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An Exelon/British Energy Company

10CFR50.90

March 14, 2001
5928-01-20069

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: THREE MILE ISLAND, UNIT 1 (TMI UNIT 1)
OPERATING LICENSE NO. DPR-50
DOCKET NO. 50-289
ADDITIONAL INFORMATION – LICENSE AMENDMENT REQUEST NO. 301 – USE OF "M5" ADVANCED ALLOY

This letter provides an additional affected Technical Specification page associated with TMI Unit 1 License Amendment Request No. 301, previously submitted to NRC on December 20, 2000, and provides responses to NRC questions as discussed on March 1, 2001.

In clarifying the process supporting the proposed TMI Unit 1 License Amendment Request No. 301 for use of M5 advanced alloy cladding, it was identified that the Framatome Cogema Fuels (FCF) Topical Report BAW-10227 P-A, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," reviewed and approved by NRC Safety Evaluation dated February 4, 2000, should be added to the list of reload methods contained in TMI Unit 1 Technical Specification Section 6.9.5.2. Accordingly, Enclosure 1 provides a marked up Technical Specification page 6-19. It is requested that this revised page be included in the Technical Specification amendment supporting License Amendment Request No. 301. This change only provides an additional administrative control by specifying the approved methodology for use of M5 advanced alloy. Therefore, this additional change does not affect the safety evaluation or no significant hazards consideration previously submitted for TMI Unit 1 License Amendment Request No. 301.

As discussed with NRC staff on March 1, 2001, the following additional information is being provided in support of TMI Unit 1 License Amendment Request No. 301.

A001

M5 Assemblies and Mixed-Core Analysis

In the USNRC's February 4, 2000 Safety Evaluation of Framatome ANP Topical Report BAW-10227P, Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel, the staff concluded that "because of the close similarity of M5 to Zircaloy, the effects of the differences (in cladding properties, especially fuel swelling and rupture differences) on neighboring bundles would not be significant as long as the bundle geometries, including fuel dimensions and material surfaces, were alike" and therefore "when M5 is co-resident with Zircaloy fuel, and fuel geometry and other properties that might affect fluid dynamics are alike, no mixed core penalty needs to be factored into the LOCA analyses performed with FCF's LOCA models for fuels clad with either M5 or Zircaloy."

In the event that bundle geometries are not alike, the following describes Famatome ANP's methodology for mixed-core analysis with respect to LOCA.

The method used to perform a mixed-core analysis maintains the basic two-channel representation of the core with 22 axial control volumes as specified in the Evaluation Model (EM) (FRA-ANP Topical Report, "BWNT LOCA Evaluation Model for OTSG Plants", BAW-10192-PA, Rev. 0, June, 1998, FRA-ANP Proprietary). One channel is a single assembly modeled as the hot assembly. The second channel is modeled as the average of the remaining fuel assemblies in the core. The channels are connected by cross-flow junctions. The fuel pin cooling during the LBLOCA is predicted by the codes using fuel assembly-specific mechanical and hydraulic inputs. If a new or altered fuel assembly has a substantial hydraulic difference from the fuel assemblies that are already in the core, then FRA-ANP evaluates the potential for a mixed-core LOCA penalty. This penalty, if necessary, is due to flow redistribution during the transient. It may be assigned to either the new assembly (or assemblies) or the existing assemblies.

The method that determines the penalty uses an analysis with one assembly (generally the one with the highest overall hydraulic resistance) in the hot channel and the other assembly type in the average channel. The analysis quantifies any Linear Heat Rate (LHR) or Peak Clad Temperature (PCT) penalties needed to compensate for the hydraulically dissimilar assemblies placed adjacent to each other. In cases where there may be local variations in the hydraulic resistances (i.e. higher in some places and lower in others), then the analysis may swap the assembly types in the EM channels and repeat the analysis to confirm the need for a penalty as a consequence of the LBLOCA transient.

Mixed-core LOCA analyses are primarily used for flow dominated transients such as LBLOCA. The SBLOCA transient evolves much slower and core flow is relatively stagnant during the core uncovering phase. Therefore, mixed-core SBLOCA analyses are not needed because there is no flow diversion potential. Nonetheless, FRA-ANP would reevaluate this conclusion if there are significant future evolutionary fuel assembly design changes that could potentially cause flow diversion during SBLOCA transients.

