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NL-15-144

December 10, 2015

U.S. Nuclear Regulatory Commission
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Rockville, MD 20852-2738

SUBJECT License Amendment Request – Conditional Exemption from End-of-Life (EOL)
Moderator Temperature Coefficient (MTC) Measurement
Indian Point Unit Numbers 2, and 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations, Inc. (Entergy) hereby requests a License Amendment for Indian Point No.2 (IP2), Operating License DPR-26, Docket No. 50-247, and for Indian Point No.3 (IP3), Operating License DPR-64, Docket No. 50-286. This request proposes a change to the near-end of life (EOL) Moderator Temperature Coefficient (MTC) Surveillance Requirement (SR) 3.1.3.2 and Specification 5.6.5 for Indian Point Units 2 and 3 by placing a set of conditions on reactor core operation, which if met, would allow exemption from the required MTC measurement. The conditional exemption will be determined on a cycle-specific basis by considering the margin predicted to the Surveillance Requirement MTC limit and by the performance of other reactor core parameters, such as beginning of life (BOL) MTC measurements and the critical boron concentration as a function of cycle length. The conditional exemption will improve plant availability and minimize disruptions to normal plant operation with no compromise in plant safety.

Proposed changes are listed below:

- The following Note is proposed to be added to SR 3.1.3.2:

"SR 3.1.3.2 is not required to be performed by measurement provided that the benchmark criteria in WCAP-13749-P-A are satisfied and the Revised Predicted MTC satisfies the 300 ppm surveillance limit specified in the COLR."
- The following reference will be added to Specification 5.6.5, "Core Operating Limits Report (COLR)":

Attachment 5 to this letter contains Proprietary Information that should be withheld from public disclosure per 10 CFR 2.390. When separated from Attachment 5 there are no withholding criteria.

A001
NRR

"WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997."

Appropriate Bases changes would also be made consistent with the TS changes discussed above.

Attachment 1 provides the basis for the proposed changes to the IP2 and IP3 Technical Specifications (TSs). Attachment 2 provides the TS markup pages showing the proposed changes. Attachment 3 provides the TS Bases markup pages showing the proposed changes. Attachment 4 provides markups for information only the Indian Point representative Core Operating Limits (COLR).

By letter dated July 25, 2012, FirstEnergy Nuclear Operating Company (FENOC) submitted a similar amendment request for the Beaver Valley Power Station (BVPS). By letter dated December 28, 2012, the NRC issued a request for additional information (RAI) with three questions. By letter dated September 17, 2014, Southern Nuclear Operating Company (SNC), submitted a request to revise the Joseph M. Farley Nuclear Plant (FNP), Unit 1 and Unit 2, and the Vogtle Electric Generating Plant (VEGP), Unit 1 and Unit 2, Technical Specification Surveillance Requirement 3.1.3.2 and TS 5.6.5. These revisions are related to the near end of life (EOL) moderator temperature coefficient (MTC) measurement. By letter dated December 16, 2014, the Nuclear Regulatory Commission (NRC) submitted a Request for Additional Information (RAI) letter to SNC.

Based on later correspondence between FENOC and the NRC, the NRC staff stated that a response to the third RAI question is not required. Attachment 5 provides the proprietary Entergy response to the first and second question of NRC RAI to BVPS, Farley 1 and 2 (FNP) and Vogtle 1 and 2 (VEGP). Attachment 6 provides the non-proprietary Entergy response to the first and second question of NRC RAI to BVPS, Farley 1 and 2 (FNP) and Vogtle 1 and 2 (VEGP). Attachment 7 provides the Westinghouse affidavit requesting to withhold Attachment 5 from public disclosure.

Due to the upcoming Indian Point Unit 3 performance of SA 3.1.3.2 currently projected for December 2016, Entergy requests approval of the proposed license amendment by November 30, 2016.

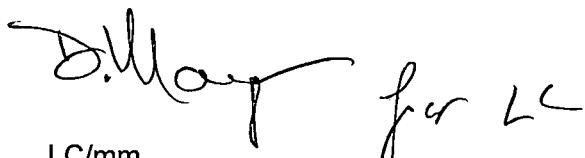
In accordance with 10 CFR 50.91(b)(1), "State Consultation," a copy of this application and its associated Attachments is being provided to the designated New York State officials.

This letter contains no NRC commitments.

Should you have any questions concerning this letter, or require additional information, please contact Robert Walpole, Manager, Regulatory Assurance at (914) 254-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 10, 2015.

