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DMB

July 25, 1986

Mr. James Keppler
Regional Administrator
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL. 60137

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
Zion Station Units 1 and 2
LaSalle County Station Units 1 and 2
Byron Station Units 1 and 2
Braidwood Station Units 1 and 2
Response to I.E. Bulletin 86-02
Docket Nos. 50-237 & 50-249, 50-254 & 50-265,
50-373 & 50-374, 50-454 & 50-455, and
50-456 & 50-457

Reference: (a) I.E. Bulletin 86-02, J.M. Taylor
to all OLS and CPS dated July 18, 1986

Dear Mr. Keppler:

Reference (a) requested certain actions of licensees with Static-O-Ring Differential Pressure Switches which were installed as electrical equipment important to safety as defined in 10CFR 50.49(b). Commonwealth Edison has completed a review pursuant to the term outlined in I.E. Bulletin 86-02 for its Dresden, Quad Cities, Zion, LaSalle, and Byron Nuclear Power Plants. Commonwealth Edison has one station, LaSalle, which uses the specified SOR differential pressure switches, series 102 and 103.

The Dresden, Quad Cities, Zion, and Byron Stations do not use Static-O-Ring Model 102 or 103 differential pressure switches in a safety related electrical equipment capacity. Therefore, the I.E. Bulletin is inapplicable. No further actions are required at these stations.

The information requested of Commonwealth Edison in response to I.E. Bulletin 86-02, as it pertains to LaSalle County Station, can be found in Attachment 1.

A separate response will be transmitted for the Braidwood Nuclear Power Station by November 1, 1986 prior to its commencing critical operation.

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To the best of my knowledge and belief, the statements contained above are true and correct. In some respect these statements are not based on my personal knowledge but obtain information furnished by other Commonwealth Edison employees, contractor employees, and consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Please address any questions that you or your staff may have concerning our response to this office.

One signed original with attachments is being sent directly to the U.S. Nuclear Regulatory Commission Document Control Room in Washington for reproduction and distribution as requested in the bulletin.

Respectfully,

I. M. Johnson
Nuclear Licensing Administrator

/klj
cc: U.S. NRC Document Control Desk
Washington, DC. 20555

Resident Inspector-Dresden
" Quad Cities
" Zion
" LaSalle
" Byron
" Braidwood

SUBSCRIBED and SWORN to
before me this 25th day
of July, 1986

Julia A. Mayo
Notary Public

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ATTACHMENT 1

LASALLE COUNTY STATION, UNITS 1 AND 2
RESPONSE TO IE BULLETIN NO. 86-02
STATIC-O-RING DIFFERENTIAL PRESSURE SWITCHES

1. SOR DIFFERENTIAL PRESSURE SWITCHES INSTALLED AT LASALLE

SOR series 102 and 103 differential pressure (DP) switches are installed on both units at LaSalle. During the spring 1985 outage on Unit 2, 59 SOR DP switches were installed as part of an environmental qualification modification to replace the original switches. On Unit 1, 58 SOR DP switches were installed during the first refueling outage in the first two quarters of 1986.

These switches are used in the following applications:

No. of Switches Unit 1	Unit 2	Application
22	23	Reactor Water Level 1,2,3, and 8
8	8	ECCS Minimum Flow
16	16	Main Steam Line High Flow Isolation
8	8	RCIC/RHR High Steam Line Flow Isolation
4	4	RHR Shutdown Cooling Line High Flow Isolation

Table 1 contains a complete list of the SOR DP switches installed on both Units at LaSalle.

2. Operator Training

All licensed shift personnel has been trained on the June 1 event at LaSalle Unit 2 with regards to the SOR DP switches. This training included a discussion of where the switches are installed, their functions, and their setpoints. The "Conduct of Operations" requirement to monitor plant instrumentation and initiate manual action if a nominal Tech. Spec. setpoint is exceeded and the required automatic action does not occur was also re-emphasized.

3. Special Testing of SOR DP Switches

LaSalle has performed special testing on the Unit 2 switches to characterize the setpoint variability. These setpoint characterization tests measured the shift in setpoints due to the increase in static pressure from calibration to operation, the effects of cycling the switch during calibration, and the repeatability of the switches.

