

**IES**  
**INDUSTRIES INC.**

February 10, 1994  
NG-94-0595

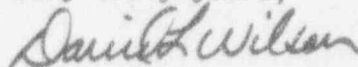
Mr. John B. Martin  
Regional Administrator  
Region III  
U. S. Nuclear Regulatory Commission  
801 Warrenville Road  
Lisle, IL 60532

Subject: Duane Arnold Energy Center  
Docket No: 50-331  
Op. License DPR-49  
Licensee Event Report #94-002

Gentlemen:

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

Very truly yours,



David L. Wilson  
Plant Superintendent - Nuclear

DLW/JK/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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*TEP*  
*11*

February 10, 1994

To: L. Liu  
L. Root  
J. Franz  
Safety Committee  
K. Peveler  
Rich Anderson  
S. Swails  
C. Bleau  
P. Bessette  
C. Crew  
K. Shea (N&H)  
INPO  
GDS Associates, Inc.  
Central Iowa Power Cooperative  
Corn Belt Power Cooperative  
DAEC Commitment Control

FROM: D. Wilson *DWilson*  
Plant Superintendent - Nuclear

FILE: A-118a

Please find attached one copy of a Licensee Event Report that has been transmitted to the NRC.

LICENSEE EVENT REPORT NO. 94-002

Notification Letter No. NG-94-0595

DR NUMBERS: 94-013, 94-014, 94-015

JK/eah

(6/91)

Copied via PROFS Note:

- R. Baldyga
- D. Church
- J. Edom
- R. Hannen
- T. Allen (STA Coordinator)
- W. Miller
- A. Roderick
- D. Sjulín
- J. Thorsteinson
- G. Van Middlesworth
- T. Wilkerson
- A. Binder

**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)<br>Duane Arnold Energy Center |  | DOCKET NUMBER (2)<br>05000 331 | PAGE (3)<br>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 |
| 01             | 12  | 94   | 94             | 002               | 00              | 02                | 10  | 94   |                               | 05000         |
|                |     |      |                |                   |                 |                   |     |      | FACILITY NAME                 | DOCKET NUMBER |
|                |     |      |                |                   |                 |                   |     |      |                               | 05000         |

|                         |  |  |  |                  |  |  |                      |  |  |  |
|-------------------------|--|--|--|------------------|--|--|----------------------|--|--|--|
| OPERATING MODE (9)<br>1 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11) |  |  |                  |  |  |                      |  |  |  |
| POWER LEVEL (10)<br>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<br>John W. Karrick, Technical Support Specialist | TELEPHONE NUMBER (include Area Code)<br>(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)

|  |    |                               |             |           |            |
|--|----|-------------------------------|-------------|-----------|------------|
| YES (if yes, complete EXPECTED SUBMISSION DATE)<br>X | NO | EXPECTED SUBMISSION DATE (15) | MONTH<br>07 | DAY<br>29 | YEAR<br>94 |
|--|----|-------------------------------|-------------|-----------|------------|

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 M02400 and M02401 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 out of service times. The cause of this event was instrument drift of the Barksdale model B2T-M12SS pressure switches.

Increased surveillance frequency, procedure revisions, Instrument Trending Program enhancements, and Engineering evaluations of Barksdale pressure switches are in progress to preclude the recurrence of this and similar events. There was no effect on continued safe operation of the plant or personnel safety as a result of this event.

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 (MNRB 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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|---|--|----------------|----------------------------|-------------------------|----------|--|
| FACILITY NAME (1)<br><br>Duane Arnold Energy Center | DOCKET NUMBER (2)<br><br>0   5   0   0   0   3   3   1 | LER NUMBER (8) |                            |                         | PAGE (3) |  |
|   |  | YEAR<br>9 4    | SEQUENTIAL NUMBER<br>- 002 | REVISION NUMBER<br>- 00 |          |  |

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

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 Department was contacted to provide the calculated allowed values for these instruments that had been included in a recent DAEC setpoint control project to replace existing Technical Specification nominal trip settings with plant specific calculated allowed values. Pressure switches PS2443A, PS2443C, and PS2443D were all outside of the calculated allowed values provided by the (I&C) Engineering Department.

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

II. CAUSE OF EVENT

The cause of this event was instrument drift of the Barksdale model B2T-M12SS pressure switches. The most probable factors causing the drift were changes in ambient temperatures at the installed switch locations and performing the calibration at normal reactor pressure versus outage conditions with the system depressurized. Additional factors such as the effect of calibrating only one switch in a dual switch instrument, the existing STP as-left tolerances being very close to the as found limits, whether or not the existing ranges of the instruments support the desired setpoints, the effects the internal snubbers within the Barksdale switches have on the as-found setpoint, and the service life of the Barksdale switches, are being evaluated and have not been excluded as contributors to the drift.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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| FACILITY NAME (1)<br><br>Duane Arnold Energy Center | DOCKET NUMBER (2)<br><br>0   5   0   0   0   3   3   1 | LER NUMBER(6) |                            |                         | PAGE(3) |      |
|   |  | YEAR<br>9 4   | SEQUENTIAL NUMBER<br>- 002 | REVISION NUMBER<br>- 00 | 3       | OF 6 |

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

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.

