UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD
ARLINGTON, TX 76011-4511

May 27, 2015

EA-15-077

Mr. Michael R. Chisum
Site Vice President
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000382/2015007 AND EXERCISE OF ENFORCEMENT DISCRETION

Dear Mr. Chisum:

On April 15, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Waterford Steam Electric Station, Unit 3, and discussed the results of this inspection with Mr. B. Lanka, Director, Engineering, and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented four findings of very low safety significance (Green) in this report. All of these findings involved violations of NRC requirements. The NRC is treating these violations as non-cited violations consistent with Section 2.3.2.a of the Enforcement Policy. Additionally, one finding involving 10 CFR 50.48(b) was identified and was a violation of NRC requirements. The inspectors have screened this finding and determined that it warrants enforcement discretion per the NRC Enforcement Policy Section 9.1, “Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)” and Section 11.05(b) of Inspection Manual Chapter 0305 (EA-15-077).

If you contest the violations or significance of the violations 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at the Waterford Steam Electric Station, Unit 3.

If you disagree with a cross-cutting aspect assignment 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 Station, Unit 3.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, “Public Inspections, Exemptions, Requests for Withholding,” a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC’s Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Gregory E. Werner, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 50-382
License No. NPF-38

Enclosure:
Inspection Report No. 05000382/2015007
w/Attachment: Supplemental Information

cc w/encl: Waterford Steam Electric Station

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Distribution:
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ADAMS ACCESSION NUMBER: ML15147A192

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Letter to Michael R. Chisum from Gregory E. Werner, dated May 27, 2015

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – NRC TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000382/2015007 AND EXERCISE OF ENFORCEMENT DISCRETION

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000382
License:	NPF-38
Report:	05000382/2015007
Licensee:	Entergy Operations, Inc.
Facility:	Waterford Steam Electric Station, Unit 3
Location:	Hwy. 18 Killona, Louisiana
Dates:	January 26 through April 15, 2015
Team Leader:	J. Mateychick, Senior Reactor Inspector, Engineering Branch 2
Inspectors:	S. Alferink, Reactor Inspector, Engineering Branch 2 J. Watkins, Reactor Inspector, Engineering Branch 2 R. Kopriva, Senior Reactor Inspector, Engineering Branch 1
Approved By:	Gregory E. Werner Chief, Engineering Branch 2 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000382/2015007; 01/26/2015 – 04/15/2015; 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. Four findings of very low safety significance (Green) are documented in this report. Four of these findings involved violations of NRC requirements. The significance of inspection findings is indicated by their color (i.e., Green, White, Yellow, or Red) which is determined using Inspection Manual Chapter 0609, "Significance Determination Process," dated June 2, 2011. Cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. Violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4.

Cornerstone: Mitigating Systems

- Green. The team identified a non-cited violation of License Condition 2.C.(9), "Fire Protection," for the failure to ensure the required separation between fire areas. Specifically, the licensee installed fire barriers on two ventilation ducts which were not in a configuration demonstrated to provide the required three-hour fire-rated separation between fire areas. The licensee entered this issue into their corrective action program as Condition Report CR-WF3-2015-00540 and established an hourly fire watch as a compensatory measure until corrective actions can be taken (Fire Impairments 15-30 and 15-31).

  The failure to ensure the required separation between fire areas 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 finding using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013. Both emergency diesel generator rooms were equipped with pre-action sprinkler systems which would limit temperatures near the ceiling around the room exhaust ducts; therefore, the finding screened to Green at Section 1.4.3.C.

  This finding did not have a cross-cutting aspect since it was not indicative of current licensee performance since this fire barrier configuration was installed in the 1980s. (Section 1R05.02.b)

- Green. The team identified a non-cited violation of License Condition 2.C.9, "Fire Protection," for the failure to adequately correct a previous violation. Specifically, the licensee failed to provide a bounding calculation for the amount of time available for operators to establish component cooling water during an alternative shutdown. The licensee developed this calculation in response to Non-cited Violation 2012007-02. The licensee entered this issue into their corrective action program as

Condition Report CR-WF3-2015-0859 and implemented a fire impairment as a compensatory measure.

The failure to provide a bounding calculation for the amount of time available for operators to establish component cooling water during an alternative shutdown 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. A senior reactor analyst performed a Phase 3 evaluation to determine the risk significance of this finding since it involved a postulated control room fire that led to control room evacuation and determined this violation was of very low safety significance.

This finding had a cross-cutting aspect associated with resolution within the problem identification and resolution area since the licensee failed to take effective corrective actions to address issues in a timely manner commensurate with their safety significance. Specifically, the team determined that the licensee's corrective actions were not effective since the licensee failed to provide a bounding calculation for the amount of time available for operators to establish component cooling water during an alternative shutdown (P.3). (Section 1R05.05.b.1)

- Green. The team identified a non-cited violation of License Condition 2.C.9, "Fire Protection," for the failure to periodically test and demonstrate the 8-hour capacity of the Appendix R emergency lighting units. The licensee entered this issue into their corrective action program as Condition Report CR-WF3-2015-00856 and operators had flashlights available as a compensatory measure.

  The failure to periodically test and demonstrate the 8-hour capacity of the Appendix R emergency lighting units 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 finding using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013. The team assigned the finding a low degradation rating because it would not prevent reaching and maintaining safe shutdown conditions in the event of a control room fire. Specifically, the team had reasonable assurance that the emergency lighting units would provide adequate illumination for a sufficient amount of time for operators to perform the most time critical actions. In addition, the team determined that operators performing an alternative shutdown had flashlights available in the Appendix R equipment lockers. Because the team assigned a low degradation rating, this finding screened as having very low safety significance.

  This finding did not have a cross-cutting aspect since it was not indicative of present performance in that the performance deficiency occurred more than three years ago. (Section 1R05.08.b.1)

- Green. The team identified a non-cited violation of License Condition 2.C.9, "Fire Protection," for the failure to correct adverse conditions associated with fire protection. Specifically, the licensee failed to correct longstanding deficiencies with the Appendix R emergency lighting units. The licensee entered this issue into their corrective action program as Condition Report CR-WF3-2015-00593 and operators had flashlights available as a compensatory measure.

  The failure to correct longstanding deficiencies with the Appendix R emergency lighting units 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 finding using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013. The team assigned the finding a low degradation rating because the failure to provide adequate 8-hour emergency lights at all locations would not prevent reaching and maintaining safe shutdown conditions in the event of a control room fire. Specifically, the team determined that operators performing an alternative shutdown had flashlights available in the Appendix R equipment lockers. Because the team assigned a low degradation rating, this finding screened as having very low safety significance.

  This finding had a cross-cutting aspect associated with resolution within the problem identification and resolution area since the licensee failed to take effective corrective actions to address issues in a timely manner commensurate with their safety significance. Specifically, the team determined that the licensee failed to take corrective actions to address the nonfunctional emergency lighting units in a timely manner (P.3). (Section 1R05.08.b.2)

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 the Waterford Steam Electric Station, Unit 3. The licensee committed to adopt a risk-informed fire protection program in accordance with National Fire Protection Association 805 (NFPA-805), but has not yet completed the program transition. The 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 and one or more mitigating strategies for review. The team used the Waterford Steam Electric Station, Unit 3, Fire PRA Summary Report to select the following three risk-significant fire areas (inspection samples) for review:

Fire Area	Description
RAB 6	Electrical Penetration Room A
RAB 7	Relay Rooms (+35' Elevation)
RAB 8	Switchgear Rooms

The team evaluated the licensee's fire protection program using the applicable requirements, which included plant Technical Specifications, Operating License Condition 2.C.(9), 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.

