reports CR-WF3-2009-04731, for diesel under-frequency, CR-WF3-2009-04528, for the unanalyzed 25 gpm diverted away from the steam generators through the pump recirculation line, and CR-WF3-2009-05043, for the additional flow diverted from the steam generators through the pump and its suction piping. The licensee performed an operability assessment for all three issues. This violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy:

NCV 050382/2009009-01 "Failure to Account for Reduction of Flow from the Emergency Feedwater System to the Steam Generators."

.1.2 High Pressure Safety Injection Pump 'A' (SI-MPMP-0002A):

a. Inspection Scope:

The team reviewed safety function, design basis, modifications, calculations, in-service testing data, system health notebook, and procedures. Specifically, the team verified that this pump has sufficient margin in flow and generated head to fulfill its safety function. The team verified that the pump would have a safety-related source of power and that the net positive suction head would be sufficient to prevent cavitation or air entrainment under worst-case accident conditions.

b. Findings:
No findings of significance were identified.

.1.3 Low Pressure Safety Injection Pump 'A' (SI-MPMP-0001A):

a. Inspection Scope:

The team reviewed safety function, design basis, modifications, calculations, in-service testing data, system health notebook, and procedures. Specifically, the team verified that this pump has sufficient margin in flow and generated head to fulfill its safety function. The team verified that the pump would have a safety-related source of power and that the net positive suction head would be sufficient to prevent cavitation or air entrainment under worst-case accident conditions.

b. Findings:

No findings of significance were identified.

.1.4 Refueling Water Storage Pool (SI-MPOL-0001):

a. Inspection Scope:

The team reviewed safety function, design basis, calculations, system health notebook, and procedures. Specifically, the team verified that the pool will have adequate inventory to ensure it will fulfill its safety function while providing sufficient net positive suction head to the Containment Spray, High Pressure Safety Injection and Low Pressure Safety Injection pumps to prevent cavitation and air ingestion. The team also verified that the raw water storage pool instrumentation will meet its design purpose.

b. Findings:

No findings of significance were identified.

.1.5 Component Cooling Water Heat Exchanger 'A':

a. Inspection Scope:

The team reviewed the design basis heat load sizing analysis for this heat exchanger to verify its capability to meet design basis heat removal requirements. Test procedures and test results were reviewed as well as engineering analysis of the test results including projection of the test results to design basis conditions. The team evaluated the accuracy of test results, impact of instrument calibration, instrument uncertainties, tube plugging, water temperature (tube and shell sides), and fouling factor. The heat exchanger design documentation, including specifications, data sheets, and applicable design calculations were reviewed for agreement with the design basis, safety analysis, and testing requirements. Vendor manual requirements were reviewed for agreement with operating and maintenance procedures and records. The team reviewed the current system health report, trend data, inspection frequency, applicable operating experience, as well as significant corrective action documents and their impact on design basis margin.

b. Findings:

No findings of significance were identified.

.1.6 Emergency Feedwater Pump Suction Piping, Emergency Diesel Generator Fuel Oil Transfer Pump Strainer, and Emergency Feedwater System Flow Instruments:

a. Inspection Scope:

The team reviewed the hydraulic analysis of the emergency feedwater pumps and the fuel oil transfer pumps. The review consisted of calculations, system diagrams, isometric drawings, equipment specifications, vendor manuals, and applicable UFSAR sections. The team reviewed whether the hydraulic calculations used the correct data from engineering and component related documents, whether the data was applied correctly in the analysis, and whether instrument uncertainties were accounted for. The team also reviewed whether assumptions were properly documented, explained, justified, or confirmed, and whether the engineering calculations were correctly translated into procedures and limits of operation.

b. Findings:

Introduction. The team identified a noncited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," with three examples. The licensee failed to: (1) use the actual size of emergency feedwater pump suction pipe in the calculation of pump net positive suction head, (2) improper assumption of strainer clogging with no justification of the assumption, and (3) translate design requirements for flow instruments into test procedures.

Description. The team identified three examples of failed design control measures as follows:

Example 1: Incorrect size emergency feedwater system suction piping in calculation MNQ10-12 "Net Positive Suction Head Available for Emergency Feedwater Pumps"

The licensee did not use the correct size emergency feedwater system suction piping in calculation MNQ10-12, "Net Positive Suction Head Available for Emergency Feedwater Pumps." The motor-driven pump suction piping is 4 inches nominal diameter, but the calculation nonconservatively used 6 inches. The use of a 6-inch pipe diameter resulted in an incorrect assumption. The assumption was written as follows: "The motor-driven emergency feedwater pumps are assumed to have the same net positive suction head available as the turbine-driven pump for purposes of this calculation." This is conservative because the pipe run from the condensate storage pool to the motor-driven pump suctions is shorter and has fewer fittings than the pipe run to the turbine-drive pump suction. Therefore, the net positive suction head available at the motor-driven pump suction will always be greater than that at the turbine-driven pump suction." The assumption failed to consider the significantly smaller pipe size used in the motor-driven pumps suction lines. When the team pointed out the error, the licensee recalculated the net positive suction head available to the motor-driven pumps and concluded that the net positive suction head available to them with the correct 4-inch pipe is 22.5 feet. This negates the original assumption because the net positive suction head available to the turbine-driven pump, which is 27.91 feet, would now be greater than the motor-driven pumps. The team noted that the new value of 22.5 feet net positive suction head available to the motor-driven pumps is still greater than the 20.0 feet net positive suction head required for system operation.

Example 2: Arbitrary assumption that the Emergency Diesel Generator fuel oil tank suction strainer for the Fuel Oil Transfer Pump would only be 10 percent clogged

Design Basis calculation ECM91-001, Revision 3, "Emergency Diesel Generator Fuel Oil Transfer Pump Recirculation and Discharge Flow" arbitrarily assumes that the suction strainer of the fuel oil transfer pump will only have a 10 percent

reduction in area (i.e. 10 percent clogging). There was neither discussion nor justification supporting this value. The strainer's inspection and cleaning frequency is only once every ten years. The engineering staff could not justify the 10 percent clogging assumption or find any reason why this value was acceptable. Also, there was no discussion, inspection, or any physical comparison made to ensure that the mesh of the installed "Leslie" strainer was the same size as the mesh of the "Hayward" strainer which the calculation identified as "similar" to the Leslie strainer. The purity of the fuel oil and the mesh size of the strainer are governing factors in determining the accumulation of debris and percentage of clogging as a function of time.

Example 3: Data acquisition of emergency feedwater flow rates taken with instruments forbidden by the calculation EC-I01-003, Revision 0, "IST Instrumentation Uncertainties"

Calculation EC-I01-003, Revision 0, "IST Instrumentation Uncertainties" determined the adequacy of permanent plant instrumentation for use during inservice testing. In Table 2-1, the calculation identified flow instruments EFW-IFI8330-A2 and EFW-IFI8330-B2 and stated that "There is no indicated value on the flow indicator range that will meet inservice testing accuracy requirements." Contrary to that statement, procedure OP-903-014, Rev 011, specified that emergency feedwater flow rates are to be taken using instruments forbidden by the calculation, namely, EFW-IFI-8330-A2 and EFW-IFI-8330-B2.

Analysis. The team determined that the three examples of this finding were greater than minor because they affected the mitigating systems cornerstone attribute of design control to ensure the availability, reliability, and capability of safety systems that respond to initiating events. Also, using Inspection Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix B, Section 1-3, "Screen for More than Minor – ROP," question 2, the three examples of this finding are more than minor because if left uncorrected, the performance deficiencies would have the potential to lead to a more significant safety concern. Using Inspection Manual Chapter 0609, "Significance Determination Process," these examples of this finding were determined to have very low safety significance (Green) because they were not a design issue resulting in loss of function, did not represent an actual loss of a system safety function, did not result in exceeding the Technical Specification allowed outage time, and did not affect external event mitigation. The inspectors determined that the three examples of this finding had a crosscutting aspect in the area in the area of Problem Identification and Resolution, Self and Independent Assessment. The licensee conducted a Waterford 3 Component Design Basis Assessment on April 20-23, 2009, that included the emergency feedwater turbine-driven pump and the emergency diesel generator fuel oil transfer pump in the "Scope of Components to be Reviewed During CDBI Assessment", and failed to identify any of these examples [P.3.(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states in part, that "Measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Contrary to the above, (1) the design basis drawing showing a 4 inch suction pipe was not correctly translated into the net positive suction head calculation for the emergency feedwater pumps, (2) the strainer design was not properly used (unsupported assumption) in the fuel oil transfer hydraulic calculation, and (3) the design calculation requirement for not using certain flow indicators was not properly translated into the inservice comprehensive test procedure for the emergency feedwater pumps, which identified prohibited flow gauges to be used to gather data. The three examples of this finding are of very low safety significance (Green) and have been entered into the licensee's corrective action program as Condition Reports CR-WF3-2009-04729, for the wrong size of suction pipe, CR-WF3-2009-04812, for the 10 percent strainer clogging assumption, and CR-WF3-2009-04811, for operators instructed to take flow readings using a flow indicator determined to be inadequate for inservice testing by an instrument and controls calculation. The licensee performed an operability assessment for the three examples of this finding. This violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 050382/2009009-02 "Failure to Establish Proper Design Control Measures to Assure Adequate Design and to Properly Translate the Design into Test Procedures."

