

October 3, 2008

Mr. Richard L. Anderson  
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3277 DAEC Road  
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SUBJECT: DUANE ARNOLD ENERGY CENTER – AUTHORIZATION OF RELIEF  
REQUEST NDE-R009 REGARDING STOCK ROTATION OF THE  
RECIRCULATION PUMP SEAL ASSEMBLIES (TAC NO. MD8192)

Dear Mr. Anderson:

By letters dated March 28, 2008, (Agencywide Documents Access Management System (ADAMS) Accession No. ML080990626), and July 25, 2008, (ADAMS Accession No. ML082180449), FPL Energy Duane Arnold, LLC submitted for Nuclear Regulatory Commission (NRC) approval Relief Request (RR) NDE-R009 as an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The RR proposes to modify certain provisions of IWA-4132 of the ASME Code, Section XI, to perform the stock rotation of the recirculation pump seal flange assembly for the remainder of the fourth 10-year inservice inspection (ISI) interval at Duane Arnold Energy Center. The fourth 10-year ISI interval ends on February 21, 2014.

The NRC staff has reviewed the licensee's submittal and determined that the proposed alternative will provide an acceptable level of quality and safety. Therefore, pursuant to paragraph 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations*, the NRC staff authorizes the use of RR NDE-R009 for the fourth 10-year ISI interval at Duane Arnold. Details of the NRC staff's review are set forth in the enclosed safety evaluation.

If you have any questions regarding this matter, please contact the Project Manager, Peter Tam at 301-415-3079.

Sincerely,

[/RA/](#)

Lois M. James, Chief  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-331

Enclosure:  
Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST NDE-R009

STOCK ROTATION OF RECIRCULATION PUMP SEAL ASSEMBLY

THE FOURTH 10-YEAR INTERVAL OF INSERVICE INSPECTION

FPL ENERGY DUANE ARNOLD, LLC

DUANE ARNOLD ENERGY CENTER

1.0 INTRODUCTION

By letter dated March 28, 2008, (Agencywide Documents Access Management System (ADAMS) Accession No. ML080990626), FPL Energy Duane Arnold, LLC (the licensee) submitted for U.S Nuclear Regulatory Commission (NRC) approval Relief Request (RR) NDE-R009 as an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, (ASME Code), Section XI. The RR proposes alternatives to certain provisions of IWA-4132 of the ASME Code, Section XI to perform the stock rotation of the recirculation pump seal flange assembly for the remainder of the fourth 10-year inservice inspection (ISI) interval at Duane Arnold Energy Center (DAEC or Duane Arnold). The fourth 10-year ISI interval ends on February 21, 2014.

By letter dated July 25, 2008, (ADAMS Accession No. ML082180449), the licensee provided its response to the NRC staff's request for additional information dated July 11, 2008.

2.0 REGULATORY EVALUATION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, incorporated by reference in 10 CFR 50.55a(b), 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

Pursuant to 10 CFR 50.55a(a)(3) alternatives to the requirements of paragraph 50.55a(g)(4) may be authorized by the NRC if the licensee demonstrates that: (i) the proposed alternatives provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Enclosure

The ASME Code of record for the fourth 10-year ISI interval at Duane Arnold is the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI.

### 3.0 PROPOSED RELIEF REQUEST NDE-R009

#### 3.1 ASME Code Component Affected

The affected component is the ASME Class 1 recirculation pump seal flange assembly which includes the seal flange and cartridge.

#### 3.2 Applicable Code Edition and Addenda

The DAEC fourth ten-year interval uses the ASME Code, Section XI, 2001 Edition with the 2003 Addenda.