The setpoint characterization program consists of a static pressure cycling test and a 24-hour static pressure test. This testing program is described in detail in Reference 2.

The static pressure cycling test was performed on all switches except for a few ECCS minimum flow switches. The performance of these switches was verified during ECCS system operation.

The 24-hour static pressure test was performed on a representative sample (more than half) of switches. Switches in every application were tested. The size of the sample was based on a comparison of the amount of existing margin between the desired setpoint and Tech. Spec. limit to the adjustable range of the switch. In applications where the existing margin was very small with respect to the adjustable range of the switch (reactor water level 3, reactor water level 8, and main steam line high flow switches), every switch in the application underwent the 24 hour static pressure test.

From the early test results, it was observed that the switches with the largest repeatability error also exhibited the largest static shift error. Switches with the largest repeatability errors were then selected to be tested at static pressure over 24 hours. Therefore, the test results on this sample bounded all of the switches for that application, and performance of the 24 hour static pressure test on all switches was not necessary for determining new setpoints for that application. Table 2 provides the sample size tested in each switch application.

A series of static pressure tests conducted over various time intervals up to 72 hours demonstrated that 24 hours was sufficient to observe the full static pressure shift in the setpoint. In these series of tests, four switches were tested at static pressures longer than 24 hours, and their setpoints changed very little after 24 hours. References 2 and 3 contain this test data. This time period has also been verified by a long-term testing program at SOR on model 103AS-B212 DP switches. Their test data shows that the switch setpoints shift by 0.6 inches W.C. or less between 24 hours and 2 weeks. This data is contained in reference 4.

A similar test program will be performed or the Unit 1 SOR DP switches prior to startup.

The setpoint variance for all SOR switches will be fully characterized prior to resuming operation. Because of this program and the augmented surveillance program described in Table 4, additional special tests are not anticipated.

4. Test Results/Failures

All of the testing has been completed on the Unit 2 switches except for a few switches. The test results to date are summarized in Table 2. These test results show that some of the SOR DP switches would not have met their Tech. Spec. requirements under normal operating conditions at their existing setpoints. However, based on a GE analysis, all of the switches except for one would have tripped within analytical limits (see Reference 2).

Per reference 1 LaSalle station has submitted a report (LER 86-011-00) in accordance with 10 CFR 50.73 which addresses the June 1, 1986, event on Unit 2. The station will submit a supplemental report upon completion of the testing.

5. Interim Performance Monitoring Program

Since we will take corrective actions will be taken prior to unit startup, an interim performance monitoring program will not be developed. The corrective actions that will be taken are described in the next section.

6. Description of Corrective Actions

On the basis of the setpoint characterization tests, the setpoints of the differential pressure switches will be revised prior to startup to provide additional margin for static pressure shift and repeatability. The revised setpoints and margins are listed in Table 3. These revisions will insure that the SOR DP switches will meet their Technical Specification requirements. Switches that do not meet the static shift and repeatability acceptance limits given in Table 3 will be replaced. New switches will be tested to verify that they meet these limits.

To provide additional assurances that the switches will function properly, the ECCS minimum flow switches have been tested at their new setpoints during system operation, and reactor water level drop tests will be performed at pressures of 950, 500, and 0 psig to verify the level 3 switch setpoints. These level drop tests will be performed during startup following the current outage and during shutdown for the next refueling outage. The calibration procedures will also be revised to require the instrument maintenance technician to record the first actuation as the "as-found" and to eliminate the effects of cycling. Instead of cycling the switch between its trip and reset points, all actuations will be obtained by cycling from either zero or full-scale DP to simulate actual operating conditions. The procedures will also contain "action" and "rejection" limits. If a switch setpoint exceeds its action but not its rejection limit, its surveillance frequency will be increased. If its setpoint exceeds the rejection limit or the action limit on two consecutive surveillances, the switch will be replaced as described in Table 4.

After startup, a quarterly surveillance frequency will be established on these switches. In addition, the level 3 switches will be calibrated at 2 weeks, 4 weeks, 2 months, and 4 months before they are put on a quarterly cycles.

A complete description of the corrective actions that will be taken can be found in Table 4 and in Reference 5.

