UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BLVD
ARLINGTON, TEXAS 76011-4511

March 12, 2012

Donna Jacobs, Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC TRIENNIAL FIRE PROTECTION INSPECTION, NRC INSPECTION REPORT 05000382/2012007

Dear Ms. Jacobs:

On February 17, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Waterford 3. The enclosed inspection report documents the inspection results, which were discussed in an exit meeting on February 17, 2012, with Mr. K. Nichols, Director, Engineering 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 personnel.

Two NRC-identified findings of very low safety significance (Green) were identified during this inspection. These findings were determined to involve violations of NRC requirements. The NRC is treating these violations as non-cited violations consistent with Section 2.3.2 of the NRC Enforcement Policy.

If you contest any non-cited violation in this report, you should provide a written response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Senior Resident Inspector at the Waterford Steam Electric Station, Unit 3 facility. 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 Waterford Steam Electric Station, Unit 3. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

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

Sincerely,

/RA/

Geoffrey Miller, Chief
Engineering Branch 2
Division of Reactor Safety

Docket: 05000382
License: NPF-38

Enclosure: Inspection Report No. 05000382/2012007
w/Attachment: Supplemental Information

cc w/Enclosure:

Electronic Distribution - Waterford Steam Electric Station Unit 3

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	05000382
License:	NPF-38
Report No.:	05000382/2012007
Licensee:	Entergy Operations, Inc.
Facility:	Waterford Steam Electric Station, Unit 3
Location:	17265 River Road Killona, Louisiana
Dates:	January 30 to February 17, 2012
Team Leader:	Gregory Pick, Senior Reactor Inspector, Engineering Branch 2
Inspectors:	John Mateychick, Senior Reactor Inspector, Engineering Branch 2 Eduardo Uribe, Reactor Inspector, Engineering Branch 2 Matthew Young, Reactor Inspector, Engineering Branch 1
Approved By:	Geoffrey Miller, Chief Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000382/2012007; 01/30 – 02/17/2012; Waterford Steam Electric Station, Unit 3; Triennial Fire Protection Team Inspection

The report covered a two-week triennial fire protection team inspection by specialist inspectors from Region IV. Two Green findings, which were non-cited violations, were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process (SDP) does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a non-cited violation of License Condition 2.C.9 and Appendix R, Section III.G for the failure to adequately evaluate the impact of fire damage on the dry cooling tower fans. Specifically, the failure to adequately evaluate fire damage to the dry cooling tower fans did not ensure one train remained available to achieve and maintain hot shutdown conditions from the alternate shutdown panel. The licensee documented this deficiency in Condition Report 2012-00837.

  The failure to adequately evaluate the impact of fire damage on the dry cooling tower fans was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated this deficiency using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process." The performance deficiency affected the fire protection defense-in depth strategies involving post-fire safe shutdown systems. Since this finding involved a control room abandonment issue, a senior reactor analyst performed a Phase 3 significance determination. The senior reactor analyst determined this finding had very low risk significance based upon a bounding analysis (Green). The dominant core damage sequences involved a fire initiating event, failure of both the component cooling water and auxiliary component cooling water systems, as well as an independent failure of the turbine driven auxiliary feedwater pump. Equipment that helped to mitigate the significance included the unaffected offsite power system, the viable steam generators and the safety related auxiliary feedwater system. Because the original failure to evaluate the impact of fire damage on the dry cooling tower fans had occurred longer than three years prior to this inspection, this finding did not reflect current licensee performance (Section 1R05.05.b.1).

- Green. The team identified a non-cited violation of License Condition 2.C.9 and the fire protection program for the failure to perform a post-fire safe shutdown analysis design calculation. Specifically, the team determined that the licensee had not calculated the time available to establish component cooling water to prevent damaging the emergency diesel generator when providing power to post-fire safe shutdown components. The licensee documented this deficiency in Condition Report 2012-00818.

  The failure to perform a design calculation evaluating the ability to remove heat based upon emergency diesel generator loading following a control room fire was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated the significance of this finding using Manual Chapter 0609, Appendix F. The performance deficiency affected the fire protection defense-in depth strategies involving post-fire safe shutdown systems. Using Appendix F, the team assigned this finding a low degradation rating because the system was expected to display nearly the same level of effectiveness and reliability as it would had the degradation not been present. Specifically, the component cooling water system could accommodate the heat in the jacket water system of a lightly loaded diesel generator. This finding screened as very low safety significance (Green) in the Phase 1 evaluation. Because the original failure to perform a design calculation had occurred longer than three years prior to this inspection, this finding did not reflect current licensee performance (1R05.05.b.2).

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R05 Fire Protection (71111.05T)

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure 71111.05T, "Fire Protection (Triennial)," at Waterford 3. The licensee committed to adopt a risk informed fire protection program in accordance with National Fire Protection Association 805 (NFPA-805), "Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)," but had not yet completed the program transition. The inspection team evaluated the implementation of the approved fire protection program in selected risk-significant areas, with an emphasis on the procedures, equipment, fire barriers, and systems that ensure the post-fire capability to safely shutdown the plant.

Inspection Procedure 71111.05T requires the selection of three to five fire areas for review. The inspection team used: the fire hazards analysis, the Waterford 3 Individual Plant Examination of External Events and Attachment W, "Fire PRA Insights," to the License Amendment Request to Adopt NFPA 805, dated November 17, 2011, to select the following risk-significant fire areas (inspection samples) for review:

- Fire Area RAB 7, Relay Rooms (+35' Elevation)
- Fire Area RAB 8, Switchgear Rooms
- Fire Area RAB 15, Diesel Generator B Room
- Fire Area RAB 23, +21' Elevation General Corridors

The inspection team evaluated the licensee's fire protection program using the applicable requirements, which included the Technical Requirements Manual, plant Technical Specifications, the operating license, NRC safety evaluations, 10 CFR 50.48, and Branch Technical Position 9.5-1. The team also reviewed related documents that included the Final Safety Analysis Report, Section 9.5; the fire hazards analysis; and the post-fire safe shutdown analysis.

Specific documents reviewed by the team are listed in the attachment. The team completed four inspection samples.

.01 Protection of Safe Shutdown Capabilities

a. Inspection Scope

The team reviewed the piping and instrumentation diagrams, safe shutdown equipment list, safe shutdown design basis documents, and the post-fire safe shutdown analysis to verify that the licensee properly identified the components and systems necessary to achieve and maintain safe shutdown conditions for fires in the selected fire areas. The team observed walk downs of the procedures used for achieving and maintaining safe shutdown in the event of a fire to verify that the procedures properly implemented the safe shutdown analysis provisions.

