

Davis-Besse Nuclear Power Station
5501 North State Route 2
Oak Harbor, OH 43449-9760

NP-33-97-008-7

Docket No. 50-346

License No. NPF-3

November 20, 1997

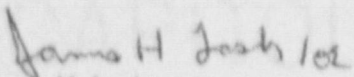
United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Ladies and Gentlemen:

LER 97-008, Revision 7
Davis-Besse Nuclear Power Station, Unit No. 1
Date of Occurrence - October 21, 1997

Enclosed please find Revision 7 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 Please destroy or mark superseded on previous copies of the LER.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

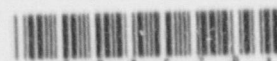
Enclosure

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

Mr. Stephen J. Campbell
DB-1 NRC Senior Resident Inspector

Utility Radiological Safety Board

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PDR ADOCK 05000346
S PDR



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: 500 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)

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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 -- | 07 | 11 | 20 | 97 | FACILITY NAME | DOCKET NUMBER | |
| | | | | | | | | | | 05000 | |
| | | | | | | | | | FACILITY NAME | DOCKET NUMBER | |
| | | | | | | | | | | 05000 | |
| OPERATING MODE (9) | | 1 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11) | | | | | | | | |
| | | | 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) |
| POWER LEVEL (10) | | 100 | 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 |
|-------|--------|-----------|--------------|---------------------|-------|--------|-----------|--------------|---------------------|
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SUPPLEMENTAL REPORT EXPECTED (14)

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|--|-----------------------------|-------------------------------|-------|-----|------|
| <input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) | <input type="checkbox"/> NO | EXPLCTED 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," the following conditions were discovered where approved Surveillance Test procedures did not completely meet the applicable Surveillance Requirements:

1. The monthly Surveillance Tests for the Safety Features Actuation System (SFAS) and for the Anticipatory Reactor Trip System did not provide a complete check of the two-out-of-four logic gates in the individual output modules.
2. Surveillance Tests for the SFAS did not verify that equipment with an alternate or swing component was load shed or energized through the emergency diesel generator load sequencers every 18 months.
3. SFAS logic was not response time tested at the Technical Specification Surveillance Requirement specified frequency.
4. The quarterly Surveillance Tests for the Reactor Protection System did not check the calibration of all necessary signal processing components.
5. The SFAS automatic load sequencer time intervals were not tested at the required accuracy during the monthly surveillance tests.
6. The monthly Surveillance Tests for the Steam Feedwater Rupture Control System did not check the actuation logic for the Main Steam Isolation Valve Bypass Valves.
7. The monthly Surveillance Tests for the SFAS did not verify the containment sump recirculation permissive was blocked until the proper level was attained.

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). Testing was performed to verify equipment operability, and the appropriate testing will continue to be performed at the required frequency. 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: 50.8 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 20545-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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| Davis-Besse Unit Number 1 | 05000346 | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | 2 OF 19 |
| | | 97 | -- 008 -- | 07 | |

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

Description of Occurrence:

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. During this review, the following conditions were discovered.

Condition 1: A review of the Safety Features Actuation System (SFAS) [Energy Industry Identification System Code: JE] was conducted. 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

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 60.0 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 (1-6 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: (Continued)

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.

Condition 2: Because of the discovery of condition 1, 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. 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. Testing 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.

Condition 3: A review of the emergency diesel generator (EDG) [EK] load shedding and sequencing circuitry was conducted. Davis-Besse Technical Specification 4.8.1.1.2.d.2 (a. & b.) states that each diesel generator shall be demonstrated operable by simulating a loss of offsite power in conjunction with a SFAS test signal every 18 months and verifying (a) de-energization of the essential busses and load shedding from the essential busses, and (b) the diesel starts on the auto-start signal energizes the essential busses with permanently connected

