

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Davis-Besse Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 4 6										PAGE (3) 1 OF 0 4									
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TITLE (4)

Unusual Event Declared Due to Inoperability of the Auxiliary Feedwater System

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES						DOCKET NUMBER(S)											
0	1	1	2	8	7	8	7	—	0	0	4	—	0	0	0	2	1	1	8	7	0 5 0 0 0 0					

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 8: (Check one or more of the following) (11)																							
POWER LEVEL (10) 0 5 1		20.402(b)						20.405(c)						50.73(a)(2)(iv)						73.71(b)					
		20.405(a)(1)(i)						50.38(c)(1)						<input checked="" type="checkbox"/> 50.73(a)(2)(v)						73.71(c)					
		20.405(a)(1)(ii)						50.38(c)(2)						<input checked="" type="checkbox"/> 50.73(a)(2)(vii)						OTHER (Specify in Abstract below and in Text, NRC Form 366A)					
		20.405(a)(1)(iii)						<input checked="" type="checkbox"/> 50.73(a)(2)(ii)						50.73(a)(2)(viii)(A)											
		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 Joseph J. Miller, Technical Support Engineer										TELEPHONE NUMBER AREA CODE 4 1 9 2 4 9 1 - 5 10 10 10									
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS
B	B	A P D S	S 3 8 2	N					

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)										<input checked="" type="checkbox"/> NO										EXPECTED SUBMISSION DATE (15)										MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

Auxiliary Feedwater (AFW) Train 1 was declared inoperable due to problems experienced in the testing of Static-O-Ring pressure switches (PSL 106A, B, C and D). Surveillance Testing and investigation revealed that the switches would not hold their set points. The operability of identical model pressure switches (PSL 107A, B, C and D) in Train 2 then came into question. A conservative approach was taken to verify the operability of the pressure switches on AFW Train 2. Intentional entry into Technical Specification (TS) 3.0.3 to conduct T.S. Test ST 5071.23, Section 5.4 of AFW Train 2 pressure switch PSL 107A, B, C, and D was made to ensure system operability. Emergency Plan EP-1500 requires that an unusual event be declared when Technical Specification 3.0.3 applies. The switches were verified operable within 30 minutes and the unusual event was terminated.

The root cause is the failure to evaluate during design review the effects of Main Steam System Chemistry on the installed diaphragms and to specify correct environmental conditions the diaphragm of the pressure switch must tolerate.

The problem was corrected by replacing the three layer (Kapton-fluorinated silicone-Kapton) pressure switch diaphragm material for both AFW Trains with stainless steel.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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

Description of Occurrence:

Recent problems experienced during monthly Technical Specification testing of the Static-O-Ring pressure switches (PSL 106A, B, C and D) installed on Auxiliary Feedwater (AFW) (IEEE Standard System, BA) Train 1, resulted in declaring the train inoperable. During testing of Static-O-Ring pressure switches (PSL 106A, B, C and D) on AFW Train 1, it was discovered that the switches had not held their calibrated set points. The switches were calibrated and exercised three separate times, but each time the set point would drift lower. As a result, a concern was raised as to the operability of identical model switches (PSL 107A, B, C and D) installed on AFW Train 2. Due to the failure mechanism occurring in a short time frame, management decided to test AFW Train 2 components before Train 1 was repaired.

The performance of Surveillance Test, ST 5071.23, "Auxiliary Feedwater Train 1-2 Auto Essential Level Control System, Suction Pressure Interlocks, Turbine Inlet Pressure Interlock and Flow Transmitter Test," Section 5.4 resulted in an intentional entry into Technical Specification 3.0.3 with both AFW Trains temporarily inoperable. As a result, an unusual event was declared as defined by the Davis-Besse Emergency Preparedness Plan (EP-1500).

At the time the unusual event was declared, the unit was in Mode 1, Power Operation, with the reactor at 51 percent power and reactor coolant system at 2155 psig and 582 degrees. No engineered safety features were challenged.

Completion of ST 5071.23, Section 5.4 verified that the pressure switches (PSL 107A, B, C and D) on AFW Train 2 would perform their functions. The unusual event was terminated 30 minutes after it was declared with AFW Train 2 being declared operable and returned to service.