Sincerely,


LC/mm

Attachments:

1. Analysis of Proposed Technical Specification Change
2. Proposed Technical Specification Changes (mark-up) [both units are included in this attachment]
3. Changes to TS Bases (for Information Only) [both units are included in this attachment]
4. Indian Point Representative COLR Markup (for Information Only) [both units are included in this attachment]
5. Entergy Response to BVPS, FNP, and VEGP RAI Questions (Proprietary)
6. Entergy Response to BVPS, FNP, and VEGP RAI Questions (Non-Proprietary)
7. Westinghouse Affidavit Requesting Withholding of Attachment 5

cc: Mr. Douglas Picket, Senior Project Manager, NRC NRR DORL
Mr. Daniel H. Dorman, Regional Administrator, NRC Region 1
NRC Resident Inspector's Office
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA
Ms. Bridget Frymire, New York State Dept. of Public Service

ATTACHMENT 1 TO NL-15-144

**Analysis of Proposed Technical Specification Change
Conditional Exemption from End-of Life Moderator
Temperature Coefficient Measurement**

**ENTERGY NUCLEAR OPERATIONS, INC. INDIAN
POINT NUCLEAR GENERATING UNIT Nos. 2 & 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64**

Analysis of Proposed Technical Specification Change

1.0 Summary Description

The proposed changes revise the near-end of life (EOL) Moderator Temperature Coefficient (MTC) Surveillance Requirement (SR) 3.1.3.2 and Technical Specification (TS) 5.6.5 for Indian Point Units 2 and 3 by placing a set of conditions on reactor core operation, which if met, would allow exemption from the required MTC measurement. The conditional exemption will be determined on a cycle-specific basis by considering the margin predicted to the Surveillance Requirement MTC limit and by the performance of other reactor core parameters, such as beginning of life (BOL) MTC measurements and the critical boron concentration as a function of cycle length. The conditional exemption will improve plant availability and minimize disruptions to normal plant operation with no compromise in plant safety.

2.0 Proposed Changes

The following Note is proposed to be added to SR 3.1.3.2:

"SR 3.1.3.2 is not required to be performed by measurement provided that the benchmark criteria in WCAP-13749-P-A are satisfied and the Revised Predicted MTC satisfies the 300 ppm surveillance limit specified in the COLR."

The following reference will be added to TS 5.6.5, "Core Operating Limits Report (COLR)":

"WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997."

Appropriate Bases changes (for information only is in Attachment 3) would also be made consistent with the TS changes discussed above.

3.0 Background

One of the controlling parameters for power and reactivity increases is the MTC. The requirements of TS 3.1.3, Moderator Temperature Coefficient, ensure that the MTC remains within the bounds used in the applicable Updated Final Safety Analysis Report (UFSAR) accident analysis (Chapter 14). This, in turn, ensures inherently stable power operations during normal operation and accident conditions.

TS 3.1.3 places limits on the MTC, based on the accident analysis assumptions for the moderator density coefficient (MDC). A positive MDC corresponds to a negative MTC. TS 3.1.3 requires that the MTC be less negative than the specified limit for the all rods withdrawn, EOL, Rated Thermal Power condition. To demonstrate compliance with the Limiting Condition for Operation (LCO) for the most negative MTC LCO, Surveillance Requirement 3.1.3.2 requires verification of the MTC after a 300 ppm equilibrium boron concentration is reached. Because the Hot Full Power (HFP) MTC value will gradually become more negative with additional core burnup and reduction in boron concentration, a 300 ppm MTC Surveillance value should be less negative than the EOL LCO limit. To account for this effect, the 300 ppm MTC Surveillance value is sufficiently less negative than the

EOL LCO limit value, to provide assurance that the LCO limit will be met as long as the 300 ppm MTC Surveillance criterion is met.

Currently, the TS require measurements of MTC at BOL to verify the most positive MTC limit is satisfied and near EOL to verify the most negative MTC limit is satisfied. At BOL, the measurement of the isothermal temperature coefficient is relatively simple to perform since it is done at hot zero power isothermal conditions and is not complicated by changes in the enthalpy rise or the presence of xenon. The measurement made near-EOL is performed at or near HFP conditions. MTC measurements at HFP are more difficult to perform due to small variations in soluble boron concentration, changes in xenon concentration and distribution, changes in fuel temperature, and changes in enthalpy rise created by small changes in the core average power during the measurement. Changes in each of these parameters must be accurately accounted for when reducing the measurement data, or additional measurement uncertainties will be introduced. Even though these additional uncertainties may be small, the total reactivity change associated with the swing in moderator temperature is also relatively small. The resulting MTC measurement uncertainty created by even a small change in power level can then become significant and, if improperly accounted for, can yield misleading measurement results.

