

June 25, 2003

Mr. Andrew C. White
President and Chief Executive Officer
GE Nuclear Energy
175 Curtner Avenue
San Jose, CA 95125

SUBJECT: REVIEW OF EXTENDED POWER UPRATES FOR BOILING WATER
REACTORS

Dear Mr. White:

During our conversations regarding extended power uprates (EPU), you requested a clarification of the EPU licensing process and the staff's expectations for support of an EPU. I hope the following information clarifies these issues for you and are useful for the preparation of future EPU submittals. GE Nuclear Energy (GENE) previously submitted several topical reports for EPU applications in boiling water reactors (BWRs). Because the GENE topical reports relied exclusively on GENE methods and evaluated GE fuel designs, the staff approved the topical reports for reactors based on the use of GE fuel and GENE analytical methods as described in the safety evaluations approving these topical reports. Recently, the staff challenged the application of these GENE topical reports to several BWRs that are utilizing other than GE fuel in their EPU applications. In summary, the staff concerns are:

- (1) Applicability of the GESTAR analysis process to the fuel transition with the EPU;
- (2) Application of the ELTR1/2 review method for a mixed core with non-GE fuel;
- (3) Limitations of the constant pressure power uprate (CPPU) methodology; and
- (4) Information necessary to justify acceptable performance for a mixed core at the EPU level.

In the staff's safety evaluation report (SER) for GESTAR dated May 12, 1978, the staff recognized that some aspects of the overall reload safety evaluation can be either generic (or bounding) to all operating BWRs or are not expected to change from one reload cycle to the next for a particular BWR plant. In order to avoid the need for the staff to review such "generic" aspects with each plant-specific reload application, the GESTAR concept was approved by the staff. The GESTAR methodology applies only to GE fuel and GENE analytical methods approved by the staff and more importantly, it is applicable to reloads that do not result in changes in licensed power level. The staff believes that the GESTAR reload process is not suitable for implementing an EPU.

The staff position for an EPU in accordance with NEDC-32424P (ELTR-1) and GENE's EPU analyses, NEDC-32523P (ELTR-2) is documented in the safety evaluations dated February 8, 1996 and September 14, 1998, respectively. The staff's approval, related to the analyses that were to be performed and submitted, was based on GENE analytical methods with GE fuel in the reactor cores. While no specific limitations were included, GENE provided analyses only to support application to its fuel type and methods. Therefore, the staff understood that these topical reports were not intended for application to mixed core reloads with fuel from vendors other than GENE. However, the staff has used the ELTR1/2 as general

guidance for BWR EPU reviews performed to date to assure that the necessary analyses are included in the EPU applications.

The first application of the ELTR1/2 process for mixed core fuel transition occurred during the Dresden and Quad Cities EPU review. The staff concluded that the application was initially deficient and requested a substantial amount of additional information. The staff needed extensive requests for additional information (RAIs) and on-site technical audits in order to understand the impact of an EPU on the plant safety analyses and to make its safety finding. The Dresden/Quad Cities submittal, including the RAI responses, and the technical audit leading to staff approval of the EPU did not provide a generic basis for mixed core reload analyses and the only precedent established was that the ELTR-1/2 process did not provide an appropriate basis for demonstrating the technical adequacy of the submittal.

The staff has reviewed and approved several EPU applications based on individual plant-specific submittals under the ELTR1/2 guidelines, supported by plant-specific power uprate safety analysis provided by GENE. Each of these applications was unique, and the submittals, although extensive in scope, were initially insufficient in depth and did not provide sufficient analyses to permit a complete and meaningful review without extensive RAIs and staff audits.

In the ELTR-1 SER it is stated that "The staff expects utilities to provide adequate analytical information to support each plant-specific extended power uprate amendment request. This documentation should include the generic calculations and evaluations provided by GENE (where applicable), supplemented by additional plant-specific data. Each utility is expected to assess the impact of power uprate on all aspects of plant operation, including overall plant operation and those plant-specific design features not addressed by the generic list of review topics (as outlined in Appendix A of ELTR-1)." EPU operation with a mixed core is an important aspect of plant operation and thus, consistent with the above statement, its impact is required to be assessed in a thorough manner.

In the staff's safety evaluation for NEDO-33004P, "Constant Pressure Power Urate," (CPPU) dated March 31, 2003, Section 1.2.2 states that "Licensees proposing to utilize fuel designs other than GE fuel, up through GE 14 fuel, may not reference the CPPU LTR as a basis for their power uprate since the CPPU LTR process applies only to GE fuel and GE accident analysis methods." The staff position is unchanged from that written in the safety evaluation. For non-fuel related issues, the CPPU methodology can be applied provided there is no change in the reactor dome pressure as part of the proposed EPU application.

In summary, licensees must submit the following plant-specific information as part of an EPU application when utilizing a mixed core, in addition to the information routinely submitted:

1. A mixed core analysis that provides bounding fuel-dependent analyses or analyses based on cycle-specific core configurations that demonstrate that at the EPU/MELLLA condition, the core and fuel performance will satisfy all safety and regulatory requirements.
2. A fuel transition report which demonstrates acceptable performance of the different fuel designs supplied by the different fuel vendors at EPU/MELLLA conditions. The report must: (1) include a discussion on the neutronic and thermal-hydraulic compatibility of

the different vendors' fuel loaded in the core, and (2) identify and demonstrate the applicability of the NRC-approved licensing methodology, analytical methods, and codes used to perform the fuel performance evaluation.

3. Analyses of anticipated transients without scram, loss-of-coolant accidents and thermal-hydraulic stability for the different fuel designs supplied by the different fuel vendors for EPU/MELLLA conditions. In conclusion, we reiterate our position that complete and comprehensive analyses of all the applicable transients and accidents for the "realistic core" which demonstrate acceptable performance and compliance with applicable regulations at the EPU level must be performed and submitted to the staff as part of the EPU application.

