

March 29, 2000

Mr. Glen A. Watford, Manager
Nuclear Fuel Engineering
GE Nuclear Energy
P. O. Box 780
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SUBJECT: AMENDMENT 26 TO GE NUCLEAR ENERGY LICENSING TOPICAL REPORT
NEDE-24011-P-A (GESTAR II) - CLARIFYING CLASSIFICATION BWR-6
PRESSURE REGULATOR FAILURE DOWNSCALE EVENT (TAC NO. MA6481)

Dear Mr. Watford:

By letter dated October 22, 1999, General Electric (GE) Nuclear Energy, submitted a request for review of Amendment 26 to GESTAR as a standard amendment. GESTAR Amendment 26 was submitted by letter dated August 13, 1999, as an administrative change and involved three areas. These areas were for: 1) clarifying classification of BWR-6 pressure regulator failure downscale event, 2) implementing improved GE Nuclear Energy steady-state methods, and 3) incorporation of BWROG-approved stability options. The August 13, 1999, submittal was further supported by a meeting with the staff on March 17, 1998, and supplemented by a letter dated October 14, 1998. The staff has reviewed Item 1 of the submittal, in relation to clarifying the classification of the pressure regulator failure downscale event for the BWR-6, and has prepared the enclosed evaluation. We find that this area (Item 1) of the proposed Amendment 26 is acceptable as discussed in the enclosure. Item 2 was found acceptable in the staff's letter dated November 10, 1999, and Item 3 has been determined to be an administrative change and no further review is required. This completes the review of Amendment 26 to GESTAR and closes TAC No. MA6481.

Sincerely,

/RA/

Stuart A. Richards, Director
Project Directorate IV and Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Enclosure: Safety Evaluation

Project No. 691

cc w/encl: See next page

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NEDE-24011-P-A (GESTAR II) - CLARIFYING CLASSIFICATION BWR- 6
PRESSURE REGULATOR FAILURE DOWNSCALE EVENT (TAC NO. MA6481)

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Project No. 691

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REGARDING AMENDMENT 26 TO GENERAL ELECTRIC NUCLEAR ENERGY
TOPICAL REPORT NEDE-24011-P-A, ITEM 1: CLARIFYING CLASSIFICATION OF
BWR-6 PRESSURE REGULATOR FAILURE DOWNSCALE EVENT

1.0 INTRODUCTION

By letter dated October 22, 1999 (Reference 1), the General Electric (GE) Nuclear Energy group submitted a request for review of Amendment 26 to GESTAR as a standard amendment. GESTAR Amendment 26 had been submitted by letter dated August 13, 1999 (Reference 2), as an administrative change involving three areas. These areas were for: 1) clarifying classification of BWR-6 pressure regulator failure downscale event, 2) implementing improved GE Nuclear Energy steady-state methods, and 3) incorporation of BWROG-approved stability options. The August 13, 1999, submittal was further supported by a meeting with the staff on March 17, 1998 (Reference 3), and supplemented by a letter dated October 14, 1998 (Reference 4).

2.0 BACKGROUND AND DISCUSSION

Two identical pressure regulators are provided to maintain primary system pressure control. They independently sense pressure just upstream of the main turbine stop valves and provide input to control the turbine control valves and turbine bypass valves to maintain a constant turbine inlet pressure. Failure of one pressure regulator is a mild event; the backup regulator will maintain control of the system pressure. Failure of both regulators is a more limiting event. A downscale failure of the pressure regulation demand to zero could cause full closure of the turbine control valves, as well as inhibit steam bypass flow and thereby increase reactor power and pressure. If this occurs, a reactor scram would be initiated when the high neutron flux scram setpoint is reached.

3.0 EVALUATION

Pressure Regulator Downscale Failure (BWR-6 plants)

The original BWR-6 licensing basis defined the pressure regulator downscale failure (PRDF) as an Anticipated Operational Occurrence (AOO) or moderate frequency event. The basis of this classification was the identification of a single initiating failure which lead to failure of both the primary and the backup regulators. This event did not affect any operating limits at rated conditions and at other than rated power and flow, protection was provided by the peaking factor setdown imposed on the average power range monitor (APRM) high flux scram.

The operating flexibility option, *Maximum Extended Operating Domain (MEOD)*, a commercial offering of General Electric (GE) for the BWR-6 plants to expand the power/flow map provided, among other improvements, the basis for removing the total peaking factor setdown of the flux scram and replaced it with a set of power and flow dependent operating limits. At this time, the classification of the PRDF as an AOO was also reevaluated and it was concluded that the expected frequency of occurrence of the single initiating failure was below the moderate frequency event definition, and was an infrequent event. As BWR-6 plants implemented the MEOD option, by NRC review and approval of a plant specific MEOD implementation report or as part of the Operating License application, the PRDF was considered to be outside the AOO range and, therefore, was no longer considered in establishing the operating limits which protect the fuel cladding during AOOs. This was not explicitly documented in GESTAR II at this time. Following a thorough historical basis review, GE confirmed that the PRDF was not included in the MEOD evaluations because of the low probability of occurrence. GE also performed a formal analysis of the expected probability of occurrence for the BWR-6 plants with GE pressure control systems, as supported by IEEE 500-1984. This was discussed with the staff in a meeting on March 17, 1998, and GE provided documentation of their evaluation to the NRC as Reference 4.

Based on a review of the historical basis and the review and approval of the MEOD flexibility options for BWR-6 plants, the staff agrees that the PRDF is not an AOO. Therefore, the MEOD plants with GE pressure control systems are not required to evaluate the PRDF event, other than to assure that the pressure control of each plant is consistent with the approved MEOD basis. Thus, the staff agrees with the proposed wording for Amendment 26 for Item 1, "Clarifying Classification of BWR-6 Pressure Regulator Downscale Event."

4.0 CONCLUSIONS

We find that this area (Item 1, Clarifying Classification of BWR-6 Pressure Regulator Downscale Event) is acceptable and appropriate for inclusion in Amendment 26 to the GE Licensing Topical Report NEDE 24011-P-A (GESTAR II), as discussed in the above evaluation.

5.0 REFERENCES

1. Letter from G. A. Watford (GE) to USNRC, "Review of Amendment 26 to GESTAR II," October 22, 1999 (MFN-034-99).
2. Letter from G. A. Watford (GE) to USNRC, "Amendment 26 to GE Licensing Topical Report NEDE-24011-P-A (GESTAR II) for (1) Clarifying Classification of BWR 6 Pressure Regulator Failure Downscale Event, (2) Implementing Improved GE Steady-State Methods, and (3) Incorporation of BWROG Approved Stability Options," August 13, 1999 (MFN-008-99).
3. Memorandum to T. H. Essig, Generic Issues and Environmental Projects Branch (NRR) from M. J. Davis, Project Manager, "Summary of Technical Information Exchange Meeting held on March 17, 1998, with GE Nuclear Energy," dated April 14, 1998.

4. Letter from G. A. Watford (GE) to J. H. Wilson (NRC), "Proposed Revision of GESTAR II to Clarify Classification of Pressure Regulator Downscale Failure Event," October 14, 1998 (MFN-039-98).

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Date: March 29, 2000