



Boston Edison

Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360-5599

Nancy L. Desmond
Regulatory Relations Group Manager

July 22, 1997
BECo Ltr. #2.97.076

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Docket No. 50-293
License No. DPR-35

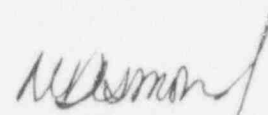
Proprietary Material Associated with Pilgrim SLMCPR Amendment Request

By letters dated January 24, 1997, and March 27, 1997, Boston Edison Company (BECo) requested an amendment to Pilgrim's Safety Limit Minimum Critical Power Ratio (SLMCPR). Amendment 171 was issued by the NRC on April 7, 1997, in response to our request.

Both request letters included material supplied by General Electric Company (GE) which is considered proprietary as described in 10CFR2.790(a)(4). The proprietary material was designated by brackets in the right-hand margin under a GE affidavit. (The affidavit is provided with Attachment A of this letter.)

Based on a verbal request from the NRC, this submittal provides two forms of the SLMCPR request letter as attachments. Attachment A is the March 27, 1997, letter with the proprietary material removed; hence, suitable for docketing. Attachment B is the complete March 27, 1997, letter, and must be detached from this submittal before docketing.

Should you wish further information on this issue, please contact P.M.Kahler at (508)830-7939.

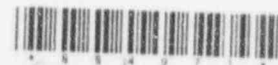

Nancy L. Desmond

PMK/dmc/prop

- Attachments A: March 27, 1997, SLMCPR amendment request letter with GE proprietary material removed and affidavit
- B: March 27, 1997, SLMCPR amendment request containing GE proprietary material (detach from this letter before docketing)

APD 1/1

9707290209 970722
PDR ADDCK 05000293
P PDR



Change NRC PDR

to ent
1 w/prop

cc: Mr. Alan B. Wang, Project Manager
Project Directorate I-3
Office of Nuclear Reactor Regulation
Mail Stop: OWF14B2
U. S. Nuclear Regulatory Commission
1 White Flint North
11555 Rockville Pike
Rockville, MD 20852

U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Senior Resident Inspector
Pilgrim Nuclear Power Station

Affidavit

I, **Ralph J. Reda**, being duly sworn, depose and state as follows:

- (1) I am Manager, Fuels and Facility Licensing, General Electric Company ("GE") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in the letter, E. T. Boulette (Boston Edison Co.) to the U. S. Nuclear Regulatory Commission Document Control Desk, Boston Edison letter number 97-002, Docket No. 50-293, License No. DPR-35.
- (3) In making this application for withholding of proprietary information of which it is the owner, GE relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.790(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).
- (4) Some examples of categories of information which fit into the definition of proprietary information are:
 - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by General Electric's competitors without license from General Electric constitutes a competitive economic advantage over other companies;
 - b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
 - c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of General Electric, its customers, or its suppliers;
 - d. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, of potential commercial value to General Electric;
 - e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in both paragraphs (4)a. and (4)b., above.

- (5) The information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (6) and (7) following. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GE, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.
- (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within GE is limited on a "need to know" basis.
- (7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GE are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
- (8) The information identified in paragraph (2) is classified as proprietary because it would provide other parties, including competitors, with information related to detailed results of analytical models, methods and processes, including computer codes, which GE has developed, requested NRC approval of, and applied to perform evaluations of the BWR. The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GE asset.
- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The fuel design and analytical methodology are part of GE's comprehensive BWR safety and technology base, and their commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GE.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

Attachment

The value of this information to GE would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

State of North Carolina)
County of New Hanover) SS:

Ralph J. Reda, being duly sworn, deposes and says:

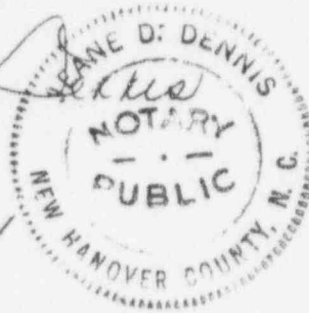
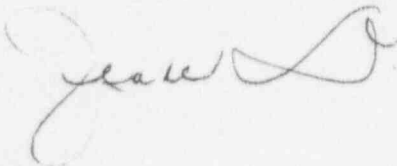
That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 17 day of January, 1997.



Ralph J. Reda
General Electric Company

Subscribed and sworn before me this 17 day of January, 1997.