AmerGen is planning to insert a full reload batch of Mark-B12 fuel assemblies, with M5 cladding, into TMI Unit 1 in the fall of 2001 for operation during Cycle 14. A feature of the Mark-B12 fuel assembly design is the implementation of the TRAPPER™ fine mesh debris filter. This debris filter is not included on the current Mark-B10 fuel assembly design (B9 fuel pin design). Until there is a full core of Mark-B12 fuel assemblies, there is a potential for flow diversion at the core inlet due to the increased resistance in the Mark-B12 assembly. Therefore, a mixed-core analysis was performed to determine if a LHR or PCT penalty is necessary to accommodate potential flow diversion effects. The mixed-core analysis evaluated the higher resistance of the fine mesh debris filter in the hot channel and concluded that it did not cause any substantial flow diversion effects. The flow differences were negligible such that an additional case with the debris filter in the average channel was not necessary. Therefore, no penalty is needed for a mixed-core of Mark-B10 assemblies and Mark-B12 assemblies with TRAPPER™ fine mesh debris filter at TMI Unit 1.

Analysis Input Values

Regarding LOCA analyses for TMI Unit 1, Framatome ANP and AmerGen have ongoing processes to check analysis input values for peak clad temperature-sensitive parameters to ensure that these inputs bound as-operated plant values.

If additional information is needed, please contact David J. Distel at (610) 765-5517.

Very truly yours,

George Gellrich for Mark Warner

Mark E. Warner
Vice President, TMI Unit 1

MEW/djd

Enclosure: (1) License Amendment Request No. 301 – Additional Affected Technical Specification Page

cc: H. J. Miller, Administrator, USNRC Region I
T. G. Colburn, USNRC Senior Project Manager, TMI Unit 1
J. D. Orr, USNRC Senior Resident Inspector, TMI Unit 1
File No. 00097

AMERGEN ENERGY COMPANY, LLC

THREE MILE ISLAND, UNIT 1

Operating License No. DPR-50
Docket No. 50-289
Additional Information - License Amendment Request No. 301

COMMONWEALTH OF PENNSYLVANIA)) SS: COUNTY OF DAUPHIN)

This additional information is submitted in support of Licensee's request to change the Technical Specifications for Three Mile Island, Unit 1. All statements contained in this submittal have been reviewed, and all such statements made and matters set forth therein are true and correct to the best of my knowledge.

AmerGen Energy Company, LLC

BY: Gg Gellb for Mark Warner
Vice President, TMI Unit 1

Sworn and Subscribed to before me

this 14th day of March 2001.

Suzanne C. Miklosik
Notary Public

Notarial Seal
Suzanne C. Miklosik, Notary Public
Londonderry Twp., Dauphin County
My Commission Expires Nov. 22, 2003
Member, Pennsylvania Association of Notaries

ENCLOSURE 1

LICENSE AMENDMENT REQUEST NO. 301 – ADDITIONAL

AFFECTED TECHNICAL SPECIFICATION PAGE

6.9.5 CORE OPERATING LIMITS REPORT

6.9.5.1 The core operating limits addressed by the individual Technical Specifications shall be established and documented in the CORE OPERATING LIMITS REPORT prior to each reload cycle or prior to any remaining part of a reload cycle.

6.9.5.2 The analytical methods used to determine the core operating limits addressed by the individual Technical Specifications shall be those previously reviewed and approved by the NRC for use at TMI-1, specifically:

(1) BAW-10179 P-A, "Safety and Methodology for Acceptable Cycle Reload Analyses." The current revision level shall be specified in the COLR.

(2) TR-078-A, "TMI-1 Transient Analyses Using the RETRAN Computer Code", Revision 0. NRC SER dated 2/10/97.

(3) TR-087-A, "TMI-1 Core Thermal-Hydraulic Methodology Using the VIPRE-01 Computer Code", Revision 0. NRC SER dated 12/19/96.

(4) TR-091-A, "Steady State Reactor Physics Methodology for TMI-1", Revision 0. NRC SER dated 2/21/96.

(5) TR-092P-A, "TMI-1 Reload Design and Setpoint Methodology", Revision 0. NRC SER dated 4/22/97.

(6) BAW-10227P-A, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," NRC SER dated February 4, 2000.

6.9.5.3 The core operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient/accident analysis limits) of the safety analysis are met.

6.9.5.4 The CORE OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance for each reload cycle to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.