

March 17, 2005

Mrs. Margaret Harding, Manager
Nuclear Fuel Engineering
Global Nuclear Fuel
P. O. Box 780
Wilmington, NC 28402

SUBJECT: FINAL SAFETY EVALUATION FOR GLOBAL NUCLEAR FUEL (GNF)
AMENDMENT 27 TO LICENSING TOPICAL REPORT NEDE-24011-P-A,
"GESTAR II" (TAC NO. MC0347)

Dear Mrs. Harding:

By letter dated August 6, 2003, as supplemented by letters dated March 15 and December 8, 2004, Global Nuclear Fuel (GNF) submitted Amendment 27 to Licensing Topical Report (LTR) NEDE-24011-P-A, "GESTAR II," to the staff for review. In its March 15 letter, GNF identified those changes in Amendment 27 which it felt were administrative in nature and requested that the administrative changes in Amendment 27 be reviewed first to allow plants with spring outages to take advantage of later revisions and newly approved codes. By letter dated July 16, 2004, the staff issued its final safety evaluation (SE) approving the requested administrative changes. This letter transmits the staff's final SE approving the remaining, more technical, changes requested by GNF in Amendment 27. A draft version of this SE (ML050110461) was shared with GNF for a proprietary information and factual error review. By e-mail dated February 3, 2005 (ML050600166), GNF replied that there were no issues with the technical content and that there was no proprietary information in the draft SE.

The staff has found that NEDE-24011-P-A, Amendment 27, is acceptable for referencing in licensing applications for General Electric designed boiling water reactors to the extent specified and under the limitations delineated in the LTR and in the enclosed SE. The SE defines the basis for acceptance of the LTR.

Our acceptance applies only to material provided in the subject LTR. We do not intend to repeat our review of the acceptable material described in the LTR. When the LTR appears as a reference in license applications, our review will ensure that the material presented applies to the specific plant involved. License amendment requests that deviate from this LTR will be subject to a plant-specific review in accordance with applicable review standards.

In accordance with the guidance provided on the NRC website, we request that GNF publish the accepted proprietary and non-proprietary versions of this LTR within three months of receipt of this letter. The accepted versions shall incorporate this letter and the enclosed SE after the title page. Also, they must contain historical review information, including NRC requests for additional information and responses. The accepted version shall include a "-A" (designating accepted) following the LTR identification symbol.

M. Harding

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If future changes to the NRC's regulatory requirements affect the acceptability of this LTR, GNF and/or licensees referencing it will be expected to revise the LTR appropriately, or justify its continued applicability for subsequent referencing.

Sincerely,

/RA/

Herbert N. Berkow, Director
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Project No. 712

Enclosure: SE

cc w/encl: See next page

M. Harding

-2-

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AMENDMENT 27 TO TOPICAL REPORT NEDE-24011-P-A, "GESTAR II"

GLOBAL NUCLEAR FUEL

PROJECT NO. 712

1.0 INTRODUCTION

By letter dated August 6, 2003, as supplemented by letters dated March 15 and December 8, 2004, Global Nuclear Fuel (GNF) submitted Amendment 27 to Licensing Topical Report (LTR) NEDE-24011-P-A, "GESTAR II," to the staff for review. By letter dated March 15, 2004, GNF identified those changes in Amendment 27 which it felt were administrative in nature and requested that the administrative changes in Amendment 27 be reviewed first to allow plants with spring outages to take advantage of later revisions and newly approved codes. By letter dated July 16, 2004, the staff issued its final safety evaluation (SE) approving the requested administrative changes. This SE addresses the remaining, more technical, changes requested by GNF in Amendment 27.

A draft version of this SE (ML050110461) was shared with GNF for a proprietary information and factual error review. By e-mail dated February 3, 2005 (ML050600166), GNF replied that there were no issues with the technical content and that there was no proprietary information in the draft SE.

2.0 REGULATORY EVALUATION

The staff has evaluated each of the proposed changes below. The regulatory guidance used in this review is contained in NUREG-0800 Standard Review Plan (SRP) Section 4.2, "Fuel System Design," Draft Revision 3, April 1996 (available at the NRC external website). This guidance document provides acceptable methods for the review of fuel system designs and fuel analysis methodology adherence to applicable General Design Criteria (GDC).