REFERENCES

1. July 1, 1986, letter from C. Reed to J. G. Keppler transmitting LER 86-011-00.

2. July 18, 1986, letter from M.S. Turbak to H. R. Denton transmitting the Draft "Report of Investigation of Static-O-Ring Differential Pressure Switches" dated July 18, 1986.

3. July 21, 1986 letter from M.S. Turbak to H. R. Denton regarding the validity of 24 hour static pressure tests.

4. July 23, 1986, letter from M.S. Turbak to H. R. Denton transmitting daily and two week test data.

5. July 24, 1986, letter from M. S. Turbak to H. R. Denton transmitting the Executive Summary.

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TABLE
LIST OF INSTALLED SOR DP SWITCHES

SWITCH NUMBER	USE	SETPOINT	MODEL	RANGE
2E12-N010AA	OPENS RHR A MIN FLOW BYPASS VALVE ON LOW FLOW	1000 gpm (5.9" W.C. decreasing)		
AB	ALARM SWITCH	1500 gpm (13.3" W.C. decreasing)	103AS-B202-NX-C1A-JJTTX7	5-35 in W.C.
BA	OPENS RHR B MIN FLOW BYPASS VALVE ON LOW FLOW	1000 gpm (5.9" W.C. decreasing)		
BB	ALARM SWITCH	1500 gpm (13.3" W.C. decreasing)		
CA	OPENS RHR C MIN FLOW BYPASS VALVE ON LOW FLOW	1000 gpm (5.9" W.C. decreasing)		
CB	ALARM SWITCH	1500 gpm (13.3" W.C. decreasing)		
E21-N004	OPENS LPCS MINIMUM FLOW BYPASS VALVE ON LOW FLOW	750 gpm (4.38" W.C. decreasing)	103AS-B202-NX-C1A-JJTTX7	5-35 in. W.C.
E22-N006	OPENS HPCS MIN FLOW BYPASS VALVE ON LOW FLOW	1000 gpm (9.7" W.C. decreasing)	103AS-B202-NX-C1A-JJTTX7	5-35 in. W.C.
B21-N101B (Unit 2 only)	RX LEVEL 8-RCIC TRIP	55.5" RWL (33.5" W.C. decreasing)	103AS-B212-NX-C1A-JJTTX6	7-100 in. W.C.
E31-N007AA,AB	RCIC/RHR HIGH STEAM LINE FLOW ISOLATION	123" W.C. increasing	103AS-B203-NX-C1A-JJTTX7	20-200 in. W.C.
E31-N007BA,BB	RCIC/RHR HIGH STEAM LINE FLOW ISOLATION	87" W.C. increasing	103AS-B203-NX-C1A-JJTTX7	20-200 in. W.C.

TAB
LIST OF INSTALLED SOR DP SWITCHES

SWITCH NUMBER	USE	SETPOINT	MODEL	RANGE
B21-N024A,B,C,D	LOW REACTOR WATER LEVEL 3-LOW LEVEL SCRAM AND PCIS GROUPS 6 AND 7	+12.5" RWL (63.78" W.C. increasing)	103AS-B212-NX-C1A-JJTTX6	7-100 in. W.C.
B21-N026AB,BB CB,DB	REACTOR WATER LEVEL -2 PCIS GROUPS 1 THRU 5	-50" RWL (145.6" W.C. increasing)	103AS-BB203-NX-C1A-JJTTX6	20-200 in. W.C.
B21-N031A,B,C,D	REACTOR WATER LEVEL 2 - HPCS INITIATION	-50" RWL (145.6" W.C. increasing	103AS-B203-NX-C1A-JJTTX6	20-200 in. W.C.
B21-N037AB,BB CB,DB	REACTOR WATER LEVEL -2 - RCIC INITIATION	-50" RWL (145.6" W.C. increasing)	103AS-B203-NX-C1A-JJTTX6	20-200 in. W.C.
			103AS-BB205-NX-C1A-JJTTX6	40-300 in. W.C.
B21-N037AA,BA CA,DA	REACTOR WATER LEVEL 1-ECCS INITIATION	-129" RWL (202.2" W.C. increasing)		
B21-N038A,B	REACTOR WATER LEVEL 3- ADS PERMISSIVE	+12.5" RWL (63.78" W.C. increasing)	103AS-B212-NX-C1A-JJTTX6	7-100 in. W.C.

