

Mr. Charles M. Dugger
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Entergy Operations, Inc.
17265 River Road
Killona, LA 70066-0751

July 21, 2000

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - ISSUANCE OF
AMENDMENT RE: EMERGENCY DIESEL GENERATOR ALLOWED OUTAGE
TIME INCREASE (TAC NO. MA6176)

Dear Mr. Dugger:

The Commission has issued the enclosed Amendment No. 166 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 29, 1999, as supplemented by letters dated August 24, 1999, and January 27, May 22, and May 31, 2000.

The amendment modifies Technical Specification (TS) 3.8.1.1 and associated Bases by extending the Emergency Diesel Generator (EDG) allowed outage time from 72 hours to ten days. In the supplement letter dated May 22, 2000, an alternate source for the onsite power system during the EDG maintenance outage, by way of a temporary EDG was added. The application dated July 29, 1999, did not include the TEDG.

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,
/RA/

N. Kalyanam, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No. 166 to NPF-38
2. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

July 21, 2000

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Sincerely,

N. Kalyanam, Project Manager, Section 1
Project Directorate IV & Decommissioning
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Office of Nuclear Reactor Regulation

Docket No. 50-382

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cc w/encls: See next page

Waterford Generating Station 3

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 166
License No. NPF-38

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Entergy Operations, Inc. (the licensee) dated July 29, 1999, as supplemented by letters dated August 24, 1999, and January 27, May 22, and May 31, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

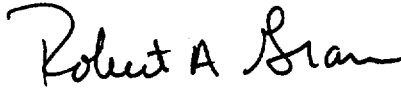
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-38 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 166, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert A. Gramm, Chief, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: July 21, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 166

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

3/4 8-1

3/4 8-2

B 3/4 8-1

Insert

3/4 8-1

3/4 8-2

3/4 8-2a

B 3/4 8-1

B 3/4 8-1a

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Two separate and independent diesel generators, each with:
 1. Diesel oil feed tanks containing a minimum volume of 339 gallons of fuel, and
 2. A separate diesel generator fuel oil storage tank containing:
 - a. A minimum volume of 38,760 gallons of fuel, or
 - b. A fuel oil volume less than 38,760 gallons and greater than 38,000 gallons of fuel for a period not to exceed 5 days (provided replacement fuel oil is onsite within the first 48 hours), and
 3. A separate fuel transfer pump.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

- a. With one offsite circuit of 3.8.1.1a inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter. Restore the offsite A.C. circuit to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With one diesel generator of 3.8.1.1b inoperable:
 - (1) Demonstrate the OPERABILITY of the remaining A.C. circuits by performing Surveillance Requirements 4.8.1.1.1a (separately for each offsite A.C. circuit) within 1 hour and at least once per 8 hours thereafter. If the diesel generator became inoperable due to any cause other than an inoperable support system, an independently testable component, or preplanned maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator (unless it has been successfully tested in the last 24 hours) by performing Surveillance Requirement 4.8.1.1.2a.4 within 8 hours unless the absence of any potential common mode failure for the remaining diesel generator is demonstrated.
 - (2) Restore the diesel generator to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, unless the following condition exists:

ELECTRICAL POWER SYSTEMS

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

- (a) The requirement for restoration to OPERABLE status within 72 hours may be extended to 10 days if a temporary emergency diesel generator is verified available, and
 - (b) If at any time the temporary emergency diesel generator availability cannot be met, either restore the temporary emergency diesel generator to available status within 72 hours (not to exceed 10 days from the time the permanent plant EDG originally became inoperable), or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- c. With one offsite A.C. circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter; and, if the diesel generator became inoperable due to any cause other than an inoperable support system, an independently testable component, or preplanned maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator by performing Surveillance Requirement 4.8.1.1.2a.4 within 8 hours (unless it is already operating) unless the absence of any potential common mode failure for the remaining diesel generator is demonstrated. Restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the other A.C. power source (offsite A.C. circuit or diesel generator) to OPERABLE status in accordance with the provisions of ACTION statement a or b, as appropriate, with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable A.C. power source. A successful test of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2a.4 performed under this ACTION statement satisfies the diesel generator test requirement of ACTION statement a or b.
- d. With one diesel generator inoperable, in addition to ACTION b. or c. above, verify that:
 - (1) All required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and
 - (2) When in MODE 1, 2, or 3, the steam-driven emergency feed pump is OPERABLE.

If these conditions are not satisfied within 2 hours be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ELECTRICAL POWER SYSTEMS

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

- e. With two of the above required offsite A.C. circuits inoperable, restore one of the inoperable offsite A.C. circuits to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. Following restoration of one offsite A.C. circuit, follow ACTION statement a with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable offsite A.C. circuit. A successful test of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2a.4 performed under this ACTION statement satisfies the diesel generator test requirement of ACTION statement a.
- f. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter; restore one of the inoperable diesel generators to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Following restoration of one diesel generator, follow ACTION statement b with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable diesel generator.