For each of the selected fire areas, the team reviewed the separation of redundant post-fire safe shutdown cables, equipment, and components located within the same fire area. The team also reviewed the licensee's method for meeting the requirements of 10 CFR 50.48; Branch Technical Position 9.5-1, Appendix A; and 10 CFR Part 50, Appendix R, Section III.G. Specifically, the team evaluated whether at least one post-fire safe shutdown success path remained free of fire damage in the event of a fire. In addition, the team verified that the licensee met applicable license commitments.

b. Findings

No findings were identified.

.02 Passive Fire Protection

a. Inspection Scope

The team walked down accessible portions of the selected fire areas to observe the material condition and configuration of the installed fire area boundaries (including walls, fire doors, and fire dampers) and verified that the electrical raceway fire barriers were appropriate for the fire hazards in the area. The team compared the installed configurations to the approved construction details, supporting fire tests, and applicable license commitments.

The team reviewed installation, repair, and qualification records for a sample of penetration seals to ensure the fill material possessed an appropriate fire rating and that the installation met the engineering design. The team also reviewed similar records for the rated fire wraps to ensure the material possessed an appropriate fire rating and that the installation met the engineering design.

b. Findings

No findings were identified.

.03 Active Fire Protection

a. Inspection Scope

The team reviewed the design, maintenance, testing, and operation of the fire detection and suppression systems in the selected fire areas. The team verified that the automatic detection systems and that the manual and automatic suppression systems were installed, tested, and maintained in accordance with the National Fire Protection Association code of record or approved deviations, and that each suppression system was appropriate for the hazards in the selected fire areas.

The team walked down accessible portions of the detection and suppression systems in the selected fire areas. The team walked down major system support equipment in other areas (e.g., fire pumps) to assess the material condition of these systems and components.

The team reviewed the electric and diesel fire pump flow and pressure tests to verify that

the pumps met their design requirements. The team also reviewed the fire protection flow tests to verify that the system capability met the design requirements.

The team assessed the fire brigade capabilities by reviewing training and qualification records. The team also reviewed pre-fire plans and smoke removal plans for the selected fire areas to determine if appropriate information was provided to fire brigade members and plant operators to identify safe shutdown equipment and instrumentation, and to facilitate suppression of a fire that could impact post-fire safe shutdown capability. In addition, the team inspected fire brigade equipment to determine operational readiness for fire fighting.

The team observed an unannounced fire drill simulating a fire at the Emergency Diesel Generator B (Fire Area RAB 15), conducted on February 15, 2012, and the subsequent drill critique using the guidance contained in Inspection Procedure 71111.05AQ, "Fire Protection Annual/Quarterly." The simulated fire occurred in the Auxiliary Building, located in the radiological controlled area. The team verified that the licensee identified problems, openly discussed them in a self-critical manner at the drill debrief, and identified appropriate corrective actions. Specific attributes evaluated were: (1) proper wearing of turnout gear and self-contained breathing apparatus; (2) proper use and layout of fire hoses; (3) employment of appropriate fire fighting techniques; (4) sufficient firefighting equipment was brought to the scene; (5) effectiveness of fire brigade leader communications, command, and control; (6) identification of personnel in the area; (7) smoke removal operations; (8) utilization of pre-planned strategies; (9) adherence to the pre-planned drill scenario; and (10) drill objectives.

b. Findings

No findings were identified.

.04 Protection from Damage from Fire Suppression Activities

a. Inspection Scope

The team performed plant walk downs and document reviews to verify that redundant trains of systems required for hot shutdown, which are located in the same fire area, would not be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems. Specifically, the team verified that:

- A fire in one of the selected fire areas would not directly, through production of smoke, heat, or hot gases, cause activation of suppression systems that could potentially damage all redundant safe shutdown trains.

- A fire in one of the selected fire areas or the inadvertent actuation or rupture of a fire suppression system would not directly cause damage to all redundant trains (e.g., sprinkler-caused flooding of other than the locally affected train).

- Adequate drainage is provided in areas protected by water suppression systems.

b. Findings

No findings were identified.

.05 Alternative Shutdown Capability

a. Inspection Scope

Review of Methodology

The team reviewed the post-fire safe shutdown analysis, operating procedures, piping and instrumentation diagrams, electrical drawings, the Final Safety Analysis Report, and other supporting documents to verify that hot and cold shutdown could be achieved and maintained from outside the control room for fires that require evacuation of the control room, with or without offsite power available.

The team walked down the plant to verify that the plant configuration was consistent with the description contained in the post-fire safe shutdown and fire hazards analyses. The team evaluated the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor decay heat removal, process monitoring instrumentation, and support system functions.

The team also verified that the systems and components credited for post-fire safe shutdown would remain free from fire damage. Finally, the team verified that the transfer of control from the control room to the alternative shutdown location would not be affected by fire induced circuit faults (e.g., by the provision of separate fuses and power supplies for alternative shutdown control circuits).

Review of Operational Implementation

The team verified that licensed and non-licensed operators received training on alternative shutdown procedures. The team verified that sufficient personnel to perform post-fire safe shutdown actions were trained and available onsite at all times, exclusive of those assigned as fire brigade members.

A walkthrough of the post-fire safe shutdown procedure with licensed and non-licensed operators was performed to determine the adequacy of the procedure. The team verified that the operators could be reasonably expected to perform specific actions within the time required to maintain plant parameters within specified limits (i.e., those expected to occur in response to a loss of offsite power). Time critical actions that were verified included restoring electrical power, establishing control at the auxiliary shutdown and local shutdown panels, establishing reactor coolant makeup, and establishing decay heat removal.

The team reviewed manual actions to ensure that they had been properly reviewed and approved and that the actions could be implemented in accordance with plant procedures in the time necessary to support the post-fire safe shutdown method.

The team also reviewed the periodic testing of the alternative shutdown transfer capability and instrumentation and control functions to verify that the tests were adequate to demonstrate the functionality of the alternative shutdown capability.

b. Findings

.1 Failure to Adequately Evaluate the Impact of Fire Damage on the Dry Cooling Tower Fans

Introduction. The team identified a Green non-cited violation of License Condition 2.C.9 and Appendix R, Section III.G for the failure to adequately evaluate the impact of fire damage on the dry cooling tower fans. Specifically, the failure to adequately evaluate fire damage to the dry cooling tower fans did not ensure one train remained available to achieve and maintain hot shutdown conditions from the alternate shutdown panel. The licensee documented this deficiency in Condition Report 2012-00837.

