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Donna Jacobs
Site Vice President
Waterford 3

W3F1-2013-0043

November 11, 2013

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Request for Review and Approval of Change to Updated Final Safety Analysis Report Clarifying Pressurizer Heaters Function for Natural Circulation at the Onset of a Loss of Offsite Power
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

Pursuant to 10CFR50.90 and 10CFR50.59, Entergy hereby requests an amendment to the Facility Operating License NPF-38 for Waterford Steam Electric Station, Unit 3 (Waterford 3). Entergy requests review and approval, pursuant to 10CFR50.59 for a change to the Waterford 3 Updated Final Safety Analysis Report (UFSAR). This change concerns a clarification for how the Pressurizer Heaters function is met for natural circulation at the onset of a loss of offsite power concurrent with the specific single point vulnerability.

Additional information and documents to support this application are provided in three attachments to this letter. Attachment 1 provides the description of the proposed change, no significant hazards consideration determination, and evaluation for environmental impact. Attachment 2 provides a copy of the marked up UFSAR pages for the proposed change. Attachment 3 provides the regulatory commitment list.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that the proposed change involves no significant hazards consideration. For restoring the Pressurizer Heaters function during natural circulation at the onset of a loss of offsite power concurrent with the specific single point vulnerability, Entergy commits to establish appropriate controls sufficient to ensure 'flash suits' for Operations usage (for local manual operation of 4160 VAC breakers) are available in Reactor Auxiliary Building Safety Switchgear Room B at all times to meet Personal Protection Equipment requirements.

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This submittal contains one new regulatory commitment as identified in Attachment 3.

Although this request is neither exigent nor an emergency, review and approval is requested by November 11, 2014.

After NRC staff approval of this amendment request, the UFSAR will be revised as captured in Attachment 2, within 90 days of issuance of amendment.

If you should have any questions on the above or on the attachments, please contact Mr. John P. Jarrell, Manager, Licensing, at (504) 739-6685.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 11, 2013.

Sincerely,

DJ/MEM

Attachment(s):

1. Description of Proposed Change
2. Proposed Updated Final Safety Analysis Report Changes (mark-up)
3. Regulatory Commitment List

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Attachment 1

W3F1-2013-0043

Description of Proposed Change

1.0 DESCRIPTION

This proposed license amendment is a request by Entergy Operations, Inc. (Entergy) to amend Operating License NPF-38 for the Waterford Steam Electric Station, Unit 3 (Waterford 3). Specifically, this proposed amendment will provide clarification that manual operator action outside of the Control Room is needed to energize the Pressurizer Heaters associated with natural circulation at the onset of a loss of offsite power in the event a specific common circuit breaker being open concurrently.

During Integrated Emergency Diesel Generator /Engineering Safety Features Testing, Waterford 3 identified that the Switchgears 32A and 32B Supply Circuit Breakers that provide power to the Pressurizer Heaters shared a specific common circuit breaker, CVCEBKR014AB-13, that affects their control power close circuitry. If this specific common circuit breaker were to be Open, the Switchgears 32A and 32B Supply Circuit Breakers would not close automatically at the onset of a loss of offsite power (i.e. a specific single point vulnerability does exist). This inability of automatic closure of the Switchgears 32A and 32B Supply Circuit Breakers at the onset of a loss of offsite power means that Plant Operators would be unable to energize Pressurizer Heaters from the Control Room. Manual operator action would be necessary outside of the Control Room to close the Switchgears 32A and 32B Supply Circuit Breakers. The specific common circuit breaker being open does not trip the Switchgears 32A and 32B Supply Circuit Breakers from their emergency power buses.

2.0 PROPOSED CHANGE

10CFR50.59, Changes, Tests, and Experiments, states that a licensee may make changes in the facility and procedures as described in the final safety analysis report as updated (UFSAR) and conduct tests or experiments not described in the UFSAR without obtaining a license amendment pursuant to 10CFR50.90 if a change to the technical specifications is not required, and the change, test, or experiment does not meet any of the criteria in paragraph (c)(2) of 10CFR50.59. Otherwise, a license amendment pursuant to 10CFR50.90 will be obtained prior to implementing a proposed change, test, or experiment.

In UFSAR 5.4.10, Pressurizer, it states that each bank of Pressurizer Heaters has access to only one Class 1E division power supply and that reenergization of the necessary Pressurizer Heaters from the emergency power source, i.e. the Emergency Diesel Generator, can be accomplished manually from the Control Room after a loss of offsite power. Additionally, in UFSAR 1.9.26, Emergency Power Supply for Pressurizer Heaters, it states that the pressurizer heater power supply satisfies General Design Criterion 17, Electric Power Systems, and each group of heaters has access to only one Class 1E division power supply. General Design Criterion 17 requires onsite electric power supplies and distribution to have sufficient independence and redundancy to perform their safety functions assuming a single failure.