.1.7 Emergency Diesel Generator 'A' Fuel Oil Tank Transfer Pump:

a. Inspection Scope:

The inspection team reviewed the design of the fuel oil transfer pump and the pump's capability to perform its design function. The review consisted of design specification, system flow diagram, isometric drawings, calculations, the UFSAR, technical specifications, and a license amendment. The team also reviewed operating procedures, vendor documents and inspection and maintenance records. The team walked down the pump as well as its storage tank, the suction piping, and a short portion of the pump discharge piping.

b. Findings:

Introduction. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" pertaining to the emergency diesel generator fuel oil transfer pump. Criterion V states in part "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

Description. The licensee did not have any operating procedures for accomplishing the transfer of fuel oil from one storage tank to the opposite train feed tank (day tank) using the opposite train fuel oil transfer pump, as designated in USAR Table 9.5-2, "Failure Mode and Effects Analysis." Also, License Amendment Number 157 (TAC Number MA4940) was granted in part for having the capability to transfer fuel oil from one storage tank to the opposite train feed tank using the opposite train transfer pump. The licensee specified this capability as part of the justification for having an insufficiently sized fuel oil storage tank. Moreover, the Safety Evaluation Report associated with the license amendment specifically refers to this capability at Waterford 3, and specifies that procedures are available for accomplishing the transfer of fuel oil.

The license amendment had been granted to provide relief to a portion of the design basis requirements contained in ANSI N 195-1976, endorsed by Reg. Guide 1.137, Revision 1, "Fuel Oil Systems for Standby Diesel Generators." The licensee did not comply with the following specific features regarding fuel oil storage:

- The calculation of the required fuel volume is part of the time dependent calculation which requires 10 percent margin according to the ANSI standard (otherwise, a more conservative calculation is required, assuming that the emergency diesel generator operates at continuous rated capacity for seven days)
- The amount of fuel oil does not contain an explicit allowance for fuel consumption required for emergency diesel generator testing
- The fuel oil feed tank overflow discharges to the sump rather than back to the fuel oil storage tank
- The fuel oil feed tank suction is located at the bottom of the tank rather than "above the bottom"
- The fuel oil transfer system does not have a pressure indicator located at the discharge of the fuel oil transfer pump

The licensee requested a License Amendment with a relief from these design requirements based in part upon Waterford 3 having two cross-ties between the two emergency diesel generator fuel oil storage and transfer systems which enable either one of the emergency diesel generators to be supplied from either one of the emergency diesel generator fuel oil storage tanks. With the ability to cross tie the two emergency diesel generator fuel oil storage and transfer systems; one emergency diesel generator will be able to operate continuously for a period of well over seven days. Specifically, the cross ties "enable the fuel oil transfer pump of either emergency diesel generator to fill either or both feed tanks from either fuel oil storage tank."

Based on the licensee's request and the rationale provided in the request, License Amendment 00-0016 was granted, concluding that the fuel oil inventory maintained

in the fuel oil storage tanks meets the intent of the guidance described in ANSI N195-1976, and that Waterford 3 will have sufficient fuel oil for emergency diesel generator operation to power the safety systems required to mitigate design basis accidents. However, the licensee did not have procedures to enable the fuel oil transfer pump of either emergency diesel generator to fill either or both feed tanks from either fuel oil storage tank.

The licensee has a surveillance procedure where a fuel oil transfer pump will transfer oil from the opposite fuel oil storage tank to its own feed tank, but there is no operating procedure for such operation. The surveillance procedure is inadequate for use post accident because it requires the suction valve from the transfer pump's own storage tank to be closed. This is contrary to engineering calculation ECM91-001, Revision 3, "Emergency Diesel Generator Fuel Oil Transfer Pump Recirculation and Discharge Flow," which specifically states that "in order to satisfy the fuel oil transfer pump requirements when suction is from the opposite train's fuel oil storage tank, the pump must also be aligned to take suction from its respective fuel oil storage tank if it is supplying a feed tank." The calculation determined that when the 'B' tank reaches 80 percent level, the transfer must be secured as the 'A' transfer pump's required net positive suction head could not be satisfied.

Moreover, UFSAR Table 9.5-2, "Diesel Fuel Oil Storage and Transfer Systems Failure Mode and Effects Analysis" states that in case of a transfer pump strainer being plugged, and a subsequent loss of suction to one fuel oil transfer pump, "a redundant fuel oil transfer pump is available which can feed either of two feed tanks."

Analysis. The team determined this finding to be greater than minor because it affected the mitigating systems cornerstone attribute of equipment performance to ensure the availability, reliability, and capability of safety systems that respond to initiating events. Also, using Inspection Manual Chapter 0612, "Power Reactor Inspection Reports," Appendix B, Section 1-3, "Screen for More than Minor – ROP," question 2, the finding is more than minor because if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern. Using Inspection Manual Chapter 0609, "Significance Determination Process," the finding was determined to have very low safety significance (Green) because the lack of an operating procedure did not result in loss of function, did not represent an actual loss of a system safety function, did not result in exceeding the Technical Specification allowed outage time, and did not affect external event mitigation. This finding was reviewed for crosscutting aspects and none were identified.

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" states in part "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type

appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings." Contrary to the above, the licensee did not have an operating procedure (or an emergency operating procedure) to execute the evolution where the emergency diesel generator fuel oil from one storage tank will be transferred to the opposite train's feed tank with the opposite train's fuel oil transfer pump. Waterford 3 is specifically credited with the capability to perform this evolution in the UFSAR (Table 9.5-2, Diesel Fuel Oil Storage and Transfer Systems Failure Mode and Effects Analysis) and in a License Amendment (Number 157, TAC Number MA4940). Because the finding is of very low safety significance (Green) and has been entered into the licensee's corrective action program as Condition Report CR-WF3-2009-04950 and an operability assessment was performed for this issue, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 050382/2009009-03 "Failure to have an Operating Procedure for Executing an Evolution Credited in the UFSAR and in a Request for a License Amendment."

.1.8 Emergency Feedwater Turbine-Driven Pump Discharge Check Valve '207 AB':

a. Inspection Scope:

The team reviewed the safety function of the discharge check valve of the emergency feedwater turbine-driven pump with respect to opening and closing (preventing reverse flow). The team reviewed the check valve program development document and the current status and rating of the check valve with respect to required inspection, testing, and overall compliance with the requirements of Inservice Testing. The team reviewed drawings, calculations, applicable sections of the UFSAR, vendor instructions, warnings, and maintenance requirements. The team also reviewed the check valve's impact on other safety related equipment, namely, the emergency feedwater motor-driven pumps. The team reviewed operating history, maintenance records and results of past inspections and testing. In addition, the team conducted a walkdown to verify that the installed configuration was consistent with design basis information, to measure its distance from the closest upstream elbow, and to visually inspect the material condition of the check valve.

b. Findings:

Introduction. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for failure to properly analyze the effect of acceptable reverse flow through the turbine-driven pump check valve on pump integrity and on the integrity of the pump's suction piping. Specifically, the licensee failed to account for an established acceptance criteria of 25 gpm reverse flow (back leakage) through the turbine-driven pump check valve.

Description. The team identified that the licensee failed to analyze the effects of the 25 gpm established acceptance criterion for back leakage through the emergency feedwater turbine-driven discharge check valve. The licensee failed to consider the effect of the 25 gpm on the turbine-driven pump low pressure suction piping during a plant condition where both motor-driven emergency feedwater pumps are operating and the turbine-driven emergency feedwater pump is idle. The design pressure of the suction piping of the emergency feedwater turbine-driven pump is 50 psig. The pressure on the downstream side of the check valve will be over 1000 psig. With an acceptance criterion of 25 gpm back flow through the check valve, the licensee failed to analyze the impact of high pressure fluid on the low pressure suction piping. The licensee also failed to consider the effect of the reverse flowing 25 gpm on the pump. Such reverse flow could rotate the pump backwards. When called upon, the turbine-drive pump starts with extreme acceleration until the ramp controller takes over, reduces speed and then slowly increases speed up to the design flow rate. The pump is not designed for starting while rotating backward. The licensee had not performed an analysis of the turbine-driven motor and pump shaft to confirm that it would be capable of withstanding a fast start while rotating backward.

This finding also applies, with some variations, to the two motor-driven pumps and their discharge check valves. These check valves have an acceptance criterion of 15 gpm each. Similarly, the motor-driven pumps were not designed for starting while reverse rotating, The licensee had not analyzed the impact of 15 gpm on pump reverse rotation with respect to the increased torque on the pumps' shafts and on their motors.

The licensee discussed the impact on the pumps with the pump manufacturers who stated that the motor-driven pumps would most likely not reverse rotate due to 15 gpm reverse flow, and that the turbine-driven pump would most likely reverse rotate. The shafts of all three pumps are expected to withstand the increased torque.

The licensee was questioned on the consequences of a stuck open pump discharge check valve, due to the possibility that the suction piping could possibly fail due to its low design pressure and the high system pressure downstream. If the suction piping were to break, a loss of all three EFW pumps may result because the water from the Condensate Storage Pool will drain through the broken suction pipe. Such analysis had never been conducted. As a result of the possibility, the licensee analyzed the effect of this stuck open check valve on the suction piping and concluded that the 50 psig design pressure suction piping will be exposed to 48.4 psig. The licensee added that this suction piping has been previously analyzed as capable of withstanding 72 psig.