The MTC measurement typically includes time at reduced power as a result of the measurement procedures. This measurement introduces a perturbation to normal reactor operation and increases the potential for a human performance error involving a reactivity manipulation. An alternate method is proposed to improve availability and minimize perturbations on normal reactor operation. The MTC measurement is replaced by a design calculation of the core MTC if predefined requirements are met.

The proposed change would modify the EOL MTC Surveillance Requirement by placing a set of conditions on core operations. If these conditions are met, i.e., the specified revised prediction of the MTC and several core parameters measured during the cycle are within specified bounds, the Surveillance measurement would not be required to be performed.

4.0 Technical Evaluation

The proposed conditional exemption from the Hot Full Power (HFP) near-EOL 300 ppm MTC measurement does not impact the safe operation of Indian Point Units 2 and 3. The safety analysis assumption of a constant MDC and the actual value assumed will not change. The proposed change uses a revised prediction to determine if the MTC Surveillance limit is met. The proposed method for calculating the revised prediction is consistent with the approved algorithm contained in WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," (Reference 1).

The methodology associated with the proposed change was submitted to the NRC in Westinghouse topical report WCAP-13749-P in June 1993. In October 1996, the NRC determined the report to be acceptable for referencing in license applications to the extent specified and under the limitations stated in the Brookhaven Technical Evaluation Report (TER) and the NRC staff's Safety Evaluation Report (Reference 1).

The NRC approved WCAP-13749-P with two conditions:

"(1) only PHOENIX/ANC calculation methods are used for the individual plant analyses relevant to determinations for the EOL MTC plant methodology, and

(2) the predictive correction is reexamined if changes in core fuel designs or continued MTC calculation/measurement data show significant effect on the predictive correction."

The Entergy resolution to both of these conditions is discussed below.

Condition 1

Only PHOENIX/ANC calculation methods are used for the individual plant analyses relevant to determinations for the EOL MTC plant methodology.

Entergy Disposition to Condition 1

The Indian Point core design calculations have been transitioned from nuclear calculations that are performed with the PHOENIX-P lattice code to generate cross-section data to those that are performed with the PARAGON lattice code.

In Section 4.0, Conditions and Limitations of the NRC's Safety Evaluation (SE) for WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON," (Reference 2), the NRC stated:

"1. The PARAGON code can be used as a replacement for the PHOENIX-P lattice code, whenever the PHOENIX-P code is used in NRC approved methodologies."

Core design calculations that are performed using the PARAGON/ANC system are equivalent to those performed with those using the PHOENIX/ANC system. The use of PARAGON/ANC is consistent with condition (1) above in the NRC SER for WCAP-13749-P, since it was benchmarked against PHOENIX-P/ANC. Therefore the PARAGON/ANC code set satisfies the TER requirement to demonstrate the uncertainty limits assumed in WCAP-13749-P-A, as discussed on page 5 of the TER. The NRC used this TER as the basis for their SER.

For additional information regarding how Entergy will meet this Condition, see Attachment 5 (proprietary) or Attachment 6 (non-proprietary).

Condition 2

The predictive correction is reexamined if changes in core fuel designs or continued MTC calculation/measurement data show significant effect on the predictive correction.

Entergy Disposition to Condition 2

Prior to the use of the conditional elimination technique, Entergy will confirm that core design changes and MTC calculation and measurement data do not show a significant effect on the predictive correction. The administrative controls for this confirmation will reside in the Indian Point procedure that controls the EOL MTC surveillance. If a significant effect is found, the use of the predictive correction will be re-examined.

All of the core performance benchmark criteria confirmed from startup physics test results, from

routine HFP boron concentration measurements, and from flux map Surveillances performed during the cycle must be met before the Revised Predicted MTC can be calculated in accordance with the prescribed algorithm contained in Reference 1. An illustration of the benchmark criteria is contained in Table D-1, "Benchmark Criteria for Application of the 300 PPM MTC Conditional Exemption Methodology," in WCAP-13749-P-A.

For additional information regarding how Entergy will meet this Condition, see Attachment 5 (proprietary) or Attachment 6 (non-proprietary).

Entergy is using the NRC-approved WCAP-13749-P-A as the basis for this License Amendment Request. Entergy will meet all of the technical requirements in the approved WCAP, but proposes an enhancement to reduce regulatory burden for both the NRC and the licensee. Entergy proposes not to submit a "Most Negative Moderator Temperature Coefficient Limit Report" to the NRC, for two reasons. First, there is an inconsistency in WCAP-13749-P-A regarding the time frame of data collection and the submittal of the Most Negative Moderator Temperature Coefficient Limit Report to the NRC. Additionally, the Most Negative Moderator Temperature Coefficient Limit Report serves no apparent technical purpose. Each of these reasons is discussed below.

