FENOC
FirstEnergy Nuclear Operating Company

Perry Nuclear Power Plant
10 Center Road
Perry, Ohio 44081

Mark B. Bezilla
Vice President

440-280-5382
Fax: 440-280-8029

December 15, 2010
L-10-201

10 CFR 50.90

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

SUBJECT:
Perry Nuclear Power Plant
Docket No. 50-440, License No. NPF-58
License Amendment Request to Revise Technical Specification 3.1.4, "Control Rod Scram Times," to Incorporate TSTF-460, Revision 0

Pursuant to 10 CFR 50.90, FirstEnergy Nuclear Operating Company (FENOC) is requesting an amendment to the Perry Nuclear Power Plant (PNPP) Technical Specification (TS) 3.1.4, "Control Rod Scram Times." The proposed amendment would revise the required testing frequency of Surveillance Requirement (SR) 3.1.4.2 from "120 days cumulative operation in MODE 1" to "200 days cumulative operation in MODE 1" by incorporating Nuclear Regulatory Commission (NRC) approved Technical Specification Task Force (TSTF) change traveler TSTF-460, Revision 0.

An evaluation of the proposed amendment is provided as an enclosure. NRC staff approval is requested by December 15, 2011. Implementation of the amendment by FENOC is planned within 90 days of its approval.

The regulatory commitment contained in this submittal is listed in the attachment. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at (330) 761-6071.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 15, 2010.

Sincerely,

Mark B. Bezilla

Attachment: Regulatory Commitment List

Enclosure: Evaluation of Proposed License Amendment

cc: NRC Region III Administrator
NRC Resident Inspector
NRC Project Manager
Executive Director, Ohio Emergency Management Agency, State of Ohio (NRC Liaison)
Utility Radiological Safety Board

A001
NRR

Attachment
L-10-201

Regulatory Commitment List

The following list identifies those actions committed to by FirstEnergy Nuclear Operating Company (FENOC) for the Perry Nuclear Power Plant in this document. Any other actions discussed in the submittal represent intended or planned actions by FENOC. They are described only as information and are not regulatory commitments. Please notify Mr. Thomas A. Lentz, Manager - Fleet Licensing, at (330) 761-6071 of any questions regarding this document or associated regulatory commitments.

Regulatory Commitment	Due Date
FENOC will incorporate the revised acceptance criterion value of 7.5 percent into the [Technical Specifications] TS Bases for PNPP in accordance with the Bases Control Program described in TS 5.5.11.	Within 90 days of the proposed amendment's approval.

EVALUATION OF PROPOSED LICENSE AMENDMENT

Subject: Revision of Required Testing Frequency Within Perry Nuclear Power Plant (PNPP) Technical Specification 3.1.4, "Control Rod Scram Times," Surveillance Requirement (SR) 3.1.4.2.

1.0 INTRODUCTION

2.0 PROPOSED CHANGE

3.0 BACKGROUND

4.0 REGULATORY REQUIREMENTS AND GUIDANCE

5.0 TECHNICAL ANALYSIS

6.0 COMMITMENTS

7.0 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

8.0 ENVIRONMENTAL EVALUATION

9.0 PRECEDENT

10.0 REFERENCES

Attachments:

1. Proposed Technical Specification Changes (Mark-Up)
2. Proposed Technical Specification Bases Changes (Provided For Information)
3. Proposed Technical Specification Changes (Retyped)

1.0 INTRODUCTION

The proposed license amendment revises the required testing frequency for the surveillance requirement (SR) in Technical Specification (TS) 3.1.4, "Control Rod Scram Times." A notice announcing the availability of this proposed TS change using the consolidated line item improvement process (CLIIP) was published in the Federal Register on August 23, 2004 (69 FR 51864).

2.0 PROPOSED CHANGE

The required frequency of SR 3.1.4.2, control rod scram time testing, is changed from "120 days cumulative operation in MODE 1" to "200 days cumulative operation in MODE 1." This change is based on Technical Specification Task Force (TSTF) change traveler TSTF-460, Revision 0, which has been approved generically by the Nuclear Regulatory Commission (NRC) for the boiling water reactor (BWR) Standard Technical Specifications – General Electric Plants (BWR/6), NUREG-1434.

3.0 BACKGROUND

The background for this application is adequately addressed by the CLIIP Notice of Availability published on August 23, 2004 (69 FR 51864) and TSTF-460.

4.0 REGULATORY REQUIREMENTS AND GUIDANCE

The applicable regulatory requirements and guidance associated with this application are adequately addressed by the CLIIP Notice of Availability published on August 23, 2004 (69 FR 51864) and TSTF-460.