3/4.8 ELECTRICAL POWER SYSTEMS

BASES

3/4.8.1, 3/4.8.2, and 3/4.8.3 A.C. SOURCES, D.C SOURCES, AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety-related equipment required for (1) the safe shutdown of the facility and (2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criterion 17 of Appendix A to 10 CFR Part 50.

The Limiting Condition for Operation (LCO) ensures that each diesel generator storage tank contains fuel oil of a sufficient volume to operate each diesel generator for a period of 7 days. The minimum required volume is based on the time-dependent loads of the diesel generator following a loss of offsite power and a design bases accident and includes the capacity to power the engineered safety features in conformance with Regulatory Guile 1.137 October 1979. The minimum onsite stored fuel oil is sufficient to operate the diesel generator for a period longer than the time to replenish the onsite supply from the outside sources discussed in FSAR 9.5.4.2.

An additional provision is included in the LCO which allow the diesel generators to remain operable when their 7 day fuel oil supply is not available. This provision is acceptable on the basis that replacement fuel oil is onsite within the first 48 hours after falling below the 7 day supply.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite A.C. source. When one diesel generator is inoperable to perform either preplanned maintenance (both preventive and corrective) or unplanned corrective maintenance work, the allowed-outage-time (AOT) can be extended from 72 hours to 10 days, if a temporary emergency diesel generator (TEDG) is verified available and aligned for backup operation to the permanent plant EDG removed from service. The TEDG will be available prior to removing the permanent plant EDG from service for the extended preplanned maintenance work or prior to exceeding the 72-hour AOT for the extended unplanned corrective maintenance work. A Configuration Risk Management Program (CRMP) is implemented to assess risk of this activity when applying this ACTION. The TEDG availability is verified by: (1) starting the TEDG and verifying proper operation; (2) verifying 24 hour onsite fuel supply; and (3) ensuring the TEDG is aligned to supply power through a 4.16 kV non-safety bus to the 4.16kV safety bus. A status check for TEDG availability will also be performed at least once every 72 hours following the initial TEDG availability verification. The status check shall consists of: (1) verifying the TEDG equipment is mechanically and electrically ready for manual operation; (2) verifying 24 hour onsite fuel supply; and (3) ensuring the TEDG is aligned to supply power through a 4.16 kV non-safety bus to the 4.16 kV safety bus. If the TEDG becomes unavailable during the 10 day AOT and cannot be restored to available status, the EDG AOT reverts back to 72-hours. The

ELECTRICAL POWER SYSTEMS

BASES

3/4.8.1, 3/4.8.2, and 3/4.8.3 A.C. SOURCES, D.C SOURCES, AND ONSITE POWER DISTRIBUTION SYSTEMS (Continued)

72 hours begins with the discovery of the TEDG unavailability, not to exceed a total of 10 days from the time the EDG originally became inoperable. The A.C. and D.C. source allowable out-of-service times are based on Regulatory Guide 1.93, "Availability of Electrical Power Sources," December 1974. When one diesel generator is inoperable, there is an additional ACTION requirement to verify that all required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and that the steam-driven auxiliary feedwater pump is OPERABLE. This requirement is intended to provide assurance that a loss-of-offsite power event will not result in a complete loss of safety function of critical systems during the period one of the diesel generators is inoperable. The term verify as used in this context means to administratively check by examining logs or other information to determine if certain components are out-of-service for maintenance or other reasons. It does not mean to perform the Surveillance Requirements needed to demonstrate the OPERABILITY of the component.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that (1) the facility can be maintained in the shutdown or refueling condition for extended time periods and (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 166 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

On July 29, 1999, Entergy Operations, Inc. (EOI, the licensee) submitted an amendment to Technical Specifications (TS) Section 3.8.1.1 and associated bases of the Waterford Steam Electric Station, Unit 3 (Waterford 3). The amendment proposes to extend the emergency diesel generator (EDG) allowed outage time (AOT) from 72 hours to ten days. The purpose of this proposed change is to provide the licensee with needed flexibility in the performance of both corrective maintenance (CM) and preventive maintenance (PM) during power operation. On December 21, 1999, the NRC forwarded a request for additional information (RAI) to the licensee. The licensee responded to the RAI by letter dated January 27, 2000. Subsequently, the licensee determined the need for an alternate alternating current (A.C.) source for the onsite power system during extended EDG maintenance outages (longer than 72 hours but not to exceed ten days) and, as a result, resubmitted the application on May 22, 2000, for the extended EDG AOT and included a temporary EDG (TEDG). EOI provided additional information by letter dated May 31, 2000.

On June 14, 2000, the Commission published in the *Federal Register* (FR) a Notice of consideration of issuance of amendment to facility operating license, proposed no significant hazards consideration determination, and opportunity for a hearing (65 FR 37425). In this finding, incorrect reference is made to supplements dated August 8, 1999, and March 29, 2000. There are no supplements from the licensee with these dates.

