



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

September 25, 2013

Vice President, Operations
Entergy Operations, Inc.
Grand Gulf Nuclear Station
P.O. Box 756
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENT
RE: REVISE THE STANDBY SERVICE WATER PASSIVE FAILURE
METHODOLOGY IN THE UPDATED FINAL SAFETY ANALYSIS REPORT
(TAC NO. ME9568)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 196 to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1 (GGNS). This amendment consists of changes to the Updated Final Safety Analysis Report (UFSAR) in response to your application dated September 14, 2012, as supplemented by letters dated December 17, 2012, and July 29, 2013.

The amendment changes the methodology for postulating single passive failures of the Standby Service Water (SSW) system following a loss-of-coolant accident (LOCA). The revised methodology considers a limited size piping break in the SSW system during the first 24 hours following a LOCA, and considers only pump and valve seal leakage after more than 24 hours. The licensee will include the revised information in the UFSAR in the next periodic update in accordance with 10 CFR 50.71(e).

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

Sincerely,

A handwritten signature in black ink that reads "Alan Wang".

Alan Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures:

1. Amendment No. 196 to NPF-29
 2. Safety Evaluation
- cc w/encls: Distribution via Listserv

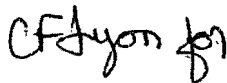
2. Accordingly, the license is amended by changes to the Grand Gulf Nuclear Station, Unit 1 (GGNS), Updated Final Safety Analysis Report (UFSAR) and, as indicated in the attachment to this license amendment, Paragraph 2.C.(2) of Facility Operating License No. NPF-29 is hereby amended to read as follows:

2. Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 196, 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. The license amendment is effective as of its date of issuance and shall be implemented within 90 days from the date of issuance. In addition, the licensee shall include the revised information in the Grand Gulf Nuclear Station UFSAR in the next periodic update in accordance with 10 CFR 50.71(e), as described in the licensee's application dated September 14, 2012, as supplemented by letters dated December 17, 2012, and July 29, 2013, and the NRC staff's safety evaluation for this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION



Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Facility Operating
License No. NPF-29

Date of Issuance: September 25, 2013

ATTACHMENT TO LICENSE AMENDMENT NO. 196

FACILITY OPERATING LICENSE NO. NPF-29

DOCKET NO. 50-416

Replace the following pages of the Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Facility Operating License

Remove

Insert

~~-4-~~

~~-4-~~

(b) SERI is required to notify the NRC in writing prior to any change in (i) the terms or conditions of any new or existing sale or lease agreements executed as part of the above authorized financial transactions, (ii) the GGNS Unit 1 operating agreement, (iii) the existing property insurance coverage for GGNS Unit 1 that would materially alter the representations and conditions set forth in the Staff's Safety Evaluation Report dated December 19, 1988 attached to Amendment No. 54. In addition, SERI is required to notify the NRC of any action by a lessor or other successor in interest to SERI that may have an effect on the operation of the facility.

C. The license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

Entergy Operations, Inc. is authorized to operate the facility at reactor core power levels not in excess of 4408 megawatts thermal (100 percent power) in accordance with the conditions specified herein.

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 196 are hereby incorporated into this license. Entergy Operations, Inc. shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

During Cycle 19, GGNS will conduct monitoring of the Oscillation Power Range Monitor (OPRM). During this time, the OPRM Upscale function (Function 2.f of Technical Specification Table 3.3.1.1-1) will be disabled and operated in an "indicate only" mode and technical specification requirements will not apply to this function. During such time, Backup Stability Protection measures will be implemented via GGNS procedures to provide an alternate method to detect and suppress reactor core thermal hydraulic instability oscillations. Once monitoring has been successfully completed, the OPRM Upscale function will be enabled and technical specification requirements will be applied to the function; no further operating with this function in an "indicate only" mode will be conducted.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 196 TO

FACILITY OPERATING LICENSE NO. NPF-29

ENTERGY OPERATIONS, INC., ET AL.