Three fire area inspection samples and one mitigating strategy sample were completed.

.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 walkdowns 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 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 verify 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

Introduction. The team identified a Green non-cited violation of License Condition 2.C.(9), "Fire Protection," for the failure to ensure the required separation between fire areas. Specifically, the licensee installed fire barriers on two ventilation ducts which were not in a configuration demonstrated to provide the required three-hour fire-rated separation between fire areas.

Description. The approved fire protection program required fire areas to be separated by floors, walls, and ceilings having a three-hour fire resistance rating except as noted in the fire area analysis. The team reviewed surveillance Procedure ME-0003-009, "Fire-Rated Walls, Floors, and Ceilings," Revision 302. The procedure identified two fire barriers which did not require inspection because they were encapsulated in metal flashing.

The emergency diesel generator (EDG) rooms were fire areas reactor auxiliary building (RAB) 15 (EDG B) and RAB 16 (EDG A). These rooms were below the ventilation mechanical room which is fire area RAB 2. The inlets to the EDG room exhaust fans were 72"x72" ducts which extended down from the ceilings and flared out to larger openings. Fire Dampers FD-76 and FD-77 were located on the ends of the ducts in fire area RAB 15 and RAB 16, respectively. Since the fire dampers were not in the plane of the ceiling, the ductwork between the fire damper and the ceiling required protection from the effects of a fire. Thermo-Lag material was installed on the ducts between the fire damper and the ceiling. Records show that three-hour rated materials were used; however, metal flashing was also installed encapsulating the fire barriers on the ducts.

Thermo-Lag fire barriers are not passive insulating materials. Thermo-Lag sublimates when exposed to high temperatures. The gases generated during the process absorb heat which would otherwise be transferred to the item being protected. Encapsulating the fire barriers with metal flashing restricts the release of gases. This is not a tested configuration for Thermo-Lag fire barriers. While three-hour rated materials were used, the effective fire resistance of the as-installed configuration is unknown.

Analysis. The failure to ensure the required separation between fire areas 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 finding using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013. The finding involved fire barrier elements that separate one fire area from another; therefore, it was determined to be in the fire confinement category in Inspection Manual Chapter 0609, Appendix F, Attachment 1, "Part 1: Fire Protection SDP Phase 1 Worksheet." Both EDG rooms are equipped with pre-action sprinkler systems (fully automated suppression system) which would limit temperatures near the ceiling around the room exhaust ducts; therefore, the finding screened to Green in accordance with Section 1.4.3.C.

This finding did not have a cross-cutting aspect since it was not indicative of current licensee performance since this fire barrier configuration was installed in the 1980s.

Enforcement. License Condition 2.C(9), "Fire Protection," states, in part, "EOI [Entergy Operations, Inc.] 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 through Amendment 36 and as approved in the safety evaluation report (SER) through Supplement 9." The Final Safety Analysis Report, Section 9.5.1.2.1, "Fire Containment," states, in part, "Ductwork penetrations through fire area/zone boundary walls, floors, and ceilings are externally sealed to provide fire resistance rating of three hours." The Final Safety Analysis Report, Section 9.5.1.3.1, "Detailed Comparison to Appendix "A" to the Branch Technical Position APCSB 9.5-1, Revision 0," Item D.1.(j), states, in part, "Appendix R fire areas are isolated from each other by floors, walls, and ceilings having a fire resistance rating of three hours unless noted otherwise in the Fire Area-By-Area

Analysis." The Final Safety Analysis Report, Section 9.5.1.3.2, "Fire Area-By-Fire Area Analysis," identifies the fire area design rating of three hours for the boundaries between fire areas RAB 2, RAB 15, and RAB 16. Contrary to the above, prior to February 13, 2015, the licensee failed to establish fire area boundaries having a fire resistance rating of three hours. Specifically, two fire barriers protecting ventilation ducts between fire dampers and the room's ceilings are configured in a manner in which the fire resistance rating is indeterminate.

Because this violation was of very low safety significance, has been entered into the corrective action program as Condition Report CR-WF3-2015-00540, and the licensee has established an hourly fire watch as a compensatory measure until corrective actions can be taken, Fire Impairments 15-30 and 15-31, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000382/2015007-01, "Inadequate Fire Area Boundary."

.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 the automatic detection systems and 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 performed a walkdown of accessible portions of the detection and suppression systems in the selected fire areas. The team also performed a walkdown of 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 pumps' flow and pressure tests to verify that the pumps met their design requirements. The team also reviewed the fire water supply system flow and pressure tests to verify that the system capability met the design requirements.

The team assessed the fire brigade capabilities by reviewing training, qualification, and drill critique 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 and subsequent drill critique on February 12, 2015, using the guidance contained in Inspection Procedure 71111.05AQ, "Fire Protection Annual/Quarterly." The team observed fire brigade members fight a simulated fire in fire area RAB 15, EDG room B. 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 fire-fighting equipment was brought to the scene; (5) effectiveness of fire brigade leader communications, command, and control; (6) search for victims and propagation of the fire into other areas; (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 walkdowns 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:

- 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 safe shutdown analysis, operating procedures, piping and instrumentation drawings, 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 conducted plant walkdowns to verify that the plant configuration was consistent with the description contained in the safe shutdown and fire hazards analyses. The team focused on ensuring the adequacy of systems selected for reactivity control, reactor coolant makeup, reactor decay heat removal, process monitoring instrumentation, and support systems functions.

The team also verified that the systems and components credited for 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 also verified that sufficient personnel to perform a safe shutdown were trained and available on-site at all times, exclusive of those assigned as fire brigade members.

The team performed a timed walkdown of the alternative shutdown procedure with licensed and non-licensed operators to determine the adequacy of the procedure. The team verified that the operators could reasonably be expected to perform specific actions within the time required to maintain plant parameters within specified limits. Time critical actions that were verified included restoring electrical power, establishing control at the remote shutdown panels, establishing reactor coolant makeup, and establishing decay heat removal.

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 Introduction. The team identified a Green non-cited violation of License Condition 2.C.9, "Fire Protection," for the failure to adequately correct a previous violation. Specifically, the licensee failed to provide a bounding calculation for the amount of time available for operators to establish component cooling water during an alternative shutdown. The licensee developed this calculation in response to Non-cited Violation 2012007-02.

Description. During the 2012 triennial fire protection inspection, the team identified a violation for the failure to perform a safe shutdown design calculation. Specifically, the team determined that the licensee failed to calculate the amount of time available for operators to establish component cooling water to a running emergency diesel generator that was providing power to safe shutdown components during an alternative shutdown.

The team documented this issue as Non-cited Violation 2012007-02, "Failure to Calculate Adequate Cooling Provided to Diesel Generator B within Required Time."

