FPL Energy Duane Arnold, LLC
3277 DAEC Road
Palo, Iowa 52324

FPL Energy.
Duane Arnold Energy Center

September 14, 2007

NG-07-0571
10 CFR 50.90

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

Duane Arnold Energy Center
Docket 50-331
License No. DPR-49

Application for Technical Specification Improvement to Adopt TSTF-476, Revision 1, "Improved Banked Position Withdrawal Sequence (BPWS) Control Rod Insertion Process (NEDO-33091)"
Affected Technical Specification: Section 3.3.2.1

Pursuant to 10 CFR 50.90, FPL Energy Duane Arnold, LLC (FPL Energy Duane Arnold) hereby requests revision to the Technical Specifications (TS) for the Duane Arnold Energy Center (DAEC).

The proposed changes would revise TS Bases Sections 3.1.6, "Rod Pattern Control," and 3.3.2.1, "Control Rod Block Instrumentation," to allow FPL Energy Duane Arnold to reference a new Banked Position Withdrawal Sequence (BPWS) shutdown sequence in the TS Bases. In addition, a footnote is added to TS Table 3.3.2.1-1, "Control Rod Block Instrumentation."

The changes are consistent with NRC approved Industry Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler, TSTF-476, Revision 1, "Improved BPWS Control Rod Insertion Process (NEDO-33091)." The availability of this TS improvement was announced in the Federal Register on May 23, 2007 (72 FR 29004) as part of the consolidated line item improvement process (CLIIP).

FPL Energy Duane Arnold requests an implementation period of 30 days after issuance of the license amendment.

A copy of this submittal, along with the 10 CFR 50.92 evaluation of "No Significant Hazards Consideration," is being forwarded to our appointed state official pursuant to 10 CFR 50.91.

A001
NRR

Commitments made in this submittal are listed in Section 5.1 of Enclosure A. If you have any questions or require additional information, please contact Steve Catron at (319) 851-7234.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 14, 2007.

Gary Van Middlesworth
Site Vice President, Duane Arnold Energy Center
FPL Energy Duane Arnold, LLC

Enclosures: A) Evaluation of Proposed Change
B) Proposed Technical Specification and Bases Changes (Mark-Up)
C) Proposed Technical Specification Page (Re-Typed)

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC
D. McGhee (State of Iowa)

ENCLOSURE A

EVALUATION OF PROPOSED CHANGE

Subject: Application for Technical Specification Improvement to Adopt TSTF-476, Revision 1, "Improved Banked Position Withdrawal Sequence (BPWS) Control Rod Insertion Process (NEDO-33091)"

3 Pages Follow

ENCLOSURE A

Application for Technical Specification Improvement to Adopt TSTF-476, Revision 1, "Improved Banked Position Withdrawal Sequence (BPWS) Control Rod Insertion Process (NEDO-33091)"

1.0 DESCRIPTION

This letter is a request to amend Operating License DPR-49 for the Duane Arnold Energy Center (DAEC). The proposed changes would revise the Bases sections of Technical Specification (TS) 3.1.6, "Rod Pattern Control," and 3.3.2.1, "Control Rod Block Instrumentation," along with TS Table 3.3.2.1-1, "Control Rod Block Instrumentation," to allow reference to an improved, optional Banked Position Withdrawal Sequence (BPWS) for use during reactor shutdown. The new BPWS is described in Topical Report NEDO-33091-A, Revision 2, "Improved BPWS Control Rod Insertion Process," dated July 2004, and approved by the NRC by a Safety Evaluation (SE) dated June 16, 2004 (ML041700479). Technical Specification Task Force (TSTF) change traveler TSTF-476, Revision 1, "Improved BPWS Control Rod Insertion Process (NEDO-33091)" was announced for availability in the Federal Register on May 23, 2007 (72 FR 29004) as part of the consolidated line item improvement process (CLIIP).

2.0 PROPOSED CHANGES

Consistent with NRC-approved TSTF-476, Revision 1, the proposed TS change includes:

1. Revised TS Section 3.1.6 Bases to allow use of an optional BPWS during plant shutdown.

2. Revised TS Section 3.3.2.1 Bases to allow reprogramming of the rod worth minimizer during the optional BPWS shutdown sequence.

3. Revised TS Table 3.3.2.1-1, "Control Rod Block Instrumentation," which adds a footnote that allows operators to bypass the rod worth minimizer if conditions for the optional BPWS shutdown process are satisfied.