2.0 BACKGROUND

This application originated from the Combustion Engineering (CE) Owners Group (CEOG) Joint Application Report for EDG AOT extension (CE NPSD-996) submitted for staff review in May 1995. The report requested an extension of a single EDG from three to seven days and, in addition, the extension of the same AOT to ten days on a once-per-cycle frequency for participating CE plants. Later in their response to the staff RAI, CEOG revised the proposal in which the once-per-cycle AOT was removed and a single, permanent ten-day AOT for a single EDG was requested. Based on the review of the report, the staff determined that the proposal

could not be generically approved for all participating CE plants due to diversity in plant design, operating experience, and probabilistic risk analysis (PRA) modeling. In some cases, the risk implications associated with the proposal were determined to be potentially significant. Since then, a 14-day EDG AOT extension has been approved for San Onofre Nuclear Generating Station, Units 2 and 3 after an extensive plant-specific evaluation.

Waterford 3 has requested an extension of the EDG AOT from 72 hours to ten days and referenced CE NPSD-996 for justification. The staff requested additional information for review and the licensee provided sufficient information to complete this evaluation of the risk associated with the proposal.

3.0 EVALUATION

The current Waterford 3 TS 3.8.1.1 requires that if an EDG is declared inoperable for any reason, the EDG must be restored to an operable status within 72 hours or the plant must be placed in at least hot standby within 6 hours and in cold shutdown within the following 30 hours. The proposed TS amendment would allow up to ten days to restore operability to an EDG. The licensee proposed to revise TS 3.8.1.1 ACTION b. as follows:

- b. With one diesel generator of 3.8.1.1b inoperable:
 - (1) Demonstrate the OPERABILITY of the remaining A.C. circuits by performing Surveillance Requirements 4.8.1.1.1a (separately for each offsite A.C. circuit) within 1 hour and at least once per 8 hours thereafter. If the diesel generator became inoperable due to any cause other than an inoperable support system, an independently testable component, or preplanned maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator (unless it has been successfully tested in the last 24 hours) by performing Surveillance Requirement 4.8.1.1.2a.4 within 8 hours unless the absence of any potential common mode failure for the remaining diesel generator is demonstrated.
 - (2) Restore the diesel generator to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, unless the following conditions exist:
 - (a) The requirement for restoration to OPERABLE status within 72 hours may be extended to 10 days if a temporary emergency diesel generator is verified available, and
 - (b) If at any time the temporary emergency diesel generator availability cannot be met, either restore the temporary emergency diesel generator to available status within 72 hours (not to exceed 10 days from the time the permanent plant EDG originally became inoperable), or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Additionally, the licensee proposed to modify BASES Section 3/4.8.1, 3/4.8.2, and 3/4.8.3 - A.C. SOURCES, D.C. [direct current] SOURCES, and ONSITE POWER DISTRIBUTION SYSTEMS to include the following:

When one diesel generator is inoperable to perform either preplanned maintenance (both preventive and corrective) or unplanned corrective maintenance work, the allowed-outage-time (AOT) can be extended from 72 hours to 10 days, if a temporary emergency diesel generator (TEDG) is verified available and aligned for backup operation to the permanent plant EDG removed from service. The TEDG will be available prior to removing the permanent plant EDG from service for the extended preplanned maintenance work or prior to exceeding the 72-hour AOT for the extended unplanned corrective maintenance work. A Configuration Risk Management Program (CRMP) is implemented to assess risk of this activity when applying this ACTION. The TEDG availability is verified by: (1) starting the TEDG and verifying proper operation; (2) verifying 24 hour onsite fuel supply; and (3) ensuring the TEDG is aligned to supply power through a 4.16 kV non-safety bus to the 4.16kV safety bus. A status check for TEDG availability will also be performed at least once every 72 hours following the initial TEDG availability verification. The status check shall consists of: (1) verifying the TEDG equipment is mechanically and electrically ready for manual operation; (2) verifying 24 hour onsite fuel supply; and (3) ensuring the TEDG is aligned to supply power through a 4.16 kV non-safety bus to the 4.16kV safety bus. If the TEDG becomes unavailable during the 10 day AOT and cannot be restored to available status, the EDG AOT reverts back to 72-hours. The 72 hours begins with the discovery of the TEDG unavailability not to exceed a total of 10 days from the time the EDG originally became inoperable.

