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UTILITIES INC.

July 29, 1994
NG-94-2831

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 #94-002, Rev. 01

Gentlemen:

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

The following new commitments are made in this letter:

1. The Reactor Core Isolation Cooling (RCIC) Low Steam Supply Pressure and Residual Heat Removal Shutdown Cooling Isolation pressure switches will be replaced with switches of smaller ranges.

2. The Low Pressure Coolant Injection (LPCI) Loop Select 900 psig Permissive pressure switches will be replaced based on their service life. Additionally, the AS-LEFT tolerance in the Surveillance Test Procedure for calibrating these switches will be revised.

Very truly yours,

David L. Wilson
Plant Superintendent - Nuclear

DLW/JWK/eah

cc: Director of Nuclear Reactor Regulation
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NRC Resident Inspector - DAEC

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
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 (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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Duane Arnold Energy Center	05000 331	1 OF 6

TITLE (4)
RCIC Low Steam Supply Pressure Isolation Loss of Function Due to Instrument Drift

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
										05000
01	12	94	94	-- 002 --	01	07	29	94	FACILITY NAME	DOCKET NUMBER 05000

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

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
John W. Karrick, Licensing Specialist	(319) 851-7648

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
X	BN	PS	B070	No						

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

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

On January 12, 1994, during the performance of a routine surveillance test procedure (STP) for the Reactor Core Isolation Cooling (RCIC) system low steam supply pressure isolation function, three of the four pressure switches provided to perform this function were found low (non-conservative) outside their calculated allowed values. These four switches comprise a two-out-of-two-once logic that generates isolation signals to the RCIC inboard and outboard steam supply isolation valves MO2400 and MO2401 which are designated as Primary Containment Isolation System (PCIS) Group 6A valves.

The plant was operating at 100% power at the time of the surveillance with no existing limiting conditions for operation (LCOs) in effect. All three pressure switches were recalibrated and returned to service within the confines of the STP and allowed outage time. The cause of this event was instrument drift of the Barksdale model B2T-M12SS pressure switches.

Corrective actions include increased surveillance frequencies, procedure revisions, Instrument Trending Program enhancements, and Engineering evaluations of Barksdale pressure switches. There was no effect on plant safety, personnel safety or plant availability as result of this event.

I. DESCRIPTION OF EVENT:

On January 12, 1994, during quarterly Surveillance Test Procedure STP42A021-Q, three of the four Reactor Core Isolation Cooling (RCIC) steam supply low pressure switches (PS2443A, PS2443C, PS2443D) were found low (non-conservative) outside of their as-found limits within the STP. These four switches comprise a two-out-of-two-once logic that generates isolation signals to the RCIC inboard and outboard steam supply isolation valves MO2400 and MO2401 which are designated as Primary Containment Isolation System (PCIS) Group 6A valves.

Upon discovery of the first out of tolerance condition on PS2443A, the Instrument and Controls (I&C) Engineering Group was contacted to provide the calculated allowed values for these instruments. Pressure switches PS2443A, PS2443C, and PS2443D were all outside of their calculated allowed values.

All three switches were recalibrated and returned to service within the confines of the STP and allowed outage time.

II. CAUSE OF EVENT

The cause of the out-of-tolerance was instrument drift of the Barksdale model B2T-M12SS pressure switches. The primary cause of the drift was the range of the instruments with respect to their setpoint. The range is 50-1200 psig with setpoints between 84 and 94 psig. A contributing factor to the out-of-tolerance condition was the conservatively small margin between the As-Left and As-Found values in the STP. Specifically, with the As-Left limits as they were, there was little margin for drift before exceeding the As-Found limits.

III. ANALYSIS OF EVENT

Pressure switches PS2443A through D are arranged in a two-out-of-two- once logic. PS2443A and PS2443C are in the 'A' logic channel which provides a close signal to the RCIC outboard steam supply isolation valve, MO2401. PS2443B and PS2443D are in the 'B' logic channel which provides a close signal to the RCIC inboard steam supply isolation valve, MO2400. Both logic channels also provide a RCIC turbine trip signal. With switches A, C and D out of tolerance, neither of the RCIC Steam supply isolation valves would have isolated at calculated pressures and is therefore considered a loss of function. However, both isolation valves were operable and would have isolated on low pressure a short time later than intended.

3. As an interim measure and based on switch performance, surveillance frequencies were increased from quarterly to monthly for the RCIC Steam Line Low Pressure switches, Low Low Set (LLS) Valve Control Pressure Switches, Low Pressure Coolant Injection (LPCI) Loop Select 900 psig Permissive Switches, Residual Heat Removal (RHR) Shutdown Cooling (SDC) Isolation Pressure Switches, and the Group 1 Low Rx Pressure Bypass <850 psig in Run switches. These frequencies will revert to quarterly as further actions allow.