Description. The approved fire protection program provided alternative shutdown capability to allow safe shutdown of the plant for a fire requiring an evacuation of the control room. The licensee protected Train B components; consequently, the post-fire safe shutdown analysis assumed Train A equipment would be unavailable. The licensee used Procedure OP-901-502, "Evacuation of Control Room and Subsequent Plant Shutdown," Revision 21, to implement the control room evacuation resulting from a fire in the control room. While evaluating circuit protection schemes used for post-fire safe shutdown components, the team identified that the licensee did not adequately evaluate the impact of fire damage on the dry cooling tower fans.

The team evaluated circuit protection methods used by the licensee to protect post-fire safe shutdown components needed to achieve hot shutdown during the control room evacuation. The licensee protected post-fire safe shutdown components required to achieve hot shutdown by using either back-up fuses or current limiting resistors in their circuits. Both circuit protection methods ensure post-fire safe shutdown components would continue to function and be available upon transfer from the control room to the alternate shutdown panel.

The first circuit protection method consists of two fuses, one normal and one back-up. The normal fuse would open and protect the circuit if fire damage caused excessive current. Procedure OP-901-502 directed the operators to place the fuse transfer switches for various components required for hot shutdown to the back-up position. This action places the backup fuse and circuitry for hot shutdown post-fire safe shutdown components in service at the alternative shutdown panel. The second circuit protection method used a current limiting resistor in the circuit such that it reduced peaking currents resulting from a fault, which prevented the currents from exceeding the rating for the fuses. Since the fuses were protected, the circuit remained available and capable of powering the applicable post-fire safe shutdown components necessary to achieve hot shutdown.

From review of circuit drawings, the team determined that the licensee did not protect the 15 Train B dry cooling tower fan circuits against fire damage using either circuit protection method. Each dry cooling tower train includes five groups of three fans. The team determined the post-fire safe shutdown analysis had incorrectly assumed that a single spurious operation caused by a fire in the control room would actuate a single group of three dry cooling tower fans. The team independently walked down the control room and circuit layout for the dry cooling tower fans. The team determined that a fire in Control Panel 33 would affect all 15 dry cooling tower fans as a result of fire damage and did not require any spurious circuit actuations. Since a single control panel fire could

render all the dry cooling tower fans inoperable, the licensee implemented an hourly fire watch as a compensatory measure in the control room. The licensee documented this deficiency in Condition Report 2012-00837.

Analysis. The failure to adequately evaluate the impact of fire damage on the dry cooling tower fans was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated this deficiency using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process." The performance deficiency affected the fire protection defense-in depth strategies involving post-fire safe shutdown systems. Since this finding involved a control room abandonment issue, a senior reactor analyst performed a Phase 3 significance determination (refer to Attachment B).

The senior reactor analyst determined this finding had very low risk significance based upon a bounding analysis (Green). The dominant core damage sequences involved a fire initiating event, failure of both the component cooling water and auxiliary component cooling water systems, as well as an independent failure of the turbine driven auxiliary feedwater pump. Equipment that helped to mitigate the significance included the unaffected offsite power system, the viable steam generators and the safety related auxiliary feedwater system. Because the original failure to evaluate the impact of fire damage on the dry cooling tower fans had occurred longer than three years prior to this inspection, this finding did not reflect current licensee performance.

Enforcement. License Condition 2.C.9 states "EOI shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility and as approved in the Safety Evaluation Report through Supplement 9." Final Safety Evaluation Report, Section 9.5.1.3.1, "Detailed Comparison to Appendix A to Branch Technical Position APCSB 9.5-1, Revision 0," Item C specifies that quality assurance requirements for fire protection are documented in Procedure UNT-005-013, "Fire Protection Program." Procedure UNT-005-013, Revision 12, Section 5.8.2.1.b.4, states in part, "Reviews include items such as design reviews to verify adequacy of wiring isolation and cable separation criteria in accordance with 10 CFR 50 Appendix R." 10 CFR Part 50, Appendix R, Section III.G specifies, "Fire protection features shall be capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station is free of fire damage."

Contrary to the above, prior to February 17, 2012, the licensee failed to meet License Condition 2.C.9 by implementing and maintaining in effect all provisions of the approved fire protection program and Appendix R, Section III.G to ensure that one train of post-fire safe shutdown systems was free of fire damage. Specifically, the licensee failed to adequately evaluate the impact of fire damage on the dry cooling tower fans and ensure their availability at the alternate shutdown panel following a control room evacuation because of fire. This finding does not qualify for enforcement discretion as described in the "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" since this finding was not identified during their transition process. Because this finding is of very low safety significance and has been entered into the corrective action program (Condition Report 2012-00837), this violation

is being treated as a non-cited violation, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000382/2012007-01, Failure to Adequately Evaluate the Impact of Fire Damage on the Dry Cooling Tower Fans.

.2 Failure to Calculate Adequate Cooling Provided to Diesel Generator B within Required Time

Introduction. The team identified a Green non-cited violation of License Condition 2.C.9 and the fire protection program for the failure to perform a post-fire safe shutdown analysis design calculation. Specifically, the team determined that the licensee had not calculated the time available to establish component cooling water to prevent damaging the emergency diesel generator when providing power to post-fire safe shutdown components. The licensee documented this deficiency in Condition Report 2012-00818.

Description. The team reviewed the post-fire safe shutdown analysis that supported time critical operator actions (performed in the first 60 minutes) related to control room evacuation because of a fire. During this review, the team identified that the licensee had not completed a post-fire safe shutdown analysis calculation that determined the actual time available to initiate component cooling water prior to damage occurring in Emergency Diesel Generator B. The team determined this calculation was needed to support the 10-minute time critical action related to establishing component cooling water flow to the emergency diesel generator jacket water system.

Procedure OP-901-502 specified that operators must establish component cooling water to the emergency diesel generator jacket water within ten minutes. The component cooling water cools the jacket water system, which provides a heat sink for the emergency diesel generator by rejecting heat to the component cooling water system. The team determined that the licensee had completed a design calculation related to automatic start and loading of the emergency diesel generators for a loss of coolant accident. Under these conditions, operators had three minutes to establish cooling to the jacket water to prevent damage to the emergency diesel generator.