3.1 Deterministic Evaluation

The licensee stated that this AOT extension is sought to provide needed flexibility in the performance of both CM and PM during power operation. Furthermore, adoption of the proposed AOT extension reduces the risk of unscheduled plant shutdowns. The desire to perform selected maintenance online is based on a number of expected enhancements to the maintenance process:

- Allow for increased flexibility in the scheduling and performance of PM.
- Reduce the number of individual entries into limiting condition for operation (LCO) action statements by providing sufficient time to perform related maintenance tasks within a single entry.
- Allow better control of resource allocation. During outage maintenance windows, plant personnel and resources are spread across a large number and a wide variety of maintenance tasks. Allowing online maintenance gives the plant the flexibility to focus more quality resources on any required or elected EDG maintenance.
- Avert unplanned plant shutdown and minimize the potential for notice of enforcement discretion requests. Risks incurred by unexpected plant shutdowns can be comparable to and often exceed those associated with continued power operation.

- Improve EDG availability during shutdown modes.

The licensee stated that the TEDG will be a commercial-grade diesel generator capable of supplying auxiliary power to, at a minimum, required safe-shutdown loads on the EDG train removed from service for the maintenance outage. In the event of a loss-of-offsite power (LOOP) and the failure of the operable EDG, the TEDG would be started and ready for load within 25 minutes. Power would be supplied to a de-energized 4.16 kV non-safety bus 2A or 2B, depending on which EDG train was declared inoperable, via a 4.16 kV breaker. Power from the nonsafety bus 2A or 2B would be supplied to the associated Class 1E 4.16kV safety bus 3A or 3B through two existing plant cross-tie circuit breakers (2-3 and 3-2) to power the required safe-shutdown loads.

The TEDG will be available before removing the permanent plant EDG from service for the extended preplanned maintenance work or before exceeding the 72-hour AOT for the extended unplanned corrective maintenance work. A CRMP is implemented to assess the risk of this activity when applying this ACTION. The TEDG availability is verified by: (1) starting the TEDG and verifying proper operation, (2) verifying 24 hour onsite fuel supply, and (3) ensuring the TEDG is aligned to supply power through a 4.16 kV non-safety bus to the 4.16kV safety bus. A status check for TEDG availability will also be performed at least once every 72 hours following the initial TEDG availability verification. The status check shall consist of: (1) verifying the TEDG equipment is mechanically and electrically ready for manual operation, (2) verifying 24 hour onsite fuel supply, and (3) ensuring the TEDG is aligned to supply power through a 4.16 kV non-safety bus to the 4.16kV safety bus. If the TEDG becomes unavailable during the ten day AOT and cannot be restored to available status, the EDG AOT reverts back to 72 hours. The 72 hours begins with the discovery of the TEDG unavailability, not to exceed a total of ten days from the time the EDG originally became inoperable.

The TEDG sizing will be based on the required safe-shutdown loads and other desirable loads for operational support of plant activities (i.e., emergency feedwater pump; charging pump; measurement channel static uninterruptible power supply (SUPS); battery charger; component cooling water pump; bank of 15 dry cooling water fans; three additional room coolers; computer SUPS; pressurizer heaters; safety SUPS; chiller compressor for room coolers; chilled water pump and oil pumps; control room heating, ventilation, and air conditioning (HVAC), switchgear room HVAC; 80 kW miscellaneous loads; and ten percent margin). The TEDG will be started manually. The connected loads are stripped from the busses and the previously deenergized non-safety 4.16 kV bus is energized using the TEDG. The safe-shutdown loads will be energized either manually (the sequencer is disabled) or automatically by means of the installed sequencer.

Additionally, the existing plant switchgear, breakers, and protective relaying were evaluated to ensure adequate rating for the anticipated load. The switchgear and feeder breakers are adequately rated. The protective relays associated with the 4.16 kV breaker on non-safety bus 2A(B) may need to be adjusted to coordinate with the TEDG rating. The protective relaying associated with the TEDG will be verified for coordination and adequacy.

The TEDG is an outdoor unit, and it will be protected in accordance with Off Normal Procedure OP-901-521, "Severe Weather and Flooding," if weather or grid conditions degrade or threaten to degrade to a point at which off-site power could be lost. Further actions would be taken to expeditiously restore vital plant systems and components to service in the event the National

Weather Service issues a hurricane, tropical storm, or tornado watch or warning for the Waterford 3 area. Procedures will be developed to implement onsite power system recovery action in conjunction with the current Emergency Operating Procedures and appropriate Off Normal Procedures in the event it is necessary to use the temporary A.C. power source.

In response to the staff's questions regarding compensatory measures, the licensee provided the following:

- Current TS 3.8.1.1.d ACTION statement ensures that required systems, subsystems, trains, components, and devices that depend on the remaining operable diesel generator as a source of emergency power are also operable before removing an EDG for maintenance. In addition, positive measures exist in the form of administrative controls and guidelines that reinforce the TS requirement to ensure systems, subsystems, trains, components, and devices on the opposite train are operable before removing the EDG from service and preclude subsequent testing or maintenance activities on these systems, subsystems, trains, components, and devices while the EDG is inoperable.
- Administrative Procedure OP-100-014, "Technical Specifications and Technical Requirements Compliance," Section 5.1.18, and the Waterford 3 On-Line Maintenance Guidelines provide assurance that voluntary entries into LCO action statements to perform PM are based on the determination that the decrease in plant safety is small enough, the level of risk is acceptable for the PM period, and the PM is warranted by operational necessity. This process will be further enhanced by the implementation of the CRMP. The CRMP has been approved in the context of License Amendment No. 163, dated May 15, 2000, regarding the containment spray system (CSS).
- Waterford 3 On-Line Maintenance Guidelines and Administrative Procedure PLG-009-007, "Routine Scheduling of Station Activities," provide assurance that removal of safety systems and important non-safety equipment from service will be minimized during scheduled maintenance outages. The Waterford 3 On-Line Maintenance Guidelines use both qualitative and quantitative reviews to assess the risk impact of removing safety systems and important non-safety equipment from service during maintenance outages.

Other systems or components may be removed from service to address unanticipated deterioration of component or system conditions that create an emergency, require plant shutdown within 72 hours, or significantly jeopardize continued power operation. These activities would be considered emergent work and would be reviewed for risk impact, either qualitatively by management or quantitatively via the equipment-out-of-service (EOOS) system. If these emergent work activities increase risk, steps would be taken to restore any equipment that affects plant safety. PLG-009-007 specifies that high-risk balance-of-plant activities will be avoided during safety equipment outages.

The implementation of the CRMP will also have provisions for assessing the need for additional actions after the discovery of additional EOOS conditions while in the LCO ACTION statement or evaluating the risk impact of equipment being removed from service.

- Procedure OP-100-014, Section 5.1.18.4, and the Waterford 3 On-Line Maintenance Guidelines provide assurance that component testing or maintenance that increases the likelihood of a plant transient are avoided and that plant operation should be kept stable during the extended outage of the EDG.

Procedure OP-100-014, Section 5.1.18.4, directs the Operations staff to consider avoiding the performance of testing or maintenance that would increase the risk of a transient before voluntarily entering an LCO Action to perform on-line PM.

The Waterford 3 On-Line Maintenance Guidelines, Section 5.1.1.1, require qualitative and quantitative reviews to be performed on EOOS and combinations of EOOS considering items such as the potential for a plant trip, the potential to affect generation, as low as reasonably achievable affect while on line, environmental conditions, and manpower available. In addition, Waterford 3 implements a Protected Train Concept that serves to prevent accidentally causing standby/required safety equipment to be inoperable/unavailable due to scheduling or personnel errors.

- Planning of the extended EDG maintenance using procedural guidance in the Waterford 3 On-Line Maintenance Guidelines and the proceduralized implementation of the CRMP will consider operational factors, such as grid conditions and weather conditions. Before voluntarily entering the LCO Action to perform extended EDG maintenance and during the outage, grid and environmental conditions would be evaluated to ensure that the maximum time possible is available for restoration, when needed. The intent will be to minimize the time when the EDG is out of service under conditions that could significantly threaten the off-site power sources. The qualitative engineering judgment and operating experience provide additional realistic analysis of the safety impact and the plant response as a result of potentially adverse weather.

Although Waterford 3 is in an area affected by hurricanes, the relatively slow approach of hurricanes affords time in which to take precautions, such as a plant shutdown, before the potential for a LOOP occurs. The Waterford 3 area, moreover, has experienced a decreased frequency of tornadoes and winter storms in comparison with other parts of the country. Waterford 3 has never experienced a weather-related total LOOP event.

There may be times when an EDG is disassembled for extended outages, and weather or grid conditions degrade or threaten to degrade to a point at which off-site power could be lost. In accordance with Waterford 3 Off Normal Procedure OP-901-521, the following actions would take place in the event the National Weather Service issues a hurricane, tropical storm, or tornado watch or warning for the New Orleans, Louisiana area: (1) the Duty Plant Manager would be notified, (2) the Shift Superintendent would evaluate ongoing maintenance using EOOS, and (3) the vital plant systems and components would be expeditiously restored to service. In accordance with discussions with the National Weather Service, a hurricane or tropical storm watch will generally be issued to an area projected to be in the path of a hurricane or a tropical storm 48 to 36 hours before landfall and a warning issued within 24 hours of landfall. In addition, in anticipation of a LOOP, OP-901-521 requires commencement of a plant shutdown, followed by a cooldown to Mode 5, 12 hours before the arrival of hurricane conditions onsite, as projected by the National Weather Service.

The evaluation of ongoing maintenance and the expeditious restoration of vital plant systems and components to service would generally include the following: (1) the current status of the maintenance in progress and the estimated time of completion, (2) consideration of additional planned maintenance and its impact on the restoration of the EDG with an estimated time for completion, and (3) consideration of sufficient time for post-maintenance retesting of the EDG. The evaluation may also consider the placement of a temporary backup power supply on-site.

