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AmerGen SM

An Exelon/British Energy Company

10 CFR 50.90

May 31, 2001
5928-01-20128

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

Dear Sir or Madam:

SUBJECT: THREE MILE ISLAND, UNIT 1 (TMI UNIT 1)
OPERATING LICENSE No. DPR-50
DOCKET No. 50-289
LICENSE AMENDMENT REQUEST No. 311 – REACTOR COOLANT SYSTEM PRESSURE-TEMPERATURE SAFETY LIMITS

In accordance with 10 CFR 50.4(b)(1), enclosed is License Amendment Request No. 311.

The purpose of this License Amendment Request is to revise the TMI Unit 1 Technical Specifications to incorporate Cycle 14 specific limits for the variable low reactor coolant system pressure-temperature core protection safety limits. The proposed limits are developed in accordance with the methods described in the NRC-approved Topical Report BAW-10179P-A, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses."

Using the standards in 10 CFR 50.92, AmerGen has concluded that these proposed changes do not constitute a significant hazards consideration, as described in the enclosed analysis performed in accordance with 10 CFR 50.91(a)(1). Pursuant to 10 CFR 50.91(b)(1), a copy of this License Amendment Request is provided to the designated official of the Commonwealth of Pennsylvania, Bureau of Radiation Protection, as well as the chief executive of the township and county in which the facility is located.

AmerGen requests that this license amendment application be approved by September 1, 2001 to allow completion of plant procedure revisions associated with this change that are needed to support the TMI Unit 1 Cycle 14 startup planned for October 13, 2001.

A001

There are no new regulatory commitments established by this submittal. If any additional information is needed, please contact David J. Distel at (610) 765-5517.

Very truly yours,

Mark E. Warner
Vice President, TMI Unit 1

MEW/djd

Enclosure: 1) Safety Evaluation and No Significant Hazards Consideration
2) Affected TMI Unit 1 Technical Specification Pages

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
D. Allard, Director, Bureau of Radiation Protection – PA Department of Environmental Resources
Chairman, Board of County Commissioners of Dauphin County
Chairman, Board of Supervisors of Londonderry Township
File No. 01040

AMERGEN ENERGY COMPANY, LLC

THREE MILE ISLAND, UNIT 1

Operating License No. DPR-50
Docket No. 50-289
License Amendment Request No. 311

COMMONWEALTH OF PENNSYLVANIA)

) SS:

COUNTY OF DAUPHIN)

This License Amendment Request is submitted in support of Licensee's request to change the Technical Specifications for Three Mile Island, Unit 1 (TMI Unit 1). As a part of this request, proposed marked up pages for the TMI Unit 1 Technical Specifications are also included. 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: Mark E Warner
Vice President, TMI Unit 1

Sworn and Subscribed to before me
this 31st day of May 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

TMI Unit 1 License Amendment Request No. 311

Safety Evaluation and No Significant Hazards Consideration

I. License Amendment Request No. 311

AmerGen Energy Company, LLC (AmerGen) requests that the following changed replacement pages be inserted into the existing Technical Specification:

Revised Technical Specification pages: 2-3, 2-4a, and 2-4c

Marked up pages showing the requested changes are provided in Enclosure 2.

II. Reason for Change

The proposed change revises the variable low reactor coolant system (RCS) pressure-temperature core protection safety limits contained in Technical Specification Figure 2.1-1 and associated Technical Specification Section 2.1 Bases and Bases Figure 2.1-3.

These changes are required as a result of the TMI Unit 1 Cycle 14 core reload design analyses performed in accordance with approved Framatome ANP methods as described in NRC-approved Topical Report BAW-10179 P-A, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses," as listed in existing TMI Unit 1 Technical Specification Section 6.9.5. An additional change to the minimum RCS flow requirement for 4-pump operation to offset the Cycle 14 transition core DNB penalty is also incorporated in the Core Protection Safety Bases Figure 2.1-3.

III. Safety Evaluation Justifying Change

The variable low RCS pressure-temperature protective limits define a locus of points for which the minimum steady-state departure from nucleate boiling ratio (DNBR) is greater than or equal to the DNBR analysis limit for the critical heat flux (CHF) correlation being used. These points are calculated for the maximum overpower condition and limiting reactor coolant pump operating configurations. As stated in the bases for Technical Specification 2.1, the minimum DNBR value during steady-state operation, normal operational transients and anticipated transients must be greater than the limits specified for the appropriate CHF correlation. This is ensured by maintaining core outlet pressure and reactor outlet temperature within the variable low RCS pressure-temperature protective limits of existing Technical Specification Figure 2.1-1. It is noted that the minimum DNBR limits are not changing; only the associated protective limits that ensure the safety limits are met will be changed.

