



A Centerior Energy Company

EDISON PLAZA
300 MADISON AVENUE
TOLEDO, OHIO 43652-0001

NP-33-97-008-1

Docket No. 50-346

License No. NPF-3

May 2, 1997

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Ladies and Gentlemen:

LER 97-008, Revision 1
Davis-Besse Nuclear Power Station, Unit No. 1
Date of Occurrence - March 18, 1997

Enclosed please find Revision 1 to Licensee Event Report (LER) 97-008, which is being submitted to provide additional information regarding the subject occurrence. The changes are marked with a revision bar in the margin. Please destroy or mark superseded on previous copies of the LER. This LER is being submitted in accordance with 10CFR50.73(a)(2)(i)(B).

Very truly yours,

James H. Lash
Plant Manager
Davis-Besse Nuclear Power Station

GMW/dlc

Enclosure

cc: Mr. A. B. Beach
Regional Administrator
USNRC Region III

Mr. Stan Stasek
DB-1 NRC Sr. Resident Inspector



130064 Utility Radiological Safety Board

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY
INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE
INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY.
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND
RECORDS MANAGEMENT BRANCH (T-6 F33), 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)

Davis-Besse Unit Number 1

DOCKET NUMBER (2)

05000346

PAGE (3)

1 OF 7

TITLE (4)

Inadequate Testing of Safety Related Logic

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	18	97	97	- 008 -	01	05	02	97	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	20.2201(b)		20.2203(a)(2)(v)		X		50.73(a)(2)(i)	50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(i)				50.73(a)(2)(ii)	50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)				50.73(a)(2)(iii)	73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)				50.73(a)(2)(iv)	OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)				50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)				50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME

Gerald M. Wolf, Engineer - Licensing

TELEPHONE NUMBER (Include Area Code)

(419) 321-8114

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

SUPPLEMENTAL REPORT EXPECTED (14)

<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
			06	12	98

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

During a review as requested by Generic Letter 96-01, "Testing of Safety-Related Logic Circuits," it was determined that the monthly Surveillance Tests for the Safety Features Actuation System (SFAS) did not provide a complete check of the two-out-of-four logic gates in the individual output modules. All four channels of SFAS were declared inoperable, and Technical Specification (TS) 3.0.3 was entered. The 24 hour time period permitted by TS 4.0.3 was invoked to allow completion of the 18 month Surveillance Test, which checks the logic gates not tested by the monthly Surveillance Tests. The Anticipatory Reactor Trip System (ARTS) was then reviewed, and a similar discrepancy was found. All four channels of ARTS were declared inoperable, and TS 3.0.3 was entered. Again the 24 hour time period permitted by TS 4.0.3 was invoked to allow completion of an interchannel logic test, which checks the logic gates not tested by the monthly Surveillance Tests. These conditions represent conditions prohibited by the plant's Technical Specifications, and are therefore being reported in accordance with 10CFR50.73(a)(2)(i)(B). The appropriate testing will continue to be performed on a monthly basis so that a complete check of the two-out-of-four logic is performed. Review of safety-related logic circuits as requested by Generic Letter 96-01 is ongoing, and any future Surveillance Test deficiencies discovered as a result of this review will be reported in supplements to this Licensee Event Report.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Description of Occurrence:

A review of the Safety Features Actuation System (SFAS) [Energy Industry Identification System Code: JE] was being conducted as requested by Generic Letter 96-01, "Testing of Safety-Related Logic Circuits." Davis-Besse's Technical Specifications state that each SFAS output logic functional unit shall be demonstrated operable by performing a monthly channel functional test in Modes 1-4 and in Mode 6 if using the SFAS area radiation monitors to support core alterations or movement of irradiated fuel within containment. The Technical Specifications also specify an 18 month channel calibration and a shiftly channel check for these same functional units. On March 18, 1997, at 1015 hours with the plant in Mode 1 operating at 100 percent power, it was determined that the Technical Specification requirement for an 18 month calibration of all SFAS output logic is equivalent to the Technical Specification requirement to perform a monthly channel functional test. The existing monthly functional tests do not provide a complete check of the two-out-of-four logic gates in the individual SFAS output modules. The 18 month Surveillance Test performs a check of the logic gates not checked in the monthly channel functional tests. Since the existing monthly functional tests did not provide a complete check of the two-out-of-four logic gates in the individual SFAS output modules, the Technical Specification Surveillance Requirements were not being met. The last time these Surveillance Requirements were met was on November 20, 1996, when the 18 month test was performed. Since the Surveillance Requirements were not met in the appropriate time frame, the plant was being operated in a condition that was prohibited by the plant's Technical Specifications. This placed the plant in Technical Specification 3.0.3, which requires actions to be initiated within one hour to place the unit in a Mode in which the Specification does not apply. The 24 hour time period permitted by Technical Specification 4.0.3 was invoked to allow completion of the 18 month Surveillance Test. The 18 month test was completed on March 18, 1997, at 1300 hours, demonstrating that all channels of SFAS were operable; therefore, the plant exited Technical Specification 3.0.3.