In response to the staff's concern regarding a LOOP, the licensee stated that the Waterford 3 off-site electrical grid consists of two independent off-site power feeds connected to two separate switchyard buses. Off-site power is fed to Waterford 3 from each of these switchyard buses through separate startup transformers to two separate non-safety buses. Each non-safety bus is connected by separate bus duct to a safety bus. On the basis of its review of available data on LOOP sources, the licensee stated that no complete LOOP has occurred at Waterford 3 since commercial operation. However, events were identified that resulted in a partial LOOP and required TS 3.8.1.1 ACTION statement entries. These events did not cause a complete LOOP at Waterford 3 because one of the two plant 4160-volt vital buses was still available or the off-site power sources were available for immediate reclosure.

In response to the staff's concern regarding a full-load rejection test of the EDG at power operation after a major maintenance and overhaul, the licensee stated that the major transient is experienced by the EDG itself rather than the safety bus. Review of Waterford 3 full-load rejection test data from Refueling Outage 9 indicated that the voltage on the 4160-volt safety buses dropped approximately two percent and stabilized in about 0.5 seconds. This is a relatively minor transient and well within the capability of the loads on the safety buses. After any modification of the EDG that will require a 100 percent load rejection test in order to verify the operability of the EDG, the licensee will ensure the voltage transients experienced on the safety buses during 100 percent load rejection surveillance tests are within ± 5 percent of the initial test voltage, with stabilization within 1 second.

3.2 Conclusion of Deterministic Review

Based on the evaluation of the proposed change to extend the EDG AOT from 72 hours to ten days, the staff concludes that, from a deterministic aspect, the licensee's request for the ten-day EDG AOT to perform major maintenance is acceptable. The staff's conclusion is based on the following: (1) availability of a TEDG with a capacity to support required safe-shutdown loads, (2) the ten-day EDG AOT reduces the entries into the LCO and reduces the number of EDG starts for major EDG maintenance activities, and (3) there has been no complete LOOP at Waterford 3 since commercial operation began.

Further, the staff believes that precluding testing and maintenance of other electrical systems during extended outage and not scheduling preplanned maintenance when adverse weather is expected will minimize the impact of the longer AOT. Also, the staff finds that the change of the TS Bases section is consistent with the requested EDG AOT extension and is, therefore, acceptable.

3.3 PRA Evaluation

In Regulatory Guide (RG) 1.177, the staff identified a three-tiered approach for licensees and the staff to evaluate the risk associated with proposed TS AOT changes. Tier 1 is an evaluation of the impact on plant risk of the proposed TS change, as expressed by the change in core damage frequency (CDF), the incremental conditional core damage probability (ICCDP¹), and, where appropriate, the change in large early release frequency (LERF) and the incremental conditional large early release probability (ICLERP²). Tier 2 is an evaluation of the process used to address potentially high-risk configurations that could exist if equipment in addition to that associated with the change were to be taken out of service simultaneously, or other risk significant operational factors such as concurrent system or equipment testing were also involved. Tier 3 is an evaluation of the overall CRMP to ensure that adequate programs and procedures are in place to identify and compensate for other potentially lower probability, but nonetheless risk significant, configurations resulting from maintenance and other operational activities.

3.3.1 Tier 1: PRA Capability and Insights

3.3.1.1 PRA validity

To evaluate whether the PRA used in support of the proposed EDG AOT extension is of sufficient quality, scope, and detail, the staff evaluated all relevant information provided by the licensee in the submittal and subsequent RAI responses, the Individual Plant Examinations (IPE) and the subsequent safety evaluation report (SER), and CE NPSD-996 and its associated RAI responses.

Waterford 3 submitted its IPE in 1992, in response to Generic Letter (GL) 88-20 in which the plant CDF was estimated to be approximately $1.7\text{E-}5/\text{yr}$ for internal initiating events including internal floods. The IPE used the small event tree-large fault tree with fault tree linking approach to perform the analysis. The staff's evaluation of the IPE in 1997 indicated that the licensee's analysis appeared complete in terms of examining significant initiating events and dominant accident sequences, and the initiating event frequencies are reasonable and in agreement with other PRAs. The data used were generally consistent with the NUREG/CR-4550 data, and the β -factor method was used for common cause failures (CCFs). For some components, the Multiple Greek Letter method was also used. For the back-end (level 2) analysis, the IPE used plant damage states as the initial condition and a containment event tree with its supporting logic trees, i.e., fault trees, to quantify accident progression. The conditional early containment failure fraction, which also included containment bypass and containment isolation failure, was estimated to be approximately 0.34 in the original IPE and 0.12 based on the revised IPE during the staff review. The IPE appeared to provide an evaluation of all phenomena important to severe accident progression and did not identify any significant shortcomings. However, several weaknesses were identified by the staff, which

¹ICCDP=[(conditional CDF with the subject EOOS) - (baseline CDF with nominal equipment unavailabilities)] x (duration of single AOT under consideration)

²ICLERP = [(conditional LERF with the subject EOOS) - (baseline LERF with nominal equipment unavailabilities)] x (duration of single AOT under consideration)

included: optimistic LOOP recovery probability, low turbine-driven pump failure-to-run rate, inconsistent CCF probabilities, and human reliability analysis (HRA) limitations. In its conclusion, the staff SER of the IPE stated that the licensee's IPE met the intent of GL 88-20, but its future application may require modification for usefulness.