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 (1-6 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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Description of Occurrence: (Continued)

loads, energizes the auto-connected loads through the load sequencer, and operates for greater than or equal to 5 minutes while its generator is loaded with the essential loads. On May 12, 1997, at 1455 hours with the plant in Mode 5, it was determined that this Technical Specification requirement was not completely satisfied because all required loads were not verified to be load shed or verified to be energized through the load sequencer every 18 months. Specifically, the equipment with an alternate or swing component (such as Component Cooling Water Pump 3, Service Water Pump 3, and Containment Air Cooler 3) was only tested on an alternating outage periodicity under the SFAS integrated time response test. This test was written to check train 1 and train 2 components during one refueling outage, and then check the swing components as train 1 and train 2 components during the subsequent outage. Based on testing done by other procedures, only the following two conditions were not properly tested within the required time frame: loading logic of Component Cooling Water Pump 3 aligned as pump 1, and load shedding of Service Water Pump 3 aligned as pump 1 and as pump 2. Since all necessary components were not tested every 18 months, the Technical Specification Surveillance Requirements were not being met within the appropriate time frame. Further reviews completed on May 16, 1997, at 1105 hours with the plant in Mode 5, determined that testing of Component Cooling Water Pump 3, aligned as Pump 1, shall be completed to satisfy Surveillance Requirement 4.7.3.1.b.2. This surveillance requirement also verifies that each component cooling water pump starts automatically on an SFAS test signal. The last time that portions of the circuitry, not tested within the last 18 months, were tested satisfactorily was on November 5, 1994. These circuits were successfully tested on May 16, 1997, demonstrating that this circuitry was operable prior to the plant entering Mode 4 and was in compliance with both surveillance requirements.

Condition 4: A review of the SFAS Level 5 actuation circuitry was performed. Davis-Besse's Technical Specifications state that the Safety Features response time of each SFAS function shall be demonstrated to be within the limit at least once per 18 months. Each test shall include at least one functional unit such that all functional units are tested at least once every N times 18 months, where N is the total number of redundant functional units for a specific SFAS function. On May 14, 1997, at 1615 hours with the plant in Mode 5, it was determined that an SFAS output logic functional unit begins at the output of the bistable isolators. With this interpretation, it was determined that the SFAS logic, consisting of at least the output modules, had not been response time tested at the frequency specified in Surveillance Requirement 4.3.2.1.3. Specifically, the response time of output logic functional units for Incident Levels 1 through 4 for SFAS channels 3 and 4 had not been tested within the appropriate Technical Specification Surveillance Requirement time frame. The last time the response times for these SFAS channel 3 and 4 instruments were tested satisfactorily was during the 1991 to 1993 time frame. Response time testing was completed on May 14 through 17, 1997, demonstrating that all channels of SFAS were operable prior to the plant entering Mode 4.

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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 (2150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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Description of Occurrence: (Continued)

Condition 5: A review of the Reactor Protection System (RPS) [JC] circuitry was conducted. Davis-Besse's Technical Specification 4.3.1.1.1 requires a quarterly channel calibration of the flux-delta flux-flow tri channels while in Modes 1 or 2. The flow rate measurement sensors are excluded from the quarterly calibration by the Technical Specifications, but are required to be calibrated at least once every 18 months. On May 21, 1997, at 1715 hours with the plant in Mode 4, it was determined that this Technical Specification requirement was not completely satisfied because the current-to-voltage converters associated with the flow transmitters should be calibrated quarterly. These converters are not flow rate measurement sensors, therefore, they cannot be excluded from quarterly calibration. Since the existing quarterly Surveillance Tests did not check the calibration of these converters, the Technical Specification Surveillance Requirements were not being met within the appropriate time frame, so the plant was being operated in a condition prohibited by the Plant's Technical Specifications. The last time this Surveillance Requirement was met was during the last refueling outage, when the 18 month Surveillance Test was performed prior to the outage ending on June 2, 1996. These converters were successfully tested on May 23 and 24, demonstrating that all channels of RPS were operable prior to the plant entering Mode 2.