Section 3.3.3 of WCAP-13749-P-A states:

"The Technical Specification Bases of the most negative MTC LCO and SR and the values of these limits are not altered. Instead, a revised prediction is compared to the SR MTC to determine if the SR limit is met. The revised prediction is simply the sum of the predicted HFP 300 ppm SR MTC plus an AFD correction factor plus a predictive correction term. This algorithm is summarized in Table 3-3."

Appendix A of WCAP-13749-P-A requires a new Specification 6.9.1.7 to be added as stated below.

"6.9.1.7 The most negative MTC limits shall be provided to the NRC Regional Administrator with a copy to the Director of Nuclear Reactor Regulation, Attention: Chief, Core Performance Branch, U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, at least 60 days prior to the date the limit would become effective unless otherwise approved by the Commission by letter. This report will include the data required for the determination of the Revised Prediction of the 300 ppm/ARO/RTP MTC per WCAP-13749, "Safety Evaluation Supporting the Conditional Elimination of the Most Negative EOL Moderator Temperature Coefficient Measurement", May, 1993 (Westinghouse Proprietary)."

Since the Most Negative Moderator Temperature Coefficient Limit Report would have to be submitted at least 60 days before reaching 300 ppm boron concentration, it cannot include the 300 ppm data required for determining the Revised Prediction. To satisfy the Most Negative Moderator Temperature Coefficient Limit Report submittal requirement, the data to be used for calculating the revised predicted MTC may have to be taken 60 to 90 days prior to reaching 300 ppm boron. WCAP-13749-P-A does not provide any method for adjusting the revised predicted MTC to account for data collected 60 to 90 days prior to 300 ppm, nor does it provide justification for using such early data in the calculation. Therefore, the requirement to submit the Most Negative Moderator Temperature Coefficient Limit Report and the requirements for the data that go into the report are inconsistent.

Additionally, the Most Negative Moderator Temperature Coefficient Limit Report serves no apparent

technical requirement. The benchmark criteria and the algorithm in WCAP-13749-P-A for determining the revised predicted MTC will be incorporated into the applicable procedures. There is no compelling reason that this particular Surveillance should require notifying the NRC prior to performing the Surveillance procedure.

The exception of not including a "Most Negative Moderator Temperature Coefficient Limit Report" that is contained in WCAP-13749-P-A was approved by the NRC for South Texas Units 1 and 2 in Amendment 144 to Facility Operating License No. NPF-76 and Amendment 132 to Facility Operating License No. NPF-80 dated November 26, 2002.

The fourth paragraph in Section 3.2.1 of WCAP-13749-P-A states:

"As part of determining the applicability of a conditional exemption from the near-EOC MTC measurement, a cycle-specific figure similar to Figure 3-1 will be provided as part of that cycle's Technical Specifications or Core Operating Limits Report (COLR)."

However, the COLR changes contained in Appendix B, "COLR Revision," of WCAP-13749-P-A do not include a reference to Figure 3-1, Example of Predicted HFP ARO 300 ppm MTC Versus Cycle Burnup. As a result, Entergy proposes including the appropriate cycle-specific Figure 3-1, Predicted HFP ARO 300 ppm MTC Versus Cycle Burnup, for Indian Point and the benchmark criteria in the surveillance procedure associated with the EOL MTC measurement. The COLR will contain the algorithm for the Revised Predicted MTC similar to the draft change to the COLR shown in Attachment 4.

5.0 Regulatory Evaluation

5.1 Applicable Regulatory Requirements/Criteria

10 CFR 50.36(c), "Technical specifications," requires Technical Specifications to be included for the following categories:

- (1) *Safety limits, limiting safety system settings, and limiting control settings.*
- (2) *Limiting conditions for operation.*
- (3) *Surveillance requirements.*
- (4) *Design features.*
- (5) *Administrative controls.*

10 CFR 50.36(c) (3) *Surveillance requirements*, states:

"Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

None of the TS categories are impacted by the proposed TS changes, and SR 3.1.3.2 is not being deleted. The Bases for and values of the most negative MTC Limiting Condition for Operation and for the Surveillance Requirement are not altered. Instead, a revised prediction is compared to the MTC Surveillance limit to determine if the limit is met.

Therefore 10 CFR 50.36(c) continues to be met.