My commission expires on 2/24/01
Notary Public, State of North Carolina

ATTACHMENT A

PILGRIM SLMCPR LETTER
WITH PROPRIETARY MATERIAL REMOVED (FOR DOCKET)


Boston Edison

Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

E. T. Boulette, PhD
Senior Vice President - Nuclear

March 27, 1997
BECo Ltr. #2.97.034

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Docket No. 50-293
License No. DPR-35

**Supplement to Proposed Change to
Pilgrim's Safety Limit Minimum Critical Power Ratio Technical Specification**

Reference: Boston Edison letter 2.97.002 to the NRC, dated January 24, 1997.

By the referenced letter, Boston Edison (BECo) proposed a change to Pilgrim's Technical Specification Safety Limit Minimum Critical Power Ratio (SLMCPR). The new SLMCPR results are from a General Electric analysis for Pilgrim's Cycle 12 reactor core.

We provide Attachment 1 to supplement our January 24, 1997, SLMCPR submittal based on the March 13, 1997, conversation between GE Nuclear Energy (Wilmington, North Carolina) and the NRC. Attachment 2 provides an amended Bases page, B2-2, with the change bar to the second paragraph shortened to reflect a March 24, 1997, conversation between NRC and Boston Edison. The supplement and amended page B2-2 do not change the SLMCPR value or the proposed Technical Specification change; hence, the "Safety Evaluation and Determination of No Significant Hazards Consideration" we provided in the January 24, 1997, letter remains valid and unchanged.

This supplement contains material that GE considers General Electric Property information as described in 10 CFR 2.790(a)(4) and for which an affidavit was provided as Attachment 4 to BECo's January 24, 1997, letter. It is requested that this information continue to be withheld from public disclosure under the aegis of the January 24, 1997, affidavit. Proprietary text is denoted by brackets in the right-hand margins in this supplement.

Should you require further information on this issue, please contact P. M. Kahler at (508) 830-7939.

E. T. Boulette
E. T. Boulette, PhD

ETB/PMK/avf/mcpr2

U. S. Nuclear Regulatory Commission
Page 2

Attachments: 1) Supplement to the January 24, 1997, SLMCPR submittal
2) Amended Bases Page B2-2

cc: Mr. Alan B. Wang, Project Manager
Project Directorate I-3
Office of Nuclear Reactor Regulation
Mail Stop: OWF 14B2
U. S. Nuclear Regulatory Commission
1 White Flint North
11555 Rockville Pike
Rockville, MD 20852

U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Senior Resident Inspector
Pilgrim Nuclear Power Station

Mr. Peter LaPorte, Director
Massachusetts Energy Management Agency
400 Worcester Road
P.O. Box 1496
Framingham, MA 01701-0313
Attn: Mr. James Muckerheide

ATTACHMENT 1:

DESCRIPTION AND EVALUATION OF PROPOSED TECHNICAL SPECIFICATION CHANGE TO MINIMUM CRITICAL POWER RATIO SAFETY LIMIT

PROPOSED CHANGES

Pilgrim requests that the Technical Specifications (TS) contained in Appendix A to the Pilgrim Operating License DPR-35 be amended to revise Technical Specifications Sections 2.1.2 and note 5 to 3.2.C.1 to reflect a change in the Safety Limit Minimum Critical Power Ratio (SLMCPR).

BACKGROUND

The proposed change involves revising the SLMCPR contained in Section 2.1.2 of Pilgrim's TS. In the course of calculating a cycle-specific SLMCPR for another utility, it was determined that the GESTAR II (*General Electric Standard Application for Reactor Fuel*, NEDE-24011-P-A-11¹, and U. S. Supplement NEDE-24011-P-A-11¹-US, November 17, 1995) fuel type generic SLMCPR may be non-conservative when applied to some core and fuel designs. The U. S. Nuclear Regulatory Commission (USNRC) was informed of this condition in a telephone call by GE on March 27, 1996, and it was the subject of a 10 CFR Part 21 notification from GE dated May 24, 1996 (Reference 1). The SLMCPR values were confirmed for the current operating cycle, Cycle 11, in a letter from GE to Pilgrim, *Pilgrim Cycle 11 SLMCPR*, dated June 17, 1996.