Since the IPE, Waterford 3 has revised its PRA several times in accordance with the "living model" philosophy. These revisions seem to address some of the weaknesses identified by the staff in the SER. Weaknesses that were closely relevant to the proposed change were reviewed by the staff in order to ensure that they were either properly addressed, or their risk implications played no significant role for the overall risk assessment. The staff requested additional information from the licensee to resolve some of these concerns. The staff found that all significant issues relevant to this proposal were either adequately addressed by the licensee, or insignificant to the overall assessment of the risk. In response to the staff RAI, the licensee recalculated the non-recovery of off-site power probabilities using the latest industry recovery curve. The LOOP non-recovery probability at six hours increased by a factor of three and that at 24 hours increased by a factor of 588. For the low turbine-driven emergency feedwater (TDEFW) pump failure-to-run rate, the licensee indicated that their TDEFW pump performance justified the rate used in the PRA due to plant-specific pump performance. Additionally, the licensee performed a sensitivity study in which the pump run failure data was increased by one order of magnitude, and found that the resulting ICCDP was still below the $5E-7$ threshold in RG 1.177. In this study, the credit for potential operator recovery of the failed pump was not included. The licensee also added CCF events to systems that are important to the EDG AOT risk evaluation, and re-calculated the ICCDP, which was still below $5E-7$. The licensee indicated that most of the significant HRA issues were related to non-station blackout (SBO) sequences; therefore, the issues did not have a significant effect on the calculations for EDG AOT extension. In view of the above, the staff believes that the licensee has addressed the staff-raised PRA quality issues for this specific application.

The staff also reviewed the potential risk implications due to external initiating events. The licensee performed an additional analysis to address the issue, and concluded that the risk impact from external initiating events would be relatively insignificant compared with that from internal initiating events. The staff believes that the licensee's conclusion is reasonable based on a review of the dominant sequences in the licensee's IPE for External Events (IPEEE) submittal.

The staff also found that the licensee's PRA had been subject to peer reviews, both internally and externally, during the development of the IPE and subsequent revisions. Additionally, Waterford 3 participated in the CEOG cross-comparison project, which provided a level of review for the quality of the PRA model. The licensee indicated that the project found no unjustified differences between the licensee's PRA and other CEOG plant PRAs; however, the staff had not been involved in the project.

To assess the risk impact due to the extended AOT with credit for a TEDG, Waterford 3 revised the relevant fault tree to depict the proposed configuration of a TEDG in place of a permanent EDG taken out of service for maintenance. No common cause events were assumed to occur between the TEDG and permanent EDGs, due to different operating histories, manufacturers, design, and arrangement. Generic diesel generator failure data, found in NUREG/CR-4550, was used for the TEDG failure rates. The probability of the operator failure to start the TEDG within 50 minutes (time to core uncover) was calculated to be approximately 0.05 using an

industry-developed HRA methodology. The staff found this assessment approach to be reasonable.

The staff's detailed evaluation of the SBO portion of the PRA did not identify any shortcomings, other than those identified in the staff SER of the IPE, that could have a significant impact on risk due to the proposed change. Based on the foregoing, the staff finds that the licensee has appropriately addressed the staff-raised PRA quality issues. The licensee's PRA is of sufficient quality, scope, and detail for the proposed application and, therefore, is a valid tool to estimate the risk measures associated with the proposed change in EDG AOT.

3.3.1.2 PRA insights and findings

The calculated relevant risk measures associated with the proposed change are summarized as follows:

	<u>Current CDF</u>	<u>New CDF</u>	<u>ΔCDF</u>	<u>ICCDP (CM)^a</u>	<u>ICCDP (PM)^a</u>
Submittal ^b	1.54E-5/yr	1.75E-5/yr	2.1E-6/yr	3.9E-6	1.4E-6
Revision 1 ^c	--	--	--	1.3E-6	4.6E-7
Revision 2 ^d	--	--	--	2.5E-7	1.8E-7

^a Its definition is slightly different from that in RG 1.177. Here, it is defined as follows: ICCDP = [(Conditional CDF with an EDG out for service) - (Baseline CDF with one EDG never out for service)] * (proposed AOT duration). It generates a slightly more conservative result than the RG 1.177 formula. PM: preventive maintenance. CM: corrective maintenance.

^b These are the same values in CE NPSD-996, which were calculated using the IPE.

^c The licensee recalculated the ICCDPs using the updated PRA.

^d The licensee recalculated the ICCDPs based on the compensatory measure to install the TEDG for the use of extended AOT.