Because of this event, a review of the Anticipatory Reactor Trip System (ARTS) was conducted. Davis-Besse's Technical Specifications state that each ARTS output logic functional unit shall be demonstrated operable by performing a monthly channel functional test in Mode 1. On April 3, 1997, at 1331 hours with the plant in Mode 1 operating at 100 percent power, it was determined that the refueling interval periodic testing of all ARTS output logic is equivalent to the Technical Specification requirement to perform a monthly channel functional test. The existing monthly functional tests do not provide a complete check of the two-out-of-four logic gates in the individual ARTS output logic. Every refueling outage, a non-Technical Specification required interchannel logic test is performed to check the logic gates not checked in the monthly functional tests.

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

Description of Occurrence: (Continued)

Since the existing monthly functional tests did not provide a complete check of the two-out-of-four logic gates in the ARTS output logic, the Technical Specification Surveillance Requirement was not being met. The last time a complete check of the ARTS output logic was performed was on May 20, 1996, when the interchannel logic test was performed. Since the Surveillance Requirement was not met in the appropriate time frame, the plant was being operated in a condition that was prohibited by the plant's Technical Specifications. This placed the plant in Technical Specification 3.0.3, and the 24 hour time period permitted by Technical Specification 4.0.3 was invoked to allow performance of an interchannel logic test. This test was completed on April 3, 1997, at 1718 hours, demonstrating that all channels of ARTS were operable; therefore, the plant exited Technical Specification 3.0.3.

Both of these events represent conditions prohibited by the plant's Technical Specifications, and are therefore being reported in accordance with 10CFR50.73(a)(2)(i)(B).

On January 10, 1996, the NRC issued Generic Letter 96-01. This Generic Letter requested licensees take the following actions:

- 1) Compare electrical schematic drawings and logic diagrams for the reactor protection system, emergency diesel generator load shedding and sequencing, and actuation logic for the engineered safety features systems against plant Surveillance Test procedures to ensure that all portions of the logic circuitry, including the parallel logic, interlocks, bypasses and inhibit circuits are adequately covered in the Surveillance procedures to fulfill the Technical Specification requirements. This review should also include relay contacts, control switches, and other relevant electrical components within these systems, utilized in the logic circuits performing a safety function.
- 2) Modify the Surveillance procedures as necessary for complete testing to comply with the Technical Specifications. Additionally, the licensee may request an amendment to the Technical Specifications if relief from certain testing requirements can be justified.

Completion of these actions was requested to be accomplished prior to startup from the first refueling outage commencing one year after the issuance of the Generic Letter. In a letter dated April 16, 1996, (Serial Number 2370), Toledo Edison committed to completing this review prior to startup from the eleventh refueling outage, which is currently scheduled to start in April 1998. It was during this review that these conditions were discovered.

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

Apparent Cause of Occurrence:

Licensee Event Report (LER) 85-021, submitted to the NRC on December 2, 1985, identified the System Review and Test Program SFAS review revealed a portion of the two-out-of-four SFAS output logic was not tested regularly. This output logic was tested prior to initial plant operations. The apparent cause was that the Surveillance Test review process was not technically detailed enough to ensure that all functions of all components were being addressed. The condition was reported as a procedure inadequacy that could have allowed the failure of a component in a safety system to go undetected. Testing of the logic gates was conducted as part of the System Review and Test Program. Subsequently, a Surveillance Test was developed to test these logic gates on an 18 month frequency. At this time it was believed that not all logic gates were required to be tested to satisfy the Technical Specification monthly channel functional test Surveillance Requirement, as evidenced by prescribing testing on an 18 month frequency.

LER 88-020, submitted to the NRC on September 16, 1988, identified ARTS and SFAS monthly channel functional testing did not completely meet Technical Specification Surveillance Requirements 4.3.2.3 and 4.3.2.1.1. The apparent cause was that the testing provisions provided in the vendor drawings did not facilitate monthly testing of those portions of a coincidence logic circuit that receive an actual (i.e., other than test) demand. This condition occurred, in part, because the circuits were not wired per logic drawings (design drawing), but instead were wired per the vendor drawings. The LER recognized the SFAS gates that were not tested in the monthly channel functional test were tested in the 18 month integrated SFAS testing. The condition was reported as a condition prohibited by the plant's Technical Specifications. ARTS and SFAS logic wiring was corrected to allow monthly testing per the original design intent.

LER 91-001, submitted to the NRC on April 10, 1991, identified the Reactor Protection System (RPS) [Energy Industry Identification System Code: JC] monthly channel functional testing did not completely meet Technical Specification Surveillance Requirement 4.3.1.1.1. Prior to 1981, the test procedure included steps to verify that all combinations of the trip logic were tested. In 1981, the test procedure was revised and the measurement of voltage to each Control Rod Drive trip device was eliminated as it was deemed unnecessary. The apparent cause of this procedure deficiency was inadequate technical review. No further checks of other systems, such as ARTS and SFAS, were performed at this time to determine if the existing Surveillance Tests satisfied the Technical Specification Requirements. This was based upon the review that was performed in 1988 for LER 88-020. However, the review performed for LER 88-020 was incomplete due to a lack of understanding of the full intent of the definition of a channel functional test, and due to the belief that the existing licensing bases supported the existing methods used to accomplish Surveillance Tests.