Procedure OP-901-502 directed the operators to shed loads supplied by Emergency Diesel Generator B and start the Component Cooling Water Pump B, if needed, following a control room evacuation because of a fire. Consequently, the team assumed that fire damage initiates an automatic start of the emergency diesel generator and failed to load Component Cooling Water Pump B. Based on actual times determined during the Procedure OP-901-502 walk downs, the team determined that the emergency diesel generator would be running loaded for approximately 5.5 minutes prior to operators manually shedding the loads. After the load shedding, a mini-sequencer will start and load post-fire safe shutdown components needed to safely shutdown of the plant. Since Component Cooling Water Pump B will not be started by the mini-sequencer because the relays will not reset, the procedure directs the operator at the alternative shutdown panel to manually start Component Cooling Water Pump B prior to 10 minutes to prevent damage to the emergency diesel generator.

The team determined that engineers had identified the 10-minute response time for starting a component cooling water pump as a corrective action in a condition report documenting a similar issue identified at another facility. The corrective action evaluation did not provide an adequate basis for establishing cooling within 10 minutes. The team also identified that the evaluation did not take into account spurious operation

of plant components as required during the control room fire evacuation scenario, which would increase the diesel generator loading and cause a higher heat-up rate. The team concluded the licensee should have revised their post-fire safe shutdown analysis to demonstrate the ability to meet the required response time.

The team determined that the loading on the emergency diesel generator in this scenario would be significantly less than the design basis loading documented in their loss of coolant accident calculation. Further, the capacity of the component cooling water system will provide a large heat sink to allow for operator response time. From review of the evaluation contained in the condition report and with the lower loading of the emergency diesel generator, the team determined that operators would have time to initiate component cooling water to the jacket water system before failure of the emergency diesel generator. The licensee documented the failure to determine the actual diesel generator loading and heat rejection to the component cooling water system in Condition Report 2012-00818.

Analysis. The failure to perform a design calculation evaluating the ability to remove heat based upon emergency diesel generator loading following a control room fire was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated the significance of this finding using Manual Chapter 0609, Appendix F. The performance deficiency affected the fire protection defense-in depth strategies involving post-fire safe shutdown systems. Using Appendix F, the team assigned this finding a low degradation rating because the system was expected to display nearly the same level of effectiveness and reliability as it would had the degradation not been present. Specifically, the component cooling water system could accommodate the heat in the jacket water system of a lightly loaded diesel generator. This finding screened as very low safety significance (Green) in the Phase 1 evaluation. Because the original failure to perform a design calculation had occurred longer than three years prior to this inspection, this finding did not reflect current licensee performance.

Enforcement. License Condition 2.C.9 states "EOI shall implement and maintain in effect all provisions of the approved fire protection program as described in the Final Safety Analysis Report for the facility and as approved in the Safety Evaluation Report through Supplement 9." Final Safety Evaluation Report, Section 9.5.1.6.3 specifies Procedure UNT-005-013, "Fire Protection Program," describes responsibilities, control and implementing requirements for the Waterford 3 fire protection program. Procedure UNT-005-013, Section 5.12.1, states, "Post-Fire Safe Shutdown has been analyzed and is described in Calculation EC-F00-026." Calculation EC-F00-026, Appendix D states, "All safe shutdown functions will be evaluated as required to permit the operation of equipment used for safe shutdown functions."

Contrary to the above, from August 2007 until February 17, 2012, the licensee failed to comply with License Condition 2.C.9 and implement and maintain in effect all provisions of their fire protection program in that the licensee did not properly evaluate all post-fire safe shutdown functions. Specifically, the licensee failed to perform a post-fire safe shutdown analysis as part of Calculation EC-F00-026 to demonstrate that the emergency diesel generator would not be damaged prior to the time specified for

operators to restore component cooling water. This finding does not qualify for enforcement discretion as described in the "Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" since this finding was not identified during their transition process. Because this finding is of very low safety significance and has been entered into the corrective action program (Condition Report 2012-00818), this violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the NRC Enforcement Policy:
NCV 05000382/2012007-02, Failure to Calculate Adequate Cooling Provided to Diesel Generator B within Required Time.

.06 Circuit Analysis

a. Inspection Scope

The team reviewed the post-fire safe shutdown analysis to verify that the licensee identified the circuits that may impact the ability to achieve and maintain safe shutdown. The team verified, on a sample basis, that the licensee properly identified the cables for equipment required to achieve and maintain hot shutdown conditions in the event of a fire in the selected fire areas. The team verified that these cables were either adequately protected from the potentially adverse effects of fire damage or were analyzed to show that fire induced circuit faults (e.g., hot shorts, open circuits, and shorts to ground) would not prevent safe shutdown. The team reviewed the circuits associated with the following components:

- CVC-183, Volume Control Tank Outlet Valve
- CVC-507, Refueling Water Storage Pool Supply Valve
- MS-401A, Emergency Feedwater Pump Turbine Steam Supply Valve Train A
- MS-401B, Emergency Feedwater Pump Turbine Steam Supply Valve Train B
- MS-416, Emergency Feedwater Pump Turbine Stop Valve
- SUPS 3AB, Static Uninterruptible Power Supply 3AB

For this sample, the team reviewed electrical elementary and block diagrams and identified power, control, and instrument cables necessary to support their operation. In addition, the team reviewed cable routing information to verify that fire protection features were in place as needed to satisfy the separation requirements specified in the fire protection license basis. The team also reviewed circuit coordination studies for the safety related 4160 volt emergency bus.

b. Findings

No findings were identified.

.07 Communications

a. Inspection Scope

The team inspected the contents of designated emergency storage lockers and reviewed the alternative shutdown procedure to verify that portable radio communications and fixed emergency communications systems were available, operable, and adequate for the performance of designated activities. The team verified

the capability of the communication systems to support the operators in the conduct and coordination of their required actions. The team also verified that the design and location of communications equipment such as repeaters and transmitters would not cause a loss of communications during a fire.

b. Findings

No findings were identified.

.08 Emergency Lighting

a. Inspection Scope

The team reviewed the portion of the emergency lighting system required for alternative shutdown to verify that it was adequate to support the performance of manual actions required to achieve and maintain hot shutdown conditions and to illuminate access and egress routes to the areas where manual actions would be required. The team evaluated the locations and positioning of the emergency lights during a walkthrough of the alternative shutdown procedure.

The team verified that the licensee installed emergency lights with an 8-hour capacity, maintained the emergency light batteries in accordance with manufacturer recommendations, and tested and performed maintenance in accordance with plant procedures and industry practices.

b. Findings

No findings were identified.