#### 3.3 Applicable Code Requirement

Subarticle IWA-4132 of the 2001 edition through the 2003 addenda of the ASME Code, Section XI, states that for snubbers and pressure relief valves rotated from stock and installed on components (including piping systems), the following requirements may be used in lieu of all other requirements of IWA-4000, provided the rotation is only for testing the removed items:

- (a) Items being removed and installed shall be of the same design and construction.
- (b) Items being removed shall have no evidence of failure at the time of removal.
- (c) Items being rotated shall be removed and installed only by mechanical means.
- (d) Items being installed shall previously have been in service.
- (e) Preservice inspections shall be performed as required by IWA-4500.
- (f) The Owner shall track the items to ensure traceability of inservice inspection and testing records.
- (g) Use of an inspector and an NIS-2 form are not required.
- (h) Testing of removed snubbers, including required sample expansion, shall be performed in accordance with Subsection IWF.

#### 3.4 Proposed Alternative and Basis for Use

The recirculation pump seal flange assembly consists of the seal cartridge and the seal flange. The seal flange is a pressure boundary component that supports the seal cartridge. The entire assembly (seal flange and seal cartridge) is bolted to the pump casing. During maintenance on the seal cartridge the complete assembly (seal cartridge and flange) is rotated as a single unit.

The normal activity of testing components under the criteria of IWA-4132 involves their removal from their installed location by mechanical means (i.e., disassembly and re-assembly of mechanical joints). IWA-4132 recognizes that, rather than re-install the same component tested, a similar component from stock can be rotated into service in its place.

FPL Energy Duane Arnold, LLC believes the criteria established in IWA-4132 for stock rotation of snubbers and pressure relief valves for testing can also be applied to the stock rotation of recirculation pump seal flange assemblies for preventative maintenance. FPL Energy Duane Arnold, LLC plans to apply IWA-4132 for stock rotation of recirculation pump seal flange assemblies, as described below:

- (1) The seal flange assembly being installed will be a like-for-like replacement (same design) and built to the same construction code.
- (2) The seal flange assembly will have no evidence of failure (failure being defined as the pressure boundary failure).
- (3) The seal flange assembly will be removed and installed by mechanical means.
- (4) The seal flange assembly will have been previously installed.
- (5) Preservice and inservice inspections will be completed (i.e., visual VT-1 of the bolting).
- (6) As the seal flange assembly is installed, the work will be controlled under the work order process. Unique identification for each item will be tracked and controlled.
- (7) An Inspector and NIS-2 form will not be used unless the item being installed has been repaired/replaced\* in accordance with IWA-4000. (\*If there is a repair/replacement activity performed on the item to be installed, FPL Duane Arnold, LLC plans to follow IWA-4000, including the use of an Inspector, NIS-2 form, and pressure testing.)
- (8) Testing of the seal flange assembly will be completed as needed to determine acceptability.

FPL Energy Duane Arnold, LLC has one spare recirculation pump seal flange assembly that will be used as stock rotation for preventive maintenance. The recirculation pump seal flange assembly is rotated from stock when the mechanical seal starts to show signs of wear prior to its failure. This spare recirculation pump seal flange assembly has been previously installed and subsequently refurbished by replacing seal components which are not pressure-retaining. FPL Energy Duane Arnold, LLC considers this stock rotation to be a maintenance function (disassembly and re-assembly of mechanical joints) and not a repair/replacement activity per IWA-4000.

Since IWA-4132 does not specifically include the stock rotation of recirculation pump seal flange assemblies, FPL Energy Duane Arnold, LLC requests the use of the criteria stated above for the stock rotation of recirculation pump seal flange assemblies as an alternative to the requirements of IWA-4000 for the fourth 10-year interval.

### 3.5 Duration of Proposed Alternative

This alternative will be used for the remainder of the DAEC fourth 10-year inspection interval which ends on February 21, 2014.

## 4.0 STAFF EVALUATION

The NRC staff evaluated the proposed relief request in the following two areas of concern. The first concern is related to whether the proposed stock rotation is considered a maintenance activity or a repair/replacement activity. Under the provisions of the ASME Code, Section XI, the repair/replacement activity requires more actions to be performed, such as inspection and testing, than a maintenance activity. The second concern is related to whether the proposed alternative satisfies the intent of IWA-4132 of the 2001 edition through 2003 addenda of the ASME Code, Section XI.

