

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Davis-Besse Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 4 6										PAGE 13 1 OF 0 4																													
TITLE (4) Inoperable Safety Features Actuation System Sequencer.																																																	
EVENT DATE (5) MONTH DAY YEAR 0 3 3 0 8 7 8 7										LER NUMBER (6) YEAR SEQUENTIAL NUMBER REVISION NUMBER - 0 0 8 - 0 1 0 1 2 6 8 8										REPORT DATE (7) MONTH DAY YEAR 0 1 0 1 2 6 8 8										OTHER FACILITIES INVOLVED (8) FACILITY NAMES DOCKET NUMBER(S) 0 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0																			
OPERATING MODE (9) 1										THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																																							
POWER LEVEL (10) 11010										20.402(n) 20.406(a)(1)(i) 20.406(a)(1)(ii) 20.406(a)(1)(iii) 20.406(a)(1)(iv) 20.406(a)(1)(v)										20.406(e) 50.38(a)(1) 50.38(a)(2) 50.73(a)(2)(i) 50.73(a)(2)(ii) 50.73(a)(2)(iii)										50.73(a)(2)(iv) 50.73(a)(2)(v) 50.73(a)(2)(vi) 50.73(a)(2)(vii)(A) 50.73(a)(2)(vii)(B) 50.73(a)(2)(x)										73.71(b) 73.71(c) OTHER (Specify in Abstract below and in Text, NRC Form 308A)									
LICENSEE CONTACT FOR THIS LER (12) NAME W. Dean Siferd, Technical Support Engineer																														TELEPHONE NUMBER AREA CODE 4 1 9 2 4 9 - 1 5 1 0 1 0																			
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																																	
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SUPPLEMENTAL REPORT EXPECTED (14) YES (If yes, complete EXPECTED SUBMISSION DATE) NO																				EXPECTED SUBMISSION DATE (15) MONTH DAY YEAR																													

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

With the Unit operating at 100 percent power, the Safety Features Actuation System (SFAS) Channel 4 sequencer failed a monthly Surveillance Test (ST). The SFAS Channel 4 sequencer was declared inoperable and the station entered Technical Specification (TS) 3.3.2.1 Action 9. Because of an overly conservative requirement in TS 3.3.2.1 to have all four sequencers operable, entry into TS 3.0.3 was required; a unit shutdown was begun and an Unusual Event was declared as defined by Davis-Besse Emergency Preparedness Plan, EP-1500. Maintenance activities restored the SFAS channel, ending the event with Reactor Power at 94.5 percent.

The root cause was determined to be a degraded SFAS Logic Power Supply. In addition, a TS change was made to prevent future forced entry into TS 3.0.3 during operation with one SFAS sequencer inoperable.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Davis-Besse Unit 1	0500034687	—	008	—	01	02	OF 04

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

Description of Occurrence:

The plant was operating in Mode 1, at 100 percent reactor power at 1445 hours on March 30, 1987 when the Safety Features Actuation System (SFAS / IEEE Standard JE) Channel 4 sequencer was declared inoperable upon failing Surveillance Test ST 5031.01, "SFAS Monthly Test". The sequencer is relied upon to sequentially load Emergency Core Cooling System (ECCS / IEEE Standard BP) loads onto the Emergency Diesel Generator (EDG / IEEE Standard EK) in the event of a loss of offsite power with an SFAS actuation occurring coincidentally. The ST identified that the channel 4 sequencer was sequencing the loads too quickly. Maintenance activities began troubleshooting while the station entered Technical Specification (TS) statement 3.0.3, because the Limiting Condition for Operation in TS 3.3.2.1 did not allow for power operation with less than four sequencers operable. Operations personnel initiated a plant shutdown in accordance with TS 3.0.3 at 1545 hours, prompting the declaration of an Unusual Event as defined by Davis-Besse Emergency Preparedness Plan, EP-1500, with troubleshooting still in progress.

The sequencer was repaired and was tested successfully at 1628 hours. The plant was then removed from TS 3.0.3 and the Unusual Event was terminated. Reactor power had been reduced to 94.5 percent when the shutdown evolutions were terminated.

This report is being submitted pursuant to the requirements of 10CFR50.73 (a)(2)(i)(B). Although Technical Specifications were not violated, the plant entered TS 3.0.3.