In contrast with UFSAR 5.4.10 and 1.9.26, part of the control power closing circuitry to the Switchgears 32A and 32B Supply Circuit Breakers share a specific common circuit breaker. The specific common circuit breaker powers the interlock 52z relays. The interlock 52z relays check for completion of load stripping of circuit breakers on the respective Switchgear 32 at the onset of a loss of offsite power. If the load stripping is complete, the interlock 52z

relays close a contact in the closing circuitry to the respective Switchgears 32A and 32B Supply Circuit Breakers to allow the circuit breakers to close automatically when the sequencer load block contact in the closing circuitry is closed. Alternatively, if the specific common circuit breaker is Open, then the Switchgears 32A and 32B Supply Circuit Breakers will not close automatically at the onset of a loss of offsite power.

Waterford 3 proposes to describe this specific common circuit breaker feature in UFSAR 1.9.26 and 5.4.10. The implementation of the proposed change has been determined by Entergy to require a license amendment under 10CFR50.90 since one or more of the criteria of 10CFR50.59(c)(2) was met.

3.0 BACKGROUND

Pressurizer Heater Source of Power Overview

The pressurizer heater source of power design provides the capability to supply, from either the offsite power source or the emergency power source (i.e. the Emergency Diesel Generator, when offsite power is not available), two groups of pressurizer proportional heaters and associated controls necessary to establish and maintain natural circulation at hot standby conditions. The two groups of proportional heaters, along with other loads, are powered from the 480 volt non-safety Switchgears 32A and 32B. These non-safety Switchgears 32A and 32B are fed from the Class 1E buses protected by safety grade circuit breakers. Upon loss of offsite power, the safety related Class 1E circuit breakers providing power to the Switchgears 32A and 32B will trip. The Class 1E circuit breakers reclose on the Emergency Diesel Generator sequencer after 0.5 seconds as long as no Safety Injection Actuation Signal (SIAS) is present and all of the load breakers on the Switchgears 32A and 32B are Open.

Precipitating Event

Associated with Integrated Emergency Diesel Generator /Engineering Safety Features Testing, Waterford 3 identified that the safety related circuit breakers supplying power to the Switchgears 32A and 32B shared a specific common circuit breaker that affects their close circuitry. This specific common circuit breaker is non-safety, seismic class 2, and is one of the breakers on a non-safety power distribution panel that is powered from a non-safety static uninterruptable power supply. This non-safety common circuit breaker provides power to non-safety related interlock 52z relay, which checks for completion of load stripping of the respective Switchgear 32 at the onset of a Loss of Offsite Power event. If the load stripping is complete, the interlock 52z relay closes a contact in the control power closing circuitry to the respective Switchgear 32 Supply Circuit Breaker to allow the Switchgear 32 Supply Circuit Breaker to close automatically when the sequencer load block contact in the closing circuitry is closed. If this specific common circuit breaker were to be open, the circuit breaker to each Switchgear 32 would not close automatically at onset of a loss of offsite power.

The interlock 52z relay is located in the Electrical Isolation Panel which consists of several compartments to facilitate interfacing of safety and non-safety circuits. The coil for the interlock 52z relay is located in the non-safety compartment while the relay contact, located in the safety compartment, is operated by the relay shaft penetrating between the two

compartments, thus accomplishing the necessary physical and electrical separations between the safety and non-safety circuits.

Natural Circulation

Maintaining adequate subcooling over the long term during a Loss of Offsite Power event, as indicated in NUREG 0737, Clarification of Three Mile Island Action Plan Requirements, supports original inclusion of Pressurizer Heaters in the Technical Specifications. The requirement for emergency power supplies is also based on NUREG 0737. Per NUREG 0737, pressurizer heaters and associated controls are necessary to establish and maintain natural circulation at hot standby conditions.

Following the accident at Three Mile Island (TMI) in 1979, NUREG 0737 was developed by the NRC to address a wide array of needed safety enhancements at commercial nuclear power plants. As mentioned above, the Pressurizer Heaters were included in NUREG 0737 to support natural circulation (i.e., loss of forced flow) conditions following a loss of off-site power. Reactor coolant pumps are deenergized during a loss of offsite power and the RCS begins to transition to natural circulation as the hot water from the reactor core rises through the RCS hot leg piping to the Steam Generators (SGs) where it is cooled as it passes through the SG tubes and descends back through the RCS cold leg piping to the bottom of the core where it again absorbs heat from the core as it rises through the fuel region. This natural convection flow continues as long as a minimum water level is maintained in the SGs and thermo-hydraulic communication is maintained throughout the RCS hot and cold leg piping.

RCS cooldown via natural circulation during a loss of offsite power is limited and controlled by Operations to ensure adequate subcooling margin is maintained. Operators manually energize Pressurizer Heaters from the Control Room during a Loss of Offsite Power. In the event of the specific common circuit breaker being open at the onset of the Loss of Offsite Power, Operators would have to locally manually close the Switchgears 32A and 32B Supply Circuit Breakers in addition to the Control Room manual actions to energize the Pressurizer Heaters. This process supports maintaining the steam bubble in the pressurizer rather than having the steam bubble form in the reactor vessel head, a low or stagnant flow area of the vessel not directly cooled by natural circulation flow. A slow RCS cool down will permit time for ambient heat losses from the reactor vessel head. A more rapid RCS cool down may not permit sufficient time for adequate vessel head cool down. This controlled natural circulation cool down would progress to shutdown cooling entry conditions.

