Bryce L. Shriver
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JUL 17 2002

U. S. Nuclear Regulatory Commission
Attn.: Document Control Desk
Mail Stop OP1-17
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED AMENDMENT NO. 211 TO UNIT 2
LICENSE NPF-22: MCPR SAFETY LIMITS
AND REFERENCE CHANGES
PLA-5467 **Docket No. 50-388**

Reference: 1) PLA-5372, R. G. Byram (PPL) to USNRC, "Proposed Amendment No. 243 to License NP-14 and Proposed Amendment No. 207 to License NP-22: Adoption of NRC Approved Generic Changes to Improved Technical Specifications", dated October 16, 2001.

The purpose of this letter is to propose changes to the Susquehanna Steam Electric Station Unit 2 Technical Specifications. This proposed change entails the inclusion of Unit 2 Cycle 12 (U2C12) MCPR Safety Limits in Section 2.1.1.2, changes to the references in Section 5.6.5.b, and a change to the Design Features in Section 4.2.1. The analysis methods described in Technical Specification 5.6.5.b., as approved by the NRC, are used to generate the Safety Limits and Core Operating Limits for the U2C12 reload.

Attachment 1 to this letter is the "Safety Assessment" supporting this change.

Attachment 2 is the No Significant Hazards Considerations evaluation performed in accordance with the criteria of 10 CFR 50.92 and the Environmental Assessment.

Attachment 3 to this letter contains the applicable pages of the Susquehanna SES Unit 2 Technical Specifications, marked to show the proposed change. Pages from the Reference 1 proposed amendment were marked up to indicate the changes proposed by this amendment.

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Attachment 4 contains the "camera ready" version of the revised Technical Specification pages.

Attachment 5 has been provided as a description of the U2C12 core composition to assist in your review.

The proposed change has been approved by station management as recommended by the Susquehanna SES Plant Operations Review Committee and reviewed by the Susquehanna Review Committee.

PPL plans to implement the proposed changes in the Spring of 2003 to support the startup of U2C12 operation. Therefore, we request NRC complete its review of this change by January 9, 2002 with the changes effective upon startup following the Unit 2 11th Refueling and Inspection Outage.

Any questions regarding this request should be directed to Mr. Duane L. Filchner at (610) 774-7819.

Sincerely,

Richard J. Anderson for

B. L. Shriver

Attachments

copy: NRC Region I
Mr. D. J. Allard, PA DEP
Mr. T. G. Colburn, NRC Sr. Project Manager
Mr. S. Hansell, NRC Sr. Resident Inspector
Mr. R. Janati, DEP/BRP
Mr. E. M. Thomas, NRC Project Manager

BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

PPL Susquehanna, LLC: Docket No. 50-388

PROPOSED AMENDMENT NO. 211 TO LICENSE NPF-22:
MCPR SAFETY LIMITS AND REFERENCE CHANGES
UNIT NO. 2

Licensee, PPL Susquehanna, LLC, hereby files a revision to its Facility Operating License No. NPF-22 dated March 23, 1984.

This amendment involves a revision to the Susquehanna SES Unit 2 Technical Specifications.

PPL Susquehanna, LLC
By:

Richard L. Anderson for
B. L. Shriver
Senior Vice-President and Chief Nuclear Officer

Sworn to and subscribed before me
this 17 day of July, 2002.

Sandra K. Lines

Notary Public

Notarial Seal
Sandra K. Lines, Notary Public
Salem Twp., Luzerne County
My Commission Expires Oct. 24, 2005
Member, Pennsylvania Association Of Notaries

Attachment 1 to PLA-5467

Safety Assessment

SAFETY ASSESSMENT

Section I: Summary of Proposed Change

The MCPR Safety Limit analysis is performed on a cycle specific basis since the core design changes from cycle to cycle. The U2C12 MCPR Safety Limits were calculated by Framatome-ANP (FRA-ANP) using the NRC approved methods described in Technical Specification 5.6.5.b. The MCPR Safety Limits for U2C12 support the Rated Core Thermal Power of 3489 MWt.