Analysis. The team determined this finding to be greater than minor because it affected the mitigating systems cornerstone attribute of design control to ensure

the availability, reliability, and capability of safety systems that respond to initiating events to prevent undesirable consequences. This finding closely parallels Inspection Manual Chapter 0612, Appendix E, Example 3.j, where the finding is more than minor if the engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component. This finding was determined to be of very low safety significance (Green) because this design issue did not result in loss of function, did not represent an actual loss of a system safety function, did not result in exceeding the Technical Specification allowed outage time, and did not affect external event mitigation. The inspectors determined that the finding has a crosscutting aspect in the area of Problem Identification and Resolution, Self and Independent Assessment. The licensee conducted a Waterford 3 Component Design Basis Assessment on April 20-23, 2009, that included the emergency feedwater 'AB' turbine-driven pump in the "Scope of Components to be Reviewed During CDBI Assessment", and failed to identify the impact of reverse flow through the pump and its suction piping due to an accepted back leakage rate of 25 gpm [P.3.(a)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states in part, that "measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions." Contrary to the above, the design basis was not correctly translated into the emergency feedwater test procedure allowing unanalyzed 25 gpm reverse flow through the pump discharge check valve. Because the finding is of very low safety significance (Green) and has been entered into the licensee's corrective action program as Condition Report CR-WF3-2009-04528 and performed an operability assessment for this issue, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 050382/2009009-04 "Failure to Properly Analyze the Effect of Acceptable Reverse Flow Through Emergency Feedwater Check Valves."

.1.9 Emergency Feedwater Turbine-Driven Pump Discharge Check Valve '207 AB'

a. Inspection Scope:

The team reviewed drawings, calculation, applicable sections of the UFSAR, vendor instructions, warnings, and maintenance requirements. The team also reviewed the check valve's impact on other safety related equipment, namely, the emergency feedwater motor-operated pumps. The team reviewed operating history, maintenance records and results of past inspections and testing. In addition, the team conducted a walkdown to verify that the installed configuration was consistent with design basis information, to measure its distance from the closest upstream elbow, and to visually inspect the material condition of the check valve.

b. Finding:

Introduction. The team identified an issue where the licensee may have installed the emergency feedwater turbine-driven pump's discharge check valve contrary to the manufacturer's requirements, did not take compensatory measures, did not notify the manufacturer of the deviation from the installation instructions, and did not justify the deviation in the plant's design basis.

Description. The team selected emergency feedwater turbine-driven pump discharge check valve '207 AB' as one of the components being reviewed during the inspecton. The team requested several design documents pertaining to this valve including the manufacture's (vendors) installation and maintenance instructions. The vendor's document provided to the team identified some very specific requirements for the installation of the valve, which the licensee had not adhered to for the installation of the valve.

The valve's manufacturer specified that if the media velocity exceeds 8 ft/second, the installation must maintain a minimum of 5 pipe diameters between the valve's flange and the upstream pipe fittings (valves, pumps, elbows, reducers, etc.). The manufacturer also stated "Avoid severe increases in velocity ahead of the valve by using gradual (7 degree or less taper) reducers." Furthermore, the manufacturer warned "Any deviation from this recommendation could damage the valve due to turbulence which will cause plate flutter and accelerated part wear." Moreover, the manufacturer required that "if any of these conditions exist, the cycle of periodic inspection must be increased." Finally, the manufacturer warned that "the use of special stabilizers may be required."

Contrary to the manufacturer's installation instructions, 1) the valve's media velocity is 9.83 feet per second (according to calculation MN(Q)-10-1, Revision 2, Section 7.1.5), but the valve was installed only 2.4 (rather than 5) pipe diameters from the upstream elbow; 2) the valve is subjected to severe increase in velocity whenever the turbine-driven pump starts, but gradual reducers were not installed; 3) the cycle of periodic inspection was not increased, rather, the valve was not inspected for 17 years and was not scheduled for any future inspections (the valve was not in the licensee's preventive maintenance program); and 4) the manufacturer was not asked whether special stabilizers would be required.

The licensee was informed of the team's discovery of the condition. The team informed the licensee that the finding appeared to be a violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, where measures shall be established to assure that applicable regulatory requirements and the design basis, are correctly translated into specifications, drawings, procedures, and instructions.

At the end of the inspection, the licensee informed the team that they had provided the incorrect vendor manual to the team for the emergency feedwater turbine-

driven pump discharge check valve '207 AB.' They had provided the team with a vendor manual for a replacement emergency feedwater turbine-driven pump discharge check valve which had been purchased in the year 2000, which had not been installed. The team asked for the vendor manual for the installed valve, and the licensee was unable to provide the manual to the team during the time that the team was on-site performing the inspection. The licensee contacted the replacement valve manufacturer who stated that the design requirements identified in the instruction manual for the replacement valve would apply to the installed valve.

At the conclusion of the inspection, the licensee was unable to provide the correct vendor installation manual for the installed emergency feedwater turbine-driven pump discharge check valve '207 AB.' Without this information the inspection team was unable to determine the significance of the issue. The licensee has entered this into their corrective action program as Condition Reports CR-WF3-2009-04752 and CR-WF3-2009-04531. This issue is unresolved and is identified as URI 050382/2009009-05, "Installation of Emergency Feedwater Pump Discharge Check Valve '207 AB'."

.1.10 25/6.9/4.16kV Unit Auxiliary Transformer '3A':

a. Inspection Scope:

The team reviewed the design basis descriptions, equipment specifications, system one-line diagrams, voltage tap settings, nameplate data, short circuit and voltage drop calculations, protective relay settings, and loading requirements to evaluate the capability of the transformer to supply the voltage and current requirements to one train of electrical distribution loads. Transformer protective relay trip setting calculations were reviewed to verify whether adequate protection coordination margins were provided. The relay settings review included the transformer overall differential, sudden pressure and the ground overcurrent relays. The team also reviewed the ground overcurrent relays associated with the 230/6.9/4.16kV Startup Transformer 3A to verify the adequacy of protection and relay coordination with the 230kV transmission line relays for postulated line to ground transmission line faults. The team reviewed the results of completed transformer preventive maintenance and relay calibration test results to verify whether the test results were within design assumptions. The team interviewed system engineers and performed a visual inspection of the transformers to assess the installation configuration, material condition, and potential vulnerability to hazards.

b. Findings:

Introduction. The team identified a finding having very low safety significance (Green) for failure to translate design basis criteria for the 51G Start-Up

Transformer 3A relay to support the settings listed in calculation EC-E90-012, "Protective Relays Settings for Main Generator and Transformers," Rev 1; therefore, the basis for the relay setpoint values could not be established.

Description. During the Unit Auxiliary Transformer 3A relay settings review, the team identified that the 230/6.9/4.16kV Start-Up Transformer 3A winding connections provided a source of fault current to postulated 230kV transmission line to ground faults. The trip setpoints of the 51G relay located in the neutral of the 230kV windings were reviewed to verify whether adequate coordination was provided to ensure selective tripping. The relay is designed to detect ground faults on the 230kV system which have not been cleared by the 230 kV switching station or 230kV transmission system relays, and separate the Start-Up Transformer 3A from the 230kV grid. The team interviewed Transmission Engineering to verify the adequacy of the 51G relay settings since the relay settings were based on 230kV line to ground fault studies performed by Transmission Engineering when Waterford Steam and Electric Station, Unit 3 first went on line. More recent, Transmission Engineering fault studies had determined that the fault current contribution from the Start-Up Transformers during postulated 230kV line to ground fault to be nearly 30 percent lower than the values listed in relay setting calculation EC-E90-012, "Protective Relays Settings for Main Generator and Transformers," Rev 1. The licensee and Transmission Engineering acknowledged the need for sharing their respective design inputs to support the calculation of relay settings for the 51G relay. During the review, the team determined that the relay settings listed in calculation EC-E90-012 had not been effectively implemented since the required current transformer ratio of 600/5, upon which the settings were based, was never installed. The team evaluated the relay settings considering the field installed 3000/5 current transformer ratio and the recent Transmission Engineering fault study and determined that the applied 51G relay settings would not be sufficiently sensitive to detect the fault current contribution from the Start-Up Transformers during postulated 230kV line to ground short circuit conditions.

Analysis. The team determined that this finding was more than minor because it affected the initiating events cornerstone attribute of equipment performance for ensuring the availability, and reliability, of systems to limit the likelihood of those events that upset plant stability and challenge critical safety functions. This finding closely parallels Inspection Manual Chapter 0612, Appendix E, Example 3.j, "the finding is more than minor if the engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component." The failure to provide adequate relay setting coordination could result in an unnecessary separation of the safety buses from the electrical grid and an ensuing plant transient (Initiating Event). The team noted that this finding also applies to 51G relay in the B train which could challenge the single failure criterion. This finding was determined to be of very low safety significance (Green) because this design issue did not result in loss of function, did not represent an actual loss

of a system safety function, did not result in exceeding the Technical Specification allowed outage time, and did not affect external event mitigation. This finding was reviewed for crosscutting aspects and none were identified.

Enforcement. This finding was not a violation of regulatory requirements because the Unit Auxiliary Transformer 3A is not a system or component covered under 10 CFR Part 50, Appendix B. The issue has been entered into the licensee's corrective action program as Condition Report CR-WF3-2009-04813. This finding is identified as FIN 050382/2009009-06, "Failure to Incorporate Start-Up Transformer Protective Relay Design Basis into Instructions, Procedures, or Drawings."