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

1.0 INTRODUCTION

By letter dated September 14, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12258A386), as supplemented by letters dated December 17, 2012, and July 29, 2013 (ADAMS Accession Nos. ML12353A602 and ML13217A076, respectively), Entergy Operations, Inc. (the licensee), submitted a license amendment request (LAR) for Grand Gulf Nuclear Station, Unit 1 (GGNS). The proposed amendment would revise the methodology for postulating single passive failures of the Standby Service Water (SSW) system following a loss-of-coolant accident (LOCA). The revised methodology would consider a limited size piping break in the SSW system during the first 24 hours following a LOCA, and consider only pump and valve seal leakage after more than 24 hours.

The supplemental letter dated July 29, 2013, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* (FR) on February 5, 2013 (78 FR 8199).

2.0 REGULATORY EVALUATION

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," defines the term single failure and states, in part, that

Fluid and electric systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly) nor (2) a single failure of any passive component (assuming active components function properly), results in a loss of capability of the system to perform its safety functions.

Footnote 2 to the definition states, in part, that

The conditions under which a single failure of a passive component in a fluid system should be considered in designing the system against a single failure are under development.

Footnote 2 was part of the original addition of Appendix A to 10 CFR Part 50, as published in the FR on February 20, 1971 (36 FR 3256).

Criterion 35, "Emergency core cooling," of Appendix A to 10 CFR Part 50, requires suitable redundancy in components and features such that "the system safety function can be accomplished, assuming a single failure."

Compliance with Criterion 35 is discussed in GGNS UFSAR Section 3.1.2.4.6, "Criterion 35 – Emergency Core Cooling," where the licensee describes that the emergency core cooling system (ECCS) consists of the high pressure core spray system, automatic depressurization system, low pressure core spray system, and low pressure coolant injection system. UFSAR Section 3.1.2.4.6 states, in part, that

The design of the emergency core cooling systems, including their power supply, meets the requirements of Criterion 35.

The SSW system is not part of ECCS, but is an essential support system providing a reliable source of cooling to the ECCS.

The NRC staff evaluated the LAR to ensure that the proposed changes continue compliance with Criterion 35 as described in UFSAR Section 3.1.2.4.6.

The use of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (SRP) Section 3.6.2, "Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping," guidance to define the potential break size for passive failures following a LOCA was previously approved in an NRC Safety Evaluation Report (SER) for Indian Point 3 Nuclear Power Plant dated June 12, 1989 (ADAMS Accession No. ML093420262 (non-public, security related)). In that SER, the NRC staff concluded that the use of the break size criteria from SRP Section 3.6.2 bounded the single passive failures that needed consideration during the recirculation phase following a LOCA. The licensee identified this approval as a precedent for the proposed changes to the GGNS SSW system single passive failure methodology.

3.0 TECHNICAL EVALUATION

3.1 Proposed Changes

The LAR proposes a revision to the methodology for postulating single passive failures in the SSW system following a LOCA. The revised methodology postulates limited size breaks in the SSW system piping from 30 minutes to 24 hours post-LOCA and postulates only pump or valve seal failures more than 24 hours post-LOCA.

The SSW system is described in detail in GGNS UFSAR Section 9.2.1, "Standby Service Water System," and a passive failure analysis of the system is provided in UFSAR Table 9.2-1. The current system safety design basis states, in part, that

The SSW system is designed to perform its cooling function following a LOCA, automatically and without operator action, assuming a single active or passive failure.

Footnote 1 to this statement clarifies,

Credible non-electrical passive failures post-accident are limited to pump or valve seal leakage....

GGNS UFSAR Table 9.2-1, "Standby Service Water System Passive Failure Analysis," contains the following entry:

<u>Single Passive Failure</u>	<u>Consequences</u>
Failure of the SSW pressure boundary for single loop due to pump or valve seal leakage.	The [ultimate heat sink (UHS) has been designed to provide cooling water for a minimum of 30 days with a reasonable inventory margin to account for pump or valve seal leakage.