3.0 BACKGROUND

The background for this application is as stated in the model SE in NRC's Notice of Availability published on May 23, 2007 (72 FR 29004), the NRC Notice for Comment published on May 3, 2006 (71 FR 26118) and TSTF-476, Revision 1.

ENCLOSURE A

4.0 TECHNICAL ANALYSIS

FPL Energy Duane Arnold LLC (FPL Energy Duane Arnold) has reviewed NEDO-33091-A, Revision 2, and the staff's SE dated June 16, 2004, as well as TSTF-476, Revision 1, and the model SE published on May 23, 2007 (72 FR 29004) as part of the CLIIP Notice for Comment. FPL Energy Duane Arnold has applied the methodology in NEDO-33091-A, Revision 2 to develop the proposed TS changes. FPL Energy Duane Arnold has also concluded that the justifications presented in TSTF-476, Revision 1 and the model SE prepared by the NRC staff are applicable to the DAEC, and justify this amendment for the incorporation of the changes to the DAEC TS.

5.0 REGULATORY ANALYSIS

A description of this proposed change and its relationship to applicable regulatory requirements and guidance was provided in the NRC Notice of Availability published on May 23, 2007 (72 FR 29004), the NRC Notice for Comment published on May 3, 2006 (71 FR 26118), and TSTF-476, Revision 1.

5.1 Regulatory Commitments

As discussed in the model SE published in Federal Register on May 23, 2007 (72 FR 29004) for this technical specification improvement, the following plant-specific verifications/commitments were performed. The safety evaluation for NEDO-33091-A explained that the potential for the control rod drop accident (CRDA) will be eliminated by the following changes to the operational procedures, which FPL Energy Duane Arnold has made:

1. Before reducing power to the low power setpoint (LPSP), operators shall confirm control rod coupling integrity for all rods that are fully withdrawn. Control rods that have not been confirmed coupled and are in intermediate positions must be fully inserted prior to power reduction to the LPSP. No action is required for fully-inserted control rods.

   If a shutdown is required and all rods, which are not confirmed coupled, cannot be fully inserted prior to the power dropping below the LPSP, then the original/standard BPWS must be adhered to. The original/standard BPWS can be found in Licensing Topical Report (LTR) NEDO-21231, "Banked Position Withdrawal Sequence," January 1977, and is referred to in NUREG-1433 and NUREG-1434.

2. After reactor power drops below the LPSP, rods may be inserted from notch position 48 to notch position 00 without stopping at the intermediate positions. However, GE Nuclear Energy recommends that operators insert rods in the same order as specified for the original/standard BPWS as much as is reasonably possible. If a plant is in the process of shutting down following

improved BPWS with the power below the LPSP, no control rod shall be withdrawn unless the control rod pattern is in compliance with standard BPWS requirements.

In addition to the procedure changes specified above, the staff previously concluded, based on its review of NEDO-33091-A, that no single failure of the boiling water reactor control rod drive (CRD) mechanical or hydraulic system can cause a control rod to drop completely out of the reactor core during the shutdown process. Therefore, the proper use of the improved BPWS will prevent a CRDA from occurring while power is below the LPSP. FPL Energy Duane Arnold has verified, in accordance with NEDO-33091-A, Revision 2, that no single failure of the boiling water reactor CRD mechanical or hydraulic system can cause a control rod to drop completely out of the reactor core during the shutdown process.

6.0 NO SIGNIFICANT HAZARDS CONSIDERATION

FPL Energy Duane Arnold has reviewed the proposed no significant hazards consideration determination published on May 23, 2007 (72 FR 29004) as part of the CLIIP. FPL Energy Duane Arnold has concluded that the proposed determination presented in the notice is applicable to the DAEC and the determination is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91(a).

7.0 ENVIRONMENTAL EVALUATION

FPL Energy Duane Arnold has reviewed the environmental consideration included in the model SE published on May 23, 2007 (72 FR 29004) as part of the CLIIP. FPL Energy Duane Arnold has concluded that the staff's findings presented therein are applicable to the DAEC and the determination is hereby incorporated by reference for this application.