.1.11 4160 Vac Switchgear Bus '3A3-S':

a. Inspection Scope:

The team inspected the 4160 V switchgear to verify that it would operate during design basis events. The team reviewed selected calculations for electrical distribution system load flow/voltage drop, degraded voltage protection, short-circuit, and electrical protection and coordination. This review was conducted to assess the adequacy and appropriateness of design assumptions, and to verify that bus capacity was not exceeded and bus voltages remained above minimum acceptable values under design basis conditions. Additionally, the switchgear's protective device settings and breaker ratings were reviewed to ensure that selective coordination was adequate for protection of connected equipment during worst-case, short-circuit conditions. The station's interface and coordination with the transmission system operator for plant voltage requirements and notification set points were reviewed. The team reviewed the degraded and loss of voltage relay protection schemes. To determine whether breakers were maintained in accordance with industry and vendor recommendations, the team reviewed the preventive maintenance, inspection and testing procedures. The 125 Vdc voltage calculations were reviewed to determine whether adequate voltage would be available for the breaker open/close coils and spring charging motors. Finally, the team performed a walkdown of portions of the safety-related 4160 Vac switchgear to assess the installation configuration, material condition, and potential vulnerability to hazards.

b. Findings:

No findings of significance were identified.

.1.12 4.16 kV Diesel Generator DG 3A-S and Breaker '3A-14':

a. Inspection Scope:

The team inspected the electrical portions of the emergency diesel generator and associated output breaker to verify the adequacy of the equipment to respond to design basis events. The team reviewed drawings, design basis descriptions and the UFSAR to identify the design and licensing basis requirements for the emergency diesel generator. The team reviewed the emergency diesel generator loading calculations including voltage, frequency, and current for all operating modes to verify the capability of the emergency diesel generator and its output breaker to perform their intended safety functions. The team also performed independent calculations of available phase and ground short circuit currents to ensure that the maximum system short circuit duty was within equipment rating. Protective relay setpoint calculations and setpoint calibration test results were reviewed to assess the adequacy of protection during test mode and during emergency operations. The generator grounding scheme was also reviewed to verify the adequacy of the grounding transformer and resistor ratings. The electrical drawings and calculations that describe the generator output breaker control logic and interlocks were reviewed to determine whether the breaker opening and closing control circuits were consistent with design basis documents. The team reviewed surveillance test results to verify that applicable test acceptance criteria and test frequency requirements were satisfied. The team reviewed maintenance test records to verify that the functional validation test of the emergency diesel generator protective device bypass features were periodically performed to satisfy design and licensing basis assumptions. Finally, the team conducted a walkdown of the emergency diesel generator, the electrical relay cabinets, output breaker control switches and breaker position indicating lights to assess the installation configuration, material condition, and potential vulnerability to hazards.

b. Findings:

Introduction. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control", for not having sufficient design bases provided within calculation EE2-14-3 "Diesel Generator Overcurrent Protection", Revision 1, for setting of the IGCV-51V overcurrent with voltage control relays. Specifically, the licensee's design control measures failed to perform an adequate evaluation of new setpoint values for the IGCV-51V, voltage controlled, time-overcurrent relay, for emergency diesel generator overcurrent protection while the diesel is in test mode. If a faulted bus was isolated by the operation of the under-voltage relays, the emergency diesel generator output breaker would still be allowed to electrically reclose onto this faulted bus and potentially damage the emergency diesel generator and the associated switchgear. This design modification introduced a challenge to the safety equipment availability and reliability.

Description. The team reviewed calculation EE2-14-03, "Diesel Generator Overcurrent Protection," Rev 1. This calculation provided a plot of the IGCV-51V voltage controlled, time-overcurrent relay operating characteristic for a relay tap setting of 5 amperes and a time lever of 1. The team noted that this calculation did not provide the basis for the relay settings. The team reviewed Engineering Report ER-W3-99-0174-00-00, which identified that the primary purpose of the 4.16kV bus, under-voltage relays, was for bus under-voltage protection and the primary purpose of the IGCV-51V relays was to protect the emergency diesel generator against external faults. A faulted bus should be detected and isolated by the overcurrent relays associated with the bus supply breakers, which include the emergency diesel generator output breaker during test mode, to ensure that the emergency diesel generator output breaker will be blocked from closing following tripping for a fault. The engineering report also provided the bases for the IGCV 51V relay tap setpoint changes from the 5 to the 4 ampere tap, and voltage dropout setpoint change from 104 to 95 Vac. The engineering report stated that the original dropout voltage setting for the IGCV-51V relay was based upon the settings of the 4.16kV bus under-voltage relays, and that the under-voltage relays operated before the IGCV-51V relays, and that any fault would be cleared first by the bus under-voltage relays. According to the engineering report the new 95V dropout voltage setpoint would continue to allow the bus under-voltage relays (the Loss of Voltage) and degraded voltage relays on the 4.16kV safety buses to provide the primary protection for fault conditions or loss of offsite power events. The team identified that the IGCV-51V relay settings did not follow industry-accepted methodologies for calculating settings for voltage controlled time-overcurrent relays. If the faulted bus was isolated by the operation of the under-voltage relays, the emergency diesel generator output breaker would be allowed to electrically reclose onto this faulted bus and potentially damage the emergency diesel generator and the associated switchgear. The team discussed the lack of design basis criteria in IGCV-51V relay setting calculation EE2-14-03 with the licensee, including the errors identified in Engineering Report ER-W3-99-0174-00-00.

Analysis. The failure to have sufficient design bases for the emergency diesel generator overcurrent protection IGCV-51V relays and not verifying the adequacy of the setpoint modification for the IGCV-51V relay, Voltage Controlled, Time-Overcurrent Relay, for emergency diesel generator overcurrent protection while the diesel is in test mode, was a performance deficiency. Specifically, failure to verify the adequacy of a design modification for the IGCV-51V relay, Voltage Controlled, Time-Overcurrent Relay, for emergency diesel generator overcurrent protection while the diesel was in test mode could result in reduced reliability of the emergency diesel generators. The finding was determined to be greater than minor because the performance deficiency is associated with the mitigating systems cornerstone attribute of design control to ensure the availability, reliability, and capability of safety systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609.04, the finding was

determined to have a very low safety significance (Green) because the failure did not result in loss of operability or functionality and because the finding did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding was reviewed for crosscutting aspects and none were identified.

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that "design control measures provide for verifying or checking the adequacy of design, and design changes are required to be subjected to design control measures commensurate with those applied to the original design." Contrary to this requirement, from February 26, 1999 until September 10, 2009, the licensee failed to have sufficient design bases for the emergency diesel generator overcurrent protection IGCV-51V relays and did not verify the adequacy of the setpoint modification for the IGCV-51V relay, Voltage Controlled, Time-Overcurrent Relay, for emergency diesel generator overcurrent protection while the diesel is in test mode. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report CR-WF3-2009-04780, this violation is being treated as an NCV, consistent with Section VI.A of the Enforcement Policy: NCV 050382/2009009-07, "Failure to Verify or Check the adequacy of Design Changes for the Emergency Diesel Generator Protective Relay IGCV-51V."

.1.13 4160/480 Vac Station Service Transformer (SST) '3A31-S':

a. Inspection Scope:

The team reviewed the design basis descriptions, equipment specifications, system one-line diagrams, voltage tap settings, nameplate data, short circuit and voltage drop calculations and protective relay settings to determine whether the continuous and transient loadings of SST 3A31-S and that of the feeder supply breaker 3A-15 were within equipment ratings. The team performed independent short circuit and voltage drop calculations to verify the adequacy of the 480 V switchgear ratings. The team also reviewed the appropriateness of design assumptions and calculations related to the 480 volt grounding transformer. On a sample basis, the team reviewed maintenance and functional validation test results to verify that the SST 3A31-S was capable of supplying adequate power to 480 V Switchgear Bus 3A31-S. The team interviewed the system engineer and performed a visual inspection of the transformer to assess the installation configuration, material condition, and potential vulnerability to hazards.

b. Findings:

No findings of significance were identified.

.1.14 4160 Vac Low Pressure Safety Injection Pump A (LPSI A Electrical Portion):

a. Inspection Scope:

The team reviewed electrical calculations, drawings and equipment specifications to determine whether adequate voltage and current would be available at the pump motor terminals for starting and running under worst case voltage conditions and to determine if the motor capacity was adequate for the loading requirements. The team reviewed protective relay settings, motor feeder cable ampacity and cable short circuit current capability to determine whether appropriate electrical protection coordination margins had been applied and whether the feeder cable had been properly sized for the maximum loading and short circuit capability requirements. The LPSI 'A' motor feeder supply breaker EFW 3A-10 "Control Logic and Completed Breaker Maintenance Test Records" were reviewed to verify the test results were within design basis acceptance criteria. Finally, the team conducted a walkdown of the electrical relay cabinets, output breaker control switches and breaker position indicating lights to assess the installation configuration, material condition and potential vulnerability to hazards.

b Findings:

No findings of significance were identified.

.1.15 4160 Vac Motor-Driven Emergency Feedwater Pump 'A' (EFW Electrical Portion):

a. Inspection Scope:

The team reviewed electrical calculations, drawings and equipment specifications to determine whether adequate voltage and current would be available at the pump motor terminals for starting and running under worst case voltage conditions and to determine if the motor capacity was adequate for the loading requirements. The team reviewed protective relay settings, motor feeder cable ampacity and cable short circuit current capability to determine whether appropriate electrical protection coordination margins had been applied and whether the feeder cable had been properly sized for the maximum loading and short circuit capability requirements, with consideration of allowable cable derating for wrapped Appendix R cables. The emergency feedwater motor feeder supply breaker EFW 3A-10 Control Logic and Completed Breaker Maintenance Test Results were reviewed to verify that the test results were within design basis acceptance criteria. Finally, the team conducted a walkdown of the electrical relay cabinets, output breaker control switches and breaker position indicating lights to assess the installation configuration, material condition, and potential vulnerability to hazards.

b. Findings:

No findings of significance were identified.

