



**FPL Energy.**

**Duane Arnold Energy Center**

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

March 26, 2007

NG-07-0292

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555-0001

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

Licensee Event Report #2007-001-00

Please find attached the subject Licensee Event Report (LER) submitted in accordance with 10 CFR 50.73. This letter contains the following new NRC commitment:

Submit a supplement to LER 2007-001 that contains the completed safety significance of the subject event by 6/01/07.

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

cc: Administrator, Region III, USNRC  
Project Manager, DAEC, USNRC  
Resident Inspector, DAEC, USNRC

JE22

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME Duane Arnold Energy Center	2. DOCKET NUMBER 05000 331	3. PAGE 1 OF 8
--	-------------------------------	-------------------

4. TITLE Unplanned Inoperability of the High Pressure Coolant Injection Pump
---

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
01	24	2007	2007	1	0	03	26	2007	FACILITY NAME	DOCKET NUMBER
										05000
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
10. POWER LEVEL 100%	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER	
FACILITY NAME Robert J. Murrell, Regulatory Affairs Engineering Analyst	TELEPHONE NUMBER (Include Area Code) (319) 851-7900

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT									
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED					15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR
<input checked="" type="radio"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input type="radio"/> NO							06	01	2007

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

In preparation for an upcoming Refueling Outage, during a pre-construction inspection of the High Pressure Coolant Injection (HPCI) system injection line (pipe support EBB-5-SR-9), one of the two pipe clamp bolt assemblies (i.e., stud, nut, and spacer) was found to be missing. Initial engineering evaluation determined that with the bolt missing, the ASME Code Section III, Appendix F allowable stresses would not be met at the HPCI-to-Feedwater tee connection. Consequently, HPCI was declared inoperable on 1/24/07.

Work Order A73452 was initiated and necessary repairs were completed to replace the missing bolt assembly and HPCI was subsequently declared operable on 1/24/07.

The cause of this event was determined to be incomplete field work that occurred some time after 4/21/84, which left the pipe clamp without one of the required bolt assemblies.

There were no actual safety consequences and no effect on public health and safety as a result of this event.

# LICENSEE EVENT REPORT (LER)

## TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 8
		2007	-- 001	-- 00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

### I. Description of Event:

In preparation for an upcoming Refueling Outage, during a pre-outage inspection of the High Pressure Coolant Injection (HPCI) system injection line (pipe support EBB-5-SR-9), it was noted that one of the two pipe clamp bolt assemblies (i.e. stud, nut, and spacer) was missing. Initial engineering evaluation determined that with the bolt missing, the ASME Code Section III, Appendix F allowable stresses would not be met at the tee connection point between HPCI and Feedwater piping. Consequently, HPCI was declared inoperable on 1/24/07. Subsequently, work order (WO) A73452 completed necessary repairs to replace the missing bolt assembly and HPCI was declared Operable on 1/24/07.

The cause of this event was determined to be a result of incomplete field work that left the pipe clamp without one of the required bolt assemblies. This field work occurred sometime after April 21, 1984, the last documented date with the subject bolt assembly verified to be in place.

This event was reported to the NRC as an 8 hour event under 10 CFR 50.72(b)(3)(ii)(A), Any event or condition that results in: (A) The condition of the nuclear power plant, including its principal safety barriers, being seriously degraded and 10CFR 50.72(b)(3)(v)(D), Any event or condition that alone at the time of discovery could have prevented the fulfillment of the safety function of structures or systems that are needed to: (D) Mitigate the consequences of an accident.

At the time of this event the plant was in a planned Fire Plan Limiting Condition for Operation for Cable Spreading Room Fire Suppression System (CO<sub>2</sub>).

### II. Assessment of Safety Consequences:

This report is being submitted pursuant to 10CFR50.73(a)(2)(v)(D).

This event did not affect the availability of other systems needed to maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

Analysis is currently being performed to determine the actual safety consequences of this event and will be transmitted in a supplement to this LER. The expected submission date is June 1, 2007.

This event did result in a Safety System Functional Failure.

### III. Cause of Event:

An investigation was completed under Apparent Cause Evaluation (ACE) 1675. The ACE evaluated the condition from three historical perspectives: Maintenance Records, In-service Inspection (ISI) Records, and Plant Design Records (a metal box surrounding this pipe support was added at some point in time).