Appendix A to 10 CFR 50, General Design Criterion (GDC) 11, “Reactor inherent protection,” states:

“The reactor core and associated coolant systems shall be designed so that in the power operating range the net effect of the prompt inherent nuclear feedback characteristics tends to compensate for a rapid increase in reactivity.”

Neither the reactor core nor the RCS are being modified by the proposed TS, therefore GDC 11 continues to be met.

Therefore the proposed amendment does not impact the Regulatory Requirements discussed above.

5.2 Significant Hazards Consideration

The proposed changes revise the near-end of life (EOL) Moderator Temperature Coefficient (MTC) Surveillance Requirement (SR) 3.1.3.2 by placing a set of conditions on reactor core operation, which if met, would allow exemption from the required MTC measurement. The conditional exemption will be determined on a cycle-specific basis by considering the margin predicted to the surveillance requirement MTC limit and the performance of other reactor core parameters, such as beginning of life (BOL) MTC measurements and the critical boron concentration as a function of cycle length.

As required by 10 CFR 50.91(a), Entergy has evaluated the proposed changes to the Indian Point Technical Specifications (TS) using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration. An analysis of the issue of no significant hazards consideration is presented below:

- 1: Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The safety analysis assumption of a constant moderator density coefficient and the actual value assumed are not changing. The Bases for and values of the most negative MTC Limiting Condition for Operation and for the Surveillance Requirement are not changing. Instead, a revised prediction is compared to the MTC Surveillance limit to determine if the limit is met.

The proposed changes to the TS do not affect the initiators of any analyzed accident. In addition, operation in accordance with the proposed TS changes ensures that the previously evaluated accidents will continue to be mitigated as analyzed. The proposed changes do not adversely affect the design function or operation of any structures, systems, and components important to safety.

The probability or consequences of accidents previously evaluated in the UFSAR are unaffected by this proposed change because there is no change to any equipment

response or accident mitigation scenario. There are no new or additional challenges to fission product barrier integrity.

Therefore, it is concluded that the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

- 2: Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed changes do not involve a physical alteration of the plant (no new or different type of equipment will be installed). The proposed changes do not create any new failure modes for existing equipment or any new limiting single failures.

Additionally the proposed changes do not involve a change in the methods governing normal plant operation and all safety functions will continue to perform as previously assumed in accident analyses. Thus, the proposed changes do not adversely affect the design function or operation of any structures, systems, and components important to safety.

No new accident scenarios, failure mechanisms, or limiting single failures are introduced as a result of the proposed changes. The proposed changes do not challenge the performance or integrity of any safety-related system.

Therefore, it is concluded that the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

- 3: Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The margin of safety associated with the acceptance criteria of any accident is unchanged. The proposed change will have no effect on the availability, operability, or performance of the safety-related systems and components. A change to a surveillance requirement is proposed based on an alternate method of confirming that the surveillance is met. The Technical Specification Limiting Condition for Operation (LCO) limits are not being changed.

The proposed change will not adversely affect the operation of plant equipment or the function of equipment assumed in the accident analysis.

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

Based upon the above analysis, Entergy concludes that the proposed amendment does not involve a significant hazards consideration, under the standards set forth in 10 CFR 50.92(c), "Issuance of Amendment," and accordingly, a finding of "no significant hazards consideration" is justified.

5.3 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 Environmental Considerations

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR Part 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 References

1. WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997.
2. WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON," August 2004.

ATTACHMENT 2 TO NL-15-144

Proposed Technical Specification Changes (mark-up)

(Both units are included in this Attachment)

Conditional Exemption from End-of Life Moderator

Temperature Coefficient Measurement

ENTERGY NUCLEAR OPERATIONS, INC. INDIAN
POINT NUCLEAR GENERATING UNIT Nos. 2 & 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.1.3.2</p> <p style="text-align: center;">- NOTES -</p> <ol style="list-style-type: none">1. Not required to be performed until 7 effective full power days (EFPD) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm.2. 3 If the MTC is more negative than the 300 ppm Surveillance limit (not LCO limit) specified in the COLR, SR 3.1.3.2 shall be repeated once per 14 EFPD during the remainder of the fuel cycle.3. 4 SR 3.1.3.2 need not be repeated if the MTC measured at the equivalent of equilibrium RTP-ARO boron concentration of \leq 60 ppm is less negative than the 60 ppm Surveillance limit specified in the COLR.	Once each cycle

2. SR 3.1.3.2 is not required to be performed by measurement provided that the benchmark criteria in WCAP-13749-P-A are satisfied and the Revised Predicted MTC satisfies the 300 ppm surveillance limit specified in the COLR.