Designation of Apparent Cause of Occurrence:

Investigation during the event revealed a reduced voltage from the power supply that energizes the logic for the channel 4 sequencer. It was also noted that a solder connection for the channel 4 sequencer logic power supply was broken and was not making a good connection. This electrical connection was repaired and the power supply output voltage was adjusted. Subsequent monitoring of this power supply revealed operation to be degraded, and the power supply was replaced.

TS 3.3.2.1 was found to be inadequate in that specific guidance was not given in the event of an SFAS sequencer failure. This dictated that the conservative approach of entering TS 3.0.3 be taken.

Analysis of Occurrence:

The starting circuitry of each of the two EDGs includes two independent sequencers that prevent overloading of the EDG when an SFAS actuation signal is coincident with a loss of offsite power. The sequencers are an integral part of the SFAS. Each of the four SFAS logic channels employs one sequencer. The sequencer causes components to be loaded in

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104

EXPIRES 8-31-85

FACILITY NAME (1) Davis-Besse Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 4 6				LER NUMBER (6)			PAGE (3)		
					YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
					8 7	— 0 0 8	— 0 1	0 3	OF	0 4

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

five steps following a coincident SFAS signal and loss of offsite power. The sequencing is done by blocking of SFAS signals to the activated equipment.

The operational features of the sequencer logic are summarized below:

- The sequencer does not block the SFAS signal to the actuated equipment if offsite power is available.
- If offsite power is lost, the SFAS signal is blocked from the actuated equipment by the sequencer. The sequencer then completes the actuation of ECCS equipment on a predetermined time sequence to ensure staggered loading of the EDG.
- Either of the two sequencer channels associated with and EDG will provide the above sequenced loading of the EDG.

TS 3.3.2.1 Table 3.3-3 erroneously listed the minimum required number of operable sequencers as four rather than three. Pursuant to 10CFR50.91(a)(5), an emergency Technical Specification change was requested (Serial No. 1369) and granted (Amendment 102), changing the minimum number of operable sequencers from four to three and ensuring that the inoperable sequencer module be placed in the tripped condition by removal of the sequencer module.

Corrective Action:

Immediate troubleshooting and corrective actions taken during the event restored the SFAS Channel to an operable condition. The power supply electrical connection was repaired and the voltage output was adjusted, restoring the proper operation of the sequencer. ST 5031.01 was then completed satisfactorily and the SFAS channel was declared operable. Further analysis of the Channel 4 sequencer power supply subsequent to the event revealed an unacceptable amount of degradation, prompting replacement.

To reduce the likelihood of this type of failure, regularly scheduled preventive maintenance (PM) is being initiated. This PM will monitor, trend, and adjust or replace power supplies as necessary in the SFAS system. This activity will include a general surveillance of SFAS cabinets to identify loose electrical connections and damaged wires. The PM is expected to be in place by May 15, 1987.

A review of Technical Specification 3.3.2.1 Table 3.3-3 requirement to maintain a minimum of four SFAS sequencers was conducted and it was found to be overly conservative and inconsistent with the general SFAS design. An emergency change to this Technical Specification was effected soon after the Channel 4 SFAS sequencer was repaired.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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EXPIRES 8-31-85

FACILITY NAME (1) Davis-Besse Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 4 6 8 7 - 0 0 8 - 0 1 0 4 OF 0 4	LER NUMBER (5)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			

TEXT (If more space is required, use additional NRC Form 368A's) (17)

1 In an effort to avoid similar problems relating to Technical Specification adequacy, a comprehensive Technical Specification Verification Program (TSVP) was initiated in 1987 and is expected to be completed in 1989.

Failure Data:

There has been one previous report of a loss of SFAS power supply. See Licensee Event Report LER 80-88.

REPORT NO: NP-33-87-09PCAQ NO(s): 87-0177

January 26, 1988



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TOLEDO, OHIO 43652-0001

Log No. KA88-0008
NP-33-87-C9 Rev. 1

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

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

Gentlemen:

Enclosed is Revision 1 to Licensee Report 87-008. The revisions to the report are indicated by a "1" in the left margin of each page.

Please destroy or mark superseded your previous copy of this report and replace with the attached revision.

Yours truly,

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

LFS/ed

Enclosure

cc: Mr. A. Bert Davis
Regional Administrator,
USNRC Region III

Mr. Paul Byron
DB 1 NRC Resident Inspector

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