5.0 TECHNICAL ANALYSIS

For the Perry Nuclear Power Plant (PNPP), FirstEnergy Nuclear Operating Company (FENOC) has reviewed the safety evaluation (SE) published on August 23, 2004 (69 FR 51864) as part of the CLIIP Notice of Availability. This verification included a review of the NRC staff's SE and the supporting information provided to support TSTF-460. FENOC has concluded that the justifications presented in the TSTF proposal and the SE prepared by the NRC staff are applicable to PNPP and justify this amendment for the incorporation of the changes to the PNPP TS.

As described in the CLIIP model SE, part of the justification for the change in surveillance frequency is the high reliability of the PNPP control rod drive system. As requested in the notice of availability published on August 23, 2004 (69 FR 51864), the historical performance of the control rod drive system at PNPP is as follows:

> Since the fall 1996 implementation of Improved Technical Specifications, insertion time test results covering all 177 control rods have shown the control rod drive system at PNPP to be highly reliable. During 6036 control rod insertion

tests, only 7 control rod tests (0.12 percent) yielded results slower than the required insertion time limit, and no control rods were inoperable as a result of scram time testing. Testing of the seven control rods slower than the required insertion time limit, but still TS operable, occurred:

January 7, 1997 (Cycle 6) three control rods slow
January 7, 1999 (Cycle 7) one control rod slow
March 27, 1999 (Cycle 7) three control rods slow

All seven slow insertion time test results have been attributed to control rod scram solenoid pilot valves (SSPVs). The three slow Cycle 6 control rods had their SSPVs replaced in January 1997, and all SSPVs were replaced in April 1999. Subsequently, FENOC initiated a control rod SSPV upgrade program for PNPP to improve component reliability and extend component qualified life. This initiative resulted in 177 improved SSPVs installed in three lots over several years as noted below:

May 2002	6 SSPVs
May 2003	82 SSPVs
April 2007	89 SSPVs

Since startup into Cycle 8 in May 1999, over 11 years of operation and 4134 control rod insertion tests covering 177 control rods, PNPP has not experienced any slow but operable control rods, or inoperable control rods resulting from scram time testing. This high degree of reliability supports FENOC's request to extend the surveillance frequency from 120 days of cumulative operation in MODE 1 to 200 days of cumulative operation in MODE 1.

6.0 COMMITMENTS

Current TS Bases state that the acceptance criteria have been met if 20 percent or fewer of the sample control rods that are tested are found to be slow. The acceptance criterion is being redefined to 7.5 percent for at-power surveillance testing when the surveillance period is extended to 200 cumulative days of operation in Mode 1. This tightened acceptance criterion for at-power surveillance aligns with the TS 3.1.4 requirement for the total control rods allowed to have scram times exceeding the specified limit.

As discussed in the CLIIP model SE published in the Federal Register on August 23, 2004 (69 FR 51864) for this TS improvement, FENOC is making the following regulatory commitment with the understanding that the NRC will include it as a condition for the issuance of the requested amendment:

FENOC will incorporate the revised acceptance criterion value of 7.5 percent into the TS Bases for PNPP in accordance with the Bases Control Program described in TS 5.5.11.

7.0 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

FENOC has reviewed the proposed no significant hazards consideration determination published on August 23, 2004 (69 FR 51864) as part of the CLIIP. FENOC has concluded that the proposed determination presented in the notice is applicable to PNPP and the determination is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91(a).

8.0 ENVIRONMENTAL EVALUATION

FENOC has reviewed the environmental evaluation included in the model SE published on August 23, 2004 (69 FR 51864) as part of the CLIIP. FENOC has concluded that the NRC staff's findings presented in that evaluation are applicable to PNPP and the evaluation is hereby incorporated by reference for this application.

9.0 PRECEDENT

This application is being made in accordance with the CLIIP. FENOC is not proposing variations or deviations from the TS changes described in TSTF-460 or the NRC staff's model SE published on August 23, 2004 (69 FR 51864).

10.0 REFERENCES

Federal Register Notice: Notice of Availability of Model Application Concerning Technical Specification Improvement Regarding Revision to the Control Rod Scram Time Testing Frequency in STS 3.1.4, "Control Rod Scram Times" for General Electric Boiling Water Reactors Using the Consolidated Line Item Improvement Process, August 23, 2004 (69 FR 51864).