The TMI Unit 1 Cycle 14 core reload design analyses are based entirely on NRC-approved Framatome ANP methods described in Topical Report BAW-10179 P-A, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses." This Topical Report is currently listed in TMI Unit 1 Technical Specification Section 6.9.5 for development of core operating limits and was used for the full scope of the TMI Unit 1 cycle reload analyses prior to Cycle 12. The use of BAW-10179 P-A for Cycle 14 in lieu

of the NRC-approved methods previously utilized for Cycles 12 & 13 results in the change to the core outlet pressure coordinates specified on Figures 2.1-1 and 2.1-3. The pressure coordinates are revised to reflect actual core outlet values in lieu of hot leg tap values. The use of a maximum core quality limit of 26% as specified by BAW-10179 P-A for the BWC CHF correlation revises the 2-pump and 3-pump limits specified on Technical Specification Figure 2.1-3.

Figure 1 shows a comparison of the existing variable low RCS pressure-temperature protective limits to the proposed limits that were developed in accordance with the methods described in the NRC-approved Topical Report BAW-10179 P-A. Both sets of limits in Figure 1 were developed assuming a minimum reactor coolant system design flow rate of 102% flow. For comparison purposes, Figure 1 reflects the proposed change in Technical Specification Figures 2.1-1 and 2.1-3 pressure coordinates to core outlet pressure in lieu of hot leg pressure tap values described above. The use of core outlet pressure is consistent with the BAW-10179 P-A analysis methods. This comparison shows that the most limiting 4-pump limits, as well as the 3-pump limits, are similar to the existing Technical Specification limits and bases. The differences for the 2 pump condition are due to additional conservatism inherent in the existing limits which were conservatively developed assuming a maximum core quality limit of 20% while the proposed limits are based on a maximum core quality limit of 26%, which is the NRC-approved local quality limit for the BWC CHF correlation. The revised limits are incorporated in the proposed Technical Specification Figures 2.1-1 and 2.1-3.

The variable low pressure trip (VLPT) setpoint corresponding to the proposed change to the variable low RCS pressure-temperature protective limits described above was determined in accordance with the methods described in BAW-10179 P-A. A comparison of this VLPT setpoint to the existing protection system maximum allowable setpoints for reactor coolant pressure and temperature has confirmed that the VLPT setpoint remains non-limiting and is not required.

TMI Unit 1 Cycle 14 core introduces the Framatome ANP Mark-B12 fuel design. The hydraulic compatibility of mixed core fuel designs (MarkB8V/Mark-B10/Mark-B12) was evaluated in accordance with BAW-10179 P-A. While the designs are hydraulically similar, the Mark-B12 contains a fine mesh debris filter that alters the flow characteristics at the core inlet relative to the resident fuel designs resulting in the identification of a transition core DNB penalty. A higher RCS flow requirement (105.5%) was chosen to offset the transition core DNB penalty since substantial margin exists between current measured RCS flow (approximately 109.5%) and the minimum RCS flow required by licensing basis transient analyses (102%). Therefore, TMI Unit 1 Technical Specification Section 2.1 Bases and Bases Figure 2.1-3 are also being revised to indicate a minimum RCS flow rate corresponding to 105.5% flow in order to offset the transition core DNB penalty applied to the Cycle 14 mixed core analysis.

The proposed changes to the TMI Unit 1 Technical Specification variable low RCS pressure-temperature core protective limits have been established to assure adequate margins of safety are maintained and have been developed in accordance with NRC-approved methodologies. Therefore, the proposed changes do not adversely affect nuclear safety or safe plant operations.

IV. Environmental Consideration

10 CFR 51.22(c)(9) provides criteria for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (3) result in a significant increase in individual or cumulative occupational radiation exposure.

AmerGen has reviewed this license amendment and has determined that it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of the proposed license amendment. The basis for this determination is as follows:

1. The proposed license amendment does not involve a significant hazards consideration as described in Item V of this evaluation.

2. The proposed license amendment will not result in a significant change in the types or increase in the amounts of any effluents that may be released offsite. The proposed amendment ensures operation within applicable safety limits and margins of safety. The changes do not modify the reactor coolant pressure boundary nor make any physical changes to the facility design, material, or construction standards.