.09 Cold Shutdown Repairs

a. Inspection Scope

The team evaluated whether the licensee identified repairs needed to reach and maintain cold shutdown and had dedicated repair procedures, equipment, and materials to accomplish these repairs. Using these procedures, the team evaluated whether these components could be repaired to bring the plant to cold shutdown within the time frames specified in their design and licensing bases. The team reviewed whether the repair equipment, components, tools, and materials needed for the repairs were available and accessible on site.

b. Findings

No findings were identified.

.10 Compensatory Measures

a. Inspection Scope

The team verified that compensatory measures were implemented for out-of-service, degraded, or inoperable fire protection and post-fire safe shutdown equipment, systems, or features (e.g., detection and suppression systems and equipment; passive fire barriers; or pumps, valves, or electrical devices providing safe shutdown functions). The team also verified that the short-term compensatory measures compensated for the degraded function or feature until appropriate corrective action could be taken and that the licensee was effective in returning the equipment to service in a reasonable period of time.

b. Findings

No findings were identified.

.11 B.5.b Inspection Activities

a. Inspection Scope

The team reviewed the licensee's implementation of guidance and strategies intended to maintain or restore core, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire as required by Section B.5.b of the Interim Compensatory Measures Order, EA-02-026, dated February 25, 2002 and 10 CFR 50.54(hh)(2).

The team reviewed the strategies to verify that they continued to maintain and implement procedures, maintain and test equipment necessary to properly implement the strategies, and ensure station personnel were knowledgeable and capable of implementing the procedures. The team performed a visual inspection of portable equipment used to implement the strategy to ensure the availability and material readiness of the equipment, including the adequacy of portable pump trailer hitch attachments, and verify the availability of onsite vehicles capable of towing the portable pump. The team assessed the offsite ability to obtain fuel for the portable pump and foam used for firefighting efforts. The team reviewed the following strategies described in Procedure S-SAMG-1, "Loss of Large Areas of the Plant Due To Fire/Explosion," Revision 12:

- Makeup to the Refueling Water Storage Pool
- Makeup to the Condensate Storage Pool
- Operation of the Atmospheric Dump Valves
- Feeding Steam Generators with Portable Pump

The team completed four samples.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems

Corrective Actions for Fire Protection Deficiencies

a. Inspection Scope

The team selected a sample of condition reports associated with the fire protection program to verify that the licensee had an appropriate threshold for identifying deficiencies. The team evaluated the quality of recent engineering evaluations through a review of condition reports, calculations, and other documents during the inspection. In addition, the team reviewed the corrective actions implemented for previous noncompliances to verify that they were effective in correcting identified deficiencies.

b. Findings and Observations

No findings of significance were identified.

During review of corrective actions for previous fire protection deficiencies, the team observed two examples of ineffective corrective actions. The team determined both performance deficiencies were minor using the criteria in Manual Chapter 0612. The team documented these issues because of the insights provided into the corrective action program.

Cold Shutdown Repair Fuses

During the walk down to verify availability of cold shutdown equipment, the team determined that the number of fuses required to repair post-fire safe shutdown equipment needed to achieve to cold shutdown was again not available. In addition, the team determined that the licensee had not specified the fuse size required for the post-fire safe shutdown components. The team determined that the licensee failed to ensure that all equipment that was susceptible to fire damage had a replacement fuse pre-staged, identified and readily available. The licensee initiated Condition Reports 2012-00622 and 2012-00739 to document the identified deficiencies. The team determined the failure to correct a condition adverse to fire protection was a minor violation and the first example of ineffective corrective actions.

Bent Sprinkler Head Deflector Plates

During walk downs, the team identified two bent sprinkler head deflector plates, which had been identified during the previous triennial fire protection inspection. A previous non-cited violation documented damaged sprinkler heads in NRC Inspection Report 05000382/2009006. The team confirmed the two sprinkler heads, which had sprinkler head guards, had condition reports documenting the bent deflector plates. Bent sprinkler head deflector plates affect the spray pattern and may prevent 100 percent coverage of the area as required/designed.

The team reviewed work orders and corrective action documents related to the two sprinkler heads with bent deflector plates. The licensee had replaced the damaged sprinkler heads within one month; however, the licensee had not installed sprinkler head

guards on those susceptible to mechanical damage until 18 months after identification by the NRC. The team determined that licensee continued to evaluate whether National Fire Protection Association 13-1976, "Sprinkler Systems," required installing sprinkler head guards while initiating a design modification in parallel. One year after identification as a deficiency, the licensee determined that the guards were required and could be added as part of the existing configuration by using work orders. By the time the licensee installed the sprinkler head guards, the sprinkler head deflector plates had again been damaged. The team determined that the licensee had entered the bent sprinkler head deflector plates in the corrective action program for repair.

Because the licensee failed to take timely corrective actions to install sprinkler head guards, the team determined that sprinkler head deflector plates on sprinkler heads susceptible to damage were again bent. From discussions with the licensee, the team determined the delay related to the sprinkler heads resulted from a lack of prioritization and the initiation of the design process to obtain appropriate sprinkler head guards. The team determined this was the second example of ineffective corrective actions. The licensee documented the lack of timely corrective actions to install sprinkler head guards in Condition Report 2012-00862.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented the inspection results to Mr. K. Nichols, Director, Engineering, and other members of the licensee staff at an exit meeting on February 17, 2012. The licensee acknowledged the findings presented.

The team asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENTS: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Becker, Fire Protection Engineer
N. Bernard, Non-licensed Operator
L. Blocker, Nuclear Oversight Manager
T. Caruthers, Fire Brigade Training
M. Chaisson, Shift Manager
K. Crissman, Assistant Maintenance Manager
K. Dolese, Program and Component Engineer
J. Foret, Reactor Operator
D. Galladoro, Design Engineer Mechanical
R. Gilmore, Manager, Engineering Programs and Components
J. Gumnick, Manager, Radiation Protection
W. Hardin, Licensing Engineer
T. Lewis, Senior Reactor Operator
J. Hashim, Fire Protection Engineer
N. Lawless, Acting Training Manager
D. Litoff, Control Room Supervisor
M. Mason, Senior Licensing Specialist
W. McKinney, Manager, Corrective Action and Assessments
K. Nichols, Director, Engineering
T. Penn, Senior Auxiliary Operator
B. Steelman, Manager, Licensing
R. Tran, Design Engineer Electrical
D. Viener, Supervisor, Engineering Programs and Components

LIST OF ITEMS OPENED AND CLOSED

Opened and Closed

05000382/2012007-01	NCV	Failure to Adequately Evaluate the Impact of Fire Damage on the Dry Cooling Tower Fans (Section 1R05.05.b.1)
05000382/2012007-02	NCV	Failure to Calculate Adequate Cooling Provided to Diesel Generator B within Required Time (Section 1R05.05.b.2)