3.0 TECHNICAL EVALUATION

Update to Sections 1.1.7.C.vii and 1.2.7.C.vii

This change corrects the critical power correlation uncertainty equation to a standard form. The staff agrees with the correction to this equation.

Update to Section 3.2.4.3

This change reworded the paragraph to state that the standby liquid control system (SLCS) is analyzed to bring the core to a shutdown condition with all rods out. This change is consistent with a previous response to an NRC question contained in Appendix B of the GESTAR II LTR, page US.B-43, and is therefore acceptable.

Update to Section 3.4.2.2

This change reworded the paragraph to clarify the evaluations to be performed on axial exposure distributions. In discussions with the staff, GNF clarified that the proposed changes to this section do not affect the time varying axial power shape (TVAPS) methodology. GNF stated that the TVAPS description does not apply to this change nor any other proposed change in Amendment 27. The change to Section 3.4.2.2 clarifies the currently approved methodology. The staff agrees that these changes are administrative and therefore acceptable.

Update to Section 3.4.3

This change requires that the SLCS shutdown margin be re-examined if the final loading pattern does not meet requirements. The staff agrees that the SLCS shutdown margin needs to be evaluated for this condition and therefore this change is acceptable.

Update to Section 4.2.3

This change allows the use of 1967 steam tables or later editions. The staff accepts the use of more recent international standard steam tables. Therefore, this change is acceptable.

Update to Section 4.2.4

This change clarifies the equations and variable definitions. This change does not alter the algorithm but only clarifies its usage. Therefore, this change is acceptable.

Update to Section 4.3.1.2.7

This change clarifies the text for easier understanding of off-rated limits. This clarification does not alter the underlying meaning of the text and is therefore acceptable.

Update to Table A.15.0-2

This change updates Table A.15.0-2 to reflect the final resolution on anticipated transients without scram (ATWS). The ATWS criteria for new fuel designs is contained in GESTAR Section 1.1.13 and 1.2.13. NRC review and approval of each new fuel bundle design must include an evaluation against these ATWS criteria. In response to the staff's request, GNF agreed to revise Table A.15.0-2 to cite GESTAR Section 1.1.13 and 1.2.13 for the ATWS acceptance criteria as opposed to NEDE-31152P. GNF provided the revised table in its letter dated December 8, 2004. This final change does not alter the current licensing basis for ATWS nor the requirement for future staff review of new fuel designs and is therefore acceptable.

Update to Section S.1.3

This change adds GDC 10 requirements and stipulates the actions that can be used on an interim basis if the long-term stability analysis solution is incapable of performing its intended safety function due to Part 21 issues or hardware failures. This change is consistent with currently approved methods and is therefore acceptable.

Update to Section S.2.2.3.2.6

The minimum critical power ratio (MCPR), maximum average planar linear heat generation rate (MAPLHGR), and linear heat generation rate (LHGR) represent the three thermal limits typically monitored by BWRs. Amendment 19 to GESTAR provided the capabilities to fold the LHGR into the MAPLHGR. Most plants discontinued specifying LHGR because it was included within MAPLHGR. This change updates the text to show that MAPLHGR need not include the

LHGR limit as the LHGR limit may be specified separately. This change does not alter the previously approved thermal margin monitoring requirements and is therefore acceptable.

Update to Section S.4

This change clarifies stability solutions to those currently approved and being applied in refueling analyses. This change is consistent with currently approved positions and is therefore acceptable.

Update to Section S.4.1.2

This change adds a reference to plant-specific Option II LTRs. Referencing plant-specific LTRs is acceptable. Therefore, this change is acceptable.

Update to Section S.4.2.1

This change adds text recommending that the impact of core design changes be evaluated with respect to stability interim corrective actions. This guidance helps to ensure the continued applicability of stability interim corrective actions and is therefore acceptable.

Update to Section S.5.1.1

This change updates the text to indicate the availability of recirculation pump trips (RPTs). This clarification does not change the RPT features nor whether it may be credited. Therefore, this change is acceptable.