#### EBB-5-SR-9 Maintenance History

Maintenance history on HPCI pipe support EBB-5-SR-9 was reviewed. The following items were identified:

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 of 8
		2007	-- 001	-- 00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

1. From Maintenance Action Request (MAR) 18655, generated on March 27, 1977:

Problem statement: Bolt vibrated completely out of pipe clamp.

Instructions: Replace bolt and burr all threads of pipe clamp per engineering direction.

Actions taken: Original bolt reused. New nuts were installed and tightened by wrench. All threads were burred.

This maintenance was completed on March 31, 1977.

2. From MAR 52654, generated on November 3, 1983:

Problem statement: West strut has loose lock nut & clamp nut, East strut has loose clamp nut & is frozen in place.

Actions Taken: Repairs were completed.

This work order was closed on April 21, 1984.

The maintenance history review of HPCI pipe support EBB-5-SR-9 concluded that the support was in its correct configuration on April 21, 1984. The review didn't find any subsequent references that would explain when this bolt could have been removed.

### ISI Inspection History

The ISI Program requires periodic examinations (VT-3) for this class of piping and supports, unless an NRC relief request is approved. A review of the ISI examination history was conducted.

There are two pipe supports on the HPCI Pump Discharge Line enclosed within the metal box mentioned above: EBB-5-H-12 (HPB-CE071) and EBB-5-SR-9 (HPB-CE069).

These supports were the subject of Relief Request NDE-005, Rev. 1, originally approved on September 24, 1993 for the Duane Arnold Energy Center (DAEC) 2<sup>nd</sup> 10-year ISI Interval (1987-1996). This relief request was for performing the required surface and VT-3 examinations. The Relief Request documents the basis for relief as the inaccessibility to the two supports, as they are "located in a penetration," (i.e., the metal box enclosure). Note: Relief was not required for either the 3<sup>rd</sup> or 4<sup>th</sup> 10-year ISI Intervals, due to changes in the ASME Code of record for the DAEC.

Consequently, ISI examinations (VT-3) have not been performed on the subject support. Thus, there are no records that would help determine the cause for the missing bolt assembly.

### Plant Design Record History

The metal box enclosing HPCI pipe support EBB-5-SR-9 has been referred to as a "penetration box" (possibly part of the fire seal for the sleeve) and "radiation shield" in various plant documents.

**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Duane Arnold Energy Center	05000331	2007	-- 001 --	00	4 of 8

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

For example, in the records of the plant walkdowns conducted for Inspection and Enforcement Bulletin (IEB) 79-14, Design Document Change No. 782 contained the following information:

- a. "Piping System Walkdown Data Sheet" dated 8/14/79 states: EBB-5-SR-9 inaccessible – enclosed in a steel box.
- b. "Piping System Walkdown Data Sheet" dated 2/13/80 states: EBB-5-SR-9 inaccessible through radiation shield.
- c. Copy of support drawing M119AC-1575 (EBB-5-SR-9) checked 8/14/79 states "not visible."
- d. Another copy of the same support drawing states "restraint is enclosed in a radiation shield, pin to pin was visible."
- e. DAEC – IEB 79-14 Reassessment "IELP Walkdown vs. Bechtel 79-14 Walkdown" states for EBB-5-SR-9:
  - i. Discrepancy in Function: No
  - ii. Discrepancy in Direction: No
  - iii. Discrepancy in Configuration: Yes – insignificant (P–P = 2'-2" rather than 2'-0")

In addition, DAEC ISI Isometric drawing ISI-ISO-2.2-45 identifies hangers EBB-5-H-12 and EBB-5-SR-9 as "Inaccessible (Inside Penetration Box)."

Attempts to find any further information about the metal box were unsuccessful. The metal box could not be uniquely identified on any plant drawings. In addition, there were no installation documents identified during the investigation.

### Conclusion

The ACE considered the potential for the missing bolt having become dislodged due to vibration, but concluded that the bolt assembly (or parts thereof) should have been found inside the metal box and that there should have been some amount of wear on the associated clamp. The bolt assembly was not within the metal box when it was initially identified and subsequently repaired. In addition, no wear marks were identified on EBB-5-SR-9 that would indicate the bolt had become dislodged due to vibration.