The above information is critical path for our EPU reviews. Discussions with licensees and applications referencing licensing topical reports refer to "reference core", "equilibrium GE 14 core", or "realistic core" when describing the core design used to perform the safety analyses and evaluations. The staff understands that bounding analyses for a core design demonstrate the impact of a proposed change and assure that all safety and regulatory requirements can be met. You are requested to explain how GENE's approach of using a "representative," "realistic," or "equilibrium" core provides sufficient bases to make bounding safety findings and demonstrate the plant's ability to operate safely and meet all of the safety and regulatory requirements.

In conclusion, we reiterate our position that complete and comprehensive analyses of all the applicable transients and accidents, which demonstrate acceptable performance and compliance with applicable regulations at the EPU level must be performed and submitted to the staff as part of the EPU application. If a licensee provides a good quality submittal with the above information and there are no safety concerns, the agency goal is to complete the update review in 12 months. If the submittal is made in parts (e.g., if the fuel dependent analyses are submitted later than other analyses), we can only commit to completing our review 12 months from the time that the latest supplement to the application was provided (e.g., 12 months from the date that the fuel-dependent analyses are submitted).

If you have any questions, please contact Alan Wang, GENE Project Manager, at (301) 415-1445.

Sincerely,

/RA/

Ledyard B. Marsh, Deputy Director
Division of Licensing and Project Management
Office of Nuclear Reactor Regulation

Project No. 710

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 DLPM BWR Project Managers

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OFFICE	PDIV-2/PM	PDIV-2/LA	SRXB/SC *	SRXB *	PDIV-2/SC	PDIV-2/D	DLPM/DD
NAME	AWang	EPeyton	FAkstulewicz	JWermiel	JNDonohew for SDembek	HBerkow	TMarsh
DATE	6/25/03	6/24/03	6/24/03	6/25/03	6/25/03	6/25/03	6/25/03

cc:

Mr. J. A. Gray, Jr., Chairman
BWR Owners Group
Entergy Nuclear Northeast
440 Hamilton Avenue Mail Stop 12C
White Plains, NY 10601-5029

Mr. H. A. Sepp, Manager
Regulatory and Licensing Engineering
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

Mr. James F. Mallay
Director, Regulatory Affairs
Framatome ANP
3315 Old Forest Road
Lynchburg, VA 24501

Mr. Michael Kansler
President
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601
(Docket Nos. 50-271, 50-293 and 50-333)

Mr. John T. Conway
Vice President Nine Mile Point
Nine Mile Point Nuclear Station, LLC
P.O. Box 63
Lycoming, NY 13093
(Docket Nos. 50-220 and 50-410)

Mr. John L. Skolds, President
and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
200 Exelon Way, KSA 3-E
Kennett Square, PA 19348
(Docket Nos. 50-277, 50-278, 50-352
and 50-353)

Mr. Bryce L. Shriver
Senior Vice President
and Chief Nuclear Officer
PPL Susquehann, LLC
769 Salem Boulevard, NUCSB3
Berwick, PA 18603-0467
(Docket Nos. 50-387 and 50-388)

Mr. Roy A. Anderson
President and Chief Nuclear Officer
PSEG Nuclear, LLC - X04
P.O. Box 236
Hancocks Bridge, NJ 08038
(Docket No. 50-354)

Mr. H. L. Sumner, Jr.
Vice President - Nuclear
Hatch Project
Southern Nuclear Operating Company, Inc.
Post Office Box 1295
Birmingham, AL 35201-1295
(Docket Nos. 50-321 and 50-366)

Mr. J. S. Keenan
Vice President
Brunswick Steam Electric Plant
Carolina Power and Light Company
Post Office Box 10429
Southport, North Carolina 28461
(Docket Nos. 50-325 and 50-324)

Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801
(Docket Nos. 50-259, 50-260, and 50-296)

Mr. John L. Skolds, President
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555
(Docket Nos. 50-237, 50-249, 50-254,
50-265, 50-373, and 50-374)

Mr. Mark A. Peifer
Site Vice President
Duane Arnold Energy Center
Nuclear Management Company, LLC
3277 DAEC Road
Palo, IA 52524-0351
(Docket No. 50-331)

cc:

Mr. William R. Kanda
Vice President - Nuclear, Perry
FirstEnergy Nuclear Operating Company
Perry Nuclear Power Plant
P.O. Box 97, A200
10 Center Road
Perry, OH 44081
(Docket No. 50-440)

Mr. William T. O'Connor, Jr.
Vice President - Nuclear Generation
Detroit Edison Company
6400 North Dixie Highway
Newport, MI 48166
(Docket No. 50-341)

Mr. David L. Wilson
Site Vice President
Monticello Nuclear Generating Plant
Nuclear Management Company, LLC
2807 West County Road 75
Monticello, MN 55362-9637
(Docket No. 50-263)

Mr. John L. Skolds, Chairman
and Chief Executive Officer
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555
(Docket No. 50-461)

Mr. George A. Williams, Acting
Vice President, Operations GGNS
Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150
(Docket No. 50-416)

Mr. Paul D. Hinnenkamp
Vice President - Operations
Entergy Operations, Inc.
River Bend Station
P.O. Box 220
St. Francisville, LA 70775
(Docket No. 50-458)

Mr. Clay C. Warren
Vice President of Nuclear Energy
Nebraska Public Power District
P.O. Box 98
Brownville, NE 68321
(Docket No. 50-298)

Mr. J. V. Parrish
Chief Executive Officer
Energy Northwest
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968
(Docket No. 50-397)