This proposed Unit 2 Technical Specification change consists of :

1. A revision to Section 2.1.1.2 to reflect the Unit 2 Cycle 12 (U2C12) MCPR Safety Limits,
2. Removal from Section 5.6.5.b of references applicable to FRA-ANP 9x9-2 fuel (which is no longer contained in Unit 2),
3. The addition of a reference in Section 5.6.5.b describing FRA-ANP NRC approved methodology, and
4. A change to Section 4.2.1 to indicate the use of depleted uranium ("tails") in reload bundles.

The change to Section 2.1.1.2 is necessary because, as a result of U2C12 cycle specific calculations, the two-loop operation MCPR Safety Limit is decreased. The addition of the reference to Section 5.6.5.b is needed to include an NRC approved methodology which may be used to perform certain licensing analyses for U2C12. The removal of various references pertaining to 9x9-2 fuel from Section 5.6.5.b is necessary to reflect the fact that 9x9-2 fuel is not used in U2C12. The change to Section 4.2.1 is necessary to reflect the fact that the U2C12 reload contains fuel pins which contain depleted uranium ("tails" – a product of the manufacturing process). Use of tails provides an economic advantage, since less uranium is required for the reload.

This Technical Specification change decreases the MCPR Safety Limits from Unit 2 Cycle 11 (1.12 two-loop and 1.14 single loop) to Cycle 12 (1.10 two-loop and 1.11 single loop). The decrease is due to the removal of an excess conservatism which is not required by NRC approved methodology. Specifically, NRC approval of the previously used ANFB critical power correlation required a factor of 2 to be applied to the number of pins calculated to be in boiling transition for the Safety Limit calculation. The technical basis for the ANFB based factor requirement was that the mean of the correlation (measured over predicted critical power) was very slightly greater than 1.0.

The NRC SER on the ANFB-10 correlation (July 17, 1998 - referenced in Technical Specification Section 5.6.5) does not require use of a factor to be applied to the number of rods calculated to be in boiling transition. Since the factor of 2 is not required by the NRC approval of the ANFB-10 correlation, use of this factor for Unit 2 Cycles 10 and 11, which were both based on the ANFB-10 correlation, represented an overly conservative input. It should be noted that the mean of the ANFB-10 correlation (used for Unit 2 Cycle 12) is slightly less than 1.0 (i.e., conservative). Thus, there is no technical requirement that the factor of 2 be applied to the ANFB-10 correlation.

The requested approval date (January 9, 2003) will allow time for the Core Operating Limits Report to be prepared and reviewed by PORC prior to the outage.

Section II: Description and Basis (both Licensing and Design) of the Current Requirements

MCPR SAFETY LIMIT CHANGE

Excessive thermal overheating of the fuel rod cladding can result in cladding damage and the release of fission products. In order to protect the cladding against thermal overheating due to boiling transition, the Thermal Power, High Pressure and High Flow Safety Limits (Section 2.1.1.2 of the Susquehanna SES Unit 2 Technical Specifications) were established. The change to Section 2.1.1.2 reflects the change from the U2C11 MCPR Safety Limits to the U2C12 MCPR Safety Limits.

NUREG-0800, Standard Review Plan Section 4.4, specifies an acceptable, conservative approach to define this Safety Limit. Specifically, a Minimum Critical Power Ratio (MCPR) value is specified such that at least 99.9% of the fuel rods are expected to avoid boiling transition during normal operation or anticipated operational occurrences. Boiling transition is predicted using a correlation based on test data (i.e., a Critical Power Correlation). The Safety Limit MCPR calculation accounts for various uncertainties such as feedwater flow, feedwater temperature, pressure, power distribution uncertainties, and uncertainty in the Critical Power Correlation.