Benefit of Proposed Change

Clarifying how lack of redundancy is overcome when energizing Pressurizer Heaters at the onset of a loss of offsite power with the specific common circuit breaker open will be reflected in the Updated Final Safety Analysis Report Sections 1.9.26 and 5.4.10.

4.0 TECHNICAL ANALYSIS

System Description

The pressurizer heater power supply design provides the capability to supply, from either the offsite power source or the emergency power source (i.e. the Emergency Diesel Generator, when offsite power is not available), a redundant group of pressurizer proportional heaters and associated controls necessary to establish and maintain natural circulation at hot standby conditions. The proportional heaters, along with other loads, are powered from the 480 volt non-safety Switchgears 32A and 32B. These non-safety related buses are fed from the Class 1E buses protected by safety grade circuit breakers (Switchgears 32A and 32B Supply Circuit Breakers). Upon loss of offsite power, the Switchgears 32A and 32B Supply Circuit Breakers providing power to these buses will trip. The Switchgears 32A and 32B Supply Circuit Breakers reclose on the Emergency Diesel Generator sequencer after 0.5 seconds as long as no Safety Injection Actuation Signal (SIAS) is present and all of the load breakers on the Switchgears 32A and 32B bus are Open.

Part of the control power closing circuitry to the Switchgears 32A and 32B Supply Circuit Breakers share a specific common circuit breaker. This specific common circuit breaker, CVCEBKR014AB-13, provides power to interlock 52z relay, which checks for completion of load stripping of the respective Switchgear 32 at the onset of a Loss of Offsite Power event. If the load stripping is complete, the interlock 52z relay closes a contact in the control power closing circuitry to the respective Switchgear 32 Supply Circuit Breaker to allow the Switchgear 32 Supply Circuit Breaker to close automatically when the sequencer load block contact in the closing circuitry is closed. Alternatively, if the specific common circuit breaker is Open, then the respective Switchgear 32 Supply Circuit Breaker will not close automatically at the onset of a Loss of Offsite Power event.

Pertinent Current Licensing Basis

Two sections of UFSAR pertain to the proposed change: 5.4.10 and 1.9.26. Discussion of each section follows.

UFSAR 1.9.26

Per UFSAR 1.9.26, Emergency Power Supply for Pressurizer Heaters (II.E.3.1), the NRC Position from NUREG-0737, Clarification of TMI Action Plan Requirements, for II.E.3.1 is as follows:

Consistent with satisfying the requirements of General Design Criteria 10, 14, 15, 17, and 20 of Appendix A-to 10 CFR Part 50 for the event of loss of offsite power, the following positions shall be implemented:

(1) The pressurizer heater power supply design shall provide the capability to supply, from either the offsite power source or the emergency power source (when offsite power is not available), a predetermined number of pressurizer heaters and associated controls necessary to establish and maintain natural circulation at hot

standby conditions. The required heaters and their controls shall be connected to the emergency buses in a manner that will provide redundant power supply capability.

(2) Procedures and training shall be established to make the operator aware of when and how the required pressurizer heaters shall be connected to the emergency buses. If required, the procedures shall identify under what conditions selected emergency loads can be shed from the emergency power source to provide sufficient capacity for the connection of the pressurizer heaters.

(3) The time required to accomplish the connection of the preselected pressurizer heater to the emergency buses shall be consistent with the timely initiation and maintenance of natural circulation conditions.

(4) Pressurizer heater motive and control power interfaces with the emergency buses shall be accomplished through devices that have been qualified in accordance with safety-grade requirements.

The Waterford 3 response to II.E.3.1 is in part as follows:

Consistent with satisfying the requirements of General Design Criteria 10, 14, 15, 17, and 20 of Appendix A to 10CFR50 for the event of loss of offsite power, the Waterford 3 pressurizer heater power supply design provides the capability to supply, from either the offsite power source or the emergency power source (when offsite power is not available), a redundant group of pressurizer proportional heaters and associated controls necessary to establish and maintain natural circulation at hot standby conditions. Each group of heaters has access to only one Class 1E division power supply. The Class 1E interfaces for main power and control power are protected by safety-grade circuit breakers. Being non-Class 1E loads, the pressurizer heaters are automatically shed from the emergency power source upon the occurrence of a safety injection actuation signal. See UFSAR Subsection 5.4.10.2 for a more detailed discussion.

Emergency Procedures and training have been developed and implemented that provide information to the operator to ensure that:

a) the diesel generator is not overloaded upon manually loading the heaters and

b) The pressurizer heaters are available for pressure control to provide maintenance of natural circulation.

UFSAR 5.4.10

Per UFSAR 5.4.10, Pressurizer, in order to determine the pressurizer heater capacity required to maintain natural circulation in the hot standby condition after a loss of offsite power, it was conservatively assumed that the ambient heat loss rate through the pressurizer was 400,000 BTU/hr. The measured heat loss from startup testing was only 356,000 BTU/hr. With an assumed 400,000 BTU/hr heat loss and a safety valve leakage of up to 0.5 gpm, single phase natural circulation can be maintained at hot standby conditions with a 50°F subcooled margin indefinitely by energizing 150kW of heater capacity thirty minutes

after the loss of offsite power. Loss of subcooling, however, does not imply loss of natural circulation.