DOCUMENTS REVIEWED

Audits and Assessments

NUMBER	TITLE	DATE
LO-WLO-2011-104, CA 20	B.5.b Mitigating Strategies	01/25/2012
QA-9-2010-W3-1	Quality Assurance Audit Report	02/22/2010
QS-2010-W3-006	B.5.b Review	06/15/2010

Condition Reports (CR-WF3-)

2007-01955	2009-01722	2009-01986	2009-02007	2009-02022
2009-02024	2009-02033	2009-02143	2009-02199	2009-02249
2009-02333	2009-02418	2009-02447	2009-02472	2009-02487
2009-02494	2009-02499	2011-00439	2011-01529	2011-01580
2011-02879	2011-05424	2011-05948	2011-06725	2012-00194*
2012-00216*	2012-00334*	2012-00257*	2012-00259*	2012-00260*
2012-00334*	2012-00507*	2012-00580*	2012-00581*	2012-00585*
2012-00586*	2012-00622*	2012-00626*	2012-00627*	2012-00716*
2012-00736*	2012-00739*	2012-00741*	2012-00780*	2012-00792*
2012-00818*	2012-00837*	2012-00836*	2012-00839*	2012-00840*
2012-00844*	2012-00862*	2012-00863*		

*indicates CR was written as a result of this inspection

Calculations

NUMBER	TITLE	REVISION
EC 1617	B.5.b Phase 2 & 3 Mitigation Strategy Portable Pump and Line Loss Evaluation	0
EC-F98-003 EC 32277	Equipment Hatches – Fire Evaluation Analysis	0
EC-F00-005	Hydraulic Calculation FP-M21	1
EC-F00-026	Post Fire Safe Shutdown Analysis	2
EC-M90-087	Emergency Diesel Generator Cooling Water Temperature	1

Calculations

NUMBER	TITLE	REVISION
EE-5-32-02	Appendix R – Associated Circuit Analysis – Coordination Study	1
PRA-W3-05-007	WSES3 PRA Summary Report	0

Drawings

NUMBER	TITLE	REVISION/DATE
1564-01514	Outline 30 KVA Inverter	E2
1564-01515	SUPS Outline External Terminal Connections	0
1564-01531, Sheet 1	SUPS Static Inverter Schematic	6
1564-01532	Schematic 30 KVA Inverter	8
1564-01533	30 KVA Inverter Schematic (Distribution Panel)	7
1564-08512	CP – 33 Cooling Tower Control Panel Outline	3
5817-04323	Sprinkler Systems FP-M3A, M4B, M11A, M12B, M13	10
5817-06337	RAB Sprinkler System FP-M30A	9
5817-06382	RAB Sprinkler System FP-M25B and M30A Switchgear Area B	8
5817-06476	RAB Pre-action System FP-M24 (Materials and Symbols)	11
5817-06477	RAB Pre-Action System FP-M24 (Continued)	12
5817-10726, Sheet 1	CP – 33 UNIDS	2
5817-10726, Sheet 2	CP – 33 UNIDS	2
5817-10740, Sheet 1	CP – 8 UNIDS Engineered Safeguards Panel	6
5817-10742, Sheet 1	LCP – 43 Auxiliary Control Panel (Remote Shutdown Panel)	1

Drawings

NUMBER	TITLE	REVISION/DATE
B289, Sheet E109A	Power Distribution & Motor Data 125 DC Distribution Panel 3B1-DC-S	14
B289, Sheet E149	Power Distribution & Motor Data 120V Distribution Panel 345AB	18
B424, Sheet E327	Volume Control Tank Discharge Valve 2CH-V123A/B	18
B424, Sheet E360	Refueling Water to Charging Pumps VA 3CH-V121A/B	10
B424, Sheet E709	Control Wiring Diagram Component Cooling Water Pump B	7
B424, Sheet 731S	Dry Tower A Fan No. 1	10
B424, Sheet 781	Dry Tower B Fan No. 1	10
B424, Sheet E795	Control Wiring Diagram Dry Tower B Fan Number 15	4
B424, Sheet E1533	Control Wiring Diagram Emergency Feedwater Pump B	7
B424, Sheet E1535	Emergency FW Pump Turbine STM Shut-off VA 2MS-V611A	23
B424, Sheet E1536	Emergency FW Pump Turbine STM Shut-off VA 2MS-V612B	20
B424, Sheet E1540	Emergency FWPT Stop VA	14
B424, Sheet E1647	Steam Line 1 Isolation VA 2MS-V602A	21
B424, Sheet E1661	Steam Line 2 Isolation VA 2MS-V604B	16
B424, Sheet E2572	Static Uninterruptible Power Supply 3AB	15
B424, Sheet E2939	Isolation Switch Dev – Aux Panel 2B	4
G-127	Plot Plan	34
G-151, Sheet 1	Flow Diagram – Main & Extraction Steam System	43
G-151, Sheet 2	Flow Diagram – Main & Extraction Steam System	38

Drawings

NUMBER	TITLE	REVISION/DATE
G-151, Sheet 3	Flow Diagram – Main & Extraction Steam System	31
G-151, Sheet 4	Flow Diagram – Main & Extraction Steam System	6
G-153, Sheet 1	Flow Diagram – Feedwater, Condensate & Air Evacuation Systems	39
G-153, Sheet 2	Flow Diagram – Feedwater, Condensate & Air Evacuation Systems	31
G-153, Sheet 3	Flow Diagram – Feedwater, Condensate & Air Evacuation Systems	39
G-153, Sheet 4	Flow Diagram – Feedwater, Condensate & Air Evacuation Systems	41
G-153, Sheet 5	Flow Diagram – Feedwater, Condensate & Air Evacuation Systems	5
G-153, Sheet 6	Flow Diagram – Feedwater, Condensate & Air Evacuation Systems	8
G-160, Sheet 1	Flow Diagram – Component Closed Cooling Water System	50
G-160, Sheet 3	Flow Diagram – Component Closed Cooling Water System	32
G-160, Sheet 4	Flow Diagram – Component Closed Cooling Water System	17
G-160, Sheet 5	Flow Diagram – Component Closed Cooling Water System	19
G-160, Sheet 6	Flow Diagram – Component Closed Cooling Water System	14
G-161, Sheet 1	Flow Diagram – Fire, Make-up & Domestic Water Systems	31
G-161, Sheet 3	Flow Diagram – Fire, Make-up and Domestic Water Systems	31
G-161, Sheet 5	Flow Diagram – Fire, Make-up & Domestic Water Systems	5