The proposed Safety Limit MCPR values (two-loop and single-loop) were calculated using Framatome-ANP (FRA-ANP) NRC approved licensing methods with the ANFB-10 critical power correlation for ATRIUM™-10 fuel. Input to the U2C12 MCPR Safety Limit analysis, provided by PPL, assumed the rated core thermal power of 3489 MWt. The proposed Safety Limit MCPRs (two-loop and single-loop) assure that at least 99.9% of the fuel rods are expected to avoid boiling transition during normal operation or anticipated operational occurrences.

CHANGES TO COLR REFERENCES

Core operating limits are established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and are documented in the Core Operating Limits Report (COLR). Technical Specification Section 5.6.5.b contains the NRC approved methodology used to determine the core operating limits.

References pertaining to the analysis methodologies used to analyze Framatome-ANP (FRA-ANP) 9x9-2 fuel were removed since FRA-ANP 9x9-2 fuel is no longer used in Unit 2.

Also, a reference is added to Section 5.6.5.b. This reference documents NRC approved FRA-ANP analysis methodology. This reference is added to enable its use in core physics analyses for U2C12 and future reloads.

DESIGN FEATURES CHANGE

Section 4.2.1 contains a description of the fuel assemblies contained in the core. The U2C12 reload fuel bundles will utilize a small amount of depleted uranium ("tails") in the fuel rods, in addition to natural and slightly enriched uranium. Thus, Section 4.2.1 was modified to reflect this.

Section III: Evaluation of Proposed Change and Basis

MCPR SAFETY LIMIT CHANGE

The MCPR Safety Limit analysis is the first in a series of analyses that assure the new core loading for U2C12 is operated in a safe manner. Prior to the startup of U2C12, other licensing analyses are performed (using NRC approved methodology referenced in Technical Specification Section 5.6.5.b) to determine changes in the critical power ratio as a result of anticipated operational occurrences. These results are combined with the MCPR Safety limit values proposed here to generate the MCPR operating limits in the U2C12 COLR. The COLR operating limits thus assure that the MCPR Safety Limit will not be exceeded during normal operation or anticipated operational occurrences, thus providing the required protection for the fuel rod cladding. Postulated accidents are also analyzed prior to the startup of U2C12 and the results shown to be within the NRC approved criteria. The proposed change to the MCPR Safety Limit will have a negligible impact on the results of these accident analyses.

The MCPR Safety Limit analysis and the U2C12 core loading which it supports do not alter any plant system, equipment, or component, other than the core itself. As discussed above, the reload analyses performed prior to U2C12 startup will meet all applicable acceptance criteria. Therefore, the proposed changes do not affect the failure modes of any of these systems or components. Thus, the proposed change does not create the possibility of a previously unevaluated operator error or a new single failure. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Since the proposed change does not alter any plant system, equipment, or component, the proposed change will not jeopardize or degrade the function or operation of any plant system or component governed by Technical Specifications. The proposed MCPR Safety Limits do not involve a significant reduction in the margin of safety as currently defined in the Bases of the applicable Technical Specification sections, because the MCPR Safety Limits calculated for U2C12 preserve the required margin of safety.

Operator performance and procedures are unaffected by these proposed changes since the changes are essentially transparent to the operators and plant procedures, and do not change the way in which the plant is operated. The MCPR Operating Limits to be incorporated in the Core Operating Limits Report (determined from the MCPR Safety Limits and U2C12 Transient Analysis Results) may be different from the U2C11 limits. Following use of the methodology to analyze the Unit 2 Cycle 12 core design and future Unit 2 reloads, the reload cycle specific results are incorporated into the FSAR via an FSAR change notice. There are no other impacts on licensing documents and/or commitments.

CHANGES TO COLR REFERENCES

The changes to the references in Section 5.6.5.b remove references no longer required since 9x9-2 fuel is no longer used in Unit 2. One reference is added which contains FRA-ANP NRC approved methodology.

