

IES
UTILITIES INC.

June 13, 1994
NG-94-2218

Mr. John B. Martin
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License DPR-49
Licensee Event Report #94-008

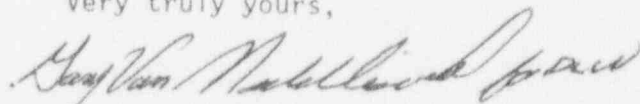
Gentlemen:

In accordance with 10 CFR 50.73 please find attached a copy of the subject Licensee Event Report.

The following new commitment is made in this letter:

The response time testing Corrective Action Team Report will be issued by July 1, 1994.

Very truly yours,



David L. Wilson
Plant Superintendent - Nuclear

DLW/JDK/eah

cc: Director of Nuclear Reactor Regulation
Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D. C. 20555

NRC Resident Inspector - DAEC

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LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Duane Arnold Energy Center		DOCKET NUMBER (2) 05000 331	PAGE (3) 1 OF 6
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TITLE (4)
Missed Sensor Response Time Testing of Reactor Protection System Pressure Switches

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
05	17	94	94	008	00	06	13	94		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)									
POWER LEVEL (10) 100	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> OTHER						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)						
<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)								
	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)							

LICENSEE CONTACT FOR THIS LER (12)

NAME John D. Kerr, Licensing Specialist	TELEPHONE NUMBER (Include Area Code) (319) 851-7492
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 17, 1994, the plant was operating at 100% power. During scheduling of Reactor Protection System (RPS) sensor response time testing it was determined that this testing had not been performed at the required surveillance frequency for one reactor high pressure scram pressure switch. The cause was inadequate tracking and scheduling of surveillance testing.

On May 19, 1994, while the plant was operating at 100% power, additional research determined that the four RPS reactor high pressure scram pressure switches had been replaced in 1987 and between 1991 and 1992 without response time testing being performed. The cause was inadequate procurement and maintenance process controls.

The untested switches were declared inoperable until they were satisfactorily tested. All four RPS pressure switches were found to perform properly when tested. The scheduling of surveillance testing for these and other switches has been formalized. A corrective action team has been formed to recommend actions to prevent recurrence.

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

EXPIRES: 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1) Duane Arnold Energy Center	DOCKET NUMBER (2) 0 5 0 0 0 3 3 1	LER NUMBER(S)			PAGE(S)		
		YEAR 9 4	SEQUENTIAL NUMBER - 008	REVISION NUMBER - 00			

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

I. DESCRIPTION OF EVENT:

On May 17, 1994 the plant was operating at 100% power. There were no limiting conditions for operation (LCO) that contributed to this event. During scheduling of Reactor Protection System (RPS) instrumentation response time measurements as required by Technical Specification 4.1.A.2., it was determined that sensor response time testing had not been performed on reactor high pressure scram pressure switch PS4552 at the required frequency. The last known performance of the appropriate surveillance test procedure (STP-41A025) for PS4552 was April 18, 1984. The required frequency for each of the four pressure switches is every 72 months +25%. During routine scheduling of this once-per-cycle test, it was not clear which of the four pressure switches needed to be tested during this cycle. This led to a thorough review of past test records, which identified the concern with PS4552. This missed surveillance constitutes a condition prohibited by the Technical Specifications and is reportable pursuant to 10CFR50.73(a)(2)(i)(B).

At 1635 hours on May 17, 1994, PS4552 was declared inoperable and a 12 hour LCO was entered to place the B-RPS in the tripped condition per Technical Specification 3.1.A.1. The LCO was exited at 0249 hours on May 18, 1994, after testing was completed satisfactorily on PS4552.

On May 19, 1994 the plant was operating at 100% power with no LCOs in effect. Additional research on PS4552 surveillance testing determined that all four RPS reactor high pressure scram pressure switches (PS4549, PS4550, PS4551, and PS4552) were replaced in April, 1987 with an improved version of the same model switch due to a history of instrument drift. Also at that time, PS4549 and PS4550 were relocated to provide improved instrument separation in support of scram frequency reduction activities. Although documentation was found stating that sensor response time testing was to be performed on the four new pressure switches prior to declaring them operable, no documentation of the test results could be found.