The licensee entered this issue into their corrective action program as Condition Report 2012-00818.

In response to this violation, the licensee developed Engineering Change EC-36621, "Evaluate Impacts of Operating the Emergency Diesel Generators (EDGs) Without Component Cooling Water." This engineering change revised Calculation EC-M12-001, "Emergency Diesel Generator with no CCW Flow," which determined the amount of time that an emergency diesel generator could run without component cooling water during an alternative shutdown prior to being damaged.

In Calculation EC-M12-001, the licensee first determined a worst case emergency diesel generator load of 3.23 megawatt (MW) for an alternative shutdown without component cooling water. The licensee then estimated the heat load for a running emergency diesel generator by fitting a second order polynomial to empirical data. The licensee estimated a heat load of approximately 5.65 MBTU/hr. when an emergency diesel generator carried a load of 3.23 MW. Using this heat load of 5.65 MBTU/hr., the licensee calculated an emergency diesel generator could run for 10 minutes without component cooling water and not be damaged. The licensee used this result to support the 10-minute time-critical action for operators to establish component cooling water during an alternative shutdown.

The team reviewed Calculation EC-M12-001 and noted the empirical data demonstrated the heat load near 3.23 MW was greater than the estimated heat load from the best fit polynomial regression. The team concluded that the licensee's calculation was not bounding and operators had less than 10 minutes available to establish component cooling water during an alternative shutdown. During the timed walkdown of the alternative shutdown procedure, the team determined that it would take operators approximately 11 minutes to establish component cooling water.

Analysis. The failure to provide an appropriate bounding calculation for the amount of time available for operators to establish component cooling water during an alternative shutdown 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 finding using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013, because it affected the ability to reach and maintain safe shutdown conditions in case of a fire. A senior reactor analyst performed a Phase 3 evaluation to determine the risk significance of this finding since it involved a postulated control room fire that led to control room evacuation.

For the control room, the senior reactor analyst assigned a generic fire ignition frequency for the main control board (FIF_{MCB}) from NUREG/CR-6850, Table 6-1, "Fire Frequency Bins and Generic Frequencies." The analyst multiplied the fire ignition frequency by a severity factor (SF) and a non-suppression probability indicating that operators failed to extinguish the fire within 20 minutes, assuming a 2-minute detection that required a

control room evacuation (NP_{CRE}). The resulting control room evacuation frequency (F_{CR}) was:

$F_{CR} = FIF_{MCB} * SF * NP_{CRE}$

$= 2.5E\text{-}3/year * 0.1 * 1.3E\text{-}2$

$= 3.25E\text{-}6/year$

The main control board had a total of 12 panels. The analyst determined that only a fire in one of these panels (CP-8) could lead to the loss of component cooling water to the emergency diesel generator. Therefore, a bounding change in core damage frequency for a control room fire that leads to evacuation and the loss of the emergency diesel generator ($F_{CRE+EDG}$) was determined to be:

$F_{CR+EDG} = F_{CR} * (1 / 12)$

$= 3.25E\text{-}6/year * (1 / 12)$

$= 2.7E\text{-}7/year$

For the cable vault, the senior reactor analyst limited the risk determination to transient and hot work fires since there were no fixed ignition sources in the cable vault. The senior reactor analyst assigned a low likelihood rating for transients and hot work activities in the cable vault. The senior reactor analyst then assigned a fire ignition frequency for transients ($FIF_{CV\text{-}TR}$) and hot work activities ($FIF_{CV\text{-}HW}$) from Inspection Manual Chapter 0609, Appendix F, Attachment 4.

The senior reactor analyst determined that the floor area of the cable vault was 5778.5 square feet. The senior reactor analyst assigned a screening weighting factor (W) of 0.1 for transient and hot work fires. The senior reactor analyst noted that the cable vault had smoke detectors and a pre-action automatic sprinkler system. The senior reactor analyst assigned a nominal failure probability of the sprinkler system (P_{SPR}) from Inspection Manual Chapter 0609, Appendix F, Task 2.7.4.

The senior reactor analyst calculated a bounding change in core damage frequency for a cable vault fire that leads to evacuation and the loss of the emergency diesel generator (F_{CV+EDG}) was determined to be:

$F_{CV+EDG} = (FIF_{TR} + FIF_{HW}) * W * NP_{SPR}$

$= (5.5E\text{-}5/year + 2.3E\text{-}5/year) * 0.1 * 0.05$

$= 3.9E\text{-}7/year$

Since fires in the control room are independent of fires in the cable vault, the senior reactor analyst calculated a bounding total change in core damage frequency (ΔCDF_{TOT}) for the performance deficiency by adding the change in core damage frequencies for the

control room and cable vault calculated above. The senior reactor analyst calculated a bounding total change in core damage frequency of:

ΔCDF_{TOT} = $F_{CR+EDG} + F_{CV+EDG}$

= 2.7E-7/year + 3.9E-7/year

= 6.6E-7/year

This change in core damage frequency was considered to be bounding since it assumed:

- A fire in any of the applicable main control board panels or the cable vault areas would cause a loss of offsite power and a loss of component cooling water, resulting in a loss of the emergency diesel generator;

- The conditional core damage probability given a control room fire with evacuation and the loss of the emergency diesel generator was equal to one, and

- The performance deficiency accounted for the entire change in core damage frequency (i.e., the baseline core damage frequency for this event was zero).

In accordance with the guidance in Inspection Manual Chapter 0609, Appendix H, "Containment Integrity Significance Determination Process," dated May 6, 2004, the senior reactor analyst screened the performance deficiency for its potential risk contribution to large early release frequency since the bounding change in core damage frequency provided a risk significance estimate greater than 1E-7/yr. Given that Waterford has a large dry containment and that control room evacuation sequences do not include steam generator tube ruptures or intersystem loss of coolant accidents, the analyst determined that this example was not significant with respect to large early release frequency. The analyst determined this example was of very low risk significance (Green).

This finding had a cross-cutting aspect associated with Resolution within the Problem Identification and Resolution area since the licensee failed to take effective corrective actions to address issues in a timely manner commensurate with their safety significance. Specifically, the team determined that the licensee's corrective actions were not effective since the licensee failed to provide a bounding calculation for the amount of time available for operators to establish component cooling water during an alternative shutdown (P.3).

Enforcement. License Condition 2.C.9, "Fire Protection," states, in part, that the licensee 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 through Amendment 36 and as approved in the Safety Evaluation Report through Supplement 9. Final Safety Analysis Report, Section 9.5.1.3.1.C, states that the fire protection program quality assurance program is documented in Procedure UNT-005-013, "Fire Protection

Program." Procedure UNT-005-013, Section 5.8.8, states, in part, that conditions adverse to quality relating to the fire protection program will be identified and corrected.

Contrary to the above, from September 5, 2012, to April 15, 2015, the licensee failed to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to correct a condition adverse to fire protection since the licensee failed to perform an appropriate bounding calculation for the amount of time available for operators to establish component cooling water during an alternative shutdown. The licensee developed this calculation as a corrective action for Non-cited Violation 2012007-02, "Failure to Calculate Adequate Cooling Provided to Diesel Generator B within Required Time."