A redundant group of pressurizer proportional heaters and three redundant groups of backup heaters have been made available to be placed manually on the Emergency Diesel Generator after a loss of offsite power. Each bank of heaters has access to only one Class 1E division power supply. Reenergization of the necessary heaters from the emergency onsite power can be accomplished manually from the Control Room. Procedures ensure that the addition of these loads after a loss of offsite power will not exceed the rating of the Emergency Diesel Generator. The heaters are powered from the 480V nonsafety switchgear buses 3A32 and 3B32. The safety-related Class 1E breakers providing power to these buses from the 4.16kV ESF buses (3A3-S and 3B3-S) will trip upon Loss of Offsite Power or Safety Injection Actuation Signal. In this manner, the Class 1E interfaces for main power and control power to the pressurizer heaters are protected by safety grade circuit breakers. This scheme also ensures that in case of an SIAS the non-Class 1E pressurizer heaters are shed from their emergency power sources via Class 1E circuit breakers.

Technical Discussion of UFSAR Change

Regarding UFSAR 1.9.26, Entergy is proposing to describe that part of the control power closing circuitry to the Switchgears 32A and 32B Supply Circuit Breakers share a specific common circuit breaker. In the event of this specific common circuit breaker being open at the onset of a loss of offsite power, manual operator actions outside of the Control Room would be necessary to energize Pressurizer Heaters.

CVCEBKR014AB-13 is a common circuit breaker that provides power to interlock 52z relay, which checks for completion of load stripping of the respective Switchgear 32 at the onset of a Loss of Offsite Power event. If the load stripping is complete, the interlock 52z relay closes a contact in the control power closing circuitry to the respective Switchgear 32 Supply Circuit Breaker to allow the Switchgear 32 Supply Circuit Breaker to close automatically when the sequencer load block contact in the closing circuitry is closed. Alternatively, if the specific common circuit breaker is Open, then the respective Switchgear 32 Supply Circuit Breaker will not close automatically at the onset of a Loss of Offsite Power event. The Switchgears 32A and 32B are maintained electrically separate and independent from one another.

Per UFSAR 1.9.26, Position (1) for the event of a loss of offsite power, the pressurizer heater power supply design shall power pressurizer heaters and associated controls necessary to establish and maintain natural circulation at hot standby conditions. The period of time to be in this condition is not specified in the UFSAR. In Standard Review Plan, Branch Technical Position 5-4, Design Requirements of the Residual Heat Removal System, Auxiliary Feedwater Supply is to have sufficient inventory to permit operation at hot shutdown for at least 4 hours followed by cooldown to conditions permitting operation of the RHR system.

Regarding keeping the RCS in a subcooled condition with natural circulation at hot, high-pressure conditions during a loss of offsite power, it is noted that RCS subcooling margin is a key parameter monitored and controlled by Operations. In maintaining the RCS subcooling margin, Operations controls the rate of natural circulation cooldown while monitoring reactor coolant system temperatures. Besides Pressurizer Heaters, NUREG 0737 also required a means of monitoring reactor vessel head temperature and reactor vessel reactor coolant

level. Waterford 3 has multiple Core Exit Thermocouples (CETs) for use in monitoring temperature in the upper regions of the reactor vessel as required by TS 3.3.3.6 in Modes 1, 2, and 3. Waterford 3 also has a Reactor Vessel Level Monitoring System (RVLMS) that will indicate when steam bubble formation begins and monitor bubble growth during natural circulation conditions. The Qualified Safety Parameter Display System (QSPDS) and Safety Parameter Display System (SPDS) computer also provide real-time display of RCS pressure-temperature relationships to plant operators for monitoring subcooling margin, the rate of cooldown, and the driving force effectiveness (core delta-temperature), among other things. Operations procedures contain in-depth discussion and guidance with regard to monitoring and controlling RCS subcooling margin. In the years since the Three Mile Island accident, operators have practiced plant cooldowns under natural circulation conditions using plant simulators. Based on current plant capabilities and operator knowledge and training, the ability to control RCS subcooling margin is reasonably expected during a loss of offsite power.

Regarding UFSAR 5.4.10, Entergy is proposing to describe that part of the control power closing circuitry to the Switchgears 32A and 32B Supply Circuit Breakers share the specific common circuit breaker. This specific common circuit breaker, CVCEBKR014AB-13, provides power to interlock 52z relay, which checks for completion of load stripping of the respective Switchgear 32 during a Loss of Offsite Power event. If the load stripping is complete, the interlock 52z relay closes a contact in the control power closing circuitry to the respective Switchgear 32 Supply Circuit Breaker to allow the Switchgear 32 Supply Circuit Breaker to close automatically when the sequencer load block contact in the closing circuitry is closed. Alternatively, if the specific common circuit breaker is Open, then the respective Switchgear 32 Supply Circuit Breaker will not close automatically at the onset of a Loss of Offsite Power event.

Finally, in UFSAR 5.4.10, Entergy is proposing to describe that for the scenario of a loss of offsite power in combination with opening of the specific common circuit that energizing the necessary Pressurizer Heaters will require action to be performed outside of the Control Room to close the respective Switchgear 32 Supply Circuit Breaker. Once one or more of the Switchgear 32's is energized, the necessary Pressurizer Heaters can be energized from the Control Room.