DESIGN FEATURES CHANGE

The U2C12 reload fuel bundles will utilize a small amount of depleted uranium ("tails") in certain fuel rods, in addition to natural and slightly enriched uranium. There is no change to the composition of the fuel pellets containing tails material (i.e., UO_2) except a slight decrease in the amount of U_{235}. Therefore, the use of depleted uranium ("tails") in the fuel rods does not affect the mechanical performance of the fuel rods. The impact of the use of tails on core performance is included in the reload licensing analysis. Also, the NRC approved methods contained in Section 5.6.5.b do not prohibit or restrict the use of tails material.

Section IV: Conclusion

Beginning with Cycle 12, Unit 2 will contain depleted uranium as well as natural and slightly enriched uranium in some of the fuel rods. The change to Section 4.2.1 reflects this. The use of depleted uranium ("tails") in the fuel rods does not affect the mechanical performance of the fuel rods.

The changes to Section 5.6.5.b references reflect the NRC approved methodology which will be used to generate Core Operating Limits for Unit 2 Cycle 12.

The proposed change to the MCPR Safety Limit does not affect any plant system, equipment, or component. Therefore, the proposed change will not jeopardize or degrade the function or operation of any plant system or component governed by Technical Specifications. The proposed MCPR Safety Limits do not involve a significant reduction in the margin of safety as currently defined in the Bases of the applicable Technical Specification sections, because the MCPR Safety Limits calculated for U2C12 preserve the required margin of safety.

Licensing analyses will be performed (using methodology referenced in Technical Specification Section 5.6.5.b) to determine changes in the critical power ratio as a result of anticipated operational occurrences. These results are added to the MCPR Safety Limit values proposed herein to generate the MCPR operating limits in the U2C12 COLR. Thus, the COLR operating limits assure that the MCPR Safety Limits will not be exceeded during normal operation or anticipated operational occurrences, thus providing the required protection for the fuel rod cladding. The proposed change to the MCPR Safety Limits will have a negligible impact on the results of postulated accident analyses.

Therefore, the proposed action does not involve an increase in the probability or an increase in the consequences of an accident previously evaluated in the SAR.

Thus, the proposed changes are in compliance with applicable regulations. The health and safety of the public is not adversely impacted by operation of SSES as proposed.

Attachment 2 to PLA-5467

No Significant Hazards Considerations and Environmental Assessment

NO SIGNIFICANT HAZARDS CONSIDERATIONS AND ENVIRONMENTAL ASSESSMENT

PPL Susquehanna, LLC has evaluated the proposed amendment and determined that it involves no significant hazard consideration. According to 10 CFR 50.92 (c) a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility with the proposed amendment would not:

- Involve a significant increase in the probability or consequences of an accident previously evaluated;
- Create the possibility of a new or different kind of accident from any accident previously analyzed; or
- Involve a significant reduction in a margin of safety.

The proposed Unit 2 Technical Specification change contains a revision of Section 2.1.1.2 to reflect the U2C12 MCPR Safety Limits. This change is necessary because, as a result of U2C12 cycle specific calculations, the MCPR Safety Limits are decreased from the current values. The change to Section 4.2.1 is necessary to reflect the fact that the U2C12 reload contains fuel pins, which contain depleted uranium ("tails"). Changes to the references in Section 5.6.5.b were necessary to reflect NRC approved methodology used for generating the U2C12 core operating limits.

The determination that the criteria set forth in 10 CFR 50.92 are met for this amendment is indicated below:

1. **Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   No:

   The proposed change to the MCPR Safety Limits does not directly or indirectly affect any plant system, equipment, component, or change the processes used to operate the plant. Further, the U2C12 MCPR Safety Limits are generated using NRC approved methodology and meet the applicable acceptance criteria. Thus, this proposed amendment does not involve a significant increase in the probability of occurrence of an accident previously evaluated.