The licensee entered this issue into their corrective action program as Condition Report CR-WF3-2015-00859 and implemented Fire Impairment 15-045 as a compensatory measure. Because this violation was of very low safety significance and has been entered into the corrective action program, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000382/2015007-02, "Failure to Provide a Bounding Calculation for Time Critical Actions."

.2 Introduction. The team identified a violation of Technical Specification 6.8.1.f for the failure to implement and maintain adequate written procedures covering fire protection program implementation. Specifically, the team identified four examples where the licensee failed to maintain an alternative shutdown procedure that successfully mitigated all postulated alternative shutdown scenarios. This finding affects 10 CFR 50.48 and has been screened and determined to warrant enforcement discretion per the Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48).

Description. The licensee used Procedure OP-901-502, "Evacuation of Control Room and Subsequent Plant Shutdown," Revision 28, to shut down the reactor from the remote shutdown panel in the event a control room or cable vault fire required evacuation of the control room. This alternative shutdown procedure provided steps for operators to transfer control of the credited safe shutdown equipment away from the control room to the remote shutdown panel and to achieve and maintain safe shutdown conditions from the remote shutdown panel.

The team performed a timed walkdown of the alternative shutdown procedure. Based on the walkdown results, the team determined that the alternative shutdown procedure was not adequate to ensure that operators could successfully mitigate all postulated alternative shutdown scenarios. In particular, the team identified the following four scenarios where operators may not be able to achieve and maintain a safe shutdown:

Example 1: Potential Loss of Credited Safe Shutdown Pumps

The first scenario involved fire damage resulting in blown fuses for either the component cooling water or emergency feedwater pumps. In this scenario, the team determined the operators would be unable to control the affected pump from the remote shutdown

panel, but the operators would be able to control the affected pump by manually operating the breakers that supplied power to the motors. The team noted that the alternative shutdown procedure did not provide any steps for operators to manually operate the breakers to control these pumps, which were required for safe shutdown.

Example 2: Potential Spurious Opening of the Atmospheric Dump Valves

The second scenario involved the spurious actuation of two atmospheric dump valves. The team noted that the licensee previously had a 10-minute requirement for operators to mitigate the spurious actuation of two atmospheric dump valves by taking manual control of an open atmospheric dump valve locally and then manually closing the valve. The team determined that the alternative shutdown procedure provided steps for operators to manually close an open atmospheric dump valve; however, the licensee removed the 10-minute requirement for operators to be able to perform this action.

The licensee removed the 10-minute requirement based on its understanding that the spurious actuation of only one atmospheric dump valve was required to be analyzed and mitigated. The team referred to guidance in Regulatory Guide 1.189, Revision 2, which stated, in part, "after control of the plant is achieved by the alternative or dedicated shutdown system, single or multiple spurious actuations that could occur in the fire-affected area should be considered..."

The team reviewed the licensee's method for isolating the atmospheric dump valves from the effects of a control room or cable vault fire. The team determined that the circuits responsible for isolating the atmospheric dump valves were located within the control room complex and, therefore, could not be relied upon to isolate the atmospheric dump valves in the event of a control room fire. The team concluded that the licensee should have maintained the 10-minute requirement in the alternative shutdown procedure for operators to manually close a spuriously open atmospheric dump valve.

During the timed walkdown of the alternative shutdown procedure, the team determined that it would take operators approximately 13 minutes to close a spuriously open atmospheric dump valve.

Example 3: Potential Spurious Opening of a Pressurizer Spray Valve

The third scenario involved the spurious opening of a pressurizer spray valve. In this scenario, the open pressurizer spray valve results in a rapid depressurization of the reactor coolant system, which could negatively impact the ability to achieve and maintain natural circulation.

The licensee considered this scenario in the safe shutdown analysis. The licensee did not perform an analysis or calculation to determine the amount of time operators had available to mitigate this scenario. Instead, the licensee used engineering judgment to specify that operators had 10 minutes available to secure the spurious spray flow.

The team was concerned that the 10-minute limit may not be sufficient to ensure that operators could achieve and maintain natural circulation. In response to the team's

concern, the licensee modeled this scenario on the simulator. The team noted that the use of the simulator was not a preferred method; however, it provided a reasonable estimate for the amount of time available.

The results of the simulator run indicated that the reactor coolant system would reach saturation pressure in less than 8 minutes. Once the reactor coolant system reaches saturation pressure, voiding begins in the reactor coolant system. This voiding could then negatively impact the ability to achieve and maintain natural circulation.

The team determined that the alternative shutdown procedure provided steps for operators to trip the reactor coolant pumps, which would mitigate this scenario by eliminating flow through the pressurizer spray valves. During the timed walkdown of the alternative shutdown procedure, the team determined that it would take operators approximately 9 minutes and 15 seconds to trip all of the reactor coolant pumps.

Scenario 4: Potential Overfilling of the Steam Generators

The fourth scenario involved the potential overfilling of the steam generators. In this scenario, the open main steam isolation valves continue to provide steam to the turbine-driven main feedwater pumps, which continue to inject feedwater into the steam generators until they overfill.

The team noted that the action to close the main steam isolation valves prior to evacuating the control room was an operator action within the fire area. The team determined that this action was not credited in the plant's approved fire protection program; therefore, the operators must take action outside of the control room to ensure that the main steam isolation valves were closed.

Because the licensee did not have an analysis establishing a time limit, the team was concerned the operators may not perform this action prior to main feedwater overfilling the steam generators. In response to the team's concern, the licensee modeled this scenario on the simulator. The team noted that the use of the simulator was not a preferred method; however, it provided a reasonable estimate for the amount of time available.

The results of the simulator run indicated that the continued injection of main feedwater at full flow could overfill the steam generators in approximately 2 minutes and 30 seconds. The team noted that overfilling the steam generators would negatively impact the ability to remove decay heat.

The team determined that the alternative shutdown procedure provided steps for operators to close the main steam isolation valves from outside the control room, which would mitigate this scenario by eliminating steam flow to the turbine-driven main feedwater pumps. During the timed walkdown of the alternative shutdown procedure, the team determined that it would take operators approximately 4 minutes and 30 seconds to close all of the main steam isolation valves.

Analysis. The failure to implement and maintain adequate written procedures covering fire protection program implementation was a performance deficiency. The performance deficiency was more than minor because it was associated with the procedure quality 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. A senior reactor analyst performed a calculation to bound the risk significance of this finding. The senior reactor analyst determined that the finding was not of high safety significance. As discussed below, the team consulted the NRC Enforcement Policy, Section 9.1, "Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)," to determine if the noncompliance was eligible for enforcement discretion.

This finding did not have a cross-cutting aspect because it qualified for enforcement discretion.

Enforcement. Technical Specification 6.8.1.f states that written procedures shall be established, implemented, and maintained covering fire protection program implementation. Licensee Procedure OP-901-502, "Evacuation of Control Room and Subsequent Plant Shutdown," Revision 28, implemented alternative shutdown outside of the control room. Contrary to the above, prior to April 15, 2015, the licensee failed to implement and maintain written procedures covering fire protection program implementation. Specifically, the team identified four scenarios where the licensee failed to ensure that the alternative shutdown procedure was adequate to ensure that operators could mitigate all postulated alternative shutdown scenarios.