TABLE 2

SUMMARY OF SETPOINT CHARACTERIZATION TESTS RESULTS FOR UNIT 2

SWITCH APPLICATION	SAMPLE SIZE	24 HOUR STATIC PRESSURE SHIFT	REPEATABILITY
-REACTOR VESSEL LEVEL 3	100% (6 switches)	2.2 - 6.1 INCHES W.C.(1)	Less Than 2%
-REACTOR VESSEL LEVEL 2 -REACTOR VESSEL LEVEL 1	44% (7 switches)	2.5 - 6.9 INCHES W.C.	Less Than 2%
-REACTOR VESSEL LEVEL 8	100% (1 switch)	3.4 INCHES W.C.	Less Than 2%
-RHR/RCIC STEAMLINE BREAK -RHR SHUTDOWN COOLING LINE -RCIC STEAM LINE BREAK	8% (1 switch)	6 INCHES W.C. (Conservative)	Less Than 2%
-RHR LPCI-A,B,C MIN. FLOW -LPCS MIN. FLOW -HPCS MIN. FLOW	25% (2 switches)	1.5 INCHES W.C.	Less Than 2%
-MAIN STEAM LINE HI FLOW	100% (16 switches)	2 - 11 PSID(2)	1.45 - 9.34 PSID(2)

NOTES: (1) Switches exceeding 3.0 inches W.C. were replaced with switches that have a static shift of 3.0 inches W.C. or less.

(2) Based on data from 11 out of 16 switches.

TABLE 3
SETPOINT CHARACTERIZATION TESTING
CONCLUSIONS FOR UNIT 2

SWITCH APPLICATION	MARGIN FROM LCO					
	STATIC SHIFT	REPEATABILITY[4]	EXISTING TECH SPEC. DRIFT	TOTAL	EXISTING L.C.O.	NEW SETPOINT
-REACTOR VESSEL LEVEL 3	4.2" RWL	2.6" RWL	1.5" RWL	8.4" RWL	11.0"RWL	19.4" RWL
-REACTOR VESSEL LEVEL 2	11.2" RWL	5.0" RWL	7.0" RWL	23.2" RWL	-57.0" RWL	-33.8" RWL
-REACTOR VESSEL LEVEL 1	11.2" RWL	7.3" RWL	7.0" RWL	25.5" RWL	-136.0" RWL	-110.5" RWL
-REACTOR VESSEL LEVEL 8	5.0" RWL	2.6" RWL	0.5" RWL	8.1" RWL	56.0" RWL	48.0" RWL
-RHR/RCIC STEAMLINE BREAK	8.0" W.C.	3.6" W.C.	5.0" W.C.	16.6" W.C.	128" W.C.	111.4" W.C.
-RHR SHUTDOWN COOLING LINE	8.0" W.C.	3.6" W.C.	6.0" W.C.	17.6" W.C.	186" W.C.	168.4" W.C.
-RCIC STEAM LINE BREAK	7.2% RATED FLOW	3.0% RATED FLOW	5.0% RATED FLOW	15.2% RATED FLOW	295% RATED FLOW	280% RATED FLOW
-RHR LPCI-A,B,C MIN. FLOW	237 GPM	73 GPM	450 GPM	1427 GPM	550 GPM	1977 GPM
-LPCS MIN. FLOW	233 GPM	71 GPM	110 GPM	1079 GPM[2]	640 GPM	1719 GPM
-HPCS MIN. FLOW	151 GPM	50 GPM	100 GPM	640 GPM[3]	900 GPM	1540 GPM
-MAIN STEAM LINE HI FLOW	(5)	(5)	5.0 PSID	(5)	116 PSID	(5)

NOTES: INCLUDES ADDITIONAL MARGIN OF 1) 666 GPM FOR LPCI 2) 664 GPM FOR LPCS AND 3) 339 GPM FOR HPCS

4) For applications other than main steam line high flow, repeatability for each switch tested was less than 2% of range; therefore 2% was used for repeatability. For mainsteam line high flow switches, repeatability of the most variable switch in service was used.

