

October 31, 2002
NG-02-0989

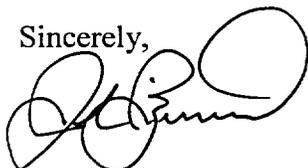
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
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Washington, D.C. 20555-0001

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Licensee Event Report #2002-003-00
File: A-120, E-51

Dear Sirs:

Please find attached the subject Licensee Event Report (LER) submitted in accordance with 10CFR50.73. There are no new commitments contained within this report. Should you have any questions regarding this report, please contact this office.

Sincerely,



10/31/02

John Bjorseth,
Plant Manager – Nuclear

cc: Mr. James Dyer
Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532

NRC Resident Inspector – DAEC
IRMS

JE22

Estimated burden per response to comply with this mandatory information 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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1) Duane Arnold Energy Center	DOCKET NUMBER (2) 05000331	PAGE (3) 1 of 4
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TITLE (4)
Technical Specification Required Shutdown Due to Reactor Core Isolation Cooling Inoperability Caused by Air Entrainment in the RCIC Oil System.

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
09	02	2002	2002	- 003 -	00	10	31	2002			
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50. (Check all that apply) (11)									
POWER LEVEL (10)											
1		20 2201(b) 20.2203(a)(3)(ii) 50 73(a)(2)(ii)(B) 50 73(a)(2)(ix)(A)									
008		20 2201(d) 20 2203(a)(4) 50 73(a)(2)(iii) 50 73(a)(2)(x)									
		20 2203(a)(1) 50 36(c)(1)(i)(A) 50.73(a)(2)(iv)(A) 73 71(a)(4)									
		20 2203(a)(2)(i) 50 36(c)(1)(ii)(A) 50.73(a)(2)(v)(A) 73 71(a)(5)									
		20 2203(a)(2)(ii) 50 36(c)(2) 50.73(a)(2)(v)(B) OTHER									
		20.2203(a)(2)(iii) 50 46(a)(3)(ii) 50 73(a)(2)(v)(C) Specify in Abstract below or in NRC Form 366A									
		20.2203(a)(2)(iv) X 50 73(a)(2)(i)(A) 50 73(a)(2)(v)(D)									
		20 2203(a)(2)(v) 50 73(a)(2)(i)(B) 50 73(a)(2)(vii)									
		20 2203(a)(2)(vi) 50.73(a)(2)(i)(C) 50 73(a)(2)(viii)(A)									
		20 2203(a)(3)(i) 50.73(a)(2)(ii)(A) 50 73(a)(2)(viii)(B)									

LICENSEE CONTACT FOR THIS LER (12)

NAME Laura B. Swenzinski, Senior Licensing Engineer	TELEPHONE NUMBER (Include Area Code) 319-851-7724
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
E	BN	TRB	T147	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On August 19, 2002, Technical Specification (TS) LCO 3.5.3 Condition A, Reactor Core Isolation Cooling (RCIC) System Inoperable, was entered for two days of planned maintenance. Following completion of maintenance, RCIC system operability testing failed on August 21, 2002 due to air entrainment in the oil system. Troubleshooting activities continued for the next twelve days.

On September 2, 2002, TS LCO 3.5.3 Condition B, was entered following failure of RCIC post startup operability testing due to oil system flooding and a plant shutdown was initiated. RCIC oil system modifications were made on September 5 and 6, 2002. RCIC testing was performed satisfactorily and TS LCO 3.5.3 Condition B was exited on September 9, 2002.

The introduction and entrainment of air in the RCIC oil system was the cause of the repeated RCIC test failures. DAEC site personnel were unable to resolve the air entrainment issues within a 14 day period. This resulted in a plant shutdown per TS LCO 3.5.3 Condition B.

RCIC oil system modifications were made to reduce and release entrained air. Procedural and programmatic changes have been initiated to improve the site's response to plant events. There was no impact on public health and safety associated with 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 4
		2002	-- 003	-- 00	

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

I. Description of Event:

On August 19, 2002 with the plant at 94 percent power, Reactor Core Isolation Cooling (RCIC) Technical Specification (TS) LCO 3.5.3 Condition A, RCIC System inoperable, was entered for planned maintenance. TS LCO 3.5.3 Condition A was entered at 1228 and was scheduled for about 30 hours. Planned maintenance was completed on August 21, 2002 at 0356. Surveillance Test Procedure (STP) 3.5.3-02, RCIC System Operability Test, failed on August 21, 2002 due to oil flooding at the RCIC turbine governor end bearing. Troubleshooting activities and review of past industry operating experience began.

On August 30, 2002 the plant was shutdown to perform repairs on the drywell cooling system. On August 31, 2002 at 2338, TS LCO 3.5.3 Condition A was exited because RCIC was no longer required to be operable with reactor pressure below 150 psig (exited the mode of applicability).

At 1059 on September 1, 2002, with drywell cooler repairs complete, the plant commenced startup. The cause of RCIC oil problems was believed to have been resolved following a successful two hour RCIC run. However, while testing RCIC at approximately 150 psig reactor pressure during plant startup, oil flooding recurred. At 1835 on September 1, 2002, RCIC was declared inoperable and the DAEC reentered the TS LCO 3.5.3 Condition A originally entered on August 19, 2002. This placed the DAEC in day 14 of 14 of TS LCO 3.5.3 Condition A. RCIC oil system pressure was adjusted and testing performed. Following successful completion of STP 3.5.3-03, Low Pressure RCIC System Flow Rate Test, RCIC was declared operable and TS LCO 3.5.3 Condition A was exited at 0319 on September 2, 2002. Activities to increase reactor power resumed. At 1327 on September 2, 2002 RCIC post-startup operability testing at reactor pressure greater than 940 psig was begun, however, the testing was unsuccessful.