Condition 6: Continued review of the EDG load sequencing circuitry identified another discrepancy. Davis-Besse Technical Specifications 4.8.1.1.2.a.7 and 4.8.1.1.2.c.7 state that each diesel generator shall be demonstrated operable at least once per 31 days by verifying that the automatic load sequence timer is operable with each load sequence time within +/- 10% of its required value. On September 23, 1997, at 1500 hours with the plant in Mode 1 at 100 percent power, it was determined that this Technical Specification requirement was not completely satisfied due to the accuracy of the equipment used to measure the load sequence times. Each load sequence timer has initiating setpoints that are set at five second intervals. Applying the percentage specified in the surveillance requirement to this five second interval yields a tolerance of 0.5 seconds. However, current monthly testing utilizes the plant computer to verify sequence time, which has a resolution of approximately one second. Additionally, it was determined that the duration of the sequencer "unblock" timing interval was not being checked on a monthly basis, which is necessary to meet the operability requirements of the Surveillance Requirement. The last time the proper accuracy of the load sequencer and the duration of the "unblock" interval was verified was during the last refueling outage, when the SFAS Integrated Time Response Test (DB-SC-03114) was performed prior to the outage ending on June 2, 1996. This test utilizes a pen recorder with an accuracy of approximately 0.2 seconds to check for drift of the sequencer time intervals. Since the existing monthly Surveillance Tests did not properly check the load sequence timers, the Technical Specification Surveillance Requirements were not being met, therefore, the plant was being operated in a condition prohibited by the Plant's Technical

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Description of Occurrence: (Continued)

Specifications. This placed the plant in Technical Specification Action Statement 3.8.1.1.e for both EDGs being inoperable. The 24 hour time period permitted by Technical Specification 4.0.3 was invoked to allow performance of the SFAS Channel Functional Tests. Testing was completed on September 23, 1997, at 2058 hours, demonstrating that all SFAS automatic load sequence timers were operable; therefore, the plant exited Technical Specification 3.8.1.1.e.

Condition 7: A review of the Steam Feedwater Rupture Control System (SFRCS) [JB] circuitry was conducted. Davis-Besse's Technical Specifications, Surveillance Requirement 4.3.2.2.1, state that each SFRCS instrumentation channel shall be demonstrated operable by the performance of the channel check, channel calibration, and channel functional test during the Modes and at the frequencies shown in Table 4.3-11. Table 4.3-11 specifies that the SFRCS Instrumentation Channels shall be functionally tested on a monthly basis. This table also specifies an 18 month channel calibration and a shiftly channel check for these instrumentation channels.

On October 7, 1997, at 1550 hours with the plant in Mode 1 operating at 100 percent power, it was determined that the Technical Specification requirement to perform a monthly channel functional test on the SFRCS output logic of the Main Steam Isolation Valve (MSIV) Bypass Valves [SB-ISV] was not being conducted. The MSIV bypass valves are provided to allow equalization of pressure around the MSIVs prior to opening the MSIVs. These bypass valves are interlocked with a position switch on the MSIVs so the bypass valves are closed when the MSIVs are open. As a result, the bypass valves are maintained in the closed position in Modes 1 and 2. The performance of the SFRCS monthly channel functional tests sends a signal to de-energize the bypass valve relay coils, but since the valves were already closed and the relay coils were already de-energized due to the interlock with the MSIVs, the relay contacts were not verified to change from a non-tripped to a tripped state.

Since the existing monthly functional tests did not adequately check the proper functioning of the SFRCS output logic, the Technical Specification Surveillance Requirement was not being met. The last time this Surveillance Requirement was met was during performance of the 18 month Surveillance Tests prior to the end of the tenth refueling outage on June 2, 1996. 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.

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

Description of Occurrence: (Continued)

The Shift Supervisor reviewed the Technical Specifications for SFRCS to determine the required actions for this issue, and determined that the appropriate actions were to declare the MSIV Bypass valves inoperable due to the untested SFRCS logic. Upon reviewing the Technical Specifications and the SFRCS Operating Procedure (DB-OP-06404), the Shift Supervisor determined that no Technical Specifications Action Statements existed for the output logic of SFRCS. This determination was due in part to the similarity in design between the SFRCS and the SFAS. The Technical Specifications for SFAS have separate entries to address both input and output logic, but the Technical Specifications for SFRCS seem to only address the input instrumentation strings. To ensure timely resolution of this issue, actions were initiated to test each SFRCS channel bypass valve output logic circuitry during the next required channel functional test. It was believed that this action, which is Action 16 of Technical Specification Table 3.3-11, was only required when one SFRCS input logic channel was inoperable.