Factors Allowing This Change

Several factors support allowing this change. First, this proposed change in no manner lessens the requirements associated with maintaining the Pressurizer Heaters OPERABLE in the Technical Specifications and Technical Requirements Manual. Second, Plant Operators are trained and have procedural guidance to address Natural Circulation Cooldown with a Loss of Offsite Power and can reasonably be credited with performing the non safety-related actions associated with reenergizing the Switchgear 32A and 32B from outside of the Control Room in the event of the specific common circuit breaker opening.

Technical Specifications and Technical Requirements Manual Discussion:

This proposed change in no manner lessens the requirements associated with maintaining the Pressurizer Heaters OPERABLE in the Technical Specifications and the Technical Requirements Manual.

Technical Specification 3.4.3.1, Pressurizer, Limiting Condition for Operation, requires at least two groups of Pressurizer Heaters powered from Class 1E buses each having a nominal capacity of 150 kW in Modes 1, 2 and 3; Action a. states that with only one group of the above required Pressurizer Heaters OPERABLE, restore at least two groups to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours; Action b. states that with the pressurizer otherwise inoperable, be in at least HOT STANDBY with the reactor trip breakers open within 6 hours and in HOT SHUTDOWN within the following 6 hours.

Technical Requirements Manual 3.4.3.1, Pressurizer Heaters, Limiting Condition for Operation, requires Pressurizer Heaters shall be OPERABLE with at least 300 kW of nominal heater capacity available in addition to the heater capacity specified in Technical Specification 3.4.3.1b in Mode 1; Action states that with less than the above heater capacity available, restore the required capacity within 72 hours or initiate a Condition Report which requires the performance of an evaluation justifying continued plant operation. The evaluation should be completed within the following 6 hours and should be approved by the General Manager Plant Operations (GMPO) or his designee (e.g., the duty plant manager).

Plant Operators Capability to Respond Discussion:

Plant Operators are trained and have procedural guidance to address Natural Circulation Cooldown for a Loss of Offsite Power and can reasonably be credited with performing the non safety-related actions associated with reenergizing the Pressurizer Heater Switchgears from outside of the Control Room in the event of the specific common circuit breaker being Open.

Associated with capabilities of the plant operator actions in responding to the Loss of Offsite Power event with the concurrent opening of the specific common circuit breaker, ANSI/ANS-58.8-1994, American National Standard Time Response Design Criteria for Safety-Related Operator Actions, may be a standard applied in review of this request. The general requirements of ANSI/ANS-58.8-1994 contained in Section 3.2, Safety-Related Operator Actions Outside the Control Room, are considered and discussed below. Specifically per the standard, for actions performed outside of the Control Room, the design must protect the operator at locations outside of the Control Room (including access routes thereto) by providing: 1) adequate protection for the operator from the environmental conditions caused by the Design Basis Event (DBE) for the required access time, action time, and return time; 2) communications links to the Control Room; 3) emergency lighting; 4) appropriate procedures for accomplishing the safety-related operator action; and 5) all necessary tools or special equipment for completing the safety-related operator action.

The Licensed Operator Requalification Program includes scheduled training on the simulator for a Loss of Offsite Power at a two year periodicity. The Licensed Operator Requalification Program includes scheduled training in the classroom for a Loss of Offsite Power at a one year periodicity. General training associated with local manual operation of circuit breakers is provided to Operations personnel during initial training and at a two year periodicity. The procedural guidance addressing Natural Circulation Cooldown for a Loss of Offsite Power is contained in an emergency operating procedure, OP-902-003, Loss of Offsite Power/Loss of Forced Circulation Recovery. OP-902-003 contains guidance for performing a controlled

cooldown on natural circulation. Additionally, a Red Annunciator (a more important or serious alarm), QSPDS Subcooled Margin Lo, Window B-4 on Cabinet L in the Control Room, alerts Control Room staff when the subcooling margin drops to 20 degrees Fahrenheit.

The procedural guidance to address Natural Circulation Cooldown for a Loss of Offsite Power is contained in OP-902-003, Emergency Operating Procedure, Loss of Offsite Power/Loss of Forced Circulation Recovery Procedure, and OP-902-009, Standard Appendices. Per OP-902-003, pressurizer heater control is contained in Appendix 25, "Restore Pressurizer Heater Control," of OP-902-009, Emergency Operating Procedure, Standard Appendices. Steps in Appendix 25, direct Operators to close Switchgears 32A and 32B Supply Circuit Breakers; this would normally be accomplished by using control switches in the Control Room when responding to the Loss of Offsite Power event. For the scenario where the specific common circuit breaker is Open at the onset of the Loss of Offsite Power event, local manual operation would be necessary to close the Switchgears 32A and 32B Supply Circuit Breakers. The local manual operation to close the 32A and 32B Supply Circuit Breaker may be accomplished in the respective Switchgear Room A and B by opening the door to the 32A and 32B Supply Circuit Breakers and depressing the close pushbutton.