DISCUSSION OF THE PROPOSED CHANGE

GE's calculation of the revised plant-specific SLMCPR value for PNPS Cycle 12 was performed as part of the Reload Licensing Analysis for PNPS Cycle 12 and is based upon NRC approved methods (*General Electric Standard Application for Reactor Fuel*, NEDE-24011-P-A-11¹ and U. S. Supplement NEDE-24011-P-A-11¹-US, November 17, 1995)[discussed above] and interim implementing procedures that have been discussed between GE and the NRC during their meetings with the NRC staff on April 17, 1996, and May 6 through 10, 1996. The implementing procedures are identical to those used for similar recent analyses (Dockets 50-341, 50-324, 50-325, 50-298, 50-277, et. al.) and described in GE's proposed Amendment 25 to GESTAR II (R. J. Reda (GE) to T. E. Collins (NRC), *Proposed Amendment 25 to GE Licensing Topical Report NEDE-24011-P-A (GESTAR II) on Cycle Specific SLMCPR*, December 13, 1996.) These procedures incorporate cycle specific parameters into the analysis which include the actual core loading and the actual bundle parameters evaluated at the projected exposure distribution based on projected control blade patterns for the rodged burn through the cycle. The analysis considers the full cycle exposure range to determine the most limiting point(s). At these exposure point(s), conservative

¹ Revision 11 has since been superseded by Revision 13, dated August, 1996. All the Revision 13 material pertinent to this application is unchanged from Revision 11. For purposes related to evaluation of this application, Revisions 11 and 13 may be considered equivalent and used interchangeably.

variations of the projected control blade patterns are used to maximize the number of bundles that contribute rods calculated to be susceptible to boiling transition in order to obtain a conservative calculation of the SLMCPR. This calculation resulted in a Cycle 12 SLMCPR value of 1.08. The current fuel type generic SLMCPR value of 1.07 is no longer bounding. The proposed change also involves revising the MCPR criteria in Section 3.2.C.1 that define a limiting rod pattern. Currently, the criteria defining a limiting rod pattern are:

MCPR < 1.40 for Core Thermal Power > 90%
MCPR < 1.70 for Core Thermal Power ≤ 90%

These criteria were determined in the "ARTS Improvement Program Analysis for Pilgrim Nuclear Power Station", NEDC-31312-P, September, 1987, such that a rod withdrawal error, without the Rod Block Monitor being operable will not result in a violation of the SLMCPR. The SLMCPR assumed in this analysis is 1.07.

An increase in the SLMCPR will require an increase in the MCPR criteria that define a limiting control rod pattern if the same margin of safety is to be provided in the event of a rod withdrawal error. For a SLMCPR of 1.08, the MCPR criteria that define a limiting rod pattern and preserve the margin of safety are:

MCPR < 1.41 for Core Thermal Power > 90%
MCPR < 1.72 for Core Thermal Power ≤ 90%

This proposed amendment also contains changes in Bases section 2.0 that adopt a paragraph from Standard Technical Specifications and in Bases Section 2.1.2 that delete an obsolete paragraph.

Based on this information, Pilgrim proposes Technical Specification Section 2.1.2 be revised to reflect the change in the SLMCPR and the Technical Specification Section 3.2.C.1 be revised to reflect the change in the MCPR criteria that define a limiting rod pattern.

EVALUATION

The proposed change revises the Technical Specifications to reflect the change in the SLMCPR due to the plant specific evaluation performed by GE for Pilgrim, Reload 11, Cycle 12. The new SLMCPR was calculated using NRC approved methods (*General Electric Standard Application for Reactor Fuel*, NEDE-24011-P-A-11, and U. S. Supplement NEDE-24011-P-A-11-US, November 17, 1995) and interim implementing procedures as discussed during the GE meetings with the NRC on April 17, 1996, and May 6 through 10, 1996. The interim procedures incorporate plant cycle specific parameters which include: 1) the actual core loading, 2) conservative variations of projected control blade patterns, 3) the actual bundle parameters, and 4) the full cycle exposure range.

The Fuel Cladding Integrity Safety Limit is set such that no mechanistic fuel damage is calculated to occur if the limit is not violated. Since the parameters which result in fuel damage are not directly observable during reactor operation, the thermal and hydraulic conditions resulting in a departure from nucleate boiling have been used to mark the beginning of the

region where fuel damage could occur. Although it is recognized that a departure from nucleate boiling would not necessarily result in damage to BWR fuel rods, the critical power at which boiling transition is calculated to occur has been adopted as a convenient limit. However, the uncertainties in monitoring the core operating state and in the procedures used to calculate the critical power result in an uncertainty in the value of the critical power. Therefore, the Fuel Cladding Integrity Safety Limit is defined as the CPR in the limiting fuel assembly for which more the 99.9% of the fuel rods in the core are expected to avoid boiling transition considering the power distribution within the core and all uncertainties. The new SLMCPR for Cycle 12 at Pilgrim is 1.08.