Because the licensee committed to adopting National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," and has committed to changing their fire protection program license basis to comply with 10 CFR 50.48(c) by submitting a license amendment request to the NRC, this violation was eligible for enforcement discretion as described in Section 9.1 of the Enforcement Policy, "Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)."

Specifically, the team determined that the licensee: (1) would have identified the violation in light of the defined scope, thoroughness, and schedule of its transition to 10 CFR 50.48(c) because the licensee was performing new analyses and revising the alternative shutdown procedure for the transition to NFPA-805; (2) the licensee will correct the violation after completing its transition to 10 CFR 50.48(c) and took immediate corrective action and compensatory measures within a reasonable time commensurate with the risk significance of the issue following identification; (3) routine licensee efforts were not likely to have previously identified the violation; (4) the violation was not willful; and (5) the team determined that this violation was not of high safety significance. The finding also met additional discretion criteria established in Section 11.05.b of Inspection Manual Chapter 0305, "Operating Reactor Assessment Program."

The licensee entered these issues into its corrective action program as Condition Reports CR-WF3-2015-00833, CR-WF3-2015-00857, CR-WF3-2015-00858, CR-WF3-2015-01871, CR-WF3-2015-01872, and CR-WF3-2015-01873, and implemented Fire Impairments 15-041 through 15-045 as compensatory measures. Since all the criteria for the use of enforcement discretion were met, the NRC is exercising enforcement discretion to not cite this violation in accordance with the Interim Enforcement Policy regarding "Enforcement Discretion For Certain Fire Protection Issues (10 CFR 50.48)." This use of enforcement discretion is documented in the Enforcement Tracking System as EA-2015-077.

.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's evaluation focused on the cables of selected components from the reactor coolant system, refueling water storage tank, component cooling water, auxiliary component cooling water, main steam isolation, atmospheric steam dumps, emergency feed water, emergency diesel, low pressure safety injection, and chemical volume and control system. For the sample of components selected, 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. Specific components reviewed by the team are listed in the attachment.

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. The team discussed system design, testing, and maintenance with the system engineer.

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 walkdown 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

.1 Introduction. The team identified a Green non-cited violation of License Condition 2.C.9, "Fire Protection," for the failure to periodically test and demonstrate the 8-hour capacity of the Appendix R emergency lighting units.

Description. In 2004, the licensee discontinued the performance of 8-hour discharge tests for the Appendix R emergency lighting units. Specifically, the licensee removed the requirement to perform the discharge tests from Procedure ME-004-445, "Self Contained Battery Powered Emergency Lighting Unit." In lieu of performing discharge tests, the licensee implemented a preventive maintenance program that replaced the emergency lighting unit batteries every three years.

The licensee documented their justification in Engineering Request ER-W3-2004-0222, "Alternative Methodology for Appendix R 8-Hour Battery Powered Emergency Light Testing," Revision 0. This engineering request referenced guidance contained in EPRI TR-106826, "Battery Performance Monitoring by Internal Ohmic Measurements."

The team reviewed the engineering request and the EPRI report and determined that the licensee incorrectly applied the results of the EPRI report. Specifically, the team noted that the objective of the EPRI report was to determine the extent to which internal ohmic measurements could replace or reduce the frequency of discharge tests for emergency lighting units. Based on the favorable test results, EPRI recommended using internal ohmic measurements in lieu of discharge tests for two types of emergency lighting units.

The team noted that the licensee did not use either of these two types of emergency lighting units, nor did the EPRI report recommend discontinuing discharge tests for any other types of emergency lighting units.

In addition to referencing the EPRI report, the licensee made the following statements regarding the discharge tests:

- No specific regulatory or OEM requirement was found that requires the 8-hour discharge test.

- The 8-hour capacity of the unit is a design function which is applicable to component selection and does not require periodic re-verification.

- The unit's self-diagnostic circuit monitors the battery capacity which is the equivalent to the current discharge test.

The team reviewed the fire protection program described in Procedure UNT-005-013, "Fire Protection Program," Revision 12, and determined that it required the licensee to periodically test the emergency lighting units to ensure that the equipment will function properly and continue to meet their design criteria (i.e., have an 8-hour battery capacity). The team noted that the licensee failed to consider this requirement when changing Procedure ME-004-445. Finally, the team reviewed the licensee's justification and the vendor's information and did not find evidence to support the statement that the unit's self-diagnostic circuit monitoring was sufficient to demonstrate the required 8-hour battery capacity.

Analysis. The failure to periodically test and demonstrate the 8-hour capacity of the Appendix R emergency lighting units 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 finding using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013, because it affected the ability to reach and maintain safe shutdown conditions in case of a fire. The team assigned the finding to the post-fire safe shutdown category since it impacted the alternate shutdown element. The team assigned the finding a low degradation rating because the failure to periodically test and demonstrate the 8-hour capacity of the Appendix R emergency lighting units would not prevent reaching and maintaining safe shutdown conditions in the event of a control room fire. Specifically, the team had reasonable assurance that the emergency lighting units would provide adequate illumination for a sufficient amount of time for operators to perform the most time critical actions. In addition, the team determined that operators performing an alternative shutdown had flashlights available in the Appendix R equipment lockers. Because the team assigned a low degradation rating, in accordance with Inspection Manual Chapter 0609, Appendix F, Step 1.3.1.B, this finding screened as having very low safety significance (Green).

This finding did not have a cross-cutting aspect since it was not indicative of present performance in that the performance deficiency occurred more than three years ago.

Enforcement. License Condition 2.C.9, "Fire Protection," states, in part, that the licensee 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 through Amendment 36 and as approved in the Safety Evaluation Report through Supplement 9. Final Safety Analysis Report, Section 9.5.1.3.1.C, states that the fire protection program quality assurance program is documented in Procedure UNT-005-013, "Fire Protection Program." Procedure UNT-005-013, Step 5.8.5.2.d, states that fire protection equipment, emergency lighting, and communication equipment are tested periodically to assure that the equipment will function properly and continue to meet the design criteria. Contrary to the above, from April 15, 2004, to April 15, 2015, the licensee failed to implement a provision of the approved fire protection program. Specifically, the licensee failed to periodically test the emergency lights to assure that the lights will function properly and continue to meet their design criteria.

The licensee entered this issue into their corrective action program as Condition Report CR-WF3-2015-00856 and operators have flashlights available as a compensatory measure. Because this violation was of very low safety significance and has been entered into the corrective action program, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000382/2015007- 03, "Failure to Periodically Test Emergency Lighting Units."

.2 Introduction. The team identified a Green non-cited violation of License Condition 2.C.9, "Fire Protection," for the failure to correct adverse conditions associated with fire protection. Specifically, the licensee failed to correct long-standing deficiencies with the Appendix R emergency lighting units.