Thus, the ACE concluded that the missing bolt assembly on HPCI support EBB-5-SR-9 occurred as a result of incomplete field work some time after April 21, 1984 (reference MAR 52654). No further evidence was identified during this investigation to identify the exact timeframe of the missing bolt assembly.

### Extent of Condition Review for ACE 1675

An extent of condition review was conducted to provide reasonable assurance that additional missing bolt assemblies on similar safety-related piping supports were not present. The extent of condition included reviews of the ISI program, IEB 79-14 Walkdowns, and other recent walkdowns of the HPCI and Feedwater piping to support an operability evaluation (OPR-323) and pre-construction of Engineering Change Package (ECP) 1803 (Feedwater/HPCI Piping and Supports Modifications).

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 of 8
		2007	-- 001 --	00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

### ISI Program

A review of the DAEC ISI program identified that only five pipe supports have been exempted from periodic VT-3 inspections. The two HPCI supports in the metal box/penetration, which were granted relief under NDE-001, Rev. 1, discussed above, and three supports on the Residual Heat Removal (RHR)-Fuel Pool Cooling & Clean-up System.

These RHR – Fuel Pool Cooling and Clean-up System supports [HBB-25-SA-174 (RHM-CE050), HBB-25-H-175 (RHM-CE053) and HBB-25-H-176 (RHM-CE055)] are located in an overhead pipe-chase (per ISI drawing ISI ISO 2.2-43). These three supports are not included in the VT-3 population due to exemption on the piping wall thickness of <0.375.

All five supports were subjected to as-found VT-3 inspections during the recently-completed Refueling Outage (RFO 20). The results were as follows:

- HBB-25-SA-174 (RHM-CE050) – completed satisfactorily under WO A73464 on 3/10/07.
- HBB-25-H-175 (RHM-CE053) – completed satisfactorily under WO A73464 on 3/10/07.
- HBB-25-H-176 (RHM-CE055) – completed satisfactorily under WO A73464 on 3/10/07.
- EBB-5-H-12 (HPB-CE071) – completed satisfactorily under WO 1138093 on 2/22/07.
- EBB-5-SR-9 (HPB-CE069) – completed satisfactorily under WO 1137679 on 3/10/07.

### IEB 79-14

IEB 79-14 walkdowns were conducted on all Feedwater (FW) pipe supports from the primary containment anchor to the 6A/B Feedwater heaters and on HPCI injection line supports from the pump discharge to the Feedwater tee-connection point, with the exception of the two supports in the metal box/penetration.

### Operability Evaluation OPR-323

The support with the missing bolt assembly (EBB-5-SR-9) was credited as being functional in the supporting analysis for OPR-323, "As-Built plant configuration different from that assumed in HPCI Voiding". The analyzed boundary for OPR 323 is comprised of the following:

- Main FW lines from the primary containment anchor to the 6A/B FW heaters.
- HPCI injection line from the FW tee-connection in the Steam Tunnel to the penetration in the HPCI Room wall.

Work Order (WO) A73444 was generated to perform detailed walkdowns of the pipe supports located within the above boundary for OPR-323, with the exception of inaccessible supports EBB-5-SR-9 and EBB-5-H-12. The following details the scope and purpose of the walkdown.

- There are a total of 60 pipe supports within the walkdown boundary.
- Visual inspections were conducted by a VT-3 qualified Quality Control (QC) Inspector, but were not considered formal VT-3 inspections.
- No insulation was removed during these walkdowns.

# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 of 8
		2007	-- 001 --	00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

- o The purpose of these inspections was to validate that the location and configuration of each support matches the design drawings and that there were no loose or missing parts.

No abnormalities were noted during these walkdowns.

## ECP 1803 Pre-Construction Walkdowns

Pre-construction walkdowns have been conducted by DAEC and Architect/Engineering personnel in support of ECP 1803, "Feedwater / HPCI Piping and Supports Modifications." The scope of these walkdowns had included Feedwater and HPCI piping supports located in the Heater Bay, Steam Tunnel, Torus Area, and HPCI Room.