Drawings

NUMBER	TITLE	REVISION/DATE
G-167, Sheet 1	Flow Diagram – Safety Injection System	49
G-167, Sheet 2	Flow Diagram – Safety Injection System	52
G-167, Sheet 3	Flow Diagram – Safety Injection System	20
G-167, Sheet 4	Flow Diagram – Safety Injection System	17
G-168, Sheet 1	Flow Diagram – Chemical & Volume Control System	43
G-168, Sheet 2	Flow Diagram – Chemical & Volume Control System	51
G-168, Sheet 3	Flow Diagram – Chemical & Volume Control System	12
G-172	Flow Diagram – Reactor Coolant System	34
G-205, Sheet 1	Yard Piping	27
G-252, Sheet 1	Safe Shutdown Analysis – Appendix R and Electrical Modifications RAB Elevation +21.00'	9
G-285	Main One Line Diagram	19
G-290-S01	Telephone Communication System Diagram	03/31/1976
G-290-S02	Telephone Communication System Diagram	03/31/1976
G-290-S03	Paging Communication System Diagram	03/25/1976
G-290-S04	Paging Communication System Diagram	03/25/1976
G-290-S05	Sound Powered Telephone Communication System Diagram	03/25/1976
G-290-S06	Sound Powered Telephone Communication System Diagram	03/25/1976
G-290-S11	Communication System Control Transfer Switch-Wiring Diagram & Miscellaneous Details	06/10/1983
G-290-S16	Emergency Communication System Diagram (Magneto/Sound Powered System)	09/22/1983

Drawings

NUMBER	TITLE	REVISION/DATE
G-763, Sheet 1	Floor Plans	20
G-FP0021	Fire Detection System Raceway and Equipment Layout Reactor Auxiliary Building Elevation +21.00'	0
G-M0026	Layout Diagram & Details – Potable Water System Owner Controlled Area	7
G-M0027	Layout Diagram & Details – Fire Protection System Owner Controlled Area	1
WD-50654-A-06	2 Speed – 1 Winding Starter Schematic Wiring Diagram	11/05/1980

Engineering Reports

NUMBER	TITLE	REVISION
WF3-FP-10-00013	Waterford 3 Fire Protection Program Review – Fire Induced Circuit Failures – RIS 2004-03	0
WF3-FP-11-00002	Expert Panel for Addressing Multiple Spurious Operations Report	0

Generic Letter 86-10 Evaluations (WF3-FP-)

NUMBER	TITLE	REVISION
10-00001	Combustibles Associated with Partial Height Walls	0
10-00002	Justification of Fire Areas RAB 31 and RAB 39 Rooms Missing Detection and Suppression (EC-18667)	0
10-00003	Minimum Spacing Between Sprinkler Heads (FPM-17 in Fire Area RAB-39 (El. -35)	0
10-00004	Minimum Spacing Between Sprinkler Heads (FPM-23 in Fire Area RAB-39 (El. -35)	0

Generic Letter 86-10 Evaluations (WF3-FP-)

NUMBER	TITLE	REVISION
10-00006	NFPA 72D, Standard for the Installation, Maintenance and Use of Proprietary Signaling Systems for Watchman, Fire Alarm and Supervisory Service, 1975 Edition	0
10-00013	WF3 Code Compliance Report for NFPA 13, Standard for Installation of Sprinkler Systems, 1976 Edition	0
10-00014	WF3 Code Compliance Report for NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection, 1973 Edition	0
11-00003	WF3 Review and Evaluations of Fire Protection Engineering Evaluations for NFPA 805 Transition	0
11-00005	WF3 Code Compliance Report for NFPA 13, Standard for Installation of Sprinkler Systems, 1976 Edition	0

Letters

NUMBER	TITLE	DATE
W3F1-2011-0037	30-day Response to NRC Bulletin 2011-01, Mitigating Strategies	06/10/2011
W3F1-2011-0038	60-day Response to NRC Bulletin 2011-01, Mitigating Strategies	07/11/2011
W3F1-2011-0074	License Amendment Request to Adopt NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)	11/17/2011
W3F1-2012-0001	Response to Request for Additional Information for the 60-day Response to NRC Bulletin 2011-01, Mitigating Strategies	01/05/2012

Procedures

NUMBER	TITLE	REVISION
EN-DC-115	Engineering Change Process	12
EN-DC-126	Engineering Calculation Process	4
EN-DC-127	Control of Hot Work and Ignition Sources	10
EN-DC-128	Fire Protection Impact Reviews	4
EN-DC-161	Control of Combustibles	5
EN-DC-330	Fire Protection Program	1
EN-LI-100	Process Applicability Determination	11
EN-LI-102	Corrective Action Process	16
EN-LI-119-01	Equipment Failure Evaluation	2
EN-TQ-125	Fire Brigade Drills	1
EN-OP-115	Conduct of Operations	12
FP-001-014	Duties of A Fire Watch	16
FP-001-015	Fire Protection System Impairments	306
FP-001-018	Pre-Fire Strategies, Development and Revision	9
FP-001-019	Fire Brigade Equipment	305
FP-001-020	Fire Emergency/Fire Report	304
ME-003-002	Fire Detection Supervisory Circuit Functional Test	304
ME-003-004	Fire Dampers	6
ME-003-009	Fire Rated Walls, Floors, and Ceilings	301
ME-004-445	Self Contained Battery Powered Emergency Lighting Unit	304
NTP-202	Fire Protection Training	301
OI-006-000	Operator Aids, Use and Control	7
OI-042-000	Watch Station Process	24

Procedures

NUMBER	TITLE	REVISION
OP-009-004	Fire Protection	312
OP-901-103	Emergency Boration	2
OP-901-502	Evacuation of Control Room and Subsequent Plant Shutdown	21
OP-901-503	Isolation Panel Fire	306
OP-901-523	Security Events	7
OP-901-524	Fire in Areas Affecting Safe Shutdown	9
OP-901-525	Airborne Security Threat	7
OP-903-053	Fire Protection Pump Operability Test	17
OP-903-055	Fire Main Flush and Hydrant Inspection	10
OP-903-056	Fire Protection Functional Test	308
OP-903-057	Fire Protection System Flow Test	16
OP-903-126	Functional Testing of LCP-43	6
PS-016-102	Security Response to Plant Emergency Conditions	16
PA-018-102	Response to Security-Related Threats	9
S-SAMG-1	Loss of Large Areas of the Plant Due to Fire/Explosion	12