During a Loss of Offsite Power event, both Switchgear Rooms A and B are readily accessible to Plant Operators. The environmental conditions and lighting conditions associated with the Loss of Offsite Power event will not preclude Plant Operators from transiting to and performing necessary activities in both Switchgear Rooms A and B. All Personnel Protective Equipment (including the 'flash suit') necessary to perform local manual operation to restore electrical power to Switchgears 32A and 32B is available in Reactor Auxiliary Building Safety Switchgear Room B. Plant Operators are trained and knowledgeable to perform local manual operation to restore electrical power to Switchgears 32A and 32B upon being directed by Control Room staff. Plant Operators carry hand held radios to ensure continuity of communications with Control Room staff. Plant Operators are available to perform local manual operation in both Switchgear Rooms A and B, and would restore electrical power to Switchgears 32A and 32B to facilitate reenergizing Pressurizer Heaters. Automatic load stripping of the Switchgears 32A and 32B is a design function that is tested every 18 months.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

Entergy Operations, Inc. (Entergy) proposes to describe this specific common circuit breaker feature in UFSAR 1.9.26 and 5.4.10 as contained in Attachment 2.

Entergy has concluded that Waterford 3 has provided adequate technical bases for revising UFSAR 1.9.26 and 5.4.10.

In conclusion, Entergy has determined that the proposed amendment does not require any technical specification changes, exemptions, or relief from regulatory requirements, but requires a change to the Waterford 3 operating license in accordance with 10CFR50.90 since one or more of the criteria of 10CFR50.59(c)(2) is met.

Waterford 3 Final Safety Analysis Report (UFSAR) will be revised to be consistent with the results from this amendment.

5.2 No Significant Hazards Consideration

Entergy Operations, Inc. has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10CFR50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed change would describe the specific common circuit breaker associated with the control power closing circuitry to the Switchgears 32A and 32B Supply Circuit Breakers in UFSAR 1.9.26 and 5.4.10 as contained in Attachment 2 and that local manual operation outside of the Control Room would be necessary to reenergize Pressurizer Heaters during a loss of offsite power concurrent with the specific common circuit breaker being open. Plant Operators are trained and have procedural guidance including manual operator action to address Natural Circulation Cooldown with a Loss of Offsite Power. The Pressurizer Heaters are not themselves a credible initiator of any accident, and the requested amendment makes no change to the Pressurizer Heaters themselves, so the probability of an accident will not be increased. The proposed change would not change the source term nor adversely impact any mitigating systems, so the consequences of an accident will not be increased.

Therefore, the probability or consequences of any accident previously evaluated will not be increased by the proposed change.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change would describe the specific common circuit breaker associated with the control power closing circuitry to the Switchgears 32A and 32B Supply Circuit Breakers in UFSAR 1.9.26 and 5.4.10 as contained in Attachment 2 and that local manual operation outside of the Control Room would be necessary to reenergize Pressurizer Heaters during a loss of offsite power concurrent with the specific common circuit breaker being open.

The proposed changes do not involve a change in the design, configuration, or method of operation of the plant that could create the possibility of a new or different accident. Equipment will be operated in a manner for which it is currently designed. This license amendment request does not impact any plant systems that are accident initiators or adversely impact any accident mitigating systems. The Pressurizer Heaters are not themselves a credible initiator of any accident.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

The proposed change would describe the specific common circuit breaker associated with the control power closing circuitry to the Switchgears 32A and 32B Supply Circuit Breakers in UFSAR 1.9.26 and 5.4.10 as contained in Attachment 2 and that local manual operation outside of the Control Room would be necessary to reenergize Pressurizer Heaters during a loss of offsite power concurrent with the specific common circuit breaker being open. Plant Operators are trained and have procedural guidance including manual operator action to address Natural Circulation Cooldown with a Loss of Offsite Power.

This amendment does not change the manner in which safety limits or limiting safety settings are determined. Because the Pressurizer Heaters will continue to be monitored and controlled as per Technical Specification 3.4.3.1 and Technical Requirements Manual 3.4.3.1, this proposed change to the UFSAR will not present an adverse impact to plant operation or result in a significant reduction in a margin of safety.

Therefore, the proposed change will not involve a significant reduction in a margin of safety. Based on the above, Entergy concludes that the proposed license amendment presents no significant hazards consideration under the standards set forth in 10CFR50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.3 Environmental Considerations

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10CFR51.22(c)(9). Therefore, pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 PRECEDENCE

No precedence specific to the proposed change were identified in a search of the industry information and NRC website.

Attachment 2

W3F1-2013-0043

Proposed Updated Final Safety Analysis Report Changes (mark-up)

(4) Pressurizer heater motive and control power interfaces with the emergency buses shall be accomplished through devices that have been qualified in accordance with safety-grade requirements.