The following abnormalities were noted during theses inspections:

CAP041472 (4/10/06) - The HPCI pump discharge wall anchor EBB-5-SA-5 displayed in drawing M119AC-01536 indicates that item No.1 is a ST 4 WF 33.5 Structural Tee (WT 4 x 33.5 is the proper nomenclature). The actual item found in the plant is not a formed structural tee but rather is a fabricated tee. Engineering determined that the fabricated tee is nearly equivalent to the structural tee originally indicated on the drawing, and therefore operability is not a concern. The existing configuration will be incorporated into the plant design via drawing revisions.

CAP042704 (6/13/06) - HPCI minimum flow line (4" EBB-006) inspection identified dimension discrepancies between station isometric drawing ISO-EBB-006-01 and the as-built configuration for several supports. Analysis performed under OPR-333 demonstrated that the as-built piping and supports configuration meets ANSI B31.7 design basis requirements and therefore remained operable. The existing configuration will be incorporated into the plant design via calculation and drawing revisions.

CAP045295 (11/7/06) - HPCI CST Suction line pipe riser clamp for HCC-6-SR-6 is bent. Review of archived information identified that this condition has previously been evaluated by Non-Conformance Report (NCR) 86-036. The NCR concluded that the support was adequate to withstand the design loading and its disposition was "Use-As-Is." However, this support was replaced with a more robust design during RFO20 as part of ECP-1803.

CAP046624 (1/24/07) - During an RFO20 pre-outage inspection of HPCI injection line pipe support EBB-5-SR-9, one of the two pipe clamp bolt assemblies (i.e. stud, nuts, and spacer) was found to be missing. This support is credited as being functional in the supporting analysis for OPR-323, discussed above. With the missing bolt, it is unlikely that the analysis results would conclude that ASME Code Section III, Appendix F allowable stresses are met at the HPCI/Feedwater tee-connection. This support was initially repaired and was subsequently replaced with an upgraded support during RFO20.

In summary, similar pipe supports were identified and inspected. No additional bolt assemblies were found to be missing.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Duane Arnold Energy Center	05000331	2007	-- 001	-- 00	7 of 8

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

**IV. Corrective Actions:****Immediate Actions to Address the Condition**

Work Order A73452 was completed on 1/24/07 to replace the missing bolt assembly. As stated earlier, none of the missing parts (stud, nut and/or spacer) were found within the metal box around EBB-5-SR-9. Note that long-term corrective actions, per ECP -1803, eliminated EBB-5-H-12 and upgraded EBB-5-SR-9.

**Corrective Actions to Address Apparent Cause**

The apparent cause of the HPCI piping support missing its bolt assembly is field work within the metal box which did not return the pipe support to its design configuration. The field work occurred some time after April 21, 1984.

No corrective actions were identified to address the apparent cause. The immediate corrective action addressed the concern, while the extent of condition review reasonably assured other missing bolt assemblies did not exist on similar piping supports.

**Corrective Actions to Address Past Operability**

Corrective Action (CA45195) was generated to evaluate the impact of the missing bolt assembly in HPCI support EBB-5-SR-9 on the past operability of the HPCI and Primary Containment systems.

**Corrective Actions to Address Extent of Condition**

1. CA45194 was written to perform VT-3 inspections on the inaccessible RHR Fuel Pool Cooling & Clean-up System supports.

HBB-25-SA-174 (RHM-CE050)

HBB-25-H-175 (RHM-CE053)

HBB-25-H-176 (RHM-CE055)

Status: Complete

2. CA45196 was written to ensure that HPCI Supports EBB-5-H-12 and EBB-5-SR-9 received an "as-found" VT-3 inspection by a qualified QC Inspector.

Status: Complete

3. CA 45197 was written to track the completion of the QC inspections of the pipe supports per WO A73444.

Status: Complete



## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Duane Arnold Energy Center	05000331	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	8 of 8
		2007	-- 001	-- 00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

4. CA45198 was written to ensure that all new and modified supports per ECP-1803 received a VT-3 inspection by a qualified QC inspector.

Status: Complete

### V. Additional Information:

#### Previous Similar Occurrences:

LER 2005-004, Unplanned Inoperability of the High Pressure Coolant Injection Pump, dated November 28, 2005.

#### EIIS System and Component Codes:

BJ High Pressure Coolant Injection System (BWR)

#### Reporting Requirements:

This report is being submitted under 10 CFR 50.73(a)(2)(v)(D)