8.0 REFERENCES

Federal Register Notices:

1. Notice for Comment published on May 3, 2006 (71 FR 26118) (ML060650252)
2. Notice of Availability published on May 23, 2007 (72 FR 29004) (ML070880921)

ENCLOSURE B

PROPOSED TECHNICAL SPECIFICATION AND BASES CHANGES

(MARK-UP)

5 Pages Follow

Table 3.3.2.1-1 (page 1 of 1)
Control Rod Block Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Rod Block Monitor				
a. Low Power Range - Upscale	(a)	2	SR 3.3.2.1.1 SR 3.3.2.1.4 SR 3.3.2.1.5	$\leq$ 115.5/125 divisions of full scale
b. Intermediate Power Range - Upscale	(b)	2	SR 3.3.2.1.1 SR 3.3.2.1.4 SR 3.3.2.1.5	$\leq$ 109.7/125 divisions of full scale
c. High Power Range - Upscale	(c),(d)	2	SR 3.3.2.1.1 SR 3.3.2.1.4 SR 3.3.2.1.5	$\leq$ 105.9/125 divisions of full scale
d. Inop	(d),(e)	2	SR 3.3.2.1.1	NA
e. Downscale	(d),(e)	2	SR 3.3.2.1.1 SR 3.3.2.1.5	NA
f. Bypass Time Delay	(d),(e)	2	SR 3.3.2.1.1 SR 3.3.2.1.5	$\leq$ 2.0 seconds
2. Rod Worth Minimizer	$1^{(f)}, 2^{(f)}$	1	SR 3.3.2.1.2 SR 3.3.2.1.3 SR 3.3.2.1.7	NA
3. Reactor Mode Switch – Shutdown Position	(g)	2	SR 3.3.2.1.6	NA

(a) THERMAL POWER $\geq$ 30% and < 65% RTP and MCPR < 1.70.

(b) THERMAL POWER $\geq$ 65% and < 85% RTP and MCPR < 1.70.

(c) THERMAL POWER $\geq$ 85% and < 90% RTP and MCPR < 1.70.

(d) THERMAL POWER $\geq$ 90% RTP and MCPR < 1.40.

(e) THERMAL POWER $\geq$ 30% and < 90% RTP and MCPR < 1.70.

(f) With THERMAL POWER $\leq$ 10% RTP, *except during the reactor shutdown process if the coupling of each withdrawn control rod has been confirmed.*

(g) Reactor mode switch in the shutdown position.

APPLICABLE SAFETY ANALYSES (continued)

Control rod patterns analyzed in Reference 1 follow the Banked Position Withdrawal Sequence (BPWS). The BPWS is applicable from the condition of all control rods fully inserted to 10% RTP (Ref. 2). For the BPWS, the control rods are required to be moved in groups, with all control rods assigned to a specific group required to be within specified banked positions (e.g., between notches 08 and 12). The banked positions are established to minimize the maximum incremental control rod worth without being overly restrictive during normal plant operation. Generic analysis of the BPWS (Ref. 1) has demonstrated that the 280 cal/gm fuel damage limit will not be violated during a CRDA while following the BPWS ~~M~~*m*ode of operation. The generic BPWS analysis (Ref. 8) also evaluates the effect of fully inserted, inoperable control rods not in compliance with the sequence, to allow a limited number (i.e., eight) and distribution of fully inserted, inoperable control rods. The Reduced Notch Worth Procedure (RNWP) (Ref. 9) is an extension of the BPWS and may be used at DAEC during control rod withdrawal to avoid high notch worth scrams.

When performing a shutdown of the plant, an optional BPWS control rod sequence (Ref. 10) may be used provided that all withdrawn control rods have been confirmed to be coupled. The rods may be inserted without the need to stop at intermediate positions since the possibility of a CRDA is eliminated by the confirmation that withdrawn control rods are coupled. When using the Reference 10 control rod sequence for shutdown, the Rod Worth Minimizer may be reprogrammed to enforce the requirements of the improved BPWS control rod insertion process, or bypassed in accordance with the allowance provided in the Applicability Note for the Rod Worth Minimizer in Table 3.3.2.1-1.

In order to use the Reference 10 BPWS shutdown process, an extra check is required in order to consider a control rod to be "confirmed" to be coupled. This extra check ensures that no Single Operator Error can result in an incorrect coupling check. For purposes of this shutdown process, the method for confirming that control rods are coupled varies depending on the position of the control rod in the core. Details on this coupling confirmation requirement are provided in site procedures, which conform to Reference 10. If the requirements for use of the BPWS control rod insertion process contained in Reference 10 are followed, the plant is considered to be in compliance with BPWS requirements, as required by LCO 3.1.6.