Prior to the startup of U2C12, licensing analyses are performed (using NRC approved methodology referenced in Technical Specification Section 5.6.5.b) to determine changes in the critical power ratio as a result of anticipated operational occurrences. These results are added to the MCPR Safety Limit values proposed herein to generate the MCPR operating limits in the U2C12 COLR. These limits could be different from those specified for the U2C11 COLR. The COLR operating limits thus assure that the MCPR Safety Limit will not be exceeded during normal operation or anticipated operational occurrences, thus providing the required level of protection for the fuel rod cladding. Postulated accidents are also analyzed prior to the startup of U2C12 and the results shown to be within the NRC approved criteria. The proposed change to the MCPR Safety Limit will have a negligible impact on the results of these accident analyses.

The U2C12 reload fuel bundles will utilize a small amount of depleted uranium ("tails") in certain fuel rods, in addition to natural and slightly enriched uranium. There is no change to the composition of the fuel pellets containing tails material, (i.e., UO_2) except a slight decrease in the amount of U_{235}. Therefore, the use of depleted uranium ("tails") in the fuel rods does not affect the mechanical performance of the fuel rods. The impact of the use of tails on core performance is included in the reload licensing analysis.

The changes to the references in Section 5.6.5.b were made to properly reflect the NRC approved methodology used to generate the U2C12 core operating limits. The use of this approved methodology does not increase the probability of occurrence or consequences of an accident previously evaluated.

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

2. **Does the proposed change create the possibility of a new or different kind of accident from any accident previously analyzed?**

No:

The change to the MCPR Safety Limits and the U2C12 core loading which it supports does not directly or indirectly affect any plant system, equipment, or component (other than the core itself) and therefore does not affect the failure modes of any of these. Thus, the proposed changes do not create the possibility of a previously unevaluated operator error or a new single failure.

The use of depleted uranium ("tails") in the fuel rods does not affect the mechanical performance of the fuel rods.

The changes to the references in Section 5.6.5.b were made to properly reflect the NRC approved methodology used to generate the U2C12 core operating limits. The use of this approved methodology does not create the possibility of a new or different kind of accident.

Therefore, this proposed amendment does not involve a possibility of a new or different kind of accident from any accident previously analyzed.

3. **Does the proposed change involve a significant reduction in a margin of safety?**

No:

Since the proposed changes do not alter any plant system, equipment, component, or the processes used to operate the plant, the proposed change will not jeopardize or degrade the function or operation of any plant system or component governed by Technical Specifications. The proposed MCPR Safety Limits do not involve a significant reduction in the margin of safety as currently defined in the Bases of the applicable Technical Specification sections, because the MCPR Safety Limits calculated for U2C12 preserve the required margin of safety.

The use of depleted uranium ("tails") in the fuel rods does not affect the mechanical performance of the fuel rods.

The changes to the references in Section 5.6.5.b were made to properly reflect the NRC approved methodology used to generate the U2C12 core operating limits. This approved methodology is used to demonstrate that all applicable criteria are met, thus, demonstrating that there is no reduction in the margin of safety.

Therefore, these changes do not involve a significant reduction in margin of safety.

Based upon the above, the proposed amendment does not involve a significant hazards consideration.

ENVIRONMENTAL ASSESSMENT

An environmental assessment is not required for the proposed change because the requested change conforms to the criteria for actions eligible for categorical exclusion as specified in 10 CFR 51.22(c)(9). The requested change will have no impact on the environment. The proposed change does not involve a significant hazard consideration as discussed above. The proposed change does not involve a significant change in the types or significant increase in the amounts of any effluents that may be released offsite. In addition, the proposed change does not involve a significant increase in individual or cumulative occupational radiation exposure.

Attachment 3 to PLA-5467

Technical Specification Mark-Ups

For Section 5.6.5 pages from Proposed Amendment No. 243 to License NPF-14 and Proposed Amendment No. 207 to License NFP-22: "Adoption of NRC Approved Generic Changes to Improved Technical Specifications" (PLA-5372 dated October 16, 2001) were marked up to indicate the changes proposed by this amendment.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10 million lbm/hr:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10 million lbm/hr:

MCPR shall be ≥ ~~1.12~~ 1.10 for two recirculation loop operation or ≥ ~~1.14~~ 1.11 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

4.0 DESIGN FEATURES

4.1 Site Location

4.1.1 Exclusion Area Boundaries

The exclusion area shall be as shown in Figure 4.1-1.