Attachment 1

PROPOSED TECHNICAL SPECIFICATION CHANGES

(MARK-UP)

(Three Pages Follow)

3.1 REACTIVITY CONTROL SYSTEMS

3.1.4 Control Rod Scram Times

LCO 3.1.4

a. No more than 13 OPERABLE control rods shall be "slow," in accordance with Table 3.1.4-1; and

b. No OPERABLE control rod that is "slow" shall occupy a location adjacent to another OPERABLE control rod that is "slow" or a withdrawn control rod that is stuck.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------
During single control rod scram time Surveillances, the control rod drive (CRD) pumps shall be isolated from the associated scram accumulator.

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify each control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ 950 psig.	Prior to exceeding 40% RTP after fuel movement within the reactor pressure vessel AND (continued)

NO CHANGES ON THIS PAGE — PROVIDED FOR CONTINUITY

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	(continued)	Prior to exceeding 40% RTP after each reactor shutdown ≥ 120 days
SR 3.1.4.2	Verify, for a representative sample, each tested control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ 950 psig.	~~120~~ 200 days cumulative operation in MODE 1
SR 3.1.4.3	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 with any reactor steam dome pressure.	Prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect scram time
SR 3.1.4.4	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ 950 psig.	Prior to exceeding 40% RTP after work on control rod or CRD System that could affect scram time

Table 3.1.4-1
Control Rod Scram Times

----------NOTES----------

1. OPERABLE control rods with scram times not within the limits of this Table are considered "slow."

2. Enter applicable Conditions and Required Actions of LCO 3.1.3, "Control Rod OPERABILITY," for control rods with scram times > 7 seconds to notch position 13. These control rods are inoperable, in accordance with SR 3.1.3.3, and are not considered "slow."

NOTCH POSITION	SCRAM TIMES(a)(b) (seconds)	
	REACTOR STEAM DOME PRESSURE(c) 950 psig	REACTOR STEAM DOME PRESSURE(c) 1050 psig
43	0.30	0.31
29	0.78	0.84
13	1.40	1.53

(a) Maximum scram time from fully withdrawn position, based on de-energization of scram pilot valve solenoids as time zero.

(b) Scram times as a function of reactor steam dome pressure when < 950 psig are within established limits.

(c) For intermediate reactor steam dome pressures, the scram time criteria are determined by linear interpolation.

NO CHANGES ON THIS PAGE

PROVIDED FOR CONTINUITY

Attachment 2

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES

(PROVIDED FOR INFORMATION)

(Seven Pages Follow)

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.4 Control Rod Scram Times

INFORMATION ONLY

BASES

BACKGROUND

The scram function of the Control Rod Drive (CRD) System controls reactivity changes during abnormal operational transients to ensure that specified acceptable fuel design limits are not exceeded (Ref. 1). The control rods are scrammed by positive means, using hydraulic pressure exerted on the CRD piston.

When a scram signal is initiated, control air is vented from the scram valves, allowing them to open by spring action. Opening the exhaust valves reduces the pressure above the main drive piston to atmospheric pressure, and opening the inlet valve applies the accumulator or reactor pressure to the bottom of the piston. Since the notches in the index tube are tapered on the lower edge, the collet fingers are forced open by cam action, allowing the index tube to move upward without restriction because of the high differential pressure across the piston. As the drive moves upward and accumulator pressure drops below the reactor pressure, a ball check valve opens, letting the reactor pressure complete the scram action. If the reactor pressure is low, such as during startup, the accumulator will fully insert the control rod within the required time without assistance from reactor pressure.

APPLICABLE SAFETY ANALYSES

The analytical methods and assumptions used in evaluating the control rod scram function are presented in References 2, 3, 4, and 5. The Design Basis Accident (DBA) and transient analyses assume that all of the control rods scram at a specified insertion rate. The resulting negative scram reactivity forms the basis for the determination of plant thermal limits (e.g., the MCPR). Other distributions of scram times (e.g., several control rods scramming slower than the average time, with several control rods scramming faster than the average time) can also provide sufficient scram reactivity. Surveillance of each individual control rod's scram time ensures the scram reactivity assumed in the DBA and transient analyses can be met.

(continued)

NO CHANGE ON THIS PAGE

INFORMATION ONLY

BASES

APPLICABLE SAFETY ANALYSES (continued)

The scram function of the CRD System protects the MCPR Safety Limit (SL) (see Bases for LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)"), and the 1% cladding plastic strain fuel design limit (see Bases for LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," and LCO 3.2.3, "LINEAR HEAT GENERATION RATE (LHGR)"), which ensure that no fuel damage will occur if these limits are not exceeded. Above 950 psig, the scram function is designed to insert negative reactivity at a rate fast enough to prevent the actual MCPR from becoming less than the MCPR SL during the analyzed limiting power transient. Below 950 psig, the scram function is assumed to perform during the control rod drop accident (Ref. 6) and, therefore, also provides protection against violating fuel damage limits during reactivity insertion accidents (see Bases for LCO 3.1.6, "Control Rod Pattern"). For the reactor vessel overpressure protection analysis, the scram function, along with the safety/relief valves, ensure that the peak vessel pressure is maintained within the applicable ASME Code limits.