On September 2, 2002 at 1500, TS LCO 3.5.3 Condition B, was entered following failure of STP 3.5.3-06, RCIC System Post-Startup Operability Test performed at reactor pressure greater than 940 psig, due to governor end bearing flooding. Plant shutdown was initiated on September 2, 2002 at 2100 in accordance with TS 3.5.3 Condition B.

On September 3, 2002 a more systematic approach to troubleshooting and repair of the RCIC oil system commenced. Oil system modifications were made on September 5 and 6, 2002. Following successful uncoupled RCIC runs on September 7, 2002, RCIC was declared operable and the plant commenced start up. STP 3.5.3-03, Low Pressure RCIC System Flow Rate Test, was completed satisfactorily at 1553 on September 8, 2002. STP 3.5.3-06, RCIC System Post-Startup Operability Test, was completed satisfactorily at 0235 on September 9, 2002. TS LCO 3.5.3 Condition B was exited on September 9, 2002 at 0316.

II. Cause of Event:

The introduction and entrainment of air in the RCIC oil system was the cause of the repeated RCIC test failures.

Root Causes include:

1. Industry operating experience was not used effectively. RCIC oil system design and maintenance improvements dating as far back as 1977 had, in many cases, not been implemented.

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 4
		2002	-- 003	-- 00	

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

II. Cause of Event continued:

2. Organizational response to the repeated RCIC test failures was inadequate because no formal process existed for troubleshooting and responding to events other than forced outages and trips.
3. Training of System Engineers does not adequately familiarize them with industry operating experience when they are assigned new systems.

III. Assessment of Safety Consequences:

The RCIC system provides makeup water to the reactor vessel following a reactor vessel isolation to ensure adequate core cooling. The RCIC system provides core cooling during reactor shutdown by pumping makeup water into the reactor vessel in case of a loss of flow from the feedwater system and is activated in time to preclude conditions that lead to inadequate core cooling.

On day 11 of 14 of RCIC TS LCO 3.5.3 Condition A, the plant was shutdown due to increasing drywell leakage. Drywell leakage was a well water leak on a cooler, unrelated to RCIC concerns. This plant shutdown had no impact on the RCIC maintenance work.

There were no actual safety consequences associated with this event. The High Pressure Coolant Injection (HPCI) system was operable during this event. Potential safety consequences were minimal. There was no impact on public health and safety.

There were other structures, systems and components inoperable at the start of this event, however, none contributed to the significance of the event. Variations in plant operating modes would not have resulted in increased consequences.

IV. Corrective Actions:

A. Completed:

The installation of Engineered Maintenance Action (EMA) 60432 eliminated the RCIC oil system flooding. This EMA rerouted the PSV 2475 discharge line to the equalizing header, enlarged the oil drain line and improved the oil system venting.

B The following Correction Action documents (ARs) have been initiated to address the root causes identified:

Root Cause 1:

- Develop an effective process for distribution, screening and use of system related operational experience (AR 32940, assigned to System Engineering, due 11/15/02).

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	4 of 4
		2002	-- 003	-- 00	

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

IV. Corrective Actions continued:

- Incorporate the Terry Turbine User Group maintenance guidance for RCIC and HPCI turbines into DAEC procedures (AR 32281, assigned to System Engineering, due 9/3/03)
- Incorporate industry operating experience into RCIC turbine oil system maintenance procedures (AR32244, assigned to Procedures, completed 10/25/02).
- Revise the RCIC turbine oil system maintenance procedures concerning venting air after maintenance (AR 32502, assigned to Procedures, due 12/17/02).
- Inadequate RCIC oil system site glass level indications have been corrected (AR 32317, assigned to System Engineering, completed 9/2/02)

Root Cause 2:

- Develop a process (i.e., staffing, procedures, communications, etc.) for responding to plant events (AR 32680, assigned to Work Management, due 1/7/03).
- Additionally, actions are in place to implement a systematic troubleshooting procedure (AR 32248, assigned to System Engineering, due 11/15/02).

Root Cause 3.

- Develop a plan to improve the training and qualification, and system familiarization process for System Engineers (AR 32941, assigned to System Engineering, due 11/15/02).

V. Additional Information:

Previous Similar Occurrences:

DAEC experienced RCIC oil system leakage on two previous occasions. In 1993, oil misting occurred when the RCIC turbine was operated at greater than rated speed. The 1993 oil misting was dissimilar to this event in that it was attributed to the higher turbine speed.

In 1995, oil whipping and flooding at the governor end bearing occurred and was attributed to an incorrect oil level. Oil level was corrected and no further oil whipping or flooding occurred. The 1995 oil flooding was dissimilar to this event in that there was no air entrained in the oil system.

EIIS System and Component Codes:

Reactor Core Isolation Cooling (RCIC): BN
 Drywell Cooling: VB
 High Pressure Coolant Injection (HPCI): BJ

This event is being submitted pursuant to 10CFR50.73(a)(2)(i)(A). Event notification (EN) 39164.