Upon further review of Condition 7, on October 16, 1997, at 1455 hours, it was determined that the SFRCS logic shown in the Technical Specifications is for both the input and output portions of the logic circuitry. Technical Specification 3.3.2.2, Table 3.3-11, Action 16, states that with the number of operable channels one less than the total number of channels, startup and/or power operation may proceed until performance of the next required channel functional test provided the inoperable section of the channel is placed in the tripped condition within 1 hour. Since the output logic associated with the MSIV Bypass Valves was not tested for both channels of SFRCS, this placed the plant in a condition prohibited by the Technical Specifications. Technical Specification 3.0.3 was entered since the Limiting Condition for Operation was not met, 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 the subject logic circuitry to be tested. Testing was completed on October 16, 1997 at 2126 hours, demonstrating that all channels of SFRCS were operable and Technical Specification 3.0.3 was exited.

Condition 8: Continued review of the SFAS Incident Level 5 actuation circuitry identified another discrepancy. Davis-Besse's Technical Specifications state the SFAS Incident Level 5 output logic channel for the containment sump recirculation permissive shall be functionally tested every 31 days in Modes 1-4, and verified to be properly calibrated every refueling outage.

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

Description of Occurrence: (Continued)

Following a loss of coolant accident, it is necessary to transfer the ECCS pump suctions from the Borated Water Storage Tank (BWST) to the containment sump for long term recirculation. This is a manual operator action which is blocked until the proper level is reached in the BWST. The permissive circuitry performs two separate safety functions:

1. The permissive prevents repositioning of the Emergency Core Cooling System (ECCS) suction valves until proper BWST level is attained. This prevents the use of the containment sump until adequate net positive suction head for the ECCS Pumps is developed by sufficient inventory transfer from the BWST.
2. When the proper level is reached, the permissive allows the ECCS pump suctions to be aligned to the Containment Sump. Current plant operating procedures direct the operator to realign the valves at a level of 8 feet in the BWST, and thus the valves should be realigned soon after the SFAS Level 5 permissive contacts close. It is necessary that the operator performs this action before the BWST level is too low. Otherwise, vortexing could occur in the BWST, causing a loss of suction and possible damage to the ECCS pumps.

The BWST level functional unit trip setpoint is listed in the Technical Specifications as having a high and a low value, indicating that a window of opportunity exists to perform the ECCS pump suction transfer from the BWST to the containment sump. On October 21, 1997, at 1600 hours with the plant in Mode 1, it was determined that the Technical Specification requirement to perform a monthly channel functional test on the SFAS Incident Level 5 actuation circuitry was incomplete in that it did not verify the permissive was blocked until the proper BWST level was attained. The test procedures used to perform the channel functional test are also used to perform the channel calibration test. Therefore, it was also determined that the permissive was not verified to be blocked prior to attaining the proper BWST level during the channel calibration test required to be performed every 18 months.

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. The SFAS Incident Level 5 Output Logic was declared inoperable, and Technical Specification 3.3.2.1 Action 11 was entered. The 24 hour time period permitted by Technical Specification 4.0.3 was invoked to allow the subject logic circuitry to be tested. Testing was completed on October 22, 1997 at 0440 hours, demonstrating that all channels of SFAS were operable; therefore, the plant exited Technical Specification 3.3.2.1.

All 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).

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 (1-6 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)

Apparent Cause of Occurrence:

Conditions 1 and 2: 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 were corrected to allow monthly testing per the original design intent.

LER 91-001, submitted to the NRC on April 10, 1991, identified the RPS 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.