3. The proposed license amendment will not result in a significant increase in individual or cumulative occupational radiation exposure. The consequences of any design basis accident are not affected by this change. The proposed changes do not affect the integrity of the reactor coolant pressure boundary or any fission product barrier. Occupational exposures are not affected by the proposed changes.

V. No Significant Hazards Consideration

AmerGen has determined that this License Amendment Request poses no significant hazards considerations as defined by 10 CFR 50.92.

1. Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The proposed Technical Specification limits (Figure 2.1-1) are developed in accordance with the methods and assumptions described in NRC-approved Framatome ANP Topical Report BAW-10179 P-A, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses." These limits remain bounded by the existing reactor protection system (RPS) trip setpoints. The TMI Unit 1 Cycle 14 core introduces the Framatome ANP Mark-B12 fuel design. The Mark-B12 fuel design is mechanically and hydraulically similar to the fuel designs currently in use at TMI Unit 1. While the designs are hydraulically similar, the Mark-B12 contains a fine mesh debris filter that alters the flow characteristics at the core inlet relative to the resident fuel designs resulting in the identification of a transition core DNB penalty. The higher minimum RCS flow requirement (105.5%) applied to offset the transition core DNB penalty is bounded by the minimum RCS flow assumed in current Updated Final Safety Analysis Report (UFSAR) Chapter 14 accident analyses (102%).

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The proposed Technical Specification limits (Figure 2.1-1) provide core protection safety limits developed in accordance with NRC-approved methods and assumptions. The revised Technical Specification limits remain bounded by the existing reactor protection system trip setpoints. The TMI Unit 1 Cycle 14 core introduces the Framatome ANP Mark-B12 fuel design. The Mark-B12 fuel design is mechanically and hydraulically similar to the fuel designs currently in use at TMI Unit 1. While the designs are hydraulically similar, the Mark-B12 contains a fine mesh debris filter that alters the flow characteristics at the core inlet relative to the resident fuel designs resulting in the identification of a transition core DNB penalty. The higher minimum reactor coolant system flow required for the transition cycles (105.5%) is within the current range of allowable operating flow rates since this value exceeds the minimum flow assumed for Chapter 14 accident analyses (102%) and is well below the maximum flow limit for fuel assembly lift which is typically approximately 115% of design flow (depending on fuel type and 4th reactor coolant pump startup temperature).

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

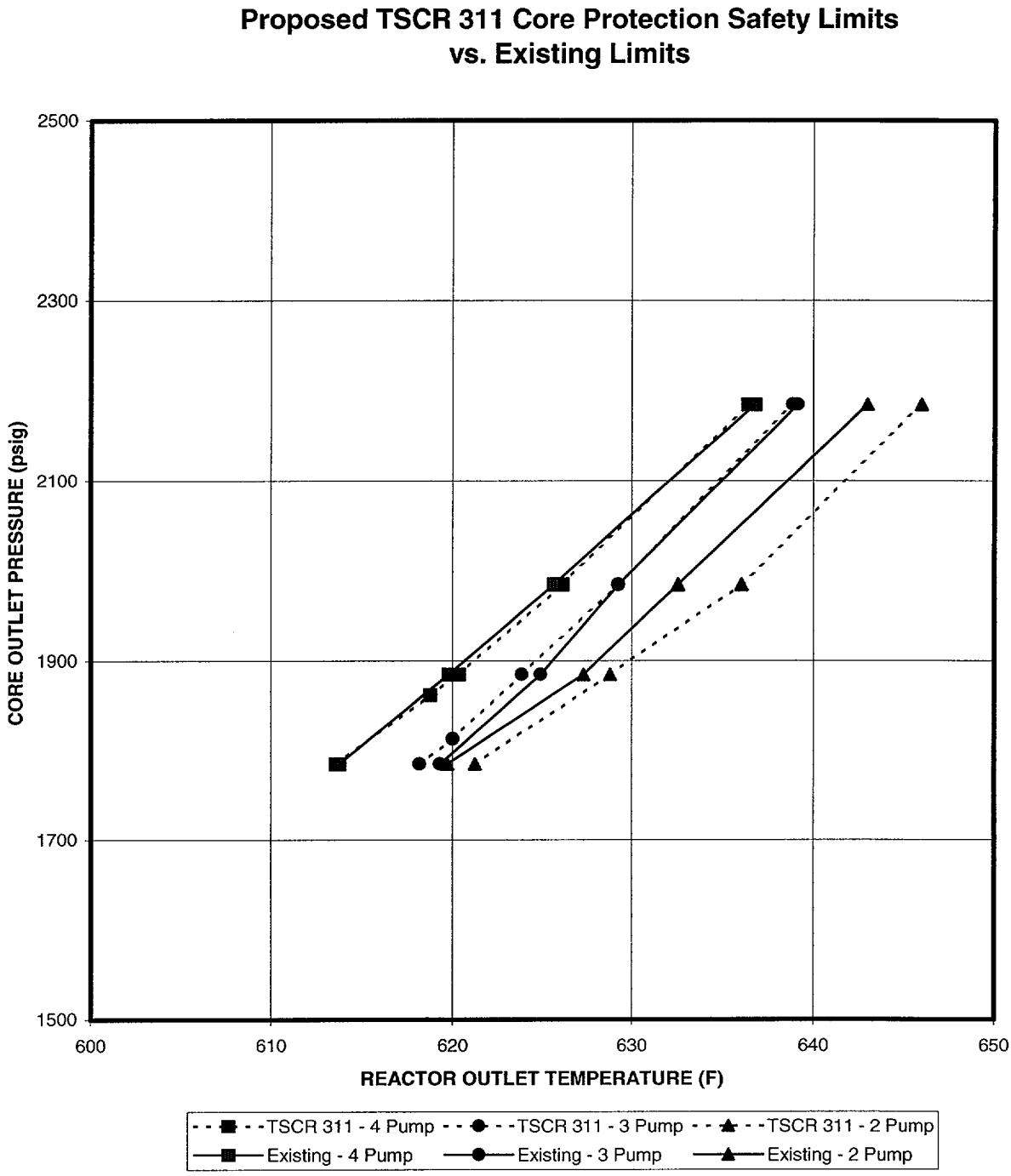
The existing RPS reactor coolant pressure and temperature trip setpoints bound the proposed Technical Specification core protection safety limits. The proposed safety limits are developed in accordance with NRC-approved methods and assumptions. The higher minimum reactor coolant system flow requirement assures safe operation commensurate with the introduction of the Mark-B12 fuel design into the TMI Unit 1 core.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