.1.16 125 Vdc Class 1E Battery '3A-S':

a. Inspection Scope:

The team conducted a review of the Train 'A,' 125 Vdc safety-related battery bank (3A-S) to assess the design aspects of the battery. The team reviewed sizing calculations, short circuit current calculations, coordination studies, design specifications, installation drawings, modifications made to the battery and battery rack, battery vendor manual, maintenance activities performed on the battery, and conducted a system walkdown with design engineering personnel to assess the material condition of the battery. A review of the testing methodology was conducted to verify the batteries were being tested in accordance with design requirements. The licensee tested the batteries to the station blackout profile and the team determined that the station blackout profile was more challenging than the loss of offsite power/loss of coolant accident profile. The team also reviewed the total battery inter cell connection resistance calculation to verify the design assumptions were being met.

b. Findings:

No findings of significance were identified.

.1.17 125 Vdc Distribution Bus '3A-DC-S':

a. Inspection Scope:

The team inspected the 125 Vdc distribution bus to ensure the bus met design basis specifications. The team reviewed short circuit calculations, sizing calculations, circuit breaker coordination studies, and operating procedures to ensure the bus is designed and being operated to ensure design criteria are maintained. Direct Current bus circuit breaker testing procedures were reviewed and breaker sizing calculations were reviewed to ensure the installed circuit breakers were appropriate for the design of the system. Maintenance activities for the distribution bus and circuit breakers were verified to maintain the system according to manufacturer recommendations.

b. Findings:

No findings of significance were identified.

.1.18 LPSI Flow Control Valve SI-139A:

a. Inspection Scope:

The team reviewed the Updated Final Safety Analysis Report, design basis documents, selected drawings, calculations, maintenance records, and operating procedures to verify the capability of the Motor-Operated Valve (MOV) to perform its intended function during design basis events. The team reviewed electrical calculations to verify the appropriate voltage values were included in the design documents, and reviewed voltage drop calculations for the motor control circuit to ensure the control circuitry could perform its intended safety function for design basis events. The team also verified that thermal overloads were appropriately sized and coordination was implemented, and that the thermal overloads were properly tested to ensure bypass functions were operable.

b. Findings:

No findings of significance were identified.

.2.0 **Results of Reviews for Operating Experience**

.2.1 NRC Bulletin 1988-04 "Potential Safety-Related Pump Loss"

a. Inspection Scope:

The NRC issued Bulletin 1988-04 to address two concerns dealing with minimum flow lines associated with safety pumps: 1) that if there is a common minimum flow line for two or more pumps, a stronger pump may cause a weaker pump to "dead-head" by dominating the flow in the minimum flow line, and 2) that there may be non-conservative assumptions for the minimum flows required by operating safety pumps to avoid premature failures. The team inspected Waterford's response to this bulletin by verifying conclusions associated with HPSI, LPSI and EFW pumps. That is, the team verified the licensee's conclusion that minimum flows interferences will not occur for these pumps and that the licensee had adequately verified their assumptions for minimum flow rates required by these pumps.

b. Findings

No findings of significance were identified.

.2.2 NRC Generic Letter 1989-04 "Guidance on Developing Acceptable Inservice Testing Programs"

a. Inspection Scope:

The team inspected the licensee's compliance with generic letter 89-04 with respect to full flow testing and back flow testing of check valves.

The team reviewed the licensee's response to the Generic Letter and reviewed the licensee's compliance with Section XI of the ASME Code requiring that check valves be exercised to the positions in which they perform their safety functions. This included a review of the licensee's verification that the check valve's full-stroke to the open position is verified by passing the required accident condition flow through the check valve. This also included a verification that valves that are self actuated in response to a system characteristic, performing a safety function in the closed position to prevent reverse flow be tested in a manner that proves that the disk travels to the seat promptly on cessation or reversal of flow. In addition, for valves that have a specified leak rate limit and are self actuated in response to a system characteristic, seat leakage must be limited to a specific maximum amount in the closed position for fulfillment of their function.

The team verified that the licensee tested the check valves as required by the generic letter and as detailed in the response to the generic letter. An instance was identified where the emergency feedwater check valves were not properly tested. Details are included in the emergency feedwater pump 'A' scope section.

b. Findings:

No findings of significance were identified

.2.3 NRC Generic Letter 1989-13 "Service Water System Problems Affecting Safety-Related Equipment"

a. Inspection Scope:

The team reviewed the licensee's responses to Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," and its compliance with the commitments specified in the responses. The team reviewed the Generic Letter 89-13 Program Document, the validity of practicing thermal testing as well as inspecting and cleaning the CCW heat exchanger. The team reviewed the chemical treatment of service water, scheduled inspections and tests, as well as trending of the condition, the heat removal capacity, and the level of fouling of the component cooling water heat exchanger.

b. Findings:

No findings of significance were identified.

.2.4 Inspection of NRC Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients"

a. Inspection Scope

Generic Letter 2007-01 documented failures of safety-related and maintenance rule cables and their associated systems at several sites due to long-term exposure to moisture. The generic letter requested the licensee to submit the status of all cable failures for those cables in the scope of the generic letter that were inaccessible or underground and requested a description of inspection, testing, and monitoring programs associated with these cables. The team reviewed the licensee's response to the generic letter, which reported one cable failure for a maintenance rule component and no safety-related equipment cables located in any of these vaults that are potentially exposed to water. The cause of the one cable failure (documented in work authorization number WA 01089129) was documented as "probable cable failure due to moisture intrusion." To assess the licensee's disposition of issues identified in the generic letter, the team reviewed all recorded megger test results for the nine motors whose cables reside in vaults potentially containing water. All nine of these motors are included in the maintenance rule program and all nine have cables that were reported by the licensee as potentially underwater due to the lack of a monitoring/dewatering program and the below sea-level elevation aspect of the plant. The team reviewed associated documents including manhole, ductbank, and raceway drawings; available cable specifications; available procedures; inspection documents for one manhole that the licensee dewatered as a study to determine how fast these vaults would fill up after they were dewatered; pictures of several vaults that were full of water; and corrective action history associated with any cable degradation or failures. The team also visually inspected the external configuration and visible conditions of the manholes and interviewed cognizant licensee staff.

b. Findings and Observations

Generic Letter 2007-01, Question 2 requested that the licensee describe their programs, procedures, or practices for inspection, testing, and monitoring programs to detect the degradation of inaccessible or underground power cables that support emergency diesel generators, offsite power, essential service water, service water, component cooling water, and other systems that are in the scope of 10 CFR 50.65, "The Maintenance Rule." The licensee asserted in their May 3, 2007 letter responding to Generic Letter 2007-01, Question 2, that "Waterford 3 inspection, testing, and monitoring practices presently include visual cable inspection during meggering of cables and connected equipment during

maintenance activities. Plant condition reporting is used to determine root cause and extent of conditions and would be the process for determining the need for and the extent of any increased cable monitoring." Both NRC regional inspectors and headquarters staff from the NRR electrical branch interpreted this response to mean that the licensee was visually inspecting the cables in the areas where the cables were vulnerable to degradation from submerged conditions, which was not the case.

During interviews, the licensee communicated that they were only visually inspecting the two foot section of cable in the switchgear that the megger equipment was connected to during the test. Furthermore, the licensee communicated that they have never inspected any cables in any of the vaults beyond what could visibly be seen through the water that filled the several vaults that were opened and that no dewatering had been done with the exception of the one vault that was studied as mentioned above in the scope section. After discussions with the NRC regional enforcement and management staff, the licensee determined that further clarification of their response to the generic letter was needed, and to submit an update to their original response that more clearly indicated their current practices for submerged cables. The licensee issued Condition Report CR-WF3-2009-04935 pertaining to the clarification submittal to Generic Letter 2007-01.

.2.5 NRC Information Notice 2006-03 "Motor Starter Failures Due to Mechanical Intelock Binding"

a. Inspection Scope:

The team reviewed the licensee response to NRC Information Notice 2006-03, which documented motor starter failures due to mechanical-interlock binding. These failures highlight the particular vulnerabilities of interlock-binding between "open" and "close" contactors. The licensee evaluated this information notice and determined that the failure mechanism described in the operating experience was not applicable to the types of contactors and interlock mechanism utilized at the site.

b. Findings:

No findings of significance were identified.

.2.6 Inspection of NRC Information Notice 2006-26, "Failure of Magnesium Rotors in MOV Actuators"

a. Inspection Scope:

The team reviewed NRC Information Notice 2006-26, which documented recent failures of motor-operated valve (MOV) actuators as a result of galvanic corrosion, general corrosion, and/or thermally induced stress. These failures highlight the particular vulnerabilities of motor actuators with magnesium rotors, particularly when the motor is located in a high humidity and/or high temperature environment. These motor-operated valve failures illustrate the necessity of adequate inspection and/or preventive maintenance on actuators manufactured with magnesium rotors. The team reviewed current inspection work orders instructions, and actual inspection documentation for inspections performed.

b. Findings:

No findings of significance were identified.

.3.0 **Results of Reviews for Operator Actions**

The team selected risk-significant components and operator actions for review using information contained in the licensee's probabilistic risk assessment. This included components and operator actions that had a risk achievement worth factor greater than two or Birnbaum value greater than 1E-6.

a. Inspection Scope:

For the review of operator actions, the team observed operators during simulator scenarios associated with the selected components as well as observing simulated actions in the plant via Job Performance Measures.