The occurrence is reportable under 10CFR50.73(a)(2)(i)(b), 10CFR50.73(a)(2)(v) and 10CFR50.73(a)(2)(vii).

Designation of Apparent Cause of Occurrence:

Investigation into the set point drift of Static-O-Ring pressure switches (Model 6TA-B4-NX-ClA-JJTX6) PSL 106 A through D by Toledo Edison and vendor personnel revealed that the failure was caused by the formation of an ammonia gas bubble between the three layers (Kapton-fluorinated silicone-Kapton). The ammonia gas bubble was formed over a period of time by ammonia gas migration across the first layer of the diaphragm (Kapton) from the process system (main steam).

The root cause of the failure has been determined that Toledo Edison personnel failed to consider in their design evaluation the effects of the main steam system chemistry on the diaphragm; therefore, the chemical specifications of the system were not provided to the vendor.

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Davis-Besse Unit 1	0500034687	—	004	—00	03	OF	04

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

Inadequate review of maintenance history and/or Licensee Event Reports resulted in a failure to identify that similar problems were encountered in 1979 and 1980. (See Failure Data)

Analysis of Occurrence:

The Static-O-Ring pressure switches (PSL 106/107 A through D) are sensing switches arranged in two redundant trains used to close the regular steam inlet (MS 106/107) and cross tie (MS 106A/107A) valves on a low turbine steam pressure condition. These switches have an acceptable set point range of 20 psig plus 10 psig minus 15 psig. Any actuation of either A and C or B and D pressure switches per train would cause the isolation of the main steam lines supplying the Auxiliary Feedwater Pump Turbine in the event of a line break. The Margin of Safety was at no time reduced.

Corrective Action:

The Model 6TA-B4-NX-C1A-JJTTX6 Static-O-Ring pressure switches on PSL 106/107A through D were replaced by Model 6TA-B4-NX-C1A-JJTTX8. Model 6TA-B4-NX-C1A-JJTTX8 diaphragms are made of stainless steel and are less susceptible to ammonia migration.

The new switches are currently being checked for set point drift on an increased surveillance frequency. The switches presently installed have performed satisfactorily since mid January, 1987. The increased test frequency will be reduced to the normal Technical Specification requirement as confidence is established in performance of the switches.

All other Static-O-Ring pressure switches within the plant, some of which are safety related, will be reevaluated and verified with the vendor to ensure that the required specification for each Static-O-Ring pressure switch is in accordance with its current application. This is expected to be completed by April 1, 1987.

A Systems Engineering Group has been established for all systems within the plant. System engineers are responsible for the review of system operation and testing results, maintaining a working knowledge of maintenance history and reviewing changes to their assigned systems. Design and procurement procedures have been reviewed with the engineers specifying new equipment to ensure they consider both external and process chemistry in ordering equipment. Changes had been incorporated into NFP 021 "Specification", Exhibit 8 (Suggested Design Review Considerations for Specifications) on January 21, 1986.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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

Failure Data:

Previously reported failures of Static-O-Ring pressure switches were reported in Licensee Event Reports 80-034 (NP-33-80-44), 79-062 (NP-33-79-64) and 79-074 (NP-33-79-82).

The three LER's written on Static-O-Ring pressure switches in 1979 and 1980 identified that in each case severe corrosion of the aluminum piston had occurred as a result of fluid permeating the thin Buna N diaphragm, but a single definitive cause was not specified. Replacement with stainless steel diaphragm pressure switches occurred in all three cases.

REPORT NO: NP-33-87-03PCAQ NO(s): 87-0005, 87-0011, 87-0016



February 11, 1987

Log No: KA87-0064
File: (NP-33-87-03)

Docket No. 50-346
License No. NPF-3

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Gentlemen:

LER No. 87-004
Davis-Besse Nuclear Power Station Unit No. 1
Date of Occurrence January 12, 1987

Enclosed is Licensee Event Report 87-004 which is being submitted in accordance with 10CFR50.73, to provide 30 day written notification of the subject occurrence.

Yours truly,

Louis F. Storz
Plant Manager
Davis-Besse Nuclear Power Station

LFS/ed

Enclosure

cc: Mr. James G. Keppler
Regional Administrator
USNRC Region III

Mr. Paul Byron
DB-1 NRC Resident Inspector

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