4. As a result of past ITP recommendations, eleven Barksdale pressure switches were previously replaced with "TC" model Barksdales. Current data shows that "TC" model switches, in some applications, do not enhance performance. Research has indicated that the only difference in the "TC" model is additional post-manufacturing test requirements. There are no differences in switch design. Therefore, further replacements with the "TC" models will not be performed for the sole purpose of improving instrument performance.

5. A performance evaluation of pressure switches used at DAEC made by other manufacturers was performed. The performance of those switches was found acceptable.

6. Bench testing of Barksdale B2T switches was performed to better understand the effects of ambient temperature, pressure set, and internal pressure restrictor (snubber) design on setpoint drift. No gross fluctuations in setpoints were observed during the temperature and pressure set tests, nor was there a discernible delay in pressure response associated with the snubber. These tests were considered to be inconclusive.

7. An evaluation was made as to the optimum as-left tolerances for Barksdale switch setpoints. Currently the as-left tolerances in STPs are close to the STP limits that define an out of tolerance condition. The margins for the RCIC Steam Supply Low Pressure, Group 1 Low Rx Pressure Bypass <850 psig in Run, LPCI/Core Spray Inject Valve Open Permissive, and High Pressure Scram switches have been revised in their respective STPs. The margins will be revised in the STP for the LPCI Loop Select 900 psig Permissive switch once a new calculation is performed. This action will be completed by Nov. 30, 1994.

The purpose of the low steam supply pressure isolation is to isolate the RCIC steam supply line if a steam line break occurs upstream of the high steam flow isolation sensing elements and to isolate RCIC when steam pressure is too low to effectively operate the RCIC turbine. This out of tolerance condition is considered non-conservative because of the delay that would have occurred if an actual system isolation would have been required.

There was no effect on plant safety, personnel safety, or plant availability as a result of this event.

RCIC system operability was not a concern in this event. The reactor pressure at which the isolation signal actuates (nominal trip setting of 50<P<100 psig) is well below the pressure that defines RCIC operability requirements (>150 psig). Variations in plant operating mode would not have magnified the significance of this event.

IV. CORRECTIVE ACTIONS

As discussed previously, the three switches were re-calibrated and returned to service within the confines of the STP.

An extensive engineering evaluation was performed as a result of repeat Barksdale instrument drifts. All Barksdale pressure switches in the plant that are calibrated in STPs were individually assessed based on their plant application and performance. The following items are the corrective actions and the results of testing performed in the evaluation:

1. STPs that calibrate Barksdale switches were revised to include measurement and recording of instrument rack temperatures to obtain correlation data for instrument drift and local instrument temperature.

2. Barksdale model B2T pressure switches contain two switches that are actuated by the same bourdon tube. Calibration of one switch can effect the setpoint of the other switch. For dual switch instruments, Equipment Specific Maintenance Procedures were revised to ensure that calibration of the first switch is reverified after adjusting the second switch. This reverification will assure that both switches are left within allowable setpoint tolerances.

8. The Instrument Trending Program was revised to include trending of instruments by manufacturer and model numbers, and by their associated logic channels/systems. Additionally, comprehensive evaluations, involving Plant Engineering as needed, are now performed during trending.

9. An evaluation was made as to whether the existing ranges of the Barksdale switches are appropriate for the given setpoints. Since drift and accuracy are proportional to the range of the instrument, minimizing the range will decrease the drift and improve the performance of the instrument. Based on this evaluation, the Turbine Trip Scram Bypass <30% Power pressure switches were replaced with switches with smaller ranges. The RCIC Low Steam Supply Pressure Isolation and RHR SDC Isolation pressure switches will also be replaced with models with smaller ranges. These replacements will occur at the next system maintenance window after receipt of the new switches.

10. An evaluation of service life for Barksdale switches was performed to determine if the recent decline in performance is indicative of age related failure. The LPCI Loop Select 900 psig Permissive switches will be replaced based on their service life. This action will be completed during the next system maintenance window after receipt of the new switches.

These evaluations are being used in conjunction with the corrective actions to reduce the likliehood of recurring drift problems associated with Barksdale pressure switches. This effort along with ITP enhancements should also improve overall instrument performance at the DAEC.

V. ADDITIONAL INFORMATION

A. Previous Similar Events

A review of DAEC LERs since 1984 identified LER 84-023 as reporting three of four pressure switches for the Reactor High Pressure Scram signal being found out of tolerance in a non-conservative direction. Those were also Barksdale model B2T-M12SS switches.

B. EIIS System and Component Codes

RCIC - BN
PCIS - JM
Pressure Switch - PS

C. Associated Documents

The details of the corrective actions taken with references to other related correspondence are contained in NG-94-1701.

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