



License No. NPF-3

Docket No. 50-346

Serial No. 915

March 11, 1983

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Mr. John F. Stolz, Chief
Operating Reactors Branch No. 4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Stolz:

This is in response to your letter dated January 31, 1983 (Log 1198) relating to Safety Features Actuation System (SFAS) Shared Power Supply Returns. Your letter identified concerns pertaining to SFAS design in compliance with the requirements of IEEE Standard 279, Section 4.6. Enclosure 1 to your letter listed four items requiring Toledo Edison response. Attachment 1 to this letter summarizes our response to these items.

Very truly yours,

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RPC:FYC:HA

cc:
DB-1 NRC Resident Inspector

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Attachment to Toledo Edison Letter on
Safety Features Actuation System - Shared Power Supply Returns

Concern:

The staff has determined that although the Davis-Besse SFAS design may comply with IEEE Std. 279 as a two channel system, additional information is required from the licensee before the staff can totally accept this SFAS design. The Davis-Besse SFAS was presented by the licensee, reviewed by the staff, and licensed as a four independent channel system. As a four channel system, the SFAS does not meet the requirements of Section 4.6 (Channel Independence) of IEEE Std. 279.

The staff has determined that interim operation is acceptable until the requested information (below) has been received and reviewed if continuous monitoring of the shared ± 15 and 24 Vdc shared power supply commons is promptly implemented by the licensee.

In order for the staff to review the Davis-Besse SFAS design as a two channel system, the licensee (Toledo Edison) should submit the following information:

1. The licensee should verify in writing that they have reviewed and analyzed the SFAS as a two channel system and have determined that the system meets all applicable criteria as defined in Section 7.3 of the Standard Review Plan, including Section 6.3 of IEEE Std. 379 regarding spurious actuations.
2. The licensee should verify in writing that they have reviewed the plant Technical Specifications and identified each instance where the minimum number of SFAS channels required to be operable is identified. The associated action statements (limiting condition for operation) for when a channel is bypassed or removed from service (for instrument, logic, and actuation channels) should also be identified. The licensee should confirm for each case that the minimum acceptable redundancy required by IEEE Std. 279-1971 will not be compromised and that the Technical Specifications are consistent with the two channel SFAS concept. For each instance where it appears that the existing Technical Specifications may not be adequate, the licensee should propose modifications for review by the staff. The licensee should confirm that the Technical Specifications which remain unchanged as a result of their review will not place the plant in an unsafe condition.
3. The licensee should review plant operating procedures to assure that they are consistent with the two channel SFAS concept and should verify in writing that they have determined that these procedures are consistent with the two channel concept.

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4. The licensee should commit to provide permanently installed continuous monitoring for faults on the SFAS ± 15 and 24 Vdc shared instrument commons or provide adequate justification demonstrating that continuous monitoring is not required. If instrumentation is installed for this monitoring function, it should provide annunciation (both audible and visible) on the main control board whenever extraneous voltages are detected. The design of this continuous monitoring system should be discussed with the staff prior to installation. Surveillance to verify the operability of this monitoring system should be required by the Davis-Besse Technical Specifications. Monthly testing of the shared floating commons should continue until the continuous monitoring system is installed.

If justification is provided for not including continuous monitoring, the licensee must demonstrate that failures which could affect the floating commons shared by redundant instrument and logic channels cannot in any way adversely affect redundant SFAS actuation channels at the system level (with regard to both preventing SFAS actuations when required and undesired spurious SFAS actuations).

In addition, the licensee should submit an amendment to the FSAR which accurately describes the Davis-Besse SFAS as a two channel system.

Response:

Toledo Edison has evaluated the Safety Features Actuation System (SFAS) at Davis-Besse Unit 1. The SFAS as described in Section 7.3 of the Final Safety Analysis Report (FSAR) consists of four identical redundant sensing and output logic channels. The output contacts from Channels 1 and 3 output logics, are further combined with an AND gate to form the actuation Channel 1. Similarly, the 2 and 4 output logics are combined into the actuation Channel 2. Therefore, concerns 1, 2 and 3 above describing the SFAS as two channel system have not been addressed individually, but the intent will be addressed.

In SFAS design, the ± 15 Vdc power supplies provide power to the instrument/sensing channels and the 24 Vdc power supplies provide power to the actuation/logic output channels. A separate 15 Vdc power supply provides power to the output modules and logic portion of actuation channels. These power supplies (± 15 Vdc and 24 Vdc) are designed to include floating returns. The floating returns associated with channels 1 and 3 (also with channels 2 and 4) are interconnected electrically by design as to form common power supply returns). To resolve the issue on channel independence and possible calibration shift of the associated channel Toledo Edison proposes to provide permanent grounding of the power supply commons to the instrument ground.

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A test was conducted on the SFAS in January, 1981 at Davis-Besse Unit 1. The power supply floating common between channels 1 and 3 was grounded. Then the SFAS functional test was conducted on channels 1 and 3 and they performed properly as designed. The same test was repeated for channels 2 and 4. No shift in bistable setpoints was observed. These test results were reviewed by the Consolidated Control Corporation (CCC), the SFAS vendor, and found to be acceptable.

By installing these permanent grounds, SFAS will meet the requirements of Section 4.6 of IEEE Std. 279-71 on channel separation criteria. If a 118 Vac to ± 15 Vdc or 24 Vdc short were to occur it would cause the 118 Vac fuse on the primary side of the power supplies to burnout causing the affected channel to the fail safe status (tripped). Also, if a 125 Vdc to ± 15 Vdc or 24 Vdc short were to occur it would either immediately blow a 125 Vdc fuse or cause a 250/125 Vdc ground fault alarm to occur. The 250/125 Vdc system is normally ungrounded. However, if this system had a prior ground on it, then the 125 Vdc fuse would blow. If it had no other ground on it, then the ground fault alarm would occur. If the 125 Vdc fuse burns out, then the associated solenoid valve would fail in its safe position. These shorts will not affect the performance of the other associated channel. By grounding the power supply commons, the possibility for a 118 Vac or 125 Vdc short to cause a setpoint drift in the associated channels has been eliminated. Also continuous monitoring for voltages on the SFAS ± 15 and 24 Vdc power supplies is accomplished, since the affected channel will fail tripped and alert the operators immediately.

By modification to SFAS as proposed, Toledo Edison has determined that the Davis-Besse SFAS complies with all the requirements listed in our FSAR Section 7.3 including IEEE Std. 279-1971 and no modification to the Technical Specification is required.

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