VI. Implementation

AmerGen requests that the amendment authorizing this change become effective upon issuance and implemented within 30 days.

Figure 1


Proposed TSCR 311 Core Protection Safety Limits
vs. Existing Limits
CORE OUTLET PRESSURE (psig)
2500
2300
2100
1900
1700
1500
600
610
620
630
640
650
REACTOR OUTLET TEMPERATURE (F)
TSCR 311 - 4 Pump
TSCR 311 - 3 Pump
TSCR 311 - 2 Pump
Existing - 4 Pump
Existing - 3 Pump
Existing - 2 Pump

ENCLOSURE 2

Affected TMI Unit 1 Technical Specification Pages

The specified flow rates for curves 1, 2, and 3 of the Axial Power Imbalance Protective Limits given in the COLR correspond to the expected minimum flow rates with four pumps, three pumps, and one pump in each loop, respectively.

The curve of Figure 2.1-1 is the most restrictive of all possible reactor coolant pump-maximum thermal power combinations shown in Figure 2.1-3. The curves of Figure 2.1-3 represent the conditions at which the DNBR limit is predicted at the maximum possible thermal power for the number of reactor coolant pumps in operation or the local quality at the point of minimum DNBR is equal to 22 percent, (BAW-2), or 26 percent (BWC) whichever condition is more restrictive.

The maximum thermal power for each reactor coolant pump operating condition (four pump, three pump and one pump in each loop) given in the COLR is due to a power level trip produced by the flux-flow ratio multiplied by the minimum flow rate for the given pump combination plus the maximum calibration and instrumentation error.

Using a local quality limit of 22 percent (BAW-2), or 26 percent (BWC) at the point of minimum DNBR as a basis for curves 2 and 3 of Figure 2.1-3 is a conservative criterion even though the quality at the exit is higher than the quality at the point of minimum DNBR.

The DNBR as calculated by the BAW-2 or BWC correlation continually increases from the point of minimum DNBR, so that the exit DNBR is always higher and is a function of the pressure.

For each curve of Figure 2.1-3, a pressure-temperature point above and to the left of the curve would result in a DNBR greater than 1.30 (BAW-2) or 1.18 (BWC) or a local quality at the point of minimum DNBR less than 22 percent (BAW-2), or 26 percent (BWC) for the particular reactor coolant pump situation. Curve 1 is more restrictive than any other reactor coolant pump situation because any pressure/temperature point above and to the left of this curve will be above and to the left of the other curves.