### 4.1 Maintenance Activity vs. Repair/Replacement Activity

Non-mandatory Appendix J of the ASME Code, Section XI, provides guidance to differentiate a maintenance activity from a repair/replacement activity. Article J-3000 of Appendix J provides

specific examples of maintenance activities. In particular, subarticle J-3000(d)(2) cites that mechanical seal maintenance is a maintenance activity.

Subarticle IWA-4132 of the 2001 edition through the 2003 addenda of the ASME Code, Section XI, allows stock rotation of components. However, the recirculation pump seal flange assembly is not a component allowed by IWA-4132 for the stock rotation. The licensee proposed an alternative which modifies certain requirements in IWA-4132 to the stock rotation of the recirculation pump seal flange assembly at Duane Arnold.

The recirculation pump seal flange assembly consists of the seal cartridge and the seal flange. The seal flange is a pressure boundary component that supports the seal cartridge. The entire assembly (seal flange and seal cartridge) is bolted to the pump casing. During maintenance on the seal cartridge the complete assembly (seal cartridge and flange) is rotated as a single unit (i.e., the existing unit is removed and a refurbished seal flange assembly is installed). The normal activity of testing components under the criteria of IWA-4132 involves their removal from their installed location by mechanical means (i.e., disassembly and re-assembly of mechanical joints). Subarticle IWA-4132 recognizes that, rather than re-install the same component tested, a similar component from stock can be rotated into service in its place. The licensee stated that the criteria established in IWA-4132 for stock rotation of snubbers and pressure relief valves for testing can also be applied to the stock rotation of recirculation pump seal flange assemblies for preventative maintenance. The licensee clarified further that the rotation of the recirculation pump seal flange assembly is a preventative maintenance activity unless an ASME Code, Section XI repair/replacement activity is being performed in addition to rotation of the seal flange assembly.

The NRC staff reviewed the licensee's explanation described above and finds that the stock rotation of the recirculation pump seal flange assembly may be considered as a maintenance activity because (1) the existing unit is removed and a refurbished seal flange assembly is installed by mechanical means (i.e., disassembly and re-assembly of mechanical joints without welding, brazing, or cold work on the pump), and (2) there is no leakage or structural degradation to the pressure boundary components.

#### 4.2 Proposed Alternative vs. IWA-4132 Requirements

The NRC staff finds that the requirements (items (1) thru (8)) in the licensee's proposed alternative as discussed in section 3.4 above are consistent with the corresponding eight requirements (Items a to h) of IWA-4132, except Items (5), (7) and (8).

Item (5) of the proposed alternative as shown in Section 3.4 above states that "Preservice and inservice inspections will be completed (i.e. visual VT-1 of the bolting)" This is different from Item (e) of IWA-4132 which states that "Preservice inspections shall be performed as required by IWA-4500".

In the July 25, 2008 letter, the licensee clarified that for the preservice and inservice inspection of the bolting for the flange assembly in Item (5), it will perform the VT-1 visual examination per IWA-2211 as required by Table IWB-2500-1, Category B-G-2, Item No. B7.60 of the ASME Code, Section XI. The NRC staff notes that the visual VT-1 examination of the bolting as defined in IWA-2211 does not require leakage identification, which would not be acceptable to the NRC staff. The licensee clarified that if the recirculation pump seal flange assembly is installed during a refueling outage, the Class 1 pressure test, which is required following reactor

pressure vessel disassembly associated with refueling, would be used to detect potential leakage even though not required. If the recirculation pump seal flange assembly is installed during an outage other than a refueling outage, the potential for leakage would be detected during the normal leakage walkdown performed when reactor pressure is approximately 400 pounds per square inch gauge (psig) during the startup sequence. The NRC staff finds that although the VT-1 examination does not require leakage identification, it is acceptable that the licensee will perform either a pressure test or a walk down to detect leakage.