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

8. WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report", April 1995;
9. WCAP-10079-P-A, "NOTRUMP, A Nodal Transient Small Break and General Network Code", August 1985;
10. WCAP-10054-P-A, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code", August 1985; and
11. WCAP-10054-P-A, Addendum 2, Revision 1, "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code: Safety Injection Into the Broken Loop and Cosi Condensation Model", July 1997.

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.

**12. WCAP-13749-P-A,
"Safety Evaluation
Supporting the Conditional
Exemption of the Most
Negative EOL Moderator
Temperature Coefficient
Measurement," March
1997.**

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

Instrument Monitoring Report

A report is required by Condition B or F of LCO 3.3.3, "Post Accident (PAM) Instrumentation," a report shall be submitted within the following time frame. The report shall outline the preplanned alternate method of monitoring, the cause or the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

5.6.7

Steam Generator Tube Inspection Report

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with the Specification 5.5.7, Steam Generator (SG) Program. The report shall include:

- a. The scope of inspections performed on each SG,
- b. Degradation mechanisms found,
- c. Nondestructive examination techniques utilized for each degradation mechanism,

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.3.1 Verify MTC is within upper limit.	Once prior to entering MODE 1 after each refueling
SR 3.1.3.2 <p>.....NOTES.....</p> <p>1. Not required to be performed until 7 effective full power days (EFPD) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm.</p> <p>2. 3 If the MTC is more negative than the 300 ppm Surveillance limit (not LCO limit) specified in the COLR, SR 3.1.3.2 shall be repeated once per 14 EFPD during the remainder of the fuel cycle.</p> <p>3. 4 SR 3.1.3.2 need not be repeated if the MTC measured at the equivalent of equilibrium RTP-ARO boron concentration of \leq 60 ppm is less negative than the 60 ppm Surveillance limit specified in the COLR.</p> <p>.....</p> <p>Verify MTC is within lower limit.</p>	Once each cycle

2. SR 3.1.3.2 is not required to be performed by measurement provided that the benchmark criteria in WCAP-13749-P-A are satisfied and the Revised Predicted MTC satisfies the 300 ppm surveillance limit specified in the COLR.

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

Position CPB 4.3-1, Westinghouse Constant Axial Offset Control (CAOC), Rev. 2, July 1981. (Specification 3.2.3, Axial Flux Difference (AFD) (Constant Axial Offset Control));

- 3a. WCAP-12945-P-A, Volume 1 (Revision 2) and Volumes 2 through 5 (Revision 1), "Code Qualification Document for Best-Estimate Loss-of-Coolant-Accident Analysis," March 1998 (Westinghouse Proprietary);
 - 3b. WCAP-11397-P-A, "Revised Thermal Design Procedure," April 1989 (Specification 2.1, Safety Limits (SL)) and Specification 3.4.1, (RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits);
 - 3c. WCAP-8745-P-A, "Design Bases for the Thermal Overpower ΔT and Thermal Overtemperature ΔT Trip Functions," September 1986 (Specification 2.1, Safety Limits (SL));
 - 3d. WCAP-10054-P-A, "SMALL BREAK ECCS EVALUATION MODEL USING NOTRUMP CODE," (W Proprietary). (Specification 3.2.1, Heat Flux Hot Channel Factor (FQ(Z)));
 - 3e. WCAP-10054-P-A, Addendum 2, Revision 1, "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code; Safety Injection into the Broken Loop and Cosi Condensation Model," July 1997 (Specification 3.2.1, Heat Flux Hot Channel Factor (FQ(Z))));
 - 3f. WCAP-10079-P-A, "NOTRUMP NODAL TRANSIENT SMALL BREAK AND GENERAL NETWORK CODE," (W Proprietary). (Specification 3.2.1, Heat Flux Hot Channel Factor (FQ(Z))); and
 - 3g. WCAP-12610, "VANTAGE+ Fuel Assembly Report," (W Proprietary). (Specification 3.2.1, Heat Flux Hot Channel Factor).
- 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 for each reload cycle to the NRC.

5.6.6 NOT USED

4. WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997. (Specification 3.1.3, Moderator Temperature Coefficient (MTC)).

(continued)

ATTACHMENT 3 TO NL-15-144

Changes to TS Bases (for Information Only)

(Both units are included in this Attachment)

Conditional Exemption from End-of Life Moderator

Temperature Coefficient Measurement

ENTERGY NUCLEAR OPERATIONS, INC. INDIAN
POINT NUCLEAR GENERATING UNIT Nos. 2 & 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

BASES

ACTIONS (continued)

which the LCO requirements are not applicable. To achieve this status, the unit must be brought to at least MODE 4 within 12 hours.