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)

Apparent Cause of Occurrence: (Continued)

The apparent cause for conditions 1 and 2 is personnel error in failing to fully understand the Technical Specification Surveillance Requirements for a channel functional test as applied to channel output logic. 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 did not satisfy the applicable Surveillance Requirement because the tests did not functionally verify the operability of all components that could complete the logic and cause a trip in the ARTS or SFAS 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.

Condition 3: The apparent cause for condition 3 is personnel error in that the requirement to test all components (including swing components) was never considered a strict surveillance requirement. Testing one component per train was previously considered adequate. There is clearly no exception stated in the Technical Specifications that allows excluding the logic circuits of the alternate components.

Condition 4: The apparent cause for condition 4 is personnel error during development of the response time Surveillance Tests. The inconsistency between the Technical Specification functional unit labels and the Updated Safety Analysis Report descriptions of SFAS channels led to the test procedure preparers misunderstanding the Technical Specification requirements.

Condition 5: The flow transmitters originally installed at Davis-Besse, model BY transmitters manufactured by Bailey, provided an output of 0 to 10 volts dc. These transmitters were replaced in 1984 with new transmitters, model 1153 transmitters manufactured by Rosemount. The new Rosemount transmitters produce an output of 4 to 20 milliamps. A current-to-voltage converter was installed with the new Rosemount transmitters to provide an output of 0 to 10 volts dc to the Reactor Protection System. Since these converters, in conjunction with the Rosemount transmitters, replaced the original flow transmitters, they were assumed to be a part of the flow sensor. Therefore the converters were not included in the quarterly calibration test. The issue of calibrating these converters quarterly was raised in 1990, and it was again determined that these converters were part of the sensors, and quarterly calibration was not required. The apparent cause for condition 5 is personnel error during development of the modification that changed the flow transmitters, in that the quarterly calibration test procedures were not changed to include them within the scope of testing.

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)

Apparent Cause of Occurrence: (Continued)

Condition 6: Davis-Besse's plant computer and associated equipment has a number of time intervals that it can use to monitor the status of equipment. These time intervals vary from a small fraction of a second for sequence of events parameters to 30 seconds or more for non-critical parameters. Timing of the automatic load sequence timer by the plant computer was believed to adequately meet any required accuracy measurements. Also, the Surveillance Requirement listed an accuracy requirement of +/- 10% without stating whether this applied to the time interval between sequence steps, or the total time of sequencer operation (25 seconds). This lack of clarity in the Surveillance Requirement resulted in a misinterpretation of the requirement, which was reflected in the surveillance test procedures. It was determined that the step setting accuracy of +/- 10% must be applied to the time interval between sequence steps to meet the most conservative interpretation of the accuracy requirement, and to ensure proper operation of the system. It was also not recognized that the duration of the "unblock" timing interval was necessary to verify proper operation of the automatic load sequence timers for compliance with the operability requirements of the Surveillance Requirement.

Condition 7: In 1994, the issue of testing the actuation logic for the MSIV bypass valves was raised. After evaluation of the issue, it was decided that monthly testing of the MSIV bypass valve actuation logic was not required. This was based on the fact that the bypass valves are maintained in the closed position in Modes 1 and 2 due to the interlock with the MSIVs, even though the SFRCS is required to be operable in Modes 1, 2 and 3. A Safety Evaluation as required by 10CFR50.59 was performed in 1994 to update the USAR to document the MSIV bypass valve actuation circuitry was not tested during power operation. This Safety Evaluation and subsequent USAR change were in conflict with the monthly requirement to perform channel functional testing as defined in Technical Specification Definition 1.11:

"A CHANNEL FUNCTIONAL TEST shall be:

- Analog channels - 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.
- Bistable channels - the injection of a simulated signal into the channel sensor to verify OPERABILITY including alarm and/or trip functions."

This Safety Evaluation acknowledged that the Technical Specifications required monthly testing of the logic associated with the MSIV bypass valves, but no License Amendment Request was processed to exclude the MSIV bypass valves from this monthly Surveillance Requirement.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THE MANDATORY INFORMATION COLLECTION REQUEST 50.6 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 /33), 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)

Apparent Cause of Occurrence: (Continued)

The apparent cause for the failure to fulfill the Technical Specification Surveillance Requirement is a failure to fully understand the Surveillance Requirements for a channel functional test as applied to channel output logic. The monthly channel functional tests did not satisfy the applicable Surveillance Requirement because the tests did not functionally verify the operability of all components that could complete the logic and actuate the subject components. 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.