Response

Consistent with satisfying the requirements of General Design Criteria 10, 14, 15, 17, and 20 of Appendix A to 1~~0CFR50~~ 10CFR50 for the event of loss of offsite power, the Waterford 3 pressurizer heater power supply design provides the capability to supply, from either the offsite power source or the emergency power source (when offsite power is not available), a redundant group of pressurizer proportional heaters and associated controls necessary to establish and maintain natural circulation at hot standby conditions. Each group of heaters has access to only one Class IE division power supply. The Class IE interfaces for main power and control power are protected by safety-grade circuit breakers. Being non-Class IE loads, the pressurizer heaters are automatically shed from the emergency power source upon the occurrence of a safety injection actuation signal. See FSAR Subsection 5.4.10.2 for a more detailed discussion. FSAR Section 8.3 has been revised to reflect this design. Figure 8.3-33 depicts the schematic arrangement of the emergency power supply for the pressurizer heaters. INSERT 1

Emergency Procedures and training have been developed and implemented that provide information to the operator to ensure that:

a) the diesel generator is not overloaded upon manually loading the heaters and

b) The pressurizer heaters are available for pressure control to provide maintenance of natural circulation.

Technical Specifications reflect operability requirements for the pressurizer heaters.

1.9.27 DEDICATED HYDROGEN PENETRATIONS (II.E.4.1)

Position

Plants using external recombiners or purge systems for postaccident combustible gas control of the containment atmosphere should provide containment penetration systems for external recombiner or purge systems that are dedicated to that service only, that meet the redundancy and single-failure requirements of General Design Criteria 54 and 56 of Appendix A to 10CFR50, and that are sized to satisfy the flow requirements of the recombiner or purge system.

The procedures for the use of combustible gas control systems following an accident that results in a degraded core and release of radioactivity to the containment must be reviewed and revised, if necessary.

Response

This position is not applicable to Waterford 3. Waterford 3 has redundant recombiners permanently installed inside containment (see Table 1.9-1).

Insert 1

Part of the closing circuitry to these safety-grade circuit breakers share a specific common circuit breaker, CVCEBKR014AB-13. If CVCEBKR014AB-13 is Open at the onset of a loss of offsite power, local manual operator action in the respective train switchgear room is necessary to reenergize the Pressurizer Heaters of that train.

setpoint, the letdown control valves close to a minimum value, and additional charging pumps in the Chemical and Volume Control System (CVCS) are automatically started to add coolant to the system and restore pressurizer level.

When load is increased, the average reactor coolant temperature is raised in accordance with the coolant temperature program. The expanding coolant from the reactor coolant piping hot leg enters the bottom of the pressurizer through the surge line, compressing the steam and raising system pressure. The increase in pressure is moderated by the condensation of steam during compression and by the decrease in bulk temperature in the liquid phase. Should the pressure increase be large enough, the pressurizer spray valves open, spraying coolant from the reactor coolant pump discharge (cold leg) into the pressurizer steam space. The relatively cold spray water condenses some of the steam in the steam space, limiting the system pressure increase. The programmed pressurizer water level is a power dependent function. A high level error signal, produced by an insurge, causes the letdown control valves to open, releasing coolant to the CVCS and restoring the pressurizer to the programmed level. Small pressure and primary coolant volume variations are accommodated by the steam volume that absorbs flow into the pressurizer and by the water volume that allows flow out of the pressurizer.

The pressurizer heaters are single unit, direct immersion heaters that protrude vertically into the pressurizer through sleeves welded in the lower head. Each heater is internally restrained from high amplitude vibrations and can be individually removed for maintenance during plant shutdown.

Approximately one-fifth of the heaters are connected to proportional controllers that adjust the heat input as required to compensate for steady-state losses and to maintain the desired steam pressure in the pressurizer. The remaining backup heaters are connected to on-off controllers. These heaters, normally deenergized, are turned on by either a low-pressurizer pressure signal or high-level error signal. This latter feature is provided since load increases result in an in-surge of relatively cold coolant into the pressurizer, thereby decreasing the bulk water temperature. The CVCS acts to restore level, resulting in a transient pressure below normal operating pressure. To minimize the extent of this transient, the backup heaters are energized, contributing more heat to the water. An interlock prevents operation of the backup heaters in the event of concurrent high level error and high-pressurizer pressure signals. A low-low pressurizer level signal deenergizes all heaters to protect the heaters should they become uncovered.

In order to determine the pressurizer heater capacity required to maintain natural circulation in the hot standby condition after a loss of offsite power, it was conservatively assumed that the ambient heat loss rate through the pressurizer was 400,000 BTU/hr. The measured heat loss from startup testing was only 356,000 BTU/hr. With an assumed 400,000 BTU/hr heat loss and a safety valve leakage of up to 0.5 gpm, single phase natural circulation can be maintained at hot standby conditions with a 50 °F subcooled margin indefinitely by energizing 150kW of heater capacity thirty minutes after the loss of offsite power. Loss of subcooling, however, does not imply loss of natural circulation.

→(DRN 00-1673)

A redundant group of pressurizer proportional heaters and three redundant groups of backup heaters have been made available to be placed manually on the emergency diesel generator after a loss of offsite power. Each bank of heaters has access to only one Class 1E division power supply.