Inspection Procedure 71111.21 requires a review of three to five relatively high-risk operator actions. The sample selection for this inspection was five operator actions.

The selected operator actions were:

- Loss of Coolant Accident where the Recirculation Actuation System has initiated but the auto-swap feature fails (Scenario).
- Loss of Offsite Power event with 1 emergency diesel generator out of service and the remaining emergency diesel generator does not auto-close on the emergency bus with the potential for Station Black-Out (Scenario).

- Steam Generator Tube Rupture event with a failure of the atmospheric dump valve to operate from the control room, requiring local manual operation (Job Performance Measure).
- Loss of Main Feedwater event requires Emergency Feed Water pump suction to be swapped locally from the Condensate Storage Pool to the Auxiliary Component Cooling Water (ACCW) wet cooling towers (Job Performance Measure).
- Loss of Offsite Power event with subsequent loss of DC Power to emergency feedwater components, requiring local manual operation of emergency feedwater flow control valves (Job Performance Measure).

b. Findings:

No findings of significance were identified.

4 OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

a. Inspection Scope:

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

b. Findings:

An issue identified during this inspection was that the licensee had not taken advantage of their established Problem Identification and Resolution programs in the area of self assessment. The licensee conducted a Waterford 3 Component Design Basis Assessment, April 20-23, 2009. In the assessment, the licensee included components such as the emergency feedwater turbine-driven pump and the emergency diesel generator fuel oil transfer pump in the "Scope of Components to be Reviewed During CDBI Assessment." Two of the violations identified in this report, one with three examples, contain crosscutting issues in the area of problem identification and resolution because they did not thoroughly review components identified in their self assessment (Section 1R21.b.1.6 and 1R21.b.1.8)

4OA6 Meetings, Including Exit

On September 18, 2009, the team leader presented the inspection results to Mr. J. Kowalewski, Vice President, Waterford 3 Operations, and other members of the licensee's staff. While some proprietary information was reviewed during this inspection, no proprietary information was included in this report.

4OA7 Licensee Identified Violations

None were identified.

ATTACHMENT 1

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

C. Alday, Manager, System Engineering
C, Arnone, General Manager, Plant Operations
R. Astnam, Manager, Engineering Programs and Controls
R. Bateman, Manager, Nuclear Information Technology
J. Bourgodis, Acting Chemistry Superintendent, Waterford 3 Chemistry
M. Bowen, Manager, Human Relations
S. Bowen, Superintendent, Administrative Support Group
K. Cook, Manager, Operations
G. Fey, Manager, Planning, Scheduling and Outage
G. Hankins, Manager, Projects
J. Hunsaker, Manager, Finance
J. Kowalewski, Vice President, Waterford 3 Operations
B. Lanka, Manager, Design Engineering
M. Mason, Senior Technical Licensing Coordinator, Licensing
B. McKinney, Manager, Corrective Action and Assessment
M. Mills, Vice President Technical Assistant, Office of the Vice President
K, Nichols, Director, Engineering
B.Pilutti, Manager, Radiological Protection
P. Santon, Supervisor, Design Engineering
M. Schaible, Manager, Training Department
N. Winieicz, Manager, Health Physics and Chemistry

NRC personnel

O. Font, Project Manager, Nuclear Reactor Regulation
M. Haire, Senior Resident Inspector, Division of Reactor Projects, Branch E
D. Overland, Resident Inspector, Division of Reactor Projects, Branch E

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

050382/2009009-01	NCV	Failure to Account for Reduction of Flow from the Emergency Feedwater System to the Steam Generators.
050382/2009009-02	NCV	Failure to Establish Proper Design Control Measures to Assure Adequate Design and to Properly Translate the Design into Test Procedures.

050382/2009009-03	NCV	Failure to have an Operating Procedure for Executing an Evolution Credited in the UFSAR and in a Request for a License Amendment
050382/2009009-04	NCV	Failure to Properly Analyze the Affect of Acceptable Reverse Flow through the Emergency Feedwater Check Valves.
050382/2009009-06	FIN	Failure to Incorporate Start-Up Transformer Protective Relay Design Bases into Instructions, Procedures, or Drawings."
050382/2009009-07	NCV	Failure to Verify or Check the Adequacy of Design Changes for the Emergency Diesel Generator Protective Relay IGCV-51V.
Opened		
050382/2009009-05	URI	Installation of Emergency Feedwater Turbine Driven Pump Discharge Check Valve '207 AB'

LIST OF DOCUMENTS REVIEWED

Action Requests

Calculations

Number	Title	Revision / Date
CN-OA-02-62	Post-LOCA Long Term Cooling ECCS Performance Analysis for Waterford-3 at 3716 MWt Extended Power Uprate	Revision 000
C-PEC-167	HPSI and LPSI Pump Curves for Use in the WSES FSAR Section 15 Analysis	Revision 000
EC-E06-002	Ampacity Derating Calculation for Cables in Fire Wrapped Conduit	Revision 000
EC-E90-006	Emergency Diesel Generator Loading and Fuel Oil Consumption	Revision 007
EC-E90-006	Electrical Loading of the Emergency Generators	Revision 000
EC-E90-012	Protective Relays Settings for Main Generator and Transformers	Revision 001
ECE91-050	Degraded Voltage Relay Setpoint & Plant Load Study	Revision 005
EC-E91-050	Degraded Voltage Relay Setpoint & Plant Load Study	Revision 006

Number	Title	Revision / Date
EC-E91-055	AC Short Circuit Calculations	Revision 004
EC-E91-056	Relay Settings and Coordination Curves for 6.9kV and 4.16kV and 480V Buses	Revision 002
ECE91-058	Battery 3A-S "A" Train Calculation for Station Blackout	Revision 005
ECE91-061	Battery 3A-S Cell Sizing	Revision 005
ECE91-250	Short Circuit Study for PDP 3A-DC-S & 3A1-DC-S	Revision 001
ECE91-253	125VDC Class 1E Coordination Studies	Revision 000
ECE91-500	Degraded Voltage Impact on AC Starters/Contractors and Auxiliary Devices	Revision 001
ECE93-003	Voltage at Motor Operated Valves	Revision 000
ECE95-001	Sizing Thermal Overload Heaters for Motor Operated Valves	Revision 002
ECE98-001	Calculation of Maximum Allowable Battery Inter-cell Connection Resistance	Revision 001
EC-I01-003	IST Instrumentation Uncertainties	Revision 000
EC-M05-003	High Pressure Safety Injection System Capacity	Revision 000
ECM07-001	NPSH Analysis of Safety Injection and Containment Spray Pumps	Revision 001
ECM89-032	Calculations for Motors Driven by Emergency Diesel Generators	Revision 003
EC-M97-026	Required Submergence to Prevent Vortexing in the RWSP	Revision 001
EC-M98-027	LPSI Flow Rate Calculation	Revision 001
EC-M98-068	LPSI System Performance Surveillance Requirement Basis	Revision 000
ECP05-001	Hose connection to Portable Diesel Sump Pump at DCT area (-35.0)	Revision 000
EE2-12-05	4.16kV Switchgears High Resistance Grounding	Revision 000
EE2-14-03	Diesel Generator Overcurrent Protection	Revision 001
EE2-14-14	Emergency Diesel Generator 3A-S & 3B-S Grounding	Revision 000
EE2-16-04	High Resistance Grounding. 480kV	Revision 001
MN(Q)6-4	Water Levels Inside Containment	Revision 003
MN(Q)10-1	Emergency Feedwater System Head Curves.	Revision 002
MN(Q)-10-12	NPSH Available for EFW Pumps.	Revision 001
EC-M97-025	Required Submergence to Prevent Vortexing in the CSP.	Revision 000
EC-M98-011	EFW System Design Pressure / Temperature	Revision 000
EC-M97-006	Design Basis for CCW Makeup.	Revision 001
EC-M97-025	Required Submergence to Prevent Vortexing in the CSP.	Revision 000

Number	Title	Revision / Date
ECM91-001	EDG Fuel Oil Transfer Pump Recirculation and Discharge Flow.	Revision 003
EC-M95-012	Vortexing in Storage Pools and Vessels Due to Pump Operation.	Revision 003
ECM-89-032	Calculation for Motors driven by Emergency Diesel Generators.	Revision 003
EC-M95-012	Minimum Pipe Submergence to Prevent Vortexing.	Revision 004
EC-I95-001	Emergency Feedwater Discharge Flow Instrumentation Loop Uncertainty Calculation.	Revision 001
EC-M98-016	Condensate Storage Pool Volume Requirements.	
EC-I01-003	IST Instrumentation Uncertainties	Revision 000
PRA-W3-01-001	Waterford 3 PRA Summary Report	Revision 000
EC-M84-001	Tank Volume vs. Level Tables.	Revision 006
EC-E90-006	Emergency Diesel Generator Loading and Fuel Oil Consumption	Revision 007
DRN 03-640	Change to calculation EC-M97-025.	
DRN 03-637	Change to calculation MNQ10-1.	