4.1.2 Low Population Zone

The low population zone shall be as shown in Figure 4.1-2.

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 764 fuel assemblies. Each assembly shall consist of a matrix of Zircalloy fuel rods with an initial composition of natural, depleted, or slightly enriched uranium dioxide (UO_2) as fuel material, and water rods or water channels. Limited substitutions of zirconium alloy filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with NRC staff approved codes and methods and have been shown by tests or analyses to comply with all safety design bases. A limited number of lead use assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 Control Rod Assemblies

The reactor core shall contain 185 cruciform shaped control rod assemblies. The control material shall be boron carbide and/or hafnium metal as approved by the NRC.

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

(continued)

5.6 Reporting Requirements (continued)

core thermal power level may not exceed the originally approved RTP of 3441 MWt, but the value of 3510 MWt (102% of 3441 MWt) remains the initial power level for the bounding licensing analysis.

Future revisions of approved analytical methods listed in this Technical Specification that are currently referenced to 102% of rated thermal power (3510 MWt) shall include reference that the licensed RTP is actually 3489 MWt. The revisions shall document that the licensing analysis performed at 3510 MWt bounds operation at the RTP of 3489 MWt so long as the LEFM✓™ system is used as the feedwater flow measurement input into the core thermal power calculation.

The approved analytical methods are described in the following documents, the approved version(s) of which are specified in the COLR.

1. PL-NF-90-001-A, "Application of Reactor Analysis Methods for BWR Design and Analysis."

2. XN-NF-80-19(P)(A), "Exxon Nuclear Methodology for Boiling Water Reactors," Exxon Nuclear Company, Inc.

3. XN-NF-85-67(P)(A), "Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel," Exxon Nuclear Company, Inc.

4. ANF-524(P)(A), "Advanced Nuclear Fuels Corporation Critical Power Methodology for Boiling Water Reactors."

~~5. ANF-1125(P)(A), "ANFB Critical Power Correlation."~~

~~6. NEDC-32071P, "SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," GE Nuclear Energy~~

5 ~~7.~~ NE-092-001A, "Licensing Topical Report for Power Uprate With Increased Core Flow," Pennsylvania Power & Light Company.

~~8. PL-NF-94-005-P-A, "Technical Basis for SPC 9x9-2 Extended Fuel Exposure at Susquehanna SES."~~

(continued)

5.6 Reporting Requirements

5.6.5 COLR (continued)

~~9. NEDE-24011-P-A-10, "General Electric Standard Application For Reactor Fuel."~~

6 ~~10.~~ ANF-89-98(P)(A), "Generic Mechanical Design Criteria for BWR Fuel Designs," Advanced Nuclear Fuels Corporation.

7 ~~11.~~ ANF-91-048(P)(A), "Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR Evaluation Model."

~~12. XN-NF-80-19(P)(A), "Exxon Nuclear Methodology for Boiling Water Reactors."~~

8 ~~13.~~ XN-NF-79-71(P)(A), "Exxon Nuclear Plant Transient Methodology for Boiling Water Reactors."

9 ~~14.~~ EMF-1997 (P)(A), "ANFB-10 Critical Power Correlation."

10 ~~15.~~ Caldon, Inc., "TOPICAL REPORT: Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM™ System," Engineering Report - 80P.

11 ~~16.~~ Caldon, Inc., "Supplement to Topical Report ER-80P: Basis for a Power Uprate with the LEFM™ or LEFM CheckPlus™ System, "Engineering Report ER-160P."

12 ~~17.~~ EMF-85-74P, "RODEX 2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model."

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

13. EMF-2158(P)(A), "Siemens Power Corporation Methodology For Boiling Water Reactors, Evaluation and Validation of CASMO-4/MICROBURN-B2," Siemens Power Corporation, [redacted] (continued)

Attachment 4 to PLA-5467

"Camera-Ready" Technical Specification Pages

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10 million lbm/hr:

THERMAL POWER shall be $\leq$ 25% RTP.