When it was determined that the output logic associated with the MSIV bypass valves was inoperable due to the lack of testing on October 7, 1997, the Shift Supervisor reviewed the Technical Specifications to determine the necessary actions. The SFRCS and SFAS consist of two actuation channels, with each actuation channel consisting of two logic channels for each input function. The SFRCS logic requires both inputs from the same parameter in the same actuation channel to actuate equipment. The SFAS only requires any two of four inputs of the same parameter to actuate equipment. Even though the actuation logic of these two systems are similar, the Technical Specifications addressing this actuation logic is different, which led to confusion in the past when applying the Technical Specification Limiting Conditions for Operation. Because of the similarity between the SFRCS and SFAS circuitry, but difference between the applicable Technical Specifications, the Shift Supervisor erroneously determined that no Technical Specification Actions were specified for the inoperable SFRCS output logic circuitry. The Shift Supervisor did verify that the MSIV bypass valves were in their SFRCS required position, had an SFRCS signal maintaining the valves in that position, and were interlocked closed by the open MSIVs. These actions would have complied with the Technical Specification Action for inoperable output logic in the SFAS had this circuitry been a part of the SFAS. This error was discovered on October 16, 1997, and since this condition was outside the Limiting Condition for Operation listed in Technical Specification 3.3.2.2, Table 3.3-11, Action 16, Technical Specification 3.0.3 was entered and the 24 hour time period permitted by Technical Specification 4.0.3 was invoked until the subject logic circuitry was tested satisfactorily.

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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Apparent Cause of Occurrence: (Continued)

Condition 8: The majority of the setpoints listed in the Technical Specifications are listed with only one value. The listed value accounts for all expected operating conditions, and is set to account for instrument inaccuracies while ensuring the equipment performs its intended safety function. The BWST level functional unit trip setpoint is listed in the Technical Specifications with a dual-sided tolerance band. The permissive must be blocked prior to reaching the upper value of the tolerance band, and enabled prior to reaching the lower value of the tolerance band to ensure adequate net positive suction head is maintained for the ECCS pumps. The associated SFAS terminating relays were being verified to operate within the dual-sided tolerance band by observing the operation of an auxiliary set of relay contacts. The apparent cause for the failure to fulfill the Technical Specification Surveillance Requirement was a failure to recognize that the terminating relay safety contacts were required to be verified open to ensure the permissive was blocked until the proper BWST level was attained.

Based on the number of events discovered resulting from the Generic Letter 96-01 Review Program, a multi-discipline team was assembled to identify the overall root cause. This multi-discipline team will evaluate the apparent cause of all events involving inadequate testing discovered under the Generic Letter 96-01 Review Program in determining the overall root cause.

Analysis of Occurrence:

Conditions 1 and 2: 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. 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.

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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Analysis of Occurrence: (Continued)

Condition 3: The portions of the emergency diesel generator load shedding and sequencing circuitry, not tested within the last 18 months, were previously tested satisfactorily on November 5, 1994, by performance of the 18 month Surveillance Test. Testing of these circuits on May 16, 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 indicated that the emergency diesel generator was capable of performing its designated safety function at the time of the test.

Condition 4: All of the logic circuitry for the sensor parameters that were not tested within the specified Surveillance Requirement was previously tested satisfactorily during the 1991 to 1993 time frame by performance of the applicable Surveillance Tests. Response time testing of these circuits on May 14 through May 17, 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 applicable Surveillance Tests determined that the logic circuitry was capable of performing its designated safety function at the time of the test.