Descriptions. During the team's walkdown of the alternative shutdown procedure and subsequent discussions with the licensee's engineering staff, the team identified three Appendix R emergency lighting units with longstanding deficiencies that had not been corrected. At the time of inspection, three lights remained nonfunctional for approximately 3 to 6 years. The three impaired emergency lighting units were:

- LTE-EBLT-324-8B – This light was located in the remote shutdown room. This light was identified as impaired on January 9, 2009, in Work Request 151869. This work request was scheduled to be completed on August 26, 2015. No condition report was generated at the time of discovery.

- LTE-EBLT-321-20B – This light was located near the main steam isolation valve area. This light was first identified as impaired on March 2, 2010, in Condition Report CR-WF3-2010-01369. This light was scheduled to be repaired under Work Request 192775. This work request was scheduled to be completed on July 14, 2015.

- LTE-EBLT-320-14E – This light was located near the main steam isolation valve area. This light was first identified as impaired on February 16, 2012, in Condition Report CR-WF3-2012-00840. This light was scheduled to be repaired under Work Request 264052. At the time this finding was identified, a completion date for this work request has not been scheduled.

The team determined that there was no practical reason for the lights to have not been repaired in a timely manner.

Analysis. The failure to correct long-standing deficiencies with the Appendix R emergency lighting units 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 finding using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013, because it affected the ability to reach and maintain safe shutdown conditions in case of a fire. The team assigned the finding to the post-fire safe shutdown category since it impacted the alternate shutdown (control room abandonment) element. The team assigned the finding a low degradation rating because the failure to provide adequate 8-hour emergency lights at all locations would not prevent reaching and maintaining safe shutdown conditions in the event of a control room fire. Specifically, the team determined that operators performing an alternative shutdown had flashlights available in the Appendix R equipment lockers. Because the team assigned a low degradation rating in accordance with Inspection Manual Chapter 0609, Appendix F, Step 1.3.1.B, this finding screened as having very low safety significance (Green).

This finding had a cross-cutting aspect associated with resolution within the problem identification and resolution area since the licensee failed to take effective corrective actions to address issues in a timely manner commensurate with their safety significance. Specifically, the team determined that the licensee failed to take corrective actions to address the nonfunctional emergency lighting units in a timely manner (P.3).

Enforcement. License Condition 2.C.9, "Fire Protection," states, in part, that the licensee 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 through Amendment 36 and as approved in the Safety Evaluation Report through Supplement 9. Final Safety Analysis Report, Section 9.5.1.3.1.C, states that the fire protection program quality assurance program is documented in Procedure UNT-005-013, "Fire Protection Program." Procedure UNT-005-013, Section 5.8.8, states, in part, that conditions adverse to quality relating to the fire protection program will be identified and corrected. Contrary to the above, from 2009 to April 15, 2015, the licensee failed to implement and maintain in effect all provisions of the approved fire protection program. Specifically, the licensee failed to correct long-standing deficiencies with the Appendix R emergency lighting units.

The licensee entered this issue into their corrective action program as Condition Report CR-WF3-2015-00593 and operators had flashlights available as a compensatory measure. Because this violation was of very low safety significance and has been entered into the corrective action program, this violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000382/2015007-04, "Failure to Correct Long Standing Deficiencies with the Appendix R Emergency Lighting Units."

.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 in time to bring the plant to cold shutdown within the timeframes 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.

The team reviewed operator manual actions credited for achieving hot shutdown for fires that do not require an alternative shutdown. The team verified that operators could reasonably be expected to perform the actions within the applicable shutdown time requirements. The team reviewed these operator manual actions using the guidance contained in NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire," dated October 2007.

b. Findings

No findings were identified.

.11 Review and Documentation of Fire Protection Program Changes

a. Inspection Scope

The team reviewed changes which occurred from February 17, 2012, to April 15, 2015, to the approved fire protection program. The team verified that the changes did not constitute an adverse effect on the ability to safely shutdown.

b. Findings

No findings were identified.

.12 Control of Transient Combustibles and Ignition Sources

a. Inspection Scope

The team reviewed the licensee's approved fire protection program, implementing procedures, and programs for the control of ignition sources and transient combustibles. The team assessed the licensee's effectiveness in preventing fires and in controlling combustible loading within limits established in the fire hazards analysis. The team performed plant walkdowns to independently verify that transient combustibles and ignition sources were being properly controlled in accordance with the administrative controls.

b. Findings

No findings were identified.

.13 Alternative Mitigation Strategy 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 the licensee 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 16:

- Fill of the Spent Fuel Pool
    - Normal Make Up and Make Up from Fire Protection
    - Make Up from Portable Pump
    - Other Make Up Methods
    - Leakage Mitigations
    - Internal Spray
    - Air Cooling
    - External Spray
    - Containing Run Off
- Containment Flooding Injection Using Portable Pump.

The team completed two samples.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES [OA]

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

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

The team presented the preliminary inspection results to Mr. M. Chisum, Site Vice President, and other members of the licensee staff at a debrief meeting on February 13, 2015. The licensee acknowledged the findings presented.

The team presented the inspection results to Mr. B. Lanka, Director, Engineering, and other members of the licensee staff in a telephonic exit meeting on April 15, 2015. The licensee acknowledged the findings presented.

The inspectors verified that no proprietary information was retained by the inspectors.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Becker, Fire Protection Engineer, Design Engineering
J. Briggs, Acting Manager, Maintenance
B. Briner, System Engineer, Systems Engineering
W. Carey, Manager, Emergency Planning
M. Chisum, Site Vice President
S. Cooper, Reactor Operator, Operations
J. Crews, Supervisor, Systems Engineering
W. Crowley, Senior Reactor Operator, Operations
R. Gilmore, Manager, Entergy Systems & Component engineering
A. Harris, Consultant, Projects
J. Hashim, Fire Protection Engineer, Systems Engineering
M. Haydel, Manager, Design & Programs Engineering
J. Jarrell, Manager, Regulatory Assurance
J. Lanci, Preventative Maintenance Program Owner
B. Lanka, Director, Engineering
B. Lindsey, Senior Manager, Operations
J. MacArthur, Senior Nuclear Auxiliary Operator, Operations
J. McBrayer, Licensing Administration Specialist
W. Mc Kinney, Manager, Training
S. Meiklejohn, Licensing Specialist, Regulatory Assurance
M. Mills, Manager, Nuclear Oversight
L. Morgan, Senior Nuclear Auxiliary Operator, Operations
S. Nelson, Operations, Fire Marshal
R. Osbom, Manager, Performance Improvement
B. Pellegrin, Senior Manager, Production
C. Rich, Director, Regulatory Assurance
M. Richey, General Manager, Operations
J. Thompson, Senior Technical Instructor, Training
R. Tran, Electrical Engineer, Design Engineering

NRC Personnel

Frances Ramirez, Senior Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000382/2015007-01	NCV	Inadequate Fire Area Boundary (Section 1R05.02.b)
05000382/2015007-02	NCV	Failure to Provide a Bounding Calculation for Time Critical Actions (Section 1R05.05.b.1)
05000382/2015007-03	NCV	Failure to Periodically Test Emergency Lighting Units (Section 1R05.08.b.1)
05000382/2015007-04	NCV	Failure to Correct Long Standing Deficiencies with the Appendix R Emergency Lighting Units (Section 1R05.08.b.2)