←(DRN 00-1673)

INSERT 2

INSERT 2A

Insert 2

Part of the closing circuitry to the breakers that provide power to the 480V non-safety switchgear buses 3A32 and 3B32 (that power the Pressurizer Heaters) share a specific common circuit breaker, CVCEBKR014AB-13. CVCEBKR014AB-13 powers the interlock 52z relay, SSDEREL2348-D (SSDEREL2398-D). The interlock 52z relay checks for completion of load stripping on the respective 480V non-safety switchgear buses 3A32(3B32) at the onset of a Loss of Offsite Power. If the load stripping is complete, the interlock 52z relay closes a contact in the closing circuitry to the breakers that provide power to the 480V non-safety switchgear buses 3A32 and 3B32 to allow the breakers to close automatically when the sequencer load block contact in the closing circuitry is closed.

Alternatively, if the specific common circuit breaker, CVCEBKR014AB-13, is Open, then the breakers that provide power to the 480V non-safety switchgear buses 3A32 and 3B32 will not close automatically at the onset of a Loss of Offsite Power. To close the breakers that power each Pressurizer Heater electrical switchgear 3A32(3B32), local manual operator action in the respective train Switchgear room is necessary.

Insert 2A

The natural circulation cooldown analysis, performed to comply with Branch Technical Position 5-4, Design Requirements of the Residual Heat Removal System, does not credit the operation of any pressurizer heaters. Therefore, the operator action to energize the Pressurizer Heaters is not a time critical operator action.

Reenergization of the necessary heaters from the emergency onsite power can be accomplished manually from the control room. Procedures ensure that the addition of these loads after a loss of offsite power will not exceed the rating of the emergency diesel generator. The heaters are powered from the 480V non-safety switchgear buses 3A32 and 3B32. The safety-related Class 1E breakers providing power to these buses from the 4.16kV ESF buses (3A3-S and 3B3-S) will trip upon LOOP or SIAS. In this manner, the Class 1E interfaces for main power and control power to the pressurizer heaters are protected by safety-grade circuit breakers. This scheme also ensures that in case of an SIAS the non-Class 1E pressurizer heaters are shed from their emergency power sources via Class 1E circuit breakers.

Pressurizer spray is supplied from each of the reactor coolant pump cold legs in loop one to the pressurizer spray nozzle. Automatic spray control valves control the amount of spray as a function of pressurizer pressure; both of the spray control valves function in response to the signal from the controller. These components are sized to use the differential pressure between the pump discharge and the pressurizer to pass the amount of spray required to maintain the pressurizer steam pressure during normal load following transients. A small continuous flow is maintained through the spray lines at all times to keep the spray lines and the surge line warm to reduce thermal shock during plant transients. This continuous flow also serves to keep the chemistry and boric acid concentration of the pressurizer water the same as that of the coolant in the heat transfer loops.

An auxiliary spray line is provided from the charging pumps to permit pressurizer spray during plant heatup, or to allow depressurization and cooling if the reactor coolant pumps are shut down. The capability to depressurize using auxiliary spray with one charging isolation valve failed open was demonstrated by testing. With a charging to cold leg isolation valve open, some of the charging pump flow is diverted from the auxiliary sprayflow path to the cold legs. With two charging pumps running (88 gpm) an auxiliary spray flow rate of 37 gpm was achieved. This resulted in a depressurization rate of 24 psi/min. This is sufficient to depressurize the RCS during any design basis accident where auxiliary spray is required.

In the event of an abnormal transient that causes a sustained increase in pressurizer pressure at a rate exceeding the control capacity of the spray, a high-pressurizer pressure reactor trip will be initiated.

5.4.10.3 Safety Evaluation

It is shown by analysis made in accordance with the requirements of the ASME Code, Section III that the pressurizer is adequate for all normal operating and transient conditions expected during the life of the plant. Following fabrication, the pressurizer was hydrostatically and nondestructively tested in accordance with the ASME Code, Section III.

During hot functional testing, the transient performance of the pressurizer is checked by determining its normal heat losses and maximum pressurization and depressurization rates. This information is used in setting the pressure controllers.

Overpressure protection of the RCS is provided by two ASME Code spring loaded safety valves.

A discussion of the radiological considerations for the pressurizer is provided in Section 12.3.

Insert 3

At the onset of a Loss of Offsite Power concurrent with the specific common circuit breaker, CVCEBKR014AB-13, being Open, the reenergization of the 480V non-safety switchgear buses 3A32 and 3B32 (that power the Pressurizer Heaters) will require action to be performed outside of the Control Room. To close the breakers that power the 480V non-safety switchgear buses 3A32 and 3B32, local manual operator action in the respective train Switchgear room is necessary. Once each 32 switchgear bus is reenergized, the necessary Pressurizer Heaters powered from that bus can be reenergized from the Control Room.

The natural circulation cooldown analysis, performed to comply with Branch Technical Position 5-4, Design Requirements of the Residual Heat Removal System, does not credit the operation of any pressurizer heaters. Therefore, the operator action to close the breakers that power each Pressurizer Heater electrical switchgear 3A32(3B32), located outside of the control room, is not a time critical operator action.

Attachment 3

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Regulatory Commitment List

Regulatory Commitment List

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check One)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Waterford 3 will establish appropriate controls sufficient to ensure 'flash suits' for Operations usage (for local manual operation of 4160 VAC breakers) are available in Reactor Auxiliary Building Safety Switchgear Room B at all times to meet Personal Protection Equipment requirements.		X	