System Descriptions

NUMBER	TITLE	REVISION
SD-CHW	Essential Chilled Water	6
SD-EDG	Emergency Diesel Generator	16
SD-EFW	Emergency Feedwater	11
SD-FP	Fire Protection System Description	3
SD-RCS	Reactor Coolant System Description	17

System Descriptions

NUMBER	TITLE	REVISION
SD-SDC	Shutdown Cooling	6
SD-SI	Safety Injection	14

Vendor Manuals

NUMBER	TITLE	REVISION
TD-E155.0035	Electroswitch Catalog	2
TD-G080.0055	General Electric Molded Case Circuit Breakers	2
TD-G900.0045	PowerTech 4.5 and 6.5 L 4945 and 6068 Tier 2/Stage II OEM Diesel Engines	0
TD-G900.0025	Goodwin HL4M DRI-Prime Pump – Operating and Maintenance Manual	0
TD-M302.0015	Micro Switch CMC Series	5

Work Orders

00108105	00163465	00205255	00241713	00261099
51660901	52261035	52274363	52282108	52293694
52294470	52307421	52322801	52329965	52332451
52332839	52335332	52350465	52366644	52369069
52390034	52390454			

Miscellaneous

TITLE
2009 3rd Quarter Fire Brigade Meeting Slides
2010 Cycle 6 Severe Accident Management Guidelines attendance rosters for licensed and non-licensed operators
2012 OPS Roster, Revision 3
2012 OPS Shift Rotation

Miscellaneous

TITLE

ANSI N45.2.11 – 1974, Quality Assurance Requirements for the Design of Nuclear Power Plants

Emergency Planning Letters of Agreement

Final Safety Analysis Report, Section 9.5

Frequently Asked Question (FAQ) 07-0038, Lessons Learned on Multiple Spurious Operations, Revision 2

Lesson Plan WDLA-NAO-B5b, B5b Walk Down, Revision 0

Lesson Plan WLP-OPS-SAM00, Severe Accident Management Guidelines (SAMG), Revision 10

Lesson Plan WLP-OPS-FP00, Fire Protection System, Revision 9

NFPA 13-1975, Sprinkler Systems

Nuclear Energy Institute (NEI) 06-12, B.5.b Phase 2 & 3 Submittal Guideline, Revision 2

Process Applicability Determination for Engineering Change 738, dated August 8, 2009

Rental Order No. 10293672 for procurement of Aggreko temporary power sources

Severe Accident Management Guideline Onsite Distribution

Technical Requirements Manual 3/4.7.3, Component Cooling Water System – Appendix B, Revision 69

Technical Requirements Manual 3/4.7.10.1, Fire Suppression Water Systems, Revision 114

Technical Requirements Manual 3/4.7.10.2, Spray and/or Sprinkler Systems, Revision 91

Technical Requirements Manual 3/4.7.4, Fire Hose Stations, Revision 91

Technical Requirements Manual 3/4.7.11, Fire Rated Assemblies, Revision 91

Technical Requirements Manual 3/4.7.12, Essential Services Chilled Water Systems Chillers – Appendix R, Revision 47

Attachment B –Phase 3 Risk Evaluation for Fire Damage in Control Panel 33

The analyst estimated the increase to the core damage frequency (delta-CDF) caused by the performance deficiency. The performance deficiency involved the potential failure of operators to manipulate dry cooling tower and wet cooling tower transfer switches prior to component fuses blowing during a control room fire. The scenario was time dependent, in that if the operators manipulated the transfer switches prior to damaging the control circuits, then the fire scenario would proceed as expected (no increase to the delta-CDF). Therefore, the analyst evaluated fire scenarios that only involved early ignition of Control Panel 33 (location of the control circuits).

Control Panel 33 was a side panel that set apart from the main control room panels. For a fire to ignite and propagate fast enough to damage the circuits, the analyst assumed that the fire started in Control Panel 33 or one of the adjacent control panels (Control Panels 15 or 18). From Manual Chapter 0609, Appendix F, listed the fire ignition frequency for a single control panel as 6.0E-5/year. Since the analyst considered a total of three control panels, the combined fire initiation frequency was 1.8E-4 per year (λ). The analyst conservatively ignored separation between the panels that could slow down the progress of the fire.

The analyst calculated the non-suppression probability (PNS) for the subject fire scenario. The analyst noted operators would likely identify the fire in two minutes or less, based on smell alone. The control room was also equipped with smoke detectors that backup the operators' senses. For a fire to progress to the point where a substantial number of dry and wet cooling tower wires could be damaged, the analyst assumed that the burned for approximately 15 minutes (on average). Using Appendix F, Attachment 8, "Guidance for Fire Non-Suppression Probability Analysis," the analyst estimated that the PNS = 0.05.

Next, the analyst calculated the incremental conditional core damage probability (ICCDP) associated losing both trains of dry cooling towers and wet cooling towers, as specified above. The analyst assumed that that the reactor would trip. The analyst used the Waterford-3 SPAR model, Revision 8.15, dated August 21, 2010, with a truncation limit of 1.0E-11. As a surrogate for failure of the dry and wet cooling towers (which also failed the chilled water system), the analyst failed the component cooling water, auxiliary component cooling water, and chilled water system pumps.

First, the analyst calculated the conditional core damage probability (CCDP) based upon a failure of the Train A dry and wet cooling towers caused by a fire (the design configuration). In addition, since a recent finding determined that the manual action to place alternate room cooling fans was not feasible (not specified by procedure, fans not staged and no obvious power source available for some scenarios), the analyst failed this response capability. The resulting CCDP from the SPAR model was 7.7E-6. Second, to determine the incremental change, the analyst performed a second evaluation with additional Train B equipment failed. The analyst allowed for the ability for operators to recover the train by replacing the blown fuses. The analyst modeled this operator recovery action by using a failure rate of 1.1E-2, which is the nominal non-recovery probability specified in NUREG/CR-6883, "The SPAR-H Human Reliability Analysis Method." The CCDP for the calculated with additional failed Train B equipment was 7.8E-6. The ICCDP was the difference between the two runs (ICCDP = 1.1E-7).

The delta-CDF was therefore:

$$\text{Delta-CDF} = \lambda * \text{PNS} * \text{ICCDP} = 1.8\text{E-}4 * 0.05 * 1.1\text{E-}7 = 1.0\text{E-}12/\text{year}.$$

Since the delta-CDF was far below 1.0E-7/year, no large early release frequency analysis was required. This finding was of very low safety significance (Green).