5) Setpoint development pending completion of testing and replacement of switches with static shift or repeatability above limits.

LASALLE COUNTY STATION UNIT 2

TABLE 4
CORRECTIVE ACTIONS

1.	Final LaSalle County Station Unit 2 SOR Investigation Report	8-1-86
2.	Flow Testing to Verify ECCS Minimum Flow switch setpoints	Completed
3.	Reactor water level drop tests to verify Level 3 switch setpoints. Tests will be performed at approximately 950 PSIG, 500 PSIG and 0 PSIG. The reactor will be held at 950 PSIG for at least 24 hours prior to the 950 PSIG Level Drop Test. Only one level drop test will be performed at each pressure.	During startup following current outage and during shutdown for the first refueling outage (approximately December 1986).
4.	Complete calibration procedure revisions.	7-28-86

a. New setpoints including: static pressure shift, repeatability margin and drift margin.

b. New calibration methods including: The "As-Found" setpoint will be the first actuation and during calibration the switch will be cycled from the appropriate 0% or 100% of differential pressure span to the setpoint.

c. "As-Found" setpoint acceptance limits will be included into the procedures, and actions will be defined for each limit. The limits and actions will be the following:

(1) Action Limit

(a) Except Main Steam Line High Flow, $\pm$ 3% of adjustable range from new calibration setpoint.

(b) For main steam line high flow this limit was 1.5X repeatability of the most variable switch in service. Repeatability was calculated for each switch to bound 95% of the data with a 95% confidence level.

(c) If this limit is exceeded increase surveillance frequencies for the switch. The next surveillance will be performed at the same interval as the last surveillance within this limit.

(d) If this limit is exceeded during the second consecutive surveillance the switch will be scheduled for replacement within 14 days.

TABLE 4

4. Complete calibration procedure revisions (continued)

(c) "As-Found" setpoint acceptance limits (continued)

(2) Rejection Limit

(a) ± (2% of Adjustable Range + Tech. Spec. Margin for drift)
(b) For main steam line high flow switches this limit is (Repeatability + Tech. Spec. drift) for the most variable switch in service. Repeatability was calculated for each switch to 95% of the data with a 95% confidence level.
(c) If this limit is exceeded the switch will be rejected.

5. Complete recalibration of switches with revised setpoints and revised procedures. — Prior to startup from current outage.

6. Implement Increased Surveillance — After Startup from current outage.

a. Categories

1. Level 3 switches (6 switches) - The Level 3 switches will be calibrated 2 weeks after startup, 4 weeks after startup, 2 months after startup and 4 months after startup. After the 4th month, the Level 3 switches will remain on a quarterly frequency. Note that this schedule assumes no problems occur with the limits as described above.

2. Main Steam Line Break Switches (16 switches) - At least 4 of the Main Steam Line (MSL) switches will be calibrated 4 weeks after startup. Of the remaining 12 switches at least 4 of the MSL switches will be calibrated 8 weeks after startup. Of the remaining 8 switches, at least 4 of the MSL switches will be calibrated 12 weeks after startup. The maximum interval for each individual switch will be limited to a quarterly frequency.

3. Remaining switches (37 switches) - A sample (grouped by model numbers) representative of the remaining switches (approximately 1/3) will be calibrated 4 weeks after startup. Of the remaining switches, approximately 1/3 will be calibrated 2 months after startup. The remaining switches will be calibrated 3 months after startup. The maximum interval for each individual switch will be limited to a quarterly frequency. The representative samples will be chosen, where possible, to include a sampling of various switch model numbers.

TABLE 4

7.	Complete evaluation of alternative level sensing Instruments to replace SOR	1-1-87
	a. Review requirements b. Review vendor environmental qualification data. c. Review vendor performance test data. d. Recommend technically acceptable alternatives. e. Complete preliminary conceptual design and obtain reviews and approval. General description of key features effecting design installation, operation and maintenance and project plan. f. Initiate detailed conceptual design.	
8.	Establish acceptance limits for new switches. The Purchase Order with SOR will be revised to require tests similar to setpoint characterization tests including a 24 hour test and to require switches perform within the static shift and repeatability limits.	Completed