The licensee stated further that in accordance with the ASME Code, Section XI, IWB-2500-1, Category B-G-2, Item No. B7.60, the examination of bolted connection is required only once during the interval when the pump is disassembled for maintenance, repair, or volumetric examination. The licensee clarified that because repair/replacement will not be performed on the pressure boundary, there is no requirement for a volumetric or surface examination. Additionally, an inservice or preservice volumetric or surface examination on this component would not be required when no repair work has been performed.

The NRC staff finds that the pressure test performed after each refueling outage or a walkdown when reactor pressure is about 400 psig provides means to determine the structural integrity of the seal assembly. Therefore, the NRC staff finds that Item (5) in the proposed alternative is acceptable.

Item (7) of the proposed alternative as shown in Section 3.4 above states that "An Inspector and NIS-2 form will not be used unless the item being installed has been repaired/replaced\* in accordance with IWA-4000. (\*If there is a repair/replacement activity performed on the item to be installed, FPL Duane Arnold, LLC plans to follow IWA-4000, including the use of an Inspector, NIS-2 form, and pressure testing.)" This requirement is different from Item (g) of IWA-4132.

The NRC staff finds that the difference is acceptable in that Item (7) of the proposed alternative includes specific requirements in the event a repair/replacement activity is performed. If a repair/replacement activity is performed on the seal flange assembly, the licensee will follow the provisions of IWA-4000, which is consistent with 10 CFR 50.55a. Therefore, the NRC staff finds that item (7) of the proposed alternative is acceptable.

Item (8) of the proposed alternative as shown in Section 3.4 above states that "Testing of the seal flange assembly will be completed as needed to determine acceptability". This requirement is different from Item (h) of IWA-4132.

The NRC staff understands that Item (h) of IWA-4132 is not applicable to the stock rotation of the flange assembly. However, the NRC staff was concerned that the testing in Item (8) will be performed on an "as-needed" basis rather than on a regular basis. In the July 25, 2008, letter, the licensee explained that a post-maintenance test would be performed each time a recirculation pump seal flange assembly is rotated from stock and installed. The post-maintenance test will verify leak tightness when the reactor pressure is approximately 400 psig. Since the recirculation pump seal flange assembly was previously installed, structural integrity is not in question.

The licensee stated that one of the criteria for the use of this relief request is that the item used for the stock rotation will have been previously installed (Item (4) in the proposed alternative). This means that a new reactor recirculation pump seal flange assembly can not be installed



under these alternative requirements. The rotated recirculation pump seal flange assembly would have already received a system leakage test when it was new. Since there is also a requirement in IWA-4132 that no repair/replacement activity has been performed (which would be performed on the pressure boundary) there is no need to perform the system leakage test.

The work performed on the stock recirculation pump seal flange assembly would not include any work on the pressure boundary portion of the assembly. The seal flange assembly after installation would be verified to have no leakage during the walkdown when the reactor pressure is approximately 400 psig.

To verify leakage of the recirculation pump seal flange assembly, the licensee will perform either (a) a post-maintenance walkdown at reactor pressure of 400 psig when the stock rotation is conducted during an outage other than a refueling outage, or (b) a Class 1 pressure test when the stock rotation is performed during a refueling outage. The NRC staff finds that either of the above two procedures will verify the structural integrity of the installed seal flange assembly and will be performed on a regular basis.

On the basis of the above evaluation, the NRC staff finds that the proposed alternative is acceptable.

## 5.0 CONCLUSION

The NRC staff has reviewed the licensee's submittals cited above and determined that Relief Request NDE-R009 will provide an acceptable level of quality and safety for the stock rotation of the recirculation pump seal flange assembly at Duane Arnold. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the use of Relief Request NDE-R009 for the stock rotation of the recirculation pump seal flange assembly for the remainder of the fourth 10-year ISI interval at Duane Arnold.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: John Tsao, NRR

Dated: October 3, 2008