Updates to Sections S.5.2, S.5.2.9, S.5.2.10, S.5.2.11, and S.5.2.12

This change adds operating flexibility options for safety/relief valves out of service, ADS valve out of service, end-of-cycle recirculation pump trip out of service, and main steam isolation valves out of service. These options have already been analyzed by GNF and have been implemented on a plant-specific basis for operating BWRs. In the future, licensees planning to implement any of these options will need to (1) ensure that implementation meets the provisions under 10 CFR 50.59 or (2) seek NRC approval prior to implementation. Since this change adds flexibility options already being implemented in operating plants and does not change the requirement for NRC review and approval of each option on a plant-specific basis, it is acceptable.

Update to Section S.5.2.2

At the staff's request, GNF has rescinded this change since the validation of the previous cycle loss-of-coolant accident (LOCA) analyses applies universally and not just to SAFE/REFLOOD LOCA methodology (Reference 3).

Update to Section S.5.2.3

This change corrects the extended load line limit (ELLLA) operating range. Specifically, the change removes the 100 percent power/75 percent flow point which is applicable to the maximum extended load line limit analysis (MELLLA), not ELLLA. This correction does not alter the currently approved application of ELLLA and is therefore acceptable.

Update to Section S.5.2.4

This change adds text clarifying the need to evaluate the effects of increased core flow on limiting transients. This change does not change the intent or magnitude of evaluations required to support increased core flow operation and is therefore acceptable.

Update to Section S.5.2.5

This change adds text clarifying the need to evaluate the effects of reduced feedwater temperature on limiting transients. This change does not change the intent or magnitude of evaluations required to support reduced feedwater temperature operation and is therefore acceptable.

Update to Section S.5.2.6

This change adds text clarifying the need to apply reduced operating limits for low power and low flow conditions. The use of MAPLHGR and LHGR limits is currently allowed and will be adjusted to provide protection during postulated transients at off-rated conditions. This clarification is acceptable.

Update to Section S.5.2.7

This change adds text clarifying the high load line aspects of maximum extended operation domain (MEOD) and the application of these limits to BWR 3/5 plants as MELLLA. This change does not alter the currently approved applications of MEOD or MELLLA and is therefore acceptable.

Update to Section S.5.2.8

This change adds text clarifying the response time requirements of the turbine bypass system. This clarification of response time does not change the intent of Section S.5.2.8 and is therefore acceptable.

Update to Section US.A.8

This change updates the operating flexibility options to be consistent with the changes noted above and is acceptable.

4.0 CONCLUSION

As discussed in the technical evaluation, the staff has reviewed the proposed changes and found each of them to be acceptable and appropriate for inclusion in Amendment 27 to NEDE-24011-P-A, "GESTAR II."

The staff finds Amendment 27 to be acceptable for referencing in license applications and does not intend to repeat our review of the matters described in Amendment 27 when the report appears as a reference in licensing applications, except to ensure that the material presented is applicable to the specific plant involved. Our acceptance applies only to the matters described in Amendment 27.

5.0 CONDITIONS AND LIMITATIONS

None.

6.0 REFERENCES

1. Letter from M. E. Harding (GNF) to U.S. Nuclear Regulatory Commission, "Review of Amendment 27 to GESTAR II, NEDE-24011-P-A," FLN-2003-009, August 6, 2003.

2. Letter from M. E. Harding (GNF) to U.S. Nuclear Regulatory Commission, "Review of Amendment 27 to GESTAR II, NEDE-24011-P-A, March 15, 2003.
3. Letter from M. E. Harding (GNF) to U.S. Nuclear Regulatory Commission, "Amendment 27 to GESTAR II, NEDE-24011-P-A," FLN-2004-034, December 8, 2004.
4. Letter from U.S. Nuclear Regulatory Commission to M. E. Harding (GNF), "Final Safety Evaluation for Global Nuclear Fuel (GNF) Licensing Topical Report NEDE-24011P, 'GESTAR II, Amendment 27'," July 16, 2004, ADAMS ML042010353.

Principal Contributor: P. Clifford

Date: March 17, 2005