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

Apparent Cause of Occurrence: (Continued)

Technical Specification Definition 1.11, Channel Functional Test, identifies a channel functional test to be the injection of a simulated signal into the channel as close to the primary sensor as practicable to verify operability, including alarm and/or trip functions for analog channels, and the injection of a simulated signal into the channel sensor to verify operability, including alarm and/or trip functions for bistable channels. The ARTS and SFAS monthly channel functional tests do inject a simulated signal into the channel output logic to verify the channel output logic trip function. However, the monthly channel functional tests do not satisfy the applicable Surveillance Requirement because the tests do not functionally verify the operability of all components that could complete the logic and cause a trip in the ARTS or SFAS output logic.

The apparent cause for the condition is personnel error in failing to fully understand the Technical Specification Surveillance Requirements for a channel functional test as applied to channel output logic. A contributing factor is the generic nature of the Technical Specification definition of the channel functional test and the application of the definition to channel output logic.

Analysis of Occurrence:

The portions of the output logic circuits for ARTS and SFAS that were not tested in the past during monthly testing are part of integrated circuits and solid state components. Past experience has shown that these components are highly reliable. Multiple failures in redundant components are required to prevent the system from tripping during actual demands for system actuation. In no case was the capability of manually tripping the logic circuits compromised. Operator training on the plant's simulator emphasizes manual initiation of a safety system when automatic initiation does not occur.

All of the logic circuits for SFAS that were not tested during monthly testing were previously tested satisfactorily on November 20, 1996, by performance of the 18 month Surveillance Test. Performance of the 18 month Surveillance Test on March 18, 1997, revealed no equipment deficiencies. Based upon this successful test, it is concluded that plant safety was not compromised. Results from previous performances of the 18 month Surveillance Test determined that SFAS was capable of performing its designated safety function at the time of the test.

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Analysis of Occurrence: (Continued)

All of the logic circuits for ARTS that were not tested during monthly testing were previously tested satisfactorily on May 20, 1996, by performance of the interchannel logic test. Performance of the interchannel logic test on April 3, 1997, revealed no equipment deficiencies. Based upon this successful test, it is concluded that plant safety was not compromised. Results from previous performances of the interchannel logic test determined that ARTS was capable of performing its designated safety function at the time of the test.

Therefore, even though portions of the affected systems were not tested monthly in accordance with the Technical Specification Surveillance Requirements, these events had minimal safety significance.

Corrective Actions:

On March 18, 1997, the 18 month Surveillance Test (DB-SC-03115, SFAS Interchannel Logic Test) was performed and completed satisfactorily with no equipment deficiencies. The combination of this test and the existing monthly tests provide an overlapping check of all required two-out-of-four logic in the output modules of SFAS. The 18 month Surveillance Test will continue to be performed on a monthly frequency along with the monthly tests so that a complete check of the two-out-of-four logic gates in the individual SFAS output modules is performed.

On April 3, 1997, the interchannel logic test (DB-MI-03355, ARTS Interchannel Logic Test) was approved, performed, and completed satisfactorily with no equipment deficiencies. The combination of this test and the existing monthly tests provide an overlapping check of all required two-out-of-four logic in the output logic of ARTS. The interchannel logic test will continue to be performed on a monthly frequency along with the monthly tests so that a complete check of the two-out-of-four logic gates in the individual ARTS output logic is performed. Additionally, the existing periodic test (DB-MI-04020), written to be performed in an outage, will be changed to a surveillance test and performed prior to entering Mode 1 after every refueling outage, as required by the Surveillance Test schedule.

Review of safety-related logic circuits as requested by Generic Letter 96-01 is ongoing. This review will be completed prior to startup from the eleventh refueling outage, which is currently scheduled to start in April 1998. Any future deficiencies discovered as a result of this review will be reported in supplements to this LER.

LICENSEE EVENT REPORT (LER)
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Failure Data:

Previous reports involving safety system logic testing that was inadequate are LER 91-001, LER 88-020, and LER 85-021. LER 91-001 involved a procedural deficiency that was caused by an inadequate procedure revision. LER 88-020 reported a procedure deficiency that was caused by the field wiring of test switches not being per drawings in SFAS and the Anticipatory Reactor Trip System. LER 85-021 reported that some logic gates in SFAS were not covered by testing, which was caused by the Surveillance Test review process not being technically detailed enough to ensure that all functions of all components were being addressed. There have been no LERs within the last three years involving inadequate safety system logic testing.

NP-33-97-008-1

PCAQR 97-0364
PCAQR 97-0430