Rod Pattern Control satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

The control rod pattern is verified to be in compliance with the BPWS at a 24 hour Frequency to ensure the assumptions of the CRDA analyses are met. The 24 hour Frequency was developed considering that the primary check on compliance with the BPWS is performed by the RWM (LCO 3.3.2.1), which provides control rod blocks to enforce the required sequence and is required to be OPERABLE when operating at ≤ 10% RTP.

REFERENCES

1. NEDE-24011-P-A-US, "General Electric Standard Application for Reactor Fuel, Supplement for United States," Section 2.2.3.1.

2. Letter from T. A. Pickens (BWROG) to G.E. Laines (NRC), "Amendment 17 to General Electric Licensing Topical Report NEDE-24011-P-A", BWROG-8644, August 15, 1988.

3. NUREG-0979, Section 4.2.1.3.2, April 1983.

4. NUREG-0800, Section 15.4.9, Revision 2, July 1981.

5. 10 CFR 50.67.

6. NEDO-21778-A, "Transient Pressure Rises Affected Fracture Toughness Requirements for Boiling Water Reactors," December 1978.

7. ASME, Boiler and Pressure Vessel Code.

8. NEDO-21231, "Banked Position Withdrawal Sequence," January 1977.

9. GE SIL No. 316, "Reduced Notch Worth Procedures," November 1979.

10. NEDO-33091-A, Rev.2, "Improved BPWS Control Rod Insertion Process," July 2004.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1. Rod Block Monitor (continued)

(Ref. 3). When operating < 90% RTP, analyses (Ref. 3) have shown that with an initial MCPR ≥ 1.70, no RWE event will result in exceeding the MCPR SL. Also, the analyses demonstrate that when operating at ≥ 90% RTP with MCPR ≥ 1.40, no RWE event will result in exceeding the MCPR SL (Ref. 3). Therefore, under these conditions, the RBM is also not required to be OPERABLE.

2. Rod Worth Minimizer

The RWM enforces a rod pattern which is consistent with the Banked Position Withdrawal Sequence (BPWS) to ensure that the initial conditions of the CRDA analysis are not violated. The analytical methods and assumptions used in evaluating the CRDA are summarized in References 4, 5, 6, 7, *and 11*. The *standard* BPWS requires that control rods be moved in groups, with all control rods assigned to a specific group required to be within specified banked positions. Requirements that the control rod sequence is in compliance with the BPWS are specified in LCO 3.1.6, "Rod Pattern Control."

When performing a shutdown of the plant, an optional BPWS control rod sequence (Ref. 11) may be used if the coupling of each withdrawn control rod has been confirmed. The rods may be inserted without the need to stop at intermediate positions. When using the Reference 11 control rod insertion sequence for shutdown, the Rod Worth Minimizer may be reprogrammed to enforce the requirements of the improved BPWS control rod insertion process, or it can be bypassed if it is not programmed to reflect the optional BPWS shutdown sequence, as permitted by the Applicability Note for the RWM in Table 3.3.2.1-1.

The RWM Function satisfies Criterion 3 of 10 CFR 50.36 (c)(2)(ii).

Since the RWM is a hardwired system designed to act as a backup to operator control of the rod sequences, only one channel of the RWM is available and required to be OPERABLE (Ref. 7). Special circumstances provided for in the Required Action of LCO 3.1.3, "Control Rod OPERABILITY," and LCO 3.1.6 may necessitate bypassing the RWM to allow continued operation with inoperable control rods, or to allow correction of a control rod

(continued)

BASES (continued)

REFERENCES

1. UFSAR, Section 7.6.1.8.

2. UFSAR, Section 7.7.7.

3. UFSAR, Section 15.1.4.1.

4. NEDE-24011-P-A-US, "General Electrical Standard Application for Reload Fuel," Supplement for United States, Section S 2.2.3.1.

5. "Modifications to the Requirements for Control Rod Drop Accident Mitigating Systems," BWR Owners' Group, July 1986.

6. NEDO-21231, "Banked Position Withdrawal Sequence," January 1977.

7. NRC SER, "Acceptance of Referencing of Licensing Topical Report NEDE-24011-P-A," "General Electric Standard Application for Reactor Fuel, Revision 8, Amendment 17," December 27, 1987.

8. NEDC-30851-P-A, "Technical Specification Improvement Analysis for BWR Control Rod Block Instrumentation," October 1988.