Corrective Action Documents

CR-WF3-1996-01657	CR-WF3-2008-04093	CR-WF3-2009-03925
CR-WF3-1998-00581	CR-WF3-2008-04231	CR-WF3-2009-04531
CR-WF3-1998-00822	CR-WF3-2008-04304	CR-WF3-2009-04528
CR-WF3-1998-00850	CR-WF3-2008-05183	CR-WF3-2009-04646
CR-WF3-2005-00592	CR-WF3-2008-05631	CR-WF3-2009-04729
CR-WF3-2005-00606	CR-WF3-2009-00396	CR-WF3-2009-04780
CR-WF3-2005-02002	CR-WF3-2009-01626	CR-WF3-2009-04806
CR-WF3-2006-00165	CR-WF3-2009-01951	CR-WF3-2009-04813
CR-WF3-2006-03273	CR-WF3-2009-02394	CR-WF3-2009-04846
CR-WF3-2006-03276	CR-WF3-2009-02434	CR-WF3-2009-04849
CR-WF3-2008-01887	CR-WF3-2009-03135	CR-WF3-2009-04888
CR-WF3-2008-01888	CR-WF3-2009-03125	CR-WF3-2009-04944
LO-LAR-2007-00045		

Design Basis Documents

Number	Title	Revision / Date
UFSAR Chapter 8.0	Electric Power	Revision 301
ER-W3-99-0174-00-00	EDG IGCV51V Design Change Criteria	
W3-DBD-008	Electrical Distribution (DC Portion)	02/1996
W3-DBD-11	Electrical Distribution AC Portion	Revision 001
W3-DBD-2	Emergency Diesel Generator & Automatic Load Sequencer	Revision 003

Design Change Packages

Number	Title	Revision / Date
ER-W3-2001-1200-000	Design Change for EFW pump spec.	
ER-W3-2001-0251-000	Design Change for EFW pump spec.	
ER-W3-01-0261-00.00	Design Change for EFW pump spec.	

Drawings

Number	Title	Revision / Date
1546-4263	4.16kV Switchgear 3A3-S Equipment Summary	Revision 010
1564-1060	Diesel Oil Transfer Pump Motor Outline	04/11/2009
1564-451	Low Pressure Safety Injection Pump Motor Data Sheet	11/31/1972
1564-6578	Unit Auxiliary Transformers 3A & 3B Nameplates	Revision 002
1564-B-289	4.16kV SWGR 3A3-5 One Line Diagram	Revision 008
1564-B424 Sh. 530	Control Wiring Diagram (LPSI Circuit Breaker 3A-5)	Revision 015
1564-B424 Sh. 2327	Control Wiring Diagram Diesel Generator A Breaker	Revision 016
B-424 Sh. 2560s2	125V DC Battery Charger 3A1-S & 3A2-S	Revision 007
D-13716 Sh. 2	125V. DC Panel 3A-DC-S & 3B-DC-S	Revision A
G-286	Key Auxiliary One Line Diagram	Revision 016
G-349	Yard Duct Runs and Outdoor Lighting	08/10/1973
G-I67 Sh. 1-4	Safety Injection System	07/08/1991
G-164 Sh. 1	Flow Diagram, Miscellaneous Reactor Auxiliary Systems	Revision 039
G-164	Flow Diagram Miscellaneous Reactor Auxiliary Systems	06/25/1976
G-187 Sh. 2	Emergency Diesel Miscellaneous Piping Sheet 2	Revision 017
G-287 Sh. 1	125 VDC & 120 VAC One Line Diagram	Revision 021
G-M-0001	Waterford Steam Electric Station Radiation and Temperature Charts	Revision 004
G-M-0008	Waterford Steam Electric Station Environmental Zone Map T.C.H.P.S. Reactor Bldg. Plan Elevation 66	Revision 003
G-M-0016	Waterford Steam Electric Station Environmental Zone Map Radiation Reactor Aux. Bldg. Plan Elevation 35	Revision 002
K-7569	Outline LCUN-29, 33	Revision 002
M-9805	Rack Assembly 'L' Series 2 Tier EP3	Revision 003
4305-6635	Revision 4 Waterford SES Unit 3 1981-1165 MW Installation	

Number	Title	Revision / Date
G153 Sh. 4	Flow Diagram Feedwater, Condensate and Air Evacuation Systems.	Revision 040
G160 Sh. 6	Waterford, SES Unit 3, 1165 MW Installation	Revision 012
G160 Sh. 5	Waterford, SES Unit 3, 1165 MW Installation	Revision 018
G160 Sh. 4	Waterford, SES Unit 3, 1165 MW Installation	Revision 016
G160 Sh. 3	Waterford, SES Unit 3, 1165 MW Installation	Revision 032
G160 Sh. 2	Waterford, SES Unit 3, 1165 MW Installation	Revision 049
G160 Sh. 1	Waterford, SES Unit 3, 1165 MW Installation	Revision 049
G164 Sh. 1	Miscellaneous Reactor Auxiliary Systems.	Revision 039
4305-6636	Condensate Isometric	Revision 005
4395-6635	Condensate Isometric	Revision 004

Licensing Documents

Number	Title	Revision / Date
W3F1-2007-0017	Response to GL 2007-01 Submerged Cables	05/03/2007
W3F1-2007-0065	Response to RAI for GL 2007-01	12/18/2007

Maintenance Work Orders

WA 00020040	WA 00426810	WA 51097327
WA 00024337	WA 00431747	WA 51793054
WA 00015350	WA 00431747	WA 05041001
WA-00016894	WA 00114683	WA 05098076
WA-00017456	WA 00117344	WA-50178295
WA 00022946	WA 00128740	WA 50232203
WA-00027684	WA 00134007	WA 50987215
WA 00031199	WA 00176366	WA 51097327
WA 00044658	WA 00156686	WA 51099555
WA 00050716	WA 00164047	WA 51191661
WA 00055388	WA 00409670	WA 51191999
WA 00055425	WA 00426810	WA 51690471
WA 00055443	WA-01072960,	WA 51696421
WA 00083559	WA-01076611,	WA 51793054
WA 00083569	WA 01089129	WA 51799299
WA 00083569	WA-01099889	WA 51802234
WA 00083559	WA-01148564	WA 52033542
WA 00080684	WA-01169612	WA 52023569
WA 00080687	WA-01169951	WA 52038543
WA 00087614	WA 03319601	WA 52189844
WA 00091792	WA 03737701	WA 52191801
WA 00114563	WA 03976604	
WA 00426811	WA 04465801	

Modifications/Engineering Change Packages

Number	Title	Revision / Date
DCP 3362	Station Battery Replacement	Revision 002
ER-W3-2006-0254-000	EDG Starting Air Modification	04/15/2007

Operator Action Items

Number	Title	Revision / Date
EC-S93-008 Attachment 18	WF3 Human Reliability Events	Revision 018
LO-LAR-2009-00192	WF3 Operator Work Arounds/Burdens List	07/11/2009
	WF3 Time Critical Operator Actions	08/19/2009
RFI -I1.01	PRA-Equip Basic Events	07/29/2009
Scenario S1 (mod)	RAS Initiation with Auto-Swap Failure	Revision 000 08/27/2009
Scenario S2 (new)	EDG 'A' Output Breaker Fails to Auto-Close on LOOP with 'B' EDG OOS	Revision 000 08/27/2009
JPM P1 (mod)	Transfer Suction of EFW Pumps from CSP to ACC during a Loss of Main Feedwater Event	Revision 000 08/27/2009
JPM P2 (new)	Local Manual Operation of an EFW Flow Control Valve due to a LOOP with a Subsequent Loss of DC Power	Revision 000 08/27/2009
JPM P3 (mod)	Operate the Atmospheric Dump Valve Locally During a Steam Generator Tube Rupture	Revision 000 08/27/2009

OE Reviewed

LO-NOE-2006-00038, Response to Information Notice 2006-003.

Procedures

Number	Title	Revision / Date
	Maintenance Rule Systems and Status Report	09/16/2009
CE-002-003	Maintaining Auxiliary Component Cooling Water Chemistry	Revision 302
EN-DC-164	Environmental Qualification (EQ) Program	Revision 000
EN-DC-203	Maintenance Rule Program	Revision 001
EN-DC-204	Maintenance Rule Scope and Basis	Revision 001
EN-DC-205	Maintenance Rule Monitoring	Revision 002
EN-DC-206	Maintenance Rule (a)(1) Process	Revision 001
EN-DC-207	Maintenance Rule Periodic Assessment	Revision 001
ENS-DC-201	ENS Transmission Grid Monitoring	Revision 003
EP-002-100	TSC Activation Operation, and Deactivation	Revision 034
ME-003-315	Molded Case Circuit Breaker	Revision 013

