

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-346/78-26

Docket No. 50-346

License No. NPF-3

Licensee: Toledo Edison Company  
Edison Plaza  
300 Madison Avenue  
Toledo, OH 43652

Facility Name: Davis-Besse Nuclear Power Station, Unit 1

Inspection At: Davis-Besse Site, Oak Harbor, OH

Inspection Conducted: August 28-31, September 27-29, October 31,  
and November 1, 1978

Inspectors: *T. N. Tambling*  
T. N. Tambling 11/14/78

*Joe Smith Sr*  
J. Smith (August 30-31, October 31,  
and November 1, 1978) 11/12/78

Approved By: *RC Knop*  
R. C. Knop, Chief 11/14/78  
Reactor Projects Section 1

Inspection Summary

Inspection on August 28-31, September 27-29, October 31, and  
November 1, 1978 (Report No. 50-346/78-26)

Areas Inspected: Routine, unannounced inspection of nonroutine reports,  
unresolved items and survey of reset features and procedures for the  
SFAS. The inspection involved 88 inspector-hours onsite by two NRC  
inspectors.

Results: Of the three areas inspected, no items of noncompliance or,  
deviations were found in two areas; one item of noncompliance was iden-  
tified in one area (Infraction - inoperable offsite power sources,  
Paragraph 6).

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## DETAILS

### 1. Persons Contacted

- \*T. Murray, Station Superintendent
- B. Beyer, Assistant Station Superintendent
- \*W. Green, Administrative Coordinator
- S. Quennoz, Technical Engineer
- P. Carr, Maintenance Engineer
- C. Domeck, D-B-1 Project Engineer
- F. Miller, Power Engineering
- M. Derivan, Operations Supervisor
- J. Hickey, Training Supervisor
- \*T. Hart, QA Engineer
- \*J. Byrne, QA Engineer
- \*J. Lindenfelter, Nuclear Engineer

The inspectors also talked with and interviewed other licensee employees, including members of technical and engineering, operations and maintenance staff.

\*Denotes those attending the exit interview.

### 2. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (50-346/78-13) - Based upon further review of the fast transfer scheme to reserve offsite power it was determined that the fast transfer feature did not meet General Design Criterion 17 for all potential operating conditions and thereby rendered the offsite power sources inoperable. This item is considered an item of noncompliance of the infraction level (Paragraph 6).

### 3. Review of Nonroutine Events Reported by the Licensee

The inspector reviewed licensee actions with respect to the following listed nonroutine event reports to verify that the events were reviewed and evaluated by the licensee as required by Technical Specifications, that corrective action was taken by the licensee, and that safety limits, limiting safety settings, and limiting conditions for operation were not exceeded. The inspector examined selected Station Review Board minutes, licensee investigation reports, logs, records, and interviewed selected personnel.

- a. Failure to complete required surveillance testing of QPT (78-14).
- b. Replacement of DG 1-1 turbocharger due to anticipated failure (78-18).

- c. Post accident radiation monitor failures (78-26, 78-38, 78-64, 78-75).
- d. Containment radiation monitors inoperable (78-30).
- e. SFAS channel 3 inadvertently placed in test trip by pass (78-32).
- f. Standby CCW heat exchanger SW isolation valve found closed (NP-33-77-111).
- g. AFP turbine 1-2 failed to start (NP-33-77-45).
- h. Failure to open DH 11 and 12 before reducing RCS temperature below 280<sup>o</sup>F (78-37).
- i. Containment Radiation Monitor bistable out of tolerance (78-39).
- j. Failure to verify rod position when Group 5 was in asymmetric bypass (78-40).
- k. Exceeded S/G level due to leaking FW 799 valve (78-33).
- i. Isolation of SFRCS steam generator to feedwater delta P switches (NP 32-77-19).

During the exit interview, the inspector made the following comments on specific LER's:

a. LER 78-14

- (1) Procedure IC 2001.06, Periodic Testing of Detectors, should be further revised to include:
  - (a) When a point is taken off scan it may make the quadrant tilt and imbalance alarm systems inoperable; therefore, there is a time limit on how long it may be off scan.
  - (b) The reference section of the procedure should include Technical Specifications sections 4.2.1 and 4.2.4.
  - (c) The procedure data sheets should have a column for verification that the point has been returned to scan.