In 1987, the licensee revised this entry in GGNS UFSAR Section 9.2-1 using the 10 CFR 50.59 process. This change limited passive failures following a LOCA to pump or valve seal leakage. Prior to this change, the UFSAR discussion of passive failures following a LOCA extended to failures of SSW pressure boundary due to pipe ruptures. By letter dated July 29, 2013, in response to the NRC staff's request for additional information (RAI) dated March 18, 2013 (ADAMS Accession No. ML13077A399), the licensee provided the following entry from Revision 0 of the GGNS Final Safety Analysis Report (FSAR), Table 9.2-1:

<u>Single Passive Failure</u>	<u>Consequences</u>
Failure of the SSW pressure boundary for any single loop due to pipe rupture, heat exchanger tubing rupture, or pipe fitting (elbow, tee, reducer, etc.) rupture.	The SSW system has been designed with sufficient redundancy (separate, redundant SSW loops) to withstand any single failure of these components.

An NRC Component Design Basis Inspection (CDBI) report noted a discrepancy in the use of 10 CFR 50.59 to implement this change without prior NRC approval. As a result, the licensee submitted the proposed LAR to obtain NRC approval to implement FSAR changes similar to those made inappropriately in 1987 using the 10 CFR 50.59 process.

3.2 NRC Guidance

SRP Section 6.3, "Emergency Core Cooling System," provides guidance for the review of Emergency Core Cooling Systems (ECCS). This section states, in part, that

The ECCS should retain its capability to cool the core in the event of a failure of any single active component during the short term immediately following an accident, or a single active or passive failure during the long-term recirculation cooling phase following an accident.

The SSW system does not belong to the ECCS, but it does provide an essential support function to the ECCS. Therefore, a single failure of the SSW system is considered when evaluating the ECCS as described in SRP Section 6.3 and the requirement of GDC 35 as discussed in UFSAR Section 3.1.2.4.6. However, SRP Section 6.3 does not provide explicit guidance on the types of passive failures that should be considered during the long-term recirculation cooling phase following an accident.

NRC Commission Paper SECY-77-439, "NRC Information Report, Single Failure Criterion," dated August 17, 1977 (ADAMS Accession No. ML060260236), reported on the single failure criterion and its application to licensing reviews. Section 3.B of SECY-77-439 describes the application of the single failure criterion to ECCS. This section states, in part:

During the long-term ECCS recirculation cooling mode the most limiting active failure, or a single passive failure equal to the leakage that would occur from a valve or pump seal failure, is assumed. The basis for not including other passive failures during the long term is based on engineering judgment that such failures (pipe or valve breaks) have an acceptably low likelihood of occurrence during the long-term phase of a [LOCA].

SECY-77-439 also references NUREG-0138, "Staff Discussion of Fifteen Technical Issues Listed in Attachment to November 3, 1976 Memorandum from Director, NRR to NRR Staff," (ADAMS No. ML13267A423). NUREG-0138 contains a more detailed discussion of the postulation of passive failures following a LOCA. The conclusion expressed in NUREG-0138 was that passive failures evaluated during the long-term recirculation period should be limited to pump or valve seal leakage, and larger breaks in ECCS piping need not be considered.

3.3 NRC Staff Evaluation

The use of SRP 3.6.2 guidance to define break sizes for single passive failures after a LOCA was proposed for Indian Point Unit 3 by the New York Power Authority in a letter dated September 7, 1988, and approved by the NRC in the SER dated June 12, 1989. Indian Point Unit 3 used the SRP Section 3.6.2 break size for passive failures during the entirety of the recirculation cooldown phase following a LOCA. Indian Point Unit 3 selected the break size because it bounded the passive failures described in SECY-77-439 to be taken into consideration during the recirculation phase of plant cooldown. In the SER dated June 12, 1989, the NRC confirmed that the leakage crack, as defined in SRP Section 3.6.2, was bounding in terms of the consideration of passive failures during the recirculation phase following a LOCA.

The licensee proposed postulating limited size breaks in the GGNS SSW system piping during the period from 30 minutes to 24 hours after a LOCA. Further, the licensee cited the Indian Point 3 approval that stated that these breaks can be assumed to have the dimensions of a leakage crack, as defined in SRP Section 3.6.2 and that the use of the leakage crack as a bounding single passive failure post-LOCA for the SSW system is equivalent to the methodology as a precedent for this LAR. The licensee additionally stated that the leakage crack bounds the passive failures described in SECY-77-439 and the SSW system can perform its intended safety function in the event of a leakage crack, and there is sufficient time to take action to isolate such a failure in the SSW system piping or provide makeup to the SSW basin.