Control rod scram times satisfy Criterion 3 of the NRC Final Policy Statement on Technical Specification Improvements (58 FR 39132).

LCO

The scram times specified in Table 3.1.4-1 are required to ensure that the scram reactivity assumed in the DBA and transient analysis is met. To account for single failure and "slow" scramming control rods, the scram times specified in Table 3.1.4-1 are faster than those assumed in the design basis analysis. The scram times have a margin to allow up to 7.5% of the control rods (i.e., 177 x 7.5% = 13) to have scram times that exceed the specified limits (i.e., "slow" control rods) assuming a single stuck control rod (as allowed by LCO 3.1.3, "Control Rod OPERABILITY") and an additional control rod failing to scram per the single failure criterion. The scram times are specified as a function of reactor steam dome pressure to account for the pressure dependence of the scram times. The scram times are specified relative to measurements based on reed switch positions, which provide the control rod position indication. The reed switch closes ("pickup") when the index tube passes a specific location and then opens ("dropout") as the index tube travels upward. Verification of the specified scram times in Table 3.1.4-1 is accomplished through measurement of the "dropout" times.

(continued)

NO CHANGE ON THIS PAGE

INFORMATION ONLY

BASES

LCO (continued)

To ensure that local scram reactivity rates are maintained within acceptable limits, no "slow" control rods may occupy a location adjacent to another "slow" control rod or adjacent to a withdrawn stuck control rod.

Table 3.1.4-1 is modified by two Notes, which state control rods with scram times not within the limits of the Table are considered "slow" and that control rods with scram times > 7 seconds are considered inoperable as required by SR 3.1.3.3.

This LCO applies only to OPERABLE control rods since inoperable control rods will be inserted and disarmed (LCO 3.1.3). Slow scramming control rods may be conservatively declared inoperable and not accounted for as "slow" control rods.

APPLICABILITY

In MODES 1 and 2, a scram is assumed to function during transients and accidents analyzed for these plant conditions. These events are assumed to occur during startup and power operation; therefore, the scram function of the control rods is required during these MODES. In MODES 3 and 4, the control rods are not able to be withdrawn since the reactor mode switch is in the shutdown position and a control rod block is applied. This provides adequate requirements for control rod scram capability during these conditions. Scram requirements in MODE 5 are contained in LCO 3.9.5, "Control Rod OPERABILITY-Refueling."

ACTIONS

A.1

When the requirements of this LCO are not met, the rate of negative reactivity insertion during a scram may not be within the assumptions of the safety analyses. Therefore, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 12 hours. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

(continued)

NO CHANGE ON THIS PAGE

BASES (continued) INFORMATION ONLY

SURVEILLANCE REQUIREMENTS

The four SRs of this LCO are modified by a Note stating that during a single control rod scram time surveillance, the CRD pumps shall be isolated from the associated scram accumulator. With the CRD pump isolated (i.e., charging valve closed), the influence of the CRD pump head does not affect the single control rod scram times. During a full core scram, the CRD pump head would be seen by all control rods and would have a negligible effect on the scram insertion times.

SR 3.1.4.1

The scram reactivity used in DBA and transient analyses is based on assumed control rod scram time. Measurement of the scram times with reactor steam dome pressure ≥ 950 psig demonstrates acceptable scram times for the transients analyzed in References 3 and 4.

Scram insertion times increase with increasing reactor pressure because of the competing effects of reactor steam dome pressure and stored accumulator energy. Therefore, demonstration of adequate scram times at reactor steam dome pressure greater than 950 psig ensures that the scram times will be within the specified limits at higher pressures. Limits are specified as a function of reactor pressure to account for the sensitivity of the scram insertion times with pressure and to allow a range of pressures over which scram time testing can be performed. To ensure scram time testing is performed within a reasonable time following a refueling or after a shutdown ≥ 120 days, all control rods are required to be tested before exceeding 40% RTP. This Frequency is acceptable, considering the additional surveillances performed for control rod OPERABILITY, the frequent verification of adequate accumulator pressure, and the required testing of control rods affected by work on control rods or the CRD System.