The allowed Completion Time is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.3.1

This SR requires measurement of the MTC at BOC prior to entering MODE 1 in order to demonstrate compliance with the most positive MTC LCO. Meeting the limit prior to entering MODE 1 ensures that the limit will also be met at higher power levels.

The BOC MTC value for ARO will be inferred from isothermal temperature coefficient measurements obtained during the physics tests after refueling. The ARO value can be directly compared to the BOC MTC limit of the LCO. If required, measurement results and predicted design values can be used to establish administrative withdrawal limits for control banks.

SR 3.1.3.2

The LCO requires that the MTC be less negative than the specified value for EOC full power conditions. This measurement may be performed at any THERMAL POWER, but its results must be extrapolated to the conditions of RTP and all banks withdrawn in order to make a proper comparison with the LCO value. Because the RTP MTC value will gradually become more negative with further core depletion and boron concentration reduction, a 300 ppm SR value of MTC should necessarily be less negative than the EOC LCO limit. The 300 ppm SR value is sufficiently less negative than the EOC LCO limit value to ensure that the LCO limit will be met when the 300 ppm Surveillance criterion is met.

SR 3.1.3.2 is modified by three Notes that includes the following requirements:

four

- a. The SR is not required to be performed until 7 effective full power days (EFPDs) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm.

b. SR 3.1.3.2 is not required to be performed by measurement provided that the benchmark criteria in WCAP-13749-P-A (Ref. 4) are satisfied and the Revised Predicted MTC satisfies the 300 ppm surveillance limit specified in the COLR.

BASES

SURVEILLANCE REQUIREMENTS (continued)

- b. **c** If the 300 ppm Surveillance limit is exceeded, it is possible that the EOC limit on MTC could be reached before the planned EOC. Because the MTC changes slowly with core depletion, the Frequency of 14 effective full power days is sufficient to avoid exceeding the EOC limit.
- e. **d** The Surveillance limit for RTP boron concentration of 60 ppm is conservative. If the measured MTC at 60 ppm is more positive than the 60 ppm Surveillance limit, the EOC limit will not be exceeded because of the gradual manner in which MTC changes with core burnup.

REFERENCES

1. 10 CFR 50, Appendix A.
2. UFSAR, Chapter 14.
3. WCAP 9273-NP-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985.

4. WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.3.1

This SR requires measurement of the MTC at BOL prior to entering MODE 1 in order to demonstrate compliance with the most positive MTC LCO. Meeting the limit prior to entering MODE 1 ensures that the limit will also be met at higher power levels.

The BOL MTC value for ARO will be inferred from isothermal temperature coefficient measurements obtained during the physics tests after refueling. The ARO value can be directly compared to the BOL MTC limit of the LCO. If required, measurement results and predicted design values can be used to establish administrative withdrawal limits for control banks.

SR 3.1.3.2

In similar fashion, the LCO demands that the MTC be less negative than the specified value for EOL full power conditions. This measurement may be performed at any THERMAL POWER, but its results must be extrapolated to the conditions of RTP and all banks withdrawn in order to make a proper comparison with the LCO value. Because the RTP MTC value will gradually become more negative with further core depletion and boron concentration reduction, a 300 ppm SR value of MTC should necessarily be less negative than the EOL LCO limit. The 300 ppm SR value is sufficiently less negative than the EOL LCO limit value to ensure that the LCO limit will be met when the 300 ppm Surveillance criterion is met.

SR 3.1.3.2 is modified by ~~three~~ Notes that include the following requirements:

four

1. This SR is not required to be performed until 7 effective full power days (EFPD) after reaching the equivalent of an equilibrium RTP all rods out (ARO) boron concentration of 300 ppm. This note alters the FREQUENCY to once each cycle within 7 effective full power days (EFPD) after reaching the equivalent of an equilibrium RTP ARO boron concentration of 300 ppm.
2. SR 3.1.3.2 is not required to be performed by measurement provided that the benchmark criteria in WCAP-13749-P-A (Ref. 4) are satisfied and the Revised Predicted MTC satisfies the 300 ppm surveillance limit specified in the COLR.