PS4549 was later tested in July, 1991 but was replaced again in August, 1991. PS4550 was later tested in February, 1990 but was replaced again in October, 1992. PS4551 was later tested in September, 1988 but was replaced again in March, 1992. PS4552 was not tested after 1984 as discussed above but was replaced again in April, 1992. Sensor response time testing was not specified as being required when these four switches were replaced in 1991 and 1992, and no documentation of test results could be found. The reasons for these replacements were problems with calibration, repeatability, spurious tripping, and sporadic drift. A summary of test and replacement dates is included in Table 1.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50 0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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		YEAR 9 4	SEQUENTIAL NUMBER - 008	REVISION NUMBER - 00			

TEXT (If more space is required, use additional NRC Form 388A) (17)

The lack of sensor response time testing following instrument replacement constitutes a condition that could have prevented fulfillment of the safety function and is reportable pursuant to 10CFR50.72(b)(2)(iii)(A) and 10CFR50.73(a)(2)(v)(A).

At 1630 hours on May 19 1994 it was determined that only PS4549 and PS4550, both in the A-RPS, had not been tested since replacement in 1991 and 1992. PS4551 had been tested in February, 1993 and PS4552 was tested in May, 1994, as discussed above. PS4549 and PS4550 were declared inoperable and at 1657 hours a manual half scram was inserted on the A-RPS per Technical Specification 3.1.A.2. PS4550 was tested satisfactorily. PS4549 had an acceptable sensor response time and was determined to be operable but was replaced and successfully re-tested due to switch contact chattering. By 0326 hours on May 20, 1994, both switches were returned to service and the half scram was reset.

Table 1

SUMMARY OF SENSOR RESPONSE TIME TESTING AND REPLACEMENT OF RPS REACTOR HIGH PRESSURE SCRAM PRESSURE SWITCHES

	PS4549	PS4550	PS4551	PS4552
RPS Logic	A1	A2	B1	B2
1978 Test	3/78	-	-	-
1979 Test	-	-	1/79	-
1980 Test	-	-	-	3/80
1981 Test	-	5/81	-	-
1982 Test	4/82	-	-	-
1983 Test	-	-	2/83	-
1984 Test	-	-	-	4/84
1985 Test	-	6/85	-	-
1986 Test	-	-	-	-
1987 Test	1/87	-	-	-
Replaced Switches	4/87	4/87	4/87	4/87
1988 Test	-	-	9/88	-
1989 Test	-	-	-	missed
1990 Test	-	2/90	-	-
1991 Test	7/91	-	-	-
Replaced Switches	8/91	10/92	3/92	4/92
1992 Test	-	-	-	-
1993 Test	-	-	2/93	-
1994 Test	5/94	5/94	-	5/94

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

EXPIRES 5-31-95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST, 50 0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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		YEAR 9 4	SEQUENTIAL NUMBER - 008	REVISION NUMBER - 00	4	OF 6

TEXT (If more space is required, use additional NRC Form 388A) (17)

The combined deficiencies described above resulted in the response time of the B-RPS switches not being tested between 9/88 and 2/93, although they were routinely functionally tested. This exceeds the 36 months +25% requirement of Technical Specification 4.1.A.2. for response time testing of each logic. The same condition existed between 4/84 and 9/88, also on the B-RPS logic.

It should be noted that the historical schedule for testing these switches, by logic, has been A1,B1,B2,A2, rather than A1,B1,A2,B2. This caused the time period between tests within both logics to, at times, exceed the nominal 36 months stated above, but the 36 months +25% requirement was not exceeded other than as discussed in the previous paragraph. The A1,B1,B2,A2 sequence creates the potential for violating the 36 months +25% requirement because the time period between tests is 18 months (once per operating cycle).

II. CAUSE OF EVENT

The first deficiency discussed above is the missed surveillance of PS4552. This was due to inadequate tracking and scheduling of STP performance. The STP for PS4552 should have been scheduled for and performed in 1989 according to the established sequence.

The second deficiency discussed above is the lack of testing on all four switches when they were replaced in 1987 by Design Change Package (DCP) 1319. The procurement dedication package for the switches specified this testing by STP number, but no documentation of testing prior to installation could be found. It is believed that the testing was to be performed after installation. However, the process controls for post-installation testing were inadequate in that the quality part report tags for the four switches did not indicate that the testing was yet to be performed and no post-installation response time testing documentation could be found.