SR 3.1.4.2

Additional testing of a sample of control rods is required to verify the continued performance of the scram function during the cycle. A representative sample contains at least 10% of the control rods. The sample remains "representative" if no more than ~~20%~~ of the control rods in

7.5%

(continued)

BASES

INFORMATION ONLY

SURVEILLANCE REQUIREMENTS

SR 3.1.4.2 (continued)

the tested sample are determined to be "slow." If more than ~~20%~~ of the sample is declared to be "slow" per the criteria in Table 3.1.4-1, additional control rods are tested until this ~~20%~~ criterion (e.g., ~~20%~~ of the entire sample size) is satisfied, or until the total number of "slow" control rods (throughout the core, from all surveillances) exceeds the LCO limit. For planned testing, the control rods selected for the sample shall be different for each test in a cycle. Data from inadvertent scrams should be used whenever possible to avoid unnecessary testing at power, even if the control rods with data were previously tested in a sample. The ~~120~~ day Frequency is based on operating experience that has shown control rod scram times do not significantly change over an operating cycle. This Frequency is also reasonable, based on the additional Surveillances done on the CRDs at more frequent intervals in accordance with LCO 3.1.3 and LCO 3.1.5, "Control Rod Scram Accumulators."

7.5%

200

SR 3.1.4.3

When work that could affect the scram insertion time is performed on a control rod or the CRD System, testing must be done to demonstrate that each affected control rod retains adequate scram performance over the range of applicable reactor pressures from zero to the maximum permissible pressure. The scram testing must be performed once before declaring the control rod OPERABLE. The required scram time testing must demonstrate that the affected control rod is still within acceptable limits. For control rod drive scram time testing at less than 950 psig, the following scram times to notch position 13 shall be used as acceptance criteria:

0 psig - 0.94 seconds

600 psig - 1.13 seconds

950 psig - 1.40 seconds

(continued)

BASES

INFORMATION ONLY

SURVEILLANCE REQUIREMENTS

SR 3.1.4.3 (continued)

For intermediate reactor steam dome pressures, the scram time criteria are determined by linear interpolation. The limits for reactor pressures < 950 psig are established based on a high probability of meeting the acceptance criteria at reactor pressures ≥ 950 psig. Limits for ≥ 950 psig are found in Table 3.1.4-1. If testing demonstrates the affected control rod does not meet these limits, but is within the 7 second limit of Table 3.1.4-1 Note 2, the control rod can be declared OPERABLE and "slow."

Specific examples of work that could affect the scram times include (but are not limited to) the following: removal of any CRD for maintenance or modification; replacement of a control rod; and maintenance or modification of a scram solenoid pilot valve, scram valve, accumulator isolation valve, or check valves in the piping required for scram.

The Frequency of once prior to declaring the affected control rod OPERABLE is acceptable because of the capability of testing the control rod over a range of operating conditions and the more frequent surveillances on other aspects of control rod OPERABILITY.

SR 3.1.4.4

When work that could affect the scram insertion time is performed on a control rod or CRD System, testing must be done to demonstrate each affected control rod is still within the limits of Table 3.1.4-1 with the reactor steam dome pressure ≥ 950 psig. Where work has been performed at high reactor pressure, the requirements of SR 3.1.4.3 and SR 3.1.4.4 will be satisfied with one test. For a control rod affected by work performed while shut down, however, a zero pressure and a high pressure test may be required. This testing ensures that the control rod scram performance is acceptable for operating reactor pressure conditions prior to withdrawing the control rod for continued operation. Alternatively, a test during hydrostatic pressure testing could also satisfy both criteria.

The Frequency of once prior to exceeding 40% RTP is acceptable because of the capability of testing the control rod at the different conditions and the more frequent surveillances on other aspects of control rod OPERABILITY.

(continued)

NO CHANGE ON THIS PAGE

BASES (continued)

INFORMATION ONLY

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10.
2. USAR, Section 4.3.2.5.5.
3. USAR, Section 4.6.1.1.2.5.3.
4. USAR, Section 5.2.2.2.2.3.
5. USAR, Section 15.4.1.
6. USAR, Section 15.4.9.

NO CHANGE ON THIS PAGE

Attachment 3

PROPOSED TECHNICAL SPECIFICATION CHANGES

(RETYPED)

(One Page Follows)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	(continued)	Prior to exceeding 40% RTP after each reactor shutdown ≥ 120 days
SR 3.1.4.2	Verify, for a representative sample, each tested control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ 950 psig.	200 days cumulative operation in MODE 1
SR 3.1.4.3	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 with any reactor steam dome pressure.	Prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect scram time
SR 3.1.4.4	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ 950 psig.	Prior to exceeding 40% RTP after work on control rod or CRD System that could affect scram time