Number	Title	Revision / Date
ME-003-230	Battery Service Test	Revision 303
ME-003-240	Battery Performance Test	Revision 302
ME-003-327	4.16kVMagne Blast Breaker	Revision 013.
ME-004-061	Unit Auxiliary Transformer	Revision 303
ME-004-081	Ventilated Dry-Type station Service Transformer	Revision 006
ME-004-141	Low Voltage Switchgear	Revision 301
ME-004-809	Low/Medium Voltage Power and Control Cable/Conductor Terminations and Splices	Revision 302
ME-007-002	Molded Case Circuit Breaker	Revision 015
OP-003-009	Fuel Oil Receipt and Transfer	Revision 304
OP-006-003	125 Vdc Electrical Distribution	Revision 301
OP-006-008	Transformer Operations	Revision 301
OP-009-002	System Operating Procedure Emergency Diesel generator	Revision 310
OP-009-002	System Operating Procedure for the EDG	Revision 310
OP-500-003	Control Room Cabinet C".	
OP-500-004	Alarm Response for EDG A Fuel Oil Day Tank LVL Hi/Lo	Revision 020
OP-600-035	MT, UAT, SUT Local Panel	Revision 006
OP-901-102	CEA or CEDMCS Malfunction	Revision 005
OP-901-311	Loss of Train B Safety Bus	Revision 302
OP-901-314	Degraded Grid Conditions	Revision 001
OP-901-504	Inadvertent ESFAS Actuation	Revision 003
OP-902-002	Loss of Coolant Accident Recovery	Revision 012
OP-902-002	Loss of Coolant Accident Recovery	Revision 012
OP-902-003	Loss of Offsite Power/Loss of Forced Circulation Recovery	Revision 006
OP-902-007	Steam Generator Tube Rupture Recovery	Revision 012
OP-902-007	Emergency Operating Procedure Steam Generator Tube Rupture Recovery	Revision 012
OP-902-008	Functional Recovery	Revision 015
OP-902-009	EOP Standard Appendices, Appendix 7	Revision 301
OP-902-009	Standard Appendixes	Revision 301
OP-903-014	Emergency Feedwater Flow Verification	Revision 011
OP-903-030	Safety Injection Pump Operability Verification	Revision 018
OP-903-068	EDG and Subgroup Relay Operability Verification	Revision 303
OP-903-100	MOV Overload Bypass Test	Revision 301
OP-903-115	Train A Integrated Emergency Diesel Generator/Engineering Safety Features Test.	Revision 011
OP-903-117	EDG Fuel Oil Transfer Pump Operability Check	Revision 303
OP-903-121	Safety Systems Quarterly IST Valve Tests	Revision 009

Surveillance Packages and Tests

Number	Title	Revision / Date
1A OP-903-115 RF-15	Integrated Emergency Diesel Generator Engineering Safety Features Test Section 7.6	05/13/ 2008

Vendor Manuals

Number	Title	Revision / Date
Vender Manual LOU-1564.279A	EBASCO Specification 125 V D-C Distribution Panels Class 1E Equipment	Revision 008
Vender Manual LOU-1564.279C	EBASCO Specification 120V AC & 125C DC Distribution Panels Class 1E Equipment	Revision 007
Vendor Manual 1564-6578	Unit Auxiliary Transformers 3A & 3B Nameplates	
Vendor Manual C629.0045	KSV Diesel Generator Operation and Maintenance Manual	Revision 020
Vendor Manual F055-0215	Federal Pacific Unit Auxiliary Transformer Installation Operation and Maintenance	Revision 001
Vendor Manual G080.0085	General Electric Metal Clad Switchgear Types M26 and M36	Revision 006
Vendor Manual G080.0095	General Electric Switchgear Magne Blast Circuit Breakers	Revision 004
Vendor Manual G080.0225	General Electric Model BDD 16B	Revision 001
Vendor Manual G080.0235	General Electric Model HAA 16B2	
Vendor Manual G080.0245	General Electric Model IAC51	
Vendor Manual G080.0255	General Electric Model IAV51K1A	
Vendor Manual G6080.0625	General Electric Station Service Ventilated Dry Transformers	Revision 000
Vendor Manual W120.2495	Westinghouse Model 290B225A10A SA1	

Miscellaneous Documents

Number	Title	Revision / Date
00000-PE-410	General Engineering Specification for Safeguards Pumps	Revision 003
1901	Model Testing of the Safety Injection System Sump	06/1982
9270-PE-410	Project Specification for Safety Injection Pumps for Louisiana Power & Light Company Waterford Steam Electric Plant"	Revision 003

Number	Title	Revision / Date
9270-PE-410	Project Specification for Safety Injection Pumps for Louisiana Power & Light Company Waterford Steam Electric Plant	Revision 003
Report No: 23495	Anaconda Industries Report	08/18/1980
D25-05B.	Bill of Material	
ER-W3-2000-0574-001	HPSI A High Vibration Correction	Revision 000
ER-W3-2002-0530-000	Rebaseline of HPSI Pump 'A' vibration following rotating element replacement	Revision 000
Letter from M. J. Clifford (Ingersol-Rand) to David Klinksiek (LP&L)	NRC Bulletin 88-04 - Review of Mim Flow Rates	02/01/1989.
Letter from T. W. Alexion (U.S.N.R.C.) to J. E. Venable (Entergy)	Waterford Steam Electric Station, Unit 3 (Waterford 3) – Issuance of Exigent Amendment Re: Removal of License Condition on Instrument Uncertainty (TAC No . MC6835)	05/23/2005
LOU 1564.266	Ebasco 5kV and 15kV Class 1E Cable Specification	Revision 006
LOU 1564.266A	Ebasco 5kV and 15kV Non-Class 1E Cable Specification	Revision 002
LO-WLO-2009-0010	Waterford 3 Component Design Basis Assessment Report CA3	
NRC BULLETIN 88-04	Potential Safety-Related Pump Loss	05/05/1988
Packing List Invoice # 92C469		Dated 9/14/92.
Purchase Order 47282		Dated 8/17/92.
Regulatory Guide-1.118	Periodic Testing of Electric Power and Protection Systems	Revision 003
System Health Report	High Pressure Safety Injection 1st Qtr 2008	Revision 000
System Health Report	High Pressure Safety Injection 2nd Qtr 2008	Revision 000
System Health Report	High Pressure Safety Injection 3rd Qtr 2007	Revision 000
System Health Report	High Pressure Safety Injection 3rd Qtr 2008	Revision 000
System Health Report	High Pressure Safety Injection 4th Qtr 2007	Revision 000

Number	Title	Revision / Date
System Health Report	High Pressure Safety Injection 4th Qtr 2008	Revision 000
System Health Report	Low Pressure Safety Injection 1st Qtr 2008	Revision 000
System Health Report	Low Pressure Safety Injection 1st Qtr 2009	Revision 000
System Health Report	Low Pressure Safety Injection 2nd Qtr 2008	Revision 000
System Health Report	Low Pressure Safety Injection 3rd Qtr 2007	Revision 000
System Health Report	Low Pressure Safety Injection 3rd Qtr 2008	Revision 000
System Health Report	Low Pressure Safety Injection 4th Qtr 2007	Revision 000
TD-1075.0035	Ingersoll-Rand Low Pressure Safety Injection Pumps Calculations, Drawings and Parts Lists	Revision 002
	Three Year Summary Megger Report for AFW Pump 1B (submerged cables)	09/18/2009
	Three Year Summary Megger Report for CW Pump A (submerged cables)	09/18/2009
	Three Year Summary Megger Report for CW Pump B (submerged cables)	09/18/2009
	Three Year Summary Megger Report for CW Pump C (submerged cables)	09/18/2009
	Three Year Summary Megger Report for CW Pump D (submerged cables)	09/18/2009
	Three Year Summary Megger Report for FHD Pump A (submerged cables)	09/18/2009
	Three Year Summary Megger Report for FHD Pump B (submerged cables)	09/18/2009
	Three Year Summary Megger Report for FHD Pump C (submerged cables)	09/18/2009
	Three Year Summary Megger Report for TCW Pump B (submerged cables)	09/18/2009
W3-DBD-001	Safety Injection system Design Basis Document	Revision 302
W3F1-2005-0032	Letter from T. G. Mitchell (Entergy) to U.S.N.R.C., "License Amendment Request NPF-38-249-1 Extended Power Uprate (Amendment 199) License Condition Regarding Instrument Uncertainty."	
W3P88-1247	Letter from R. F. Burski (LP&L) to U.S.N.R.C. "Waterford 3 SES," Docket No 50—382, License No. NPF—38, NRC Bulletin No. 88-04	07/12/1988

Number	Title	Revision / Date
W3P88-1840	Letter from Louisiana Power and Light to U.S.N.R.C. "Waterford 3 SES" Docket No50—382, License No. NPF—38, NRC Bulletin No. 88-04	11/01/1988
W3P89-2100	Letter from R. F. Burski (LP&L) to U.S.N.R.C. "Waterford 3 SES" Docket No 50—382, License No. NPF—38, NRC Bulletin No. 88-04	10/31/1989
PE-004-021	Thermal Performance Analysis for the "A" CCW Heat Exchanger.	04/8/2009
OP-903-014	50.59 Screening for dated	02/17/1999
LOU-1564.117	Emergency Steam Generator Feed Pumps and Accessories	Revision 007
1-74-06-32481	Component Cooling Water Heat Exchanger.	Revision 10/20/1976
Letter W3F1-91-0468	Inservice Testing Plan – Pumps and Valves	Revision 007 Change 1 09/03/1991
Letter Sulzer Pumps to Patrick Lewis of Entergy	Pump startup with discharge check valve leakage causing the pump to rotate backwards [the subject is Aux Feedwater Pumps but a check of the pumps' serial number has concluded that this applies to Waterford's Emergency Feedwater Pumps (S/N 230224/25 and 230223)	09/11/2009
Letter WF3 to the US NRC	Technical Specification Change Request NPF-38-233, Emergency Diesel Generator Surveillance Requirements	07/10/2001
Letter US NRC to Mr. Charles Dagger	Vice President Operations, Entergy Operations Inc., Amendment for a Previously Unrelieved Safety Question regarding Emergency Diesel generator Fuel Oil Storage and Transfer Systems Design Basis	02/16/2000
Letter W3F1-99-019	Waterford 3 to U.S. Nuclear Regulatory Commission, EDG Fuel Oil Storage Capacity Unresolved Safety Question	03/03/1999
Letter W3P90-0207	NRC Generic Letter 89-13	01/29/1990
	Struthers Wells Installation Operation and Maintenance Instructions for Component Cooling Water Heat Exchangers	03/19/1997