(continued)

BASES

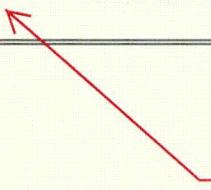
SURVEILLANCE REQUIREMENTS

SR 3.1.3.2 (continued)

2. **3** If the 300 ppm Surveillance limit is exceeded, it is possible that the EOL limit on MTC could be reached before the planned EOL. Because the MTC changes slowly with core depletion, the Frequency of 14 effective full power days is sufficient to avoid exceeding the EOL limit. This note establishes a new required action and completion time. The required action, verify the MTC is within the COLR lower limit (which is a repeat of the surveillance), occurs when the existing surveillance requirement (i.e., to verify the MTC is more positive than the limit specified in the COLR for a 300 ppm boron concentration) fails. The frequency is 14 EFPD after the initial surveillance test fails and every 14 EFPD thereafter.
3. **4** The Surveillance limit for RTP boron concentration of 60 ppm is conservative. If the measured MTC at 60 ppm is more positive than the 60 ppm Surveillance limit, the EOL limit will not be exceeded because of the gradual manner in which MTC changes with core burnup. This note acts to limit the action requirement in Note 2. It allows the action to repeat the surveillance to be terminated if the MTC measured at the equivalent of equilibrium RTP-ARO boron concentration of < 60 ppm is less negative than the 60 ppm surveillance limit specified in the COLR.

REFERENCES

1. 10 CFR 50, Appendix A.
2. FSAR, Chapter 14.
3. WCAP 9273-NP-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985.



4. WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997.

ATTACHMENT 4 TO NL-15-144

Indian Point Representative COLR Markups (for Information Only)

(Both units are included in this Attachment)

Conditional Exemption from End-of Life Moderator

Temperature Coefficient Measurement

ENERGY NUCLEAR OPERATIONS, INC. INDIAN
POINT NUCLEAR GENERATING UNIT Nos. 2 & 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

The data presented in this report applies to Cycle 22 ONLY and may NOT be used for other cycles of operation. Any technical change to this document requires a Safety Evaluation to be performed in accordance with 10 CFR 50.59.

TS 2.1.1 Reactor Core SLs

In MODES 1 and 2, the combination of thermal power level, pressurizer pressure, and highest loop average coolant temperature SHALL not exceed the limits shown in Figure 1. The safety limit is exceeded if the point defined by the combination of Reactor Coolant System average temperature and power level is at any time above the appropriate pressure line.

TS 3.1.1 Shutdown Margin (SDM)

The shutdown margin SHALL be greater than or equal to $1.3\% \Delta k/k$.

TS 3.1.3 Moderator Temperature Coefficient (MTC)

The MTC upper limit SHALL be $\leq 0.0 \Delta k/k/{}^{\circ}\text{F}$ at hot zero power.

The MTC lower limit SHALL be less negative than or equal to:

-36.5 pcm/°F @ 300 ppm
-43.0 pcm/°F @ 60 ppm
-45.5 pcm/°F @ 0 ppm

The Revised Predicted near EOL 300 ppm MTC shall be calculated using the algorithm contained in WCAP-13749-P-A:

Revised Predicted MTC = Predicted MTC + AFD Correction + -3 pcm/°F

If the Revised Predicted MTC is less negative than the SR 3.1.3.2 300 ppm surveillance limit and all the benchmark data contained in the surveillance procedure are met, than an MTC measurement in accordance with SR 3.1.3.2 is not required to be performed.

The data presented in this report applies to Cycle 19 ONLY and may NOT be used for other cycles of operation. Also, it applies only to operation at a maximum power level of 3188.4 MWt. Any technical change to this document may require a Safety Evaluation to be performed in accordance with 10 CFR 50.59.

TS 2.1.1 Reactor Core SLs

In MODE 1 and 2, the combination of thermal power level, pressurizer pressure, and Reactor Vessel inlet temperature SHALL not exceed the limits shown in Figure 1. The safety limit is exceeded if the point defined by the combination of Reactor Vessel inlet temperature and power level is at any time above the appropriate pressure line.

TS 3.1.1 SHUTDOWN MARGIN (SDM)

The shutdown margin SHALL be greater than or equal to 1.3% $\Delta k/k$.

TS 3.1.3 Moderator Temperature Coefficient (MTC)

The MTC upper limit SHALL be $\leq 0.0 \Delta k/k/{}^{\circ}\text{F}$ at hot zero power.

The MTC lower limit SHALL be less negative than or equal to:

-38.0 pcm/°F @ 300 ppm
-44.5 pcm/°F @ 60 ppm
-47.0 pcm/°F @ 0 ppm

The Revised Predicted near EOL 300 ppm MTC shall be calculated using the algorithm contained in WCAP-13749-P-A:

Revised Predicted MTC = Predicted MTC + AFD Correction + -3 pcm/°F

If the Revised Predicted MTC is less negative than the SR 3.1.3.2 300 ppm surveillance limit and all the benchmark data contained in the surveillance procedure are met, than an MTC measurement in accordance with SR 3.1.3.2 is not required to be performed.