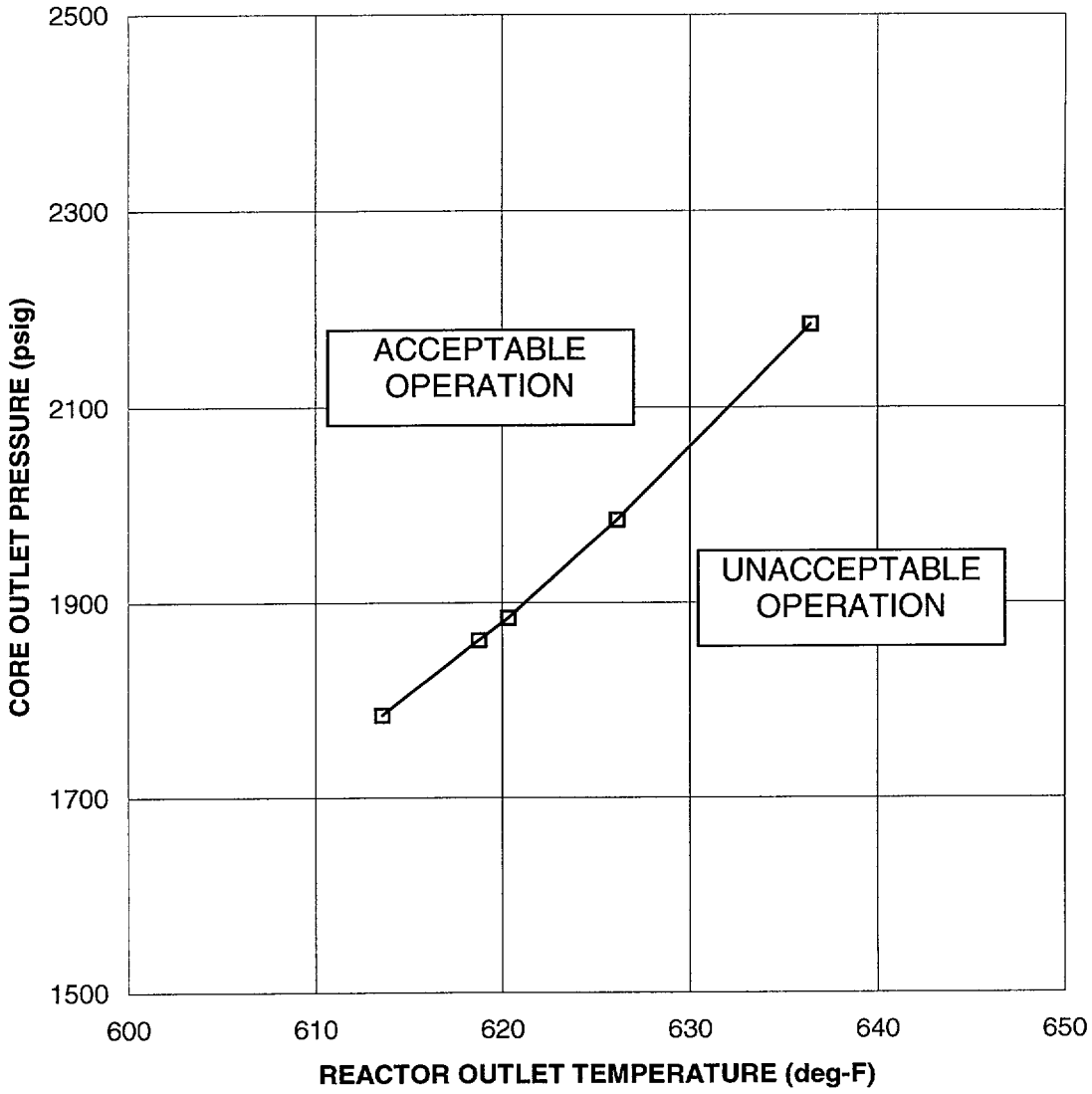
REFERENCES

(1) UFSAR, Section 3.2.3.1.1 - "Fuel Assembly Heat Transfer Design"