The licensee proposed postulating only leakage resulting from a pump or valve seal failure in the GGNS SSW system 24 hours after a LOCA, and this change is in conformance with SECY-77-439, which recommends that passive failures following a LOCA be limited to leakage resulting from a pump and valve seal failure. Additionally, the licensee stated that the possibility of a larger piping failure during the recirculation phase of a LOCA is highly unlikely, as described in SECY-77-439. Further, the licensee stated that the SSW system can perform its intended safety function with consideration of the failure of a pump or valve seal, and there is sufficient time to take action to isolate such a failure in the SSW system piping or provide makeup to the SSW basin.

The NRC staff evaluated the impact of the proposed changes on GGNS's conformance with Criterion 35, with respect to the capability of the ECCS to withstand a single passive failure. The revised methodology continues to postulate single passive failures during the long-term recirculation phase of a LOCA, which conforms to the guidance of SRP Section 6.3. The LAR revised the specific single passive failures that are considered. However, the NRC staff has confirmed that the single passive failures that are postulated under the revised methodology meet or bound the type of single passive failures identified for consideration following a LOCA in SECY-77-439. The methodology used prior to SECY-77-439 for postulating single passive failures in the SSW system following a LOCA was overly conservative. The NRC staff has determined that the revised methodology meets or exceeds the NRC guidance regarding the types of single passive failures to be considered following a LOCA, and continues to meet the requirement of GDC 35. Therefore, the revised methodology is acceptable to the NRC staff.

The LAR revises the methodology for postulating single passive failures in the SSW system following a LOCA. The revised methodology postulates a leakage crack, as defined in SRP Section 3.6.2, from 30 minutes to 24 hours post-LOCA, and postulates pump or valve seal leakage after 24 hours post-LOCA. This revised methodology meets or exceeds the NRC guidance for postulating single passive failures following a LOCA. Therefore, the NRC staff concludes that the proposed changes are acceptable.

4.0 STATE CONSULTATION

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

5.0 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 NRC 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 offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The 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 (78 FR 8199). 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.

6.0 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) there is reasonable 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.

Principal Contributor: Evan Davidson

Date: September 25, 2013

September 25, 2013

Vice President, Operations
Entergy Operations, Inc.
Grand Gulf Nuclear Station
P.O. Box 756
Port Gibson, MS 39150

**SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENT
RE: REVISE THE STANDBY SERVICE WATER PASSIVE FAILURE
METHODOLOGY IN THE UPDATED FINAL SAFETY ANALYSIS REPORT
(TAC NO. ME9568)**

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 196 to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1 (GGNS). This amendment consists of changes to the Updated Final Safety Analysis Report (UFSAR) in response to your application dated September 14, 2012, as supplemented by letters dated December 17, 2012, and July 29, 2013:

The amendment changes the methodology for postulating single passive failures of the Standby Service Water (SSW) system following a loss-of-coolant accident (LOCA). The revised methodology considers a limited size piping break in the SSW system during the first 24 hours following a LOCA, and consider only pump and valve seal leakage after more than 24 hours. The licensee will include the revised information in the UFSAR in the next periodic update in accordance with 10 CFR 50.71(e).

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

Sincerely,

/RA/
Alan Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures:

- 1. Amendment No. 196 to NPF-29
- 2. Safety Evaluation

cc w/encls: Distribution via Listserv

DISTRIBUTION:

PUBLIC RidsNrrDorlDpr Resource RidsRgn4MailCenter Resource
LPLIV r/f RidsNrrDorlLpl4 Resource EDavidson, NRR/DSS/SBPB
RidsAcrsAcnw_MailCTR Resource RidsNrrLAJBurkhardt Resource
RidsNrrDssSbpb Resource RidsNrrPMGrandGulf Resource

ADAMS Accession No. ML13261A349

*SE input via email

OFFICE	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/LA	NRR/DSS/SBPB/BC
NAME	MBartlett	AWang	JBurkhardt	GCasto*
DATE	09/20/13	09/20/13	09/19/13	09/13/13
OFFICE	OGC	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM	
NAME	EHouseman	MMarkley (CFLyon for)	AWang	
DATE	09/24/13	09/25/13	09/25/13	

OFFICIAL RECORD COPY