- (2) ST 5033.01, Incore Instrument channel check, needs to be revised to provide a verification that defector points are being scanned.
- (3) Since the use of the imbalance and quadrant power tilt alarms and Group 38 calculations are used to reduce the frequency and/or satisfy Technical Specifications surveillance requirements, the alarm function and Group 38 calculations need to be included in the preventative maintenance program for period recalibration of instrumentation and controls used to determine compliance with Technical Specifications requirements.

The licensee stated that they would review these items and take appropriate action.

b. LER's 78-26, 38, 64 and 75

Noted that many proposed solutions had been advanced to correct these repetitive failures but there appeared to be no action to provide a permanent fix. The licensee stated that a comprehensive evaluation was being made.

c. LER 78-40

Noted that the operator aid developed to alert personnel when an action item time limit was up, apparently was not being utilized in the field. The licensee stated that they would review this with the operators.

d. NP-33-77-45

Noted that no action had been taken on FCR 77-234. The licensee stated that they would review the FCR and determine whether it was still required.

The inspector noted that the licensee had identified and corrected seven items with respect to Technical Specification requirements.

No other items of noncompliance were identified.

The following licensee event reports were reviewed and closed out on the basis of an inoffice review and evaluation.

- a. RCS pressure in SFAS channel 2 failed low (78-43).
- b. Containment post accident radiation monitor inoperable (78-44).

- c. DG 1-1 declared inoperable (78-49).
- d. Containment vacuum relief valve declared in operable due to excessive leakage (78-50).
- e. Diesel fire pump inoperable (78-54).
- f. Service water pump 1-1 motor lower guide bearing failure (78-56).
- g. Seismic monitoring system calibration outage exceeded 30 days (78-58).
- h. Borated water storage tank level indications failed high (78-59).
- i. Seismographic monitoring system not recording properly (78-69).
- j. BWST low level trip setpoint out of tolerance (78-70).
- k. Containment spray pump 1-2 inoperable (78-71).
- l. Relay wiring error in the logic to channel 2 SFAC (78-73).
- m. Containment isolation valves inoperable (78-74).
- n. Failure to perform required surveillance testing on diesel generator (78-81).
- o. Containment post accident radiation monitor inoperable (78-85).
- p. Post accident radiation monitor inoperable (78-89).
- q. Makeup pump 1-2 inoperable (78-90).
- r. Diesel fire pump inoperable (78-92).
- s. Source range neutron flux instrument NI-1 failed low (78-93).
- t. Containment post-accident radiation monitor inoperable (78-94).
- u. Failure to perform surveillance on diesel generator (78-96).
- v. Containment post-accident radiation monitor inoperable (78-97).

On June 28, 1978 the licensee reported via telephone and telecopy that the incore detector string 32 was inoperable as a required symmetric detector and that the minimum incore detectors required for quadrant power tilt determination were not available. On July 10, 1978, the licensee reported that based upon further investigation it was determined that incore detector string was indeed operable when required and that there had been no noncompliance with the Technical Specifications. The inspector reviewed the results of the licensee investigation to verify that based upon the documentation and analysis incore detector string 32 had been operable when required and that the event was not required to be reported under the provisions of Section 6.9 of the Technical Specifications.

4. Survey of SFAS Reset Features and Procedures Governing Operator Action

The inspector reviewed SFAS design and reset and blocking features; reviewed procedures governing operations of the SFAS, and interviewed representatives of the licensee. The purpose of this review was to determine whether the licensee had written procedures which describe all necessary operator actions to sustain operation of the emergency core cooling system (ECCS) after SFAS actuation (actual or spurious) and SFAS actuation in conjunction with a loss of offsite power.

Davis-Besse 1 Safety Features Actuation System (SFAS) does not have a single reset feature that will block all actuated equipment at one time to permit manual control over SIS equipment following an SFAS actuation. Individual output logic modules may be blocked to permit manual control or realignment of SIS equipment and valves. The act of blocking does not change the status of the equipment or valves.

Specific SFAS equipment blocked following an actuation is noted by a bright yellow light (SAM lights) on the SFAS control room panel. If the equipment and/or valves are moved to non-SFAS position, the yellow light flashes. The SAM lights provide visual indication to the operator of the status of the individual SFAS equipment.