2.1.1.2 With the reactor steam dome pressure $\geq$ 785 psig and core flow $\geq$ 10 million lbm/hr:

MCPR shall be $\geq$ 1.10 for two recirculation loop operation or $\geq$ 1.11 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be $\leq$ 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

4.0 DESIGN FEATURES

4.1 Site Location

4.1.1 Exclusion Area Boundaries

The exclusion area shall be as shown in Figure 4.1-1.

4.1.2 Low Population Zone

The low population zone shall be as shown in Figure 4.1-2.

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor shall contain 764 fuel assemblies. Each assembly shall consist of a matrix of Zircalloy fuel rods with an initial composition of depleted, natural, or slightly enriched uranium dioxide (UO_2) as fuel material, and water rods or water channels. Limited substitutions of zirconium alloy filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with NRC staff approved codes and methods and have been shown by tests or analyses to comply with all safety design bases. A limited number of lead use assemblies that have not completed representative testing may be placed in nonlimiting core regions.

4.2.2 Control Rod Assemblies

The reactor core shall contain 185 cruciform shaped control rod assemblies. The control material shall be boron carbide and/or hafnium metal as approved by the NRC.

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

(continued)

core thermal power level may not exceed the originally approved RTP of 3441 MWt, but the value of 3510 MWt (102% of 3441 MWt) remains the initial power level for the bounding licensing analysis.

Future revisions of approved analytical methods listed in this Technical Specification that are currently referenced to 102% of rated thermal power (3510 MWt) shall include reference that the licensed RTP is actually 3489 MWt. The revisions shall document that the licensing analysis performed at 3510 MWt bounds operation at the RTP of 3489 MWt so long as the LEFM✓^{TM} system is used as the feedwater flow measurement input into the core thermal power calculation.

The approved analytical methods are described in the following documents, the approved version(s) of which are specified in the COLR.

1. PL-NF-90-001-A, "Application of Reactor Analysis Methods for BWR Design and Analysis".

2. XN-NF-80-19(P)(A), "Exxon Nuclear Methodology for Boiling Water Reactors" Exxon Nuclear Company, Inc.

3. XN-NF-85-67(P)(A), "Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel, "Exxon Nuclear Company, Inc.

4. ANF-524(P)(A), "Advanced Nuclear Fuels Corporation Critical Power Methodology for Boiling Water Reactors".

5. NE-092-001A, "Licensing Topical Report for Power Uprate With Increased Core Flow," Pennsylvania Power & Light Company.

6. ANF-89-98(P)(A) "Generic Mechanical Design Criteria for BWR Fuel Designs," Advanced Nuclear Fuels Corporation.

7. ANF-91-048(P)(A), "Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR Evaluation Model."

(continued)

5.6 Reporting Requirements

5.6.5 COLR (continued)

8. XN-NF-79-71(P)(A) "Exxon Nuclear Plant Transient Methodology for Boiling Water Reactors."

9. EMF-1997 (P)(A) "ANFB-10 Critical Power Correlation."

10. Caldon, Inc., "TOPICAL REPORT: Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM✓™ System," Engineering Report - 80P.

11. Caldon, Inc., "Supplement to Topical Report ER-80P: Basis for a Power Uprate with the LEFM✓™ or LEFM CheckPlus™ System, "Engineering Report ER-160P.

12. EMF-85-74(P), "RODEX 2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model."

13. EMF-2158(P)(A), "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2," Siemens Power Corporation.

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

(continued)

Attachment 5 to PLA-5467

Unit 2 Cycle 12 Core Composition

Unit 2 Cycle 12 Core Composition

Assembly Type	Previous Cycle Operational History	Number of Assemblies
FRA-ANP ATRIUM™-10	Fresh	284
FRA-ANP ATRIUM™-10	Once-burned	300
FRA-ANP ATRIUM™-10	Twice-burned	180