LIST OF DOCUMENTS REVIEWED

Cable Routing Data Components

30294A	30360C	30702G	31055C
30294A	30360D	30702L	31055G
30294B	30360E	30709B	31055N
30294B	30360F	30709C	31058B
30294C	30375A	30709D	31058C
30294C	30375C	30709E	31058D
30294D	30375F	30709F	31058E
30294D	30375G	30709P	31533A
30294E	30375H	30931A	31533B
30294E	30375J	30931B	31533C
30295A	30375K	30931C	31533D
30295B	30375L	30931D	31547B
30295C	30375M	30931E	31549B
30295D	30375N	30932A	31661C
30295E	30375Q	30932B	32377J
30300A	30381F	30932C	32377L
30300C	30381G	30932L	32377M
30300C	30381H	30933A	32377N
30300H	30381J	30933B	32377P
30300J	30381K	30933C	32377U
30300J	30382F	30933D	32388B
30300N	30382G	30933E	32390B
30327C	30382H	30933F	32391C
30327D	30382J	30933H	32391D
30327E	30382K	30934A	32391E
30360A	30700L	30934B	32391H
30360B	30700N	31055B	

Calculations

Number	Title	Revision
CN-TDA-10-2	Westinghouse Calculation - Waterford 3 Appendix R Fire Analysis Report.	1
EC-F00-026	Post Fire Safe Shutdown Analysis (Appendix R Revalidation)	3
EC-M12-001	Emergency Diesel Generator with no CCW Flow	0
EC-41765	DC Circuits Proper Polarity	0
ECS98-001	EOP Action Value Basis Document.	4

Calculations

Number	Title	Revision
PRA-W3-05-007	Waterford 3 Fire PRA Summary Report	2
WCAP-16175-P-A	Model for Failure of RCP Seals Given Loss of Seal Cooling in CE NSSS Plants.	0

Condition Reports (CR-WF3-xxxx-xxxxx)

2000-01144	2014-00971	2015-00563*	2015-00833*
2003-02441	2014-01635	2015-00572*	2015-00843*
2010-01369	2014-02841	2015-00576*	2015-00856*
2010-04136	2014-03620	2015-00578*	2015-00857*
2010-05237	2014-03896	2015-00592*	2015-00858*
2011-06349	2014-05185	2015-00593*	2015-00859*
2012-00550	2014-05264	2015-00595*	2015-01871*
2012-00840	2014-05393	2015-00540*	2015-01872*
2013-00089	2014-05546	2015-00625*	2015-01873*
2013-01644	2014-05875	2015-00682*	
2013-05723	2015-00528*	2015-00736*	

*Issued as a result of inspection activities.

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G-1356	Fire Protection Cooling Towers – Plan	1
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G-1364	Fire Protection Reactor Auxiliary Building Plan Elevation +7.00' and Sections "E-E" and "F-F"	0
G-1367	Fire Protection Reactor Bldg. & Wing Area Plan El. – 35.00' & El. – 4.00'	1
G-1368	Fire Protection Reactor Bldg. & Wing Area Plan El. + 21.00'	2
G-1369	Fire Protection Reactor Bldg. & Wing Area Plan El. + 46.00'	0
G-1370	Fire Protection Turbine Bldg. Ground Floor Plan El. 15.00'	2
G-1371	Fire Protection Turbine Bldg. Mezzanine Floor Plan El. +40.00'	2
G-1372	Fire Protection Turbine Bldg. Operating Floor Plan El. +67.00'	0
G-1375	Fire Protection Reactor Auxiliary Building Plan Elevation +35.00'	1
SD-FP-21, Figure 1, Pg. 56	Fire Protection System-Simplified Diagram	7
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SD-FP-21, Figure 3, Pg. 58	Fire Pump Arrangement	7
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5817-5404	Isometric Drop Details Systems FP-M18 and 19 Cable Penetration Area A and B	4
5817-5407	System FP-M18 Cable Penetration Area	6
5817-5408	Systems FP-M18 thru 19 Cable Penetration Areas	6
5817-5409	Systems FP-M11 thru 19 Cable Penetration – Vault Areas	10

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5817-6337	RAB Multi Cycle Sprinkler Systems FP-M30	9
5817-6382	RAB Sprinkler System FP-M25B and M30A Switchgear Area B	9
5817-6385	RAB Sprinkler System FP-M25B (FP-39) Switchgear Area B	8

Engineering Changes

Number	Title	Revision/ Date
EC-21260	Add Sprinklers Under Hatch HC-1 on Elevation RAB -35.00' to Comply With Final Safety Analysis Report (FSAR)	0
EC-31611	Westinghouse – Fire Analysis Report	April 30, 2013
EC-31827	Replace Obsolete EDG Sequencer Relays (B Train)	0
EC-32284	SI-405B Is Not Operable Manually	0
EC-36621	Evaluate Impacts of Operating the Emergency Diesel Generators (EDGS) Without Component Cooling Water	0
EC-39570	Establish Documentation and/or Perform Evaluation for Fire Dampers Installed In Non-Safety Related HVAC Ducts to Justify Their Fire Barrier Capability	0
EC-41765	DC Circuits Proper Polarity	0
EC-41839	Detector 39-04 Requirements for Hemyc Wrap	0
EC-52360	13-210 & 13-211 Fire Impairment Closure	0
EC-53759	CR-WF3-2014-5546 Operability Input on Bent Sprinkler Deflectors	0

Engineering Information Records

Number	Title	Revision
EC-1617	This ER Evaluates Hose Size and Pump Size Requirements to Implement the B.5.B.Water Makeup, Spray, and Portable Pump Strategies.	0
EC-31611	Westinghouse – Fire Analysis Report	0

Engineering Request

Number	Title	Revision
ER-W3-2004-0222	Alternative Methodology for Appendix R 8-Hour Battery Powered Emergency Light Testing	0

Engineering Standard

Number	Title	Revision
EN-FP-S-001-Multi	Appendix R Emergency Lighting Units	1

Fire Impairments

13-0116	14-0249	14-0312	15-043*
13-0185	14-0277	14-0322	15-044*
14-0160	14-0287	15-041*	15-045*
14-0244	14-0299	15-042*	

*Issued as a result of inspection activities.