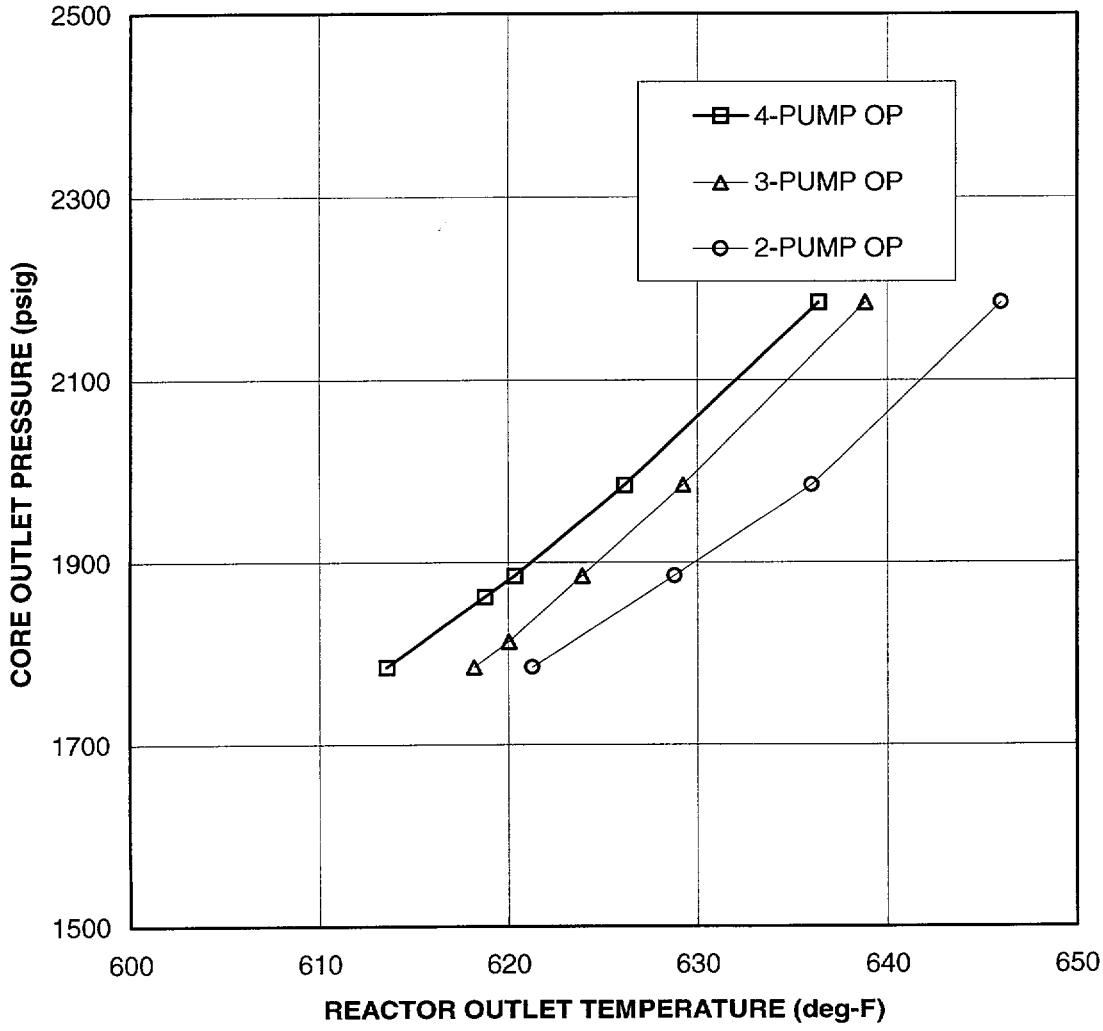
(2) BWC Correlation of Critical Heat Flux, BAW-10143P-A, Babcock & Wilcox, Lynchburg, Virginia, April 1985

(3) UFSAR, Section 3.2.3.1.1.3 - "Nuclear Power Factors"

The curves of Figures 2.1-1 and 2.1-3 were developed assuming a reactor coolant design flow rate of 102% of 352,000 gpm. However, a higher minimum flow rate (105.5% of 352,000 gpm) is specified in order to offset transition core effects due to the introduction of the Mark-B12 fuel design with fine mesh debris filter.



CORE PROTECTION SAFETY LIMIT
TMI-1
FIGURE 2.1-1



RC Pumps	Reactor Coolant Flow (lbs/hr)	Power	Pumps Operating (Type of Limit)
4	$138.52X10^6$	112%	Four Pumps (DNBR Limit)
3	See COLR	See COLR	Three Pumps (DNBR Limit)
2	See COLR	See COLR	One Pump in Each Loop (Quality Limit)

CORE PROTECTION SAFETY BASES
TMI-1
FIGURE 2.1-3