- **Control Rod Pattern Development for the Pilgrim Cycle 12 SLMCPR Analysis**

Projected control blade patterns for the rodged burn through the cycle were used to deplete the core to the cycle exposures to be analyzed. At the desired cycle exposures, the bundle exposure distributions and their associated R-factors, determined in accordance with Reference 3, were utilized for the SLMCPR cases to be analyzed. The use of different rod patterns to achieve the desired cycle exposure has been shown to have a negligible impact on the actual calculated SLMCPR. An estimated SLMCPR was obtained for an exposure point near beginning of cycle (BOC), middle of cycle (MOC), and end of cycle (EOC) in order to establish which exposure point(s) would produce the highest (most conservative) calculated SLMCPR.

For each cycle exposure point of interest, the SLMCPR is analyzed with radial power distributions that maximize the number of bundles at or near the Operating Limit MCPR during rated power operation. This approach satisfies the stipulation in Reference 4 that the number of rods susceptible to boiling transition be maximized. GE has established criteria to determine if the control rod patterns and resulting radial power distributions are acceptable. These criteria were discussed with the NRC inspection team during the May 5-9, 1996, inspection and have since been incorporated into the GE technical design procedures. These criteria include no

GE Proprietary Material

MCPR of the core. Different rod patterns were analyzed until the criteria on the above parameters were met. The rod pattern search was narrowed by starting from a defined set of patterns known from prior experience to yield the flattest possible MCPR distributions. This was done for the two most limiting exposure points in the cycle since the BOC point was excluded by criteria as non-limiting based on the value from the estimation procedure. A Monte Carlo analysis was then performed for the MOC peak hot excess point and the EOC-2000 MWd/STU exposure point to establish the maximum SLMCPR for the cycle.

- **Comparison of Pilgrim Cycle 12 SLMCPR versus the Generic GE11 Value**

Table 1 summarizes the relevant input parameters and results of the SLMCPR determination for both the generic GE11 core and the Pilgrim Cycle 12 core.

GESTAR II (Reference 2) specifies that the SLMCPR analysis for a new fuel design shall be performed for a large high power density plant assuming a bounding equilibrium core. The GE11 product line generic SLMCPR (1.07) was determined according to this specification.

Pilgrim Cycle 12 is not an equilibrium core. It is a mixed core of mainly GE11 with a smaller

GE Proprietary Material

Higher enrichment in the fresh fuel (compared to the rest of the core) produces higher power in the fresh bundles relative to the rest of the core. These enrichment differences result in the GE11 fresh fuel producing a higher relative share of the total power, which is apparent from the high maximum relative power.

Because of the higher maximum relative power in Pilgrim Cycle 12 compared to the generic analysis, there are fewer bundles closer to the core MCPR. In Table 1, it is shown that 2.8% of

GE Proprietary Material

In general, the calculated safety limit is dominated by two key parameters: (1) flatness of the core bundle-by-bundle MCPR distributions and (2) flatness of the bundle pin-by-pin power/R-factor distributions. Greater flatness in either parameter yields more rods susceptible to boiling transition and thus a higher calculated SLMCPR. The Pilgrim Cycle 12 core has a less-flat core MCPR distribution than the generic GE11 equilibrium core, but the bundle R-factor distribution is much flatter. This is the primary reason the calculated SLMCPR for the Pilgrim Cycle 12 core is 0.01 higher than the calculated SLMCPR for the generic GE11 equilibrium core.

The uncontrolled bundle pin-by-pin power distributions were compared between the dominant Cycle 12 GE11 bundle and the GE11 bundle used in the generic SLMCPR analysis. For the Pilgrim Cycle 12 bundle, there is a flatter distribution of uncontrolled R-factors for the highest

GE Proprietary Material

Another important difference is that the Cycle 12 SLMCPR analysis uses completely

GE Proprietary Material

were uncontrolled. By keeping the limiting bundles uncontrolled, it is assured that the flattest possible pin-by-pin R-factors are used in the SLMCPR calculation. By design, the R-factor distributions are optimized for their uncontrolled state, and control blade insertion causes the distributions to become more peaked (or less flat). Therefore, the most conservative approach

ATTACHMENT 2: Amended Bases Page B2-2

ATTACHMENT B

COMPLETE PILGRIM SLMCPR LETTER
(NOT FOR DOCKET)