Licensing Correspondence

Number	Title	Date
NUREG-0787	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	July 1981
NUREG-0787 Supplement No. 1	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	October 1981
NUREG-0787 Supplement No. 2	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	January 1983

Licensing Correspondence

Number	Title	Date
NUREG-0787 Supplement No. 3	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	April 1982
NUREG-0787 Supplement No. 5	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	June 1983
NUREG-0787 Supplement No. 6	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	June 1984
NUREG-0787 Supplement No. 7	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	September 1984
NUREG-0787 Supplement No. 8	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	December 1984
NUREG-0787 Supplement No. 10	Safety Evaluation Report Related to the Operation of Waterford Steam Electric Station, Unit Number 3	March 1985

Miscellaneous Documents

Number	Title	Revision Date
Engineering Report WF3-FP-10-00006	WF3 Code Compliance Report for NFPA 72D "Standard for the Installation, Maintenance and Use of Proprietary Signaling Systems for Watchman, Fire Alarm and Supervisory Service", 1975 Edition	0
Engineering Report WF3-FP-10-00007	WF3 Code Compliance Report for NFPA 72E "Automatic Fire Detectors", 1974 Edition	0
Engineering Report WF3-FP-10-00013	WF3 Code Compliance Report for NFPA 13 "Standard for Installation of Sprinkler Systems" 1976 Edition	0
Engineering Report WF3-FP-10-00015	WF3 Code Compliance Report for NFPA 20 "Centrifugal Fire Pumps" 1972 Edition	0
Engineering Report WF3-FP-11-00002	Expert Panel for Addressing Multiple Spurious Operations Report	1
Engineering Report WF3-FP-13	Evaluation of Fire Area Boundaries	0

Miscellaneous Documents

Number	Title	Revision Date
Entergy Transition Report	Transition to 10 CFR 50.48© - NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition	November 2011
Final Safety Analysis Report, Section 9.5.1	Fire Protection System	308
Letter: I. Nygren to R. Perry	Letter of Agreement, Ochsner Medical Center. Subject: Ochsner Flight Care Availability.	January 4, 2012
Letter: N. Chauncey to R. Perry	Letter of Agreement, Williams Fire & Hazard Control, Inc. Subject: Fire Response to Waterford 3.	October 31, 2011
Letter: T. Burns to G. Fey	Letter of Agreement, Southland Fire and Safety Equipment. Subject: Availability to fill SCBA bottles during emergencies at Waterford 3	May 11, 2011
LO-WLO-2014-0029	2015 Pre NRC Triennial Fire Protection Assessment	0
LOA HVFD	Letter of Agreement, Hahnville Fire Department	June 26, 2011
Prefire Strategy RAB 6-001	Elevation +35.00' RAB Electrical Penetration Area "A"	8
Prefire Strategy RAB 7-001	Elevation +35.00' RAB Relay Room	11
Prefire Strategy RAB 8A-001	Switchgear Room "A"	10
Prefire Strategy RAB 8B, E, F-001	Switchgear Room "B"	12
Prefire Strategy RAB 8C-001	Switchgear Room "A/B"	11
QA-9-2012-WF3-1	Fire Protection Audit	March 13, 2012
QA-9-2014-W3-01	Fire Protection Audit	March 14, 2014

Miscellaneous Documents

Number	Title	Revision Date
Retype A9.02	Thermo-Lag Installed to Tested Fire Barrier Evaluation (GL 86-10 Evaluation)	2
Technical Requirements Manual, Section 3/4.3.3.8	Fire Detection Instrumentation	126
Technical Requirements Manual, Section 3/4.7.10	Fire Suppression Water Systems	126
Technical Requirements Manual, Section 3/4.7.11	Fire Rated Assemblies	91
Technical Requirements Manual, Section 3/4.7.12	Essential Services Chilled Water Systems Chillers – Appendix R	128
Technical Requirements Manual, Section 3/4.1.2	Boration Systems Charging Pumps – Appendix R	128
WDLA-NAO-B5b	Dynamic Learning Activity – B5b Walkdown	0
WLP-EMCT-SAMG	PowerPoint Presentation – Sever Accident Mitigation Guidelines (SAMG) Electrical Overview	0
WLP-EMT2-SAMG	PowerPoint Presentation – Sever Accident Mitigation.	2
WLP-EP-SAM00	PowerPoint Presentation - Severe Accident Management Guidelines	8
WLP-EP-SAM00	PowerPoint Presentation - Severe Accident Management Guidelines	13
WLP-EP-SSAMG01	PowerPoint Presentation - B5B / Extensive Damage Mitigation / Security Threat	4
WLP-ESPC-FRGB5B	PowerPoint Presentation - Functional Recovery Guidelines and B.5.b.	0

Miscellaneous Documents

Number	Title	Revision Date
WLP-ICT2-SAMG	PowerPoint Presentation - Sever Accident Management Guidelines	3
WLP-MMT2-B.5.B	PowerPoint Presentation - Godwin HL4M B.5.B Pump	4
WLP-OPS-SAM00	PowerPoint Presentation - Sever Accident Mitigating Guidelines	10
WLP-OPS-SAM00	PowerPoint Presentation - Sever Accident Management Guidelines	17
WLP-OPS-SSAMG00	PowerPoint Presentation - Introduction to S-SAMG-01	5
WPCS-EP-PROG	Emergency Planning Training Program and Course Summary	6
WPCS-EP-PROG	Emergency Planning Training Program and Course Summary.	6

Procedures

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EN-DC-127	Control of Hot Work and Ignition Sources	15
EN-DC-128	Fire Protection Impact Reviews	8
EN-DC-161	Control of Combustibles	11
EN-DC-330	Fire Protection Program	4
EN-TQ-125	Fire Brigade Drills	2
FP-001-014	Duties of a Firewatch	18
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FP-001-019	Fire Brigade Equipment	307
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ME-003-002	Fire Detection Supervisory Circuit Functional Test	307
ME-003-004	Fire Dampers	7

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ME-003-017	Cerberus Pyrotronics Thermal Fire Detector Testing	306
ME-004-445	Self-Contained Battery Powered Emergency Lighting Unit	305
MM-003-021	Sprinkler System Inspection (Safety Areas)	10
NTP-202	Fire Protection Training	302
OP-009-004	Fire Protection	316
OP-009-005	Shutdown Cooling	35
OP-901-120	Pressurized Pressure Control Malfunction	302
OP-901-502	Evacuation of Control Room and Subsequent Plant Shutdown	27
OP 901-502-01	Time Critical Task Resource Management for Control Room Evacuation	1
OP-901-503	Isolation Panel Fire	309
OP-901-524	Fire in Areas Affecting Safe Shutdown	12
OP-903-053	Fire Protection System Pump Operability Test	18
OP-903-054	Fire Protection Valve Lineup check	10
OP-903-055	Fire Main and Hydrant Flush	11
OP-903-056	Fire Protection Functional Test	309
OP-903-057	Fire Protection System Flow Test	17
OP-903-126	Functional Testing of LCP-43	7
OP-904-005	Sprinkler and Spray Systems Alarm Test	13
OP-904-019	OCA Fire Protection System Main Pump Test	2
PMC-003-002	Installation and Rework of Penetration Seals, Conduit Seals, Fire Breaks and Water Barriers	4

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S-SAMG-01	Severe Accident Management Guidelines – Loss of Large Areas of the Plant due to Fire/Explosion	12
S-SAMG-01	Severe Accident Management Guidelines – Loss of Large Areas of the Plant due to Fire/Explosion	15
S-SAMG-01	Severe Accident Management Guidelines – Loss of Large Areas of the Plant due to Fire/Explosion	16
UNT-005-013	Fire Protection Program	12

Work Orders

00151869	52217545	52371388	52512964
00270990	52283342	52374001	52517633
00280756	52208382	52409924	52522454
00351003	52245794	52413005	52529715
00040984	52256546	52416793	52558563
00047410	52282108	52418265	52558938
165991-01	52293694	52418445	52561107
364896-02	52321722	52449369	52582154
51563178	52321723	52461010	526039
51679870	52332839	52479133	
52029678	52335332	52488473	