9. GENE-770-06-1, "Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times for Selected Instrumentation Technical Specifications," February 1991.

10. Licensee Event Report #97-07, "Inadequate Testing of the Reactor Mode Switch to Shutdown Position Rod Block Function and Rod Block Monitor."

11. NEDO-33091-A, Rev. 2, "Improved BPWS Control Rod Insertion Process," July 2004.

ENCLOSURE C

PROPOSED TECHNICAL SPECIFICATION PAGE

(RE-TYPED)

1 Page Follows

Table 3.3.2.1-1 (page 1 of 1)
Control Rod Block Instrumentation

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c. High Power Range - Upscale	(c),(d)	2	SR 3.3.2.1.1 SR 3.3.2.1.4 SR 3.3.2.1.5	≤ 105.9/125 divisions of full scale
d. Inop	(d),(e)	2	SR 3.3.2.1.1	NA
e. Downscale	(d),(e)	2	SR 3.3.2.1.1 SR 3.3.2.1.5	NA
f. Bypass Time Delay	(d),(e)	2	SR 3.3.2.1.1 SR 3.3.2.1.5	≤ 2.0 seconds
2. Rod Worth Minimizer	$1^{(f)}, 2^{(f)}$	1	SR 3.3.2.1.2 SR 3.3.2.1.3 SR 3.3.2.1.7	NA
3. Reactor Mode Switch – Shutdown Position	(g)	2	SR 3.3.2.1.6	NA

(a) THERMAL POWER ≥ 30% and < 65% RTP and MCPR < 1.70.

(b) THERMAL POWER ≥ 65% and < 85% RTP and MCPR < 1.70.

(c) THERMAL POWER ≥ 85% and < 90% RTP and MCPR < 1.70.

(d) THERMAL POWER ≥ 90% RTP and MCPR < 1.40.

(e) THERMAL POWER ≥ 30% and < 90% RTP and MCPR < 1.70.

(f) With THERMAL POWER ≤ 10% RTP, except during the reactor shutdown process if the coupling of each withdrawn control rod has been confirmed.

(g) Reactor mode switch in the shutdown position.

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Duane Arnold Energy Center

September 14, 2007

NG-07-0749
10 CFR 50.46(a)(3)(ii)

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

Duane Arnold Energy Center
Docket 50-331
License No. DPR-49

10 CFR 50.46 Annual Report of Changes in Peak Cladding Temperature for the Duane Arnold Energy Center

Reference: Letter from G. Van Middlesworth (FPL Energy Duane Arnold) to USNRC, "10 CFR 50.46 Annual Report of Changes in Peak Cladding Temperature for the Duane Arnold Energy Center," NG-06-0633, dated September 20, 2006.

In accordance with 10 CFR 50.46(a)(3)(ii), FPL Energy Duane Arnold, LLC (hereafter FPL Energy Duane Arnold) hereby submits the annual report regarding the changes in the calculated peak cladding temperature (PCT) of the GE14 fuel currently utilized at the Duane Arnold Energy Center (DAEC). This report covers the period from the last annual report (reference) through August 31, 2007.

Our fuel vendor has notified FPL Energy Duane Arnold that no changes or errors in the current Loss-of-Coolant Accident analysis methodology have occurred subsequent to the referenced report. Enclosed is a current summary of the DAEC's analysis of record.

This letter contains no new commitments.

Gary Van Middlesworth
Site Vice President, Duane Arnold Energy Center
FPL Energy Duane Arnold

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Duane Arnold Energy Center, USNRC
Resident Inspector, Duane Arnold Energy Center, USNRC

Enclosure to
NG-07-0749
September 14, 2007

10 CFR 50.46 ANNUAL REPORT
for DAEC - 2007

	Peak Cladding Temperature[1]
Last Acceptable Model Results[2]:	1510°F
Previously Reported Errors and Changes:	
2001 - 2006[3]:	+ 65°F
New Errors and Changes:	0°F
Analysis of Record Results:	1575°F

(1) Licensing Basis PCT (LBPCT), as defined in NEDE-23785-1-P-A, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident: Volume III - SAFER/GESTR Application Methodology," February 1985.

(2) General Electric Report, "Safety Analysis Report for Duane Arnold Energy Center Extended Power Uprate," NEDC-32980P, Revision 1, April 2001.

(3) Evaluations of each reported error have concluded that re-analysis is not required.