Condition 5: The current to voltage converters associated with the RPS flow transmitters were previously tested satisfactorily during the last refueling outage by performance of the 18 month Surveillance Tests prior to the end of the outage on June 2, 1996. Calibration of these converters on May 23 and 24, 1997, revealed no equipment deficiencies. Based upon this successful testing, it is concluded that plant safety was not compromised. Results from previous performances of the 18 month Surveillance Tests determined that these converters were capable of performing their designated safety function at the time of the test.

Condition 6: The SFAS automatic load sequence timers are comprised of solid state components. Past experience has shown that these components are highly reliable. The timers were being tested on a monthly basis by the SFAS Channel Functional Tests, using the plant computer. Any gross deficiencies in the load sequence times would have been realized by the performance of these tests. Furthermore, the timers were tested at the required accuracy, which also verified the duration of the sequencer "unblock" timing intervals, during the last refueling outage using a pen recorder. No equipment deficiencies were noted. Testing of these timers on September 23, 1997, also revealed no equipment deficiencies. Based upon this successful testing, it is concluded that plant safety was not compromised. Results from recent performances of the 18 month Surveillance Tests determined that these timers were capable of performing their designated safety function at the time of the test.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTIVELY 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)

Analysis of Occurrence: (Continued)

Condition 7: The portion of the SFRCS output logic circuit that was not tested in the past during monthly testing is comprised of integrated circuits, solid state components, and electro-mechanical relays. 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 circuitry for the MSIV bypass valves that was not being tested on a monthly basis was previously tested satisfactorily during the last refueling outage by performance of the 18 month integrated tests of SFRCS actuation channel logic prior to the end of the outage on June 2, 1996. Testing of this circuitry on October 16, 1997, revealed no equipment deficiencies. Based upon this successful testing, it is concluded that plant safety was not compromised. Results from previous performances of the 18 month Surveillance Tests determined that this circuitry was capable of performing their designated safety function at the time of the test.

The bypass valves are maintained closed in their safety position during Modes 1 and 2 by the interlock with the MSIVs. Their operation is controlled by plant procedures such that the only time the bypass valves would have been opened in Modes 1 through 3 would have been following a plant trip with an SFRCS actuation, to allow an MSIV to be re-opened.

Condition 8: The SFAS Incident Level 5 actuation circuitry enables the permissive to allow recirculation of the containment sump. Testing was not previously performed to verify the permissive was disabled prior to the level in the BWST dropping to 100.5 inches. However, current plant operating procedures direct the operator to not initiate the realignment of the ECCS pump suction valves until the BWST level has reached 8 feet (96 inches). This would have prevented the operator from realigning the ECCS pump suction valves prior to sufficient inventory being transferred from the BWST to the containment sump. Existing testing verified that the ECCS pump suction valves could be realigned once the proper BWST level was attained, thus ensuring that the ECCS pumps could perform their intended safety function.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST 50.8 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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Analysis of Occurrence: (Continued)

The only portion of the SFAS output logic circuitry not appropriately tested in the past was the safety contacts of the SFAS terminating relays. Past experience has shown these relays are highly reliable. Multiple failures in redundant components are required to prevent the system from performing its intended safety function. Testing of the SFAS Incident Level 5 actuation circuitry on October 21, 1997, revealed no equipment deficiencies. Based upon this successful testing, it is concluded plant safety was not compromised. Therefore, even though the circuitry was not tested in accordance with Technical Specification Surveillance Requirements, this event had no safety significance.

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

Corrective Actions:

Condition 1: 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 S. AS. 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.

Condition 2: 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.

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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Corrective Actions: (Continued)

Condition 3: On May 16, 1997, the portions of the emergency diesel generator load shedding and sequencing circuitry that had not been tested within the last 18 months were tested satisfactorily with no equipment deficiencies. This testing in combination with other Surveillance Testing provided an overlapping check of all the required circuitry. The 18 month Surveillance Test (DB-SC-03114, SFAS Integrated Time Response Test) will be revised to incorporate logic testing of all alternate components prior to the next scheduled performance of the test during the Eleventh Refueling Outage. The Component Cooling Water Pump 3 Refueling Test (DB-SP-03092) will also be revised by the start of the next refueling outage to require testing of CCW Pump 3 as both train 1 and train 2.