For the last case (Revision 2), the staff recalculated the ICCDPs using the formula defined in RG 1.177. The resultant ICCDP for a ten-day AOT was approximately 5.75E-8 and 1.3E-7 for a PM and a CM, respectively. The licensee estimated the ICLERP to be below 1E-8 for both a PM and a CM. These ICCDPs and ICLERPs are below the acceptance guideline set forth in RG 1.177. The changes in CDF and LERF would also be well below the acceptance guideline prescribed in RG 1.174. In CE NPSD-996, the changes in CDF and LERF were considered to be small. Furthermore, the revised cases would result in an even smaller impact in risk. Therefore, the staff finds that the licensee's application meets the numerical acceptance guidelines set forth in RGs 1.174 and 1.177.

The staff also considered, qualitatively, the potential risk decrease due to not having an EDG out of service for extended periods during refueling outages. This reduction in shutdown risk has been acknowledged in previous studies, e.g., NUREG/CR-5994 and NUREG/CR-6141. However, a detailed low power/shutdown PRA would generally be required to quantitatively assess the reduction in risk stemming from the proposed change. Nonetheless, this qualitative risk reduction further supports the small risk impact of the proposed change.

The staff's Tier 1 evaluation concludes that the licensee's PRA used in support of the proposed EDG AOT extension is valid, and the risk impact of the change is small; thus, Waterford 3 meets the intent of the Tier 1 requirements in RG 1.177.

3.3.2 Tier 2: Avoidance of Risk Significant Plant Configurations

Taking an EDG out of service at power for extended maintenance is relatively risk significant at Waterford 3. Compensatory measures associated with installing a TEDG for extended outages were proposed by the licensee to address the risk of taking an EDG out of service at power. These compensatory measures would significantly reduce the risk associated with the proposed plant configuration, which was demonstrated by the Tier 1 evaluation. The Waterford 3 PRA indicated that the TDEFW pump, and its supporting battery, and the main generator lockout relay are highly risk-significant when an EDG is out of service. Since, with one EDG out of service, the associated motor-driven emergency feedwater (EFW) pump is out of service, the TS requires a plant shutdown if a second EFW pump is out of service. Any preventive maintenance on the TDEFW pump or its battery train is not allowed when an EDG is out of service. The licensee also indicated that the generator lockout relay design does not allow for any maintenance at power, since any work on the relay would cause a reactor trip. No additional restrictions on these components that would avoid risk-significant plant configurations were identified.

Based on the above, the staff finds that the licensee's proposed compensatory measures, in addition to the current TS requirements and operational practices, adequately address the intent of the Tier 2 requirements in RG 1.177.

3.3.3 Tier 3: Risk-Informed Configuration Risk Management

The licensee proposed to implement a CRMP and to establish the CRMP requirements in the Waterford 3 Site Directive. In a May 15, 2000, SER for the Containment Spray system, the staff concluded that the risk-informed CRMP proposed by the licensee will satisfactorily assess the risk associated with the removal of equipment from service during the proposed AOT for that system. Because the same considerations applicable to the CSS apply in the context of this amendment, the same conclusion is applicable for the proposed EDG AOT. Therefore, the staff finds that the licensee meets the intent of Tier 3 requirements in RG 1.177.

3.4 PRA Conclusion

Based on the evaluation set forth above, the staff finds the licensee's PRA, used in support of the proposed EDG AOT extension, is also of sufficient quality, scope, and detail. With the proposed Tier 2 compensatory measures in place and the implementation of the Tier 3 CRMP, the risk impact of the change would be small. Therefore, the licensee has met the intent of the requirements in RGs 1.174 and 1.177, with respect to the changes proposed at Waterford 3. The staff concludes that PRA findings and insights support the proposed extension in the EDG AOT.

3.5 Implementation and Monitoring

As stated in RG 1.177, the staff expects the licensee to implement these TS changes in accordance with the three-tiered approach described above. To ensure that a TS AOT extension does not degrade operational safety over time, the licensee should ensure, as part of its Maintenance Rule program (10 CFR 10.65), that when a structure, system, or component (SSC) does not meet its performance criteria, the evaluation required under the Maintenance Rule includes prior related TS changes in its scope. If the licensee concludes that the

performance or condition of a SSC affected by a TS change does not meet established performance criteria, appropriate corrective action should be taken, in accordance with the Maintenance Rule. Such corrective action could include consideration of another TS change to shorten the revised AOT, or imposition of a more restrictive administrative limit, if the licensee determines this is an important factor in reversing the negative trend.

4.0 SUMMARY

The staff has reviewed the proposed changes to modify the EDG AOT from 72 hours to ten days from a deterministic and PRA perspective, and, therefore, concludes that the results and insights of the PRA analysis and the deterministic evaluation support the proposed EDG AOT extension for Waterford 3 from 72 hours to ten days.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Louisiana State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released off-site, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Nuclear Regulatory Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (65 FR 37425, dated June 14, 2000). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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