The third deficiency discussed above is the lack of testing on all four switches when they were replaced in 1991 and 1992 by Corrective Maintenance Action Requests (CMARs). The only testing specified was the normal instrument calibration and not the sensor response time testing. This testing was not believed to be required during the planning process for the CMARs.

The fourth deficiency discussed above is that the logic sequence in which these switches were historically tested (A,B,B,A) created the potential for violating the required frequency for testing each of the A and B logics. This is related to the first deficiency in that it is due to inadequate tracking and scheduling of STP performance.

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

EXPIRES 5/31/95

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FACILITY NAME (1) Duane Arnold Energy Center	DOCKET NUMBER (2) 0 5 0 0 0 3 3 1	LER NUMBER(6)			PAGE(3)		
		YEAR 9 4	SEQUENTIAL NUMBER - 008	REVISION NUMBER - 00			

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III. ANALYSIS OF EVENT

All four pressure switches were found to perform properly when tested. The logic for the RPS reactor high pressure scram pressure switches is one-out-of-two-twice. Therefore, at least one of the A logic switches and at least one of the B logic switches must be operable or tripped in order to ensure the operability of the safety function. The safety function is to initiate a reactor scram if reactor pressure exceeds the specified high pressure setting.

The testing performed in 1993 and 1994 on the four switches after they were replaced under CMARs in 1991 and 1992 found acceptable response times for all four switches. Therefore, although the switches were not tested when replaced in 1991 and 1992, this later testing showed that the four switches have been capable of performing within their required response times.

The testing performed in 1988, 1990, and 1991 after all four switches were replaced by DCP in 1987 found acceptable response times for the three switches that were tested. Although PS4552 was functionally tested routinely, its response time was not tested between the 1987 replacement and the 1992 replacement, so its response time during that period is not known. If it is assumed that the response time for PS4552 was slower than specified during that period, then at the times when PS4551 (the other B logic switch) was out of service for testing or calibration during that same period, the B-RPS reactor high pressure scram logic would have performed its safety function more slowly. This is not considered to be likely because the other switches easily met the sensor response time acceptance criteria of 500 milliseconds.

Reactor pressure indication and annunciation in the control room would not have been affected so operators would have been able to take appropriate actions if required. This event (condition) had a minimal, if any, effect on safe operation of the plant.

IV. CORRECTIVE ACTIONS

As discussed under Description of Event, the appropriate LCO was entered on May 17, 1994 and exited on May 18, 1994 after successful testing of PS4552. On May 19, 1994 the appropriate half scram was inserted until PS4550 was tested satisfactorily and PS4549 was replaced on May 20, 1994.

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

EXPIRES: 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.6 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

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		YEAR 9 4	SEQUENTIAL NUMBER - 008	REVISION NUMBER - 00	6	OF 6

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

The scheduling of surveillance testing for these four pressure switches has been formalized to provide better tracking of completed and future testing. This has also been done for the four reactor low water level switches which are also required by the Technical Specifications to be response time tested. The sequence of testing the pressure switches has been changed to alternate between the A and B logics.

A review of the testing and maintenance history of the reactor low water level switches was performed to ensure they have current response time test data and that the testing sequence is correct. No discrepancies were found.

A corrective action team led by Quality Assurance has been formed to recommend actions to prevent recurrence. In addition, this team will ensure that surveillance requirements with unique schedules are being properly implemented. Also included will be a review of the procurement dedication and maintenance processes and response time test methods to ensure that current controls are adequate to ensure performance and documentation of testing required by the Technical Specifications. The team recommendations will be presented to management by July 1, 1994.

During its investigation, this corrective action team raised questions about the requirements to response time test certain RPS relays. The team also had questions about response time testing methodology. A Quality Deficiency Report was generated to investigate these questions and pursue any changes that may be warranted.

V. ADDITIONAL INFORMATION

A. Previous Similar Events

A review of DAEC LERs since 1984 identified LERs 94-05, 94-01, 93-02, 91-11, 85-32 as reporting inadequate surveillance tests but none of these concern the RPS.

B. EIIS System and Component Codes

JC--Reactor Protection System
PS--Pressure Switch

C. Equipment Information

The pressure switches discussed above are Barksdale model B2T-M12SS and B2T-M12SS-TC.