Condition 4: On May 14 through May 17, 1997, the Surveillance Tests to measure the response time for affected logic circuitry were performed satisfactorily with no equipment deficiencies. The Surveillance and Periodic Test Schedule was updated on May 19, 1997, to reflect the required testing interval for the logic of the three sensor parameters of SFAS having response time requirements.

Condition 5: The quarterly Surveillance Tests (DB-MI-03057 through DB-MI-03060, RPS Channel Calibration of Overpower, Power/Imbalance/Flow, and Power/Pumps Trip Functions) were changed to include the calibration of the current-to-voltage converters. These tests were performed satisfactorily on May 23 and 24, 1997, with no equipment deficiencies.

Condition 6: The four monthly SFAS Channel Functional Surveillance Tests (DB-SC-03110 through DB-SC-03113) were changed to time the automatic load sequence timers correctly. These tests were completed satisfactorily on September 23, 1997, at 2058 hours, with no equipment deficiencies. Additionally, acceptance criteria will be added to the SFAS Integrated Time Response Test (DB-SC-03114) prior to its next performance during the eleventh refueling outage to ensure that the automatic load sequence timers are tested appropriately.

Condition 7: On October 16, 1997, the two monthly Channel Functional Tests Of SFRCS Actuation Channel Logic For Mode 1 Surveillance Tests (DB-MI-03211 and -03212) were changed so the MSIV bypass valves could be tested during power operation with the MSIV open. These tests were completed satisfactorily on October 16, 1997, at 2126 hours, with no equipment deficiencies. Additionally, the Channel Functional Tests Of SFRCS Actuation Channel Logic (DB-MI-03209 and -03210) will be revised prior to their next performance and no later than March 1, 1998, to ensure testing of the MSIV bypass valve logic circuitry is conducted. These tests are utilized for testing of the SFRCS in plant Modes 2 through 5, and have been inactivated to ensure they are revised prior to their next performance.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 500 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)

Corrective Actions: (Continued)

Because of the delay that existed between determining the SFRCS output logic was inoperable and the appropriate actions to comply with the Technical Specifications were taken, revision 6 of this LER will be reviewed by all Senior Reactor Operators by December 5, 1997. These operators will also be trained on this event by March 31, 1998, to ensure they are aware of the requirements of the SFRCS Technical Specifications. Additionally, this Technical Specification will be evaluated by March 31, 1998, to determine if clarifications can be made to eliminate this source of confusion.

Condition 8: On October 21, 1997, the SFAS Channel Functional Tests (DB-SC-03110, -03111, -03112, and -03113) were changed to ensure the SFAS Incident Level 5 associated terminating relay permissive safety contacts change state within the tolerance band specified in the Technical Specifications. These tests were completed satisfactorily on October 22, 1997, at 0440 hours, with no equipment deficiencies.

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. Based on the number of events discovered resulting from the Generic Letter 96-01 Review Program, a multi-discipline team was assembled, and a task plan was developed on July 1, 1997, to identify the overall root cause. This multi-discipline team will evaluate the apparent cause of all events discovered under the Generic Letter 96-01 Review Program in determining the overall root cause. The overall root cause evaluation will be completed thirty days after the completion of the Generic Letter 96-01 Review Program, which is scheduled for the end of the Eleventh Refueling Outage.

**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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| | | | | 97 | -- 008 -- | 07 | |

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 that relate to conditions 1 and 2 described above 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. Previous supplements to this LER reported conditions 1, 2, 3, 4, 5, 6, and 7 as events involving inadequate safety system logic testing. LER 97-011 documents an event where the wrong Technical Specification Limiting Condition for Operation was entered to perform maintenance on plant equipment. There have been no LERs within the last three years involving events similar to condition 8 described above, where portions of safety system instrument strings were not tested within the time frame specified in the Technical Specifications.

NP-33-97-008-7

PCAQRs 97-0364, 97-0430, 97-0624,
97-0640, 97-0659, 97-0694, 97-1257,
97-1325, 97-1357, 97-1378