The setpoint for this isolation function is based on preventing RCIC turbine operation at stall conditions and preventing steam leakage past the turbine gland seals into the RCIC room. Such leakage isolation would have been completed by the RCIC room high ambient temperature isolation within design limits if such a condition had occurred. There was no effect on safe operation of the plant or threat to personnel safety as a result of this event.

This out of tolerance condition is considered non-conservative because of the potential to operate the RCIC System at turbine stall speeds and not provide the turbine trip and isolation signal in a low reactor pressure condition.

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 which 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.

The DAEC has an existing Instrument Trending Program (ITP) that tracks drift data for various plant instruments including all of those contained in the DAEC Technical Specifications' tables. This event was the third in a series of recent Barksdale pressure switch drift occurrences that are being evaluated on a broader basis to make the necessary ITP and procedure enhancements to preclude recurrence of similar events. The following are actions being taken which offer both short term and long term solutions for this problem:

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TEXT (If more space is required, use additional NRC Form 308A) (17)

A. Short Term Corrective Actions:

1. STPs are being revised to include measurement and recording of instrument rack temperatures to obtain correlation data for instrument drift and local instrument temperature. These revisions will be performed prior to the performance of the next scheduled STP that calibrates Barksdale pressure switches.
2. For dual switch instruments, Equipment Specific Maintenance Procedures (ESMPs) are being revised to ensure that calibration of the first switch is reverified after adjusting the second switch. 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. This reverification will assure that both switches are left within allowable setpoint tolerances. This action will be completed by March 28, 1994.
3. Engineering evaluations of all currently installed Barksdale B2T switches were performed to determine which instruments should have increased calibration frequencies. Based on these evaluations, frequencies for the STPs that calibrate Barksdale B2T switches have been increased from quarterly to monthly. This will decrease the amount of drift and assure that the switch is calibrated more often to minimize the drift expected during the larger than normal temperature swings as it warms up from this year's record cold winter. As other corrective actions warrant, these frequencies may be returned to a quarterly basis. This action is complete.

B. Long Term Corrective Actions:

1. As a result of past ITP recommendations, (11) Barksdale pressure switches were previously replaced with the "TC" model Barksdales that are manufactured with temperature stabilized bourdon tubes. Current data shows that the performance of the "TC" model switches is, in some applications, no better than that of the existing switches. Therefore, an evaluation as to the effectiveness of these previous switch replacements is being done to ensure that this is a prudent form of corrective action. Due to the brevity of installed time for the temperature stabilized switches, this evaluation will be on-going and decisions for replacements will be made on a case by case basis. In conjunction with this effort, an investigation of trends of different brands of bistable switches is being performed using the Nuclear Plant Reliability Data System (NPRDS) and the DAEC ITP.

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TEXT (If more space is required, use additional NRC Form 385A) (17)

2. Bench testing Barksdale switches at various temperature ranges will be performed to develop an understanding of how instrument drift varies with ambient temperature variations. This action will be completed by April 29, 1994.
3. An evaluation will be made as to the optimum as-left tolerances for the particular switch setpoint. Currently the as-left tolerances in STPs are close to the STP limits that define a non-conservative condition. Moving these as-left tolerances away from those limits will allow more room for acceptable instrument drift. This evaluation will be completed by March 31, 1994.
4. An evaluation is being 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 performance of the instrument. This effort may result in the installation of new switches. This evaluation will be completed by February 28, 1994.
5. A determination as to the effects that the internal snubber used in Barksdale switches may have on determining the as-found setpoint is being conducted. Barksdale switches have an internal pressure restrictor (snubber) at the point where the process line is connected. The snubber dampens pressure pulsations that may occur in the process. Because of the snubber's effect on the time response to pressure switch actuation, as-found switch actuations may vary with how fast the calibration pressure is applied to the switch. This action will determine if the impact is negligible or if procedures should require a consistent rate of pressure change during the calibration process. This determination will be completed by April 29, 1994.
6. An investigation as to how to minimize the bias seen between times when Barksdale switches are calibrated at reactor pressure and during outages has been initiated. Trends show larger amounts of drift between calibrations performed at reactor pressure and during outage conditions with the systems depressurized. These trends are believed to be a result of the difference in deformation of the bourdon tube when exposed to high static pressure and atmospheric conditions. Additional post-startup calibrations and/or procedure revisions necessary to accomplish this will be determined. This action will be completed by April 29, 1994.

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TEXT (If more space is required, use additional NRC Form 386A) (17)

7. An evaluation of service life for Barksdale switches is being performed to determine if the recent decline in performance is indicative of age related failure. This action will be completed by February 28, 1994.

The overall goal of the above corrective actions is to take immediate actions where possible to closely monitor for and correct trends of instrument drift then follow up with Engineering evaluations to determine the most effective means of long term resolution. Replacement of existing switches will be contingent upon the results of these evaluations and the suitability of available replacement switches.

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

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