The output logic channels can be reset (unblocked) at the SFAS control panel or the individual channels can be reset at the SFAS cabinets located behind the control room panels. If the output logic channels are reset (unblocked) before the actuating bistables (input parameters) are cleared and reset, the SFAS equipment and valves return to their SFAS condition or position. Thus the operator has two options to reestablish SFAS position; one reset the output logic channels, or manipulate individual equipment to clear the flashing yellow lights (SAM lights).

Resetting of the bistables does not automatically reset the output logic channel.

Resetting the bistables or output logic channels is not a function of the reactor trip breakers.

In the event of a loss of offsite power subsequent to a SFAS actuation, any manual SFAS block on the diesel generator is automatically cleared. The diesel generator will start. Any major ECCS equipment (HPI, LPI, CS, SW pumps) that are running are automatically stripped from the essential bus and sequenced back on the buses. If the ECCS equipment was previously blocked by an operator it will not start except for component cooling water and service water pumps which are required for diesel operations.

The licensee procedures address actual LOCA situations (small to large breaks) and provide written guidance for blocking high pressure injection pump and valves (for the purpose of either throttling or stopping flow) depending upon pressurizer level. The guidance also covers such things as reestablishing makeup and let down flow and RCP seal injection. These actions require blocking output logic channels and action by the operator to change valve and pump conditions.

The licensee general policy is that if an operator blocks and assumes manual control of ECCS equipment, he assumes responsibility for the operation of the equipment.

However, the licensee's procedures do not specifically address restoration of SFAS or the ECCS equipment for spurious actuations or subsequent degradation in LOCA conditions. These actions are addressed in operator training and simulator training.

The licensee committed to review his procedure and revise as appropriate:

- a. Include guidance now found in plant and system procedures in emergency procedures.
- b. Include appropriate steps in procedures for restoration for spurious SFAS actuations.
- c. Include appropriate step or guidance in procedures for subsequent degradation in the LOCA to insure prompt operator action to restore flow and/or containment isolation.

5. Power Oscillation

During a previous inspection (Inspection Report 78-06) as part of a review of reactivity coefficient at power reactivity, oscillations were noted at 40% power. These oscillations are apparently due in part to instability in the steam generator that cause a cyclic variations in power. The power oscillations have been observed in other B and W plants. These oscillations were expected to dampen out as power is increased.

The inspector reviewed data taken as part of the Integrated Control System tuning at power levels from 20% to 100%. A review of the recorded parameter turbine header pressure error would indicate that increased pressure oscillation started at approximately 40% reaching a maximum amplitude between 50 and 60% power and then dampen out at approximately 80% power. The chart time scale was not fast enough to determine the frequency of the oscillation for comparison to the previous reactivity measurements.

In the exit interview the inspector discussed these observations noting that reactivity data would probably provide a better measurement of the power oscillations and that the licensee should continue observation to insure that these observed power oscillations do not change or worsen with time.

6. Fast Transfer to Offsite Power During Loss-of-Load Condition

The unresolved item identified in IE Inspection Report No. 50-346/78-13, Paragraph 13.b, related to blocking of the fast transfer circuit which transfers the 13.8 KV buses from the auxiliary transformer (supplied by the main generator) to the startup transformers (supplied by 345 KV offsite power sources). If the plant experiences a loss-of-load (anticipated operational occurrence as described in FSAR Section 15.2.7) due to the main generator 345 KV output breakers opening, the plant is designed to run back to 15% power and maintain station auxiliary loads on the main generator. If a loss-of-coolant accident should occur when the plant is in the loss-of-load condition, the emergency diesel generators would subsequently be called upon to supply auxiliary power without the fast transfer circuit first attempting to obtain auxiliary power from the preferred (offsite) source. This is due to the design of the fast transfer circuit which requires the 345 KV breakers to have been closed at the end of a 20-second transfer delay.

IE and NRR reviewed the licensee's fast transfer design and it was determined that it did not meet certain requirements of General Design Criterion 17 of Appendix A to 10 CFR Part 50. The



specific GDC 17 requirement not satisfied was the requirement that one of the offsite power circuits be designed to be available within a few seconds following a loss-of-coolant accident. If the main generator is lost, due to conditions other than generator faults, concurrent with or subsequent to the opening of the generator output breakers, manual action requiring more than a few seconds would be necessary to connect the essential loads to an offsite power source. One example of such a condition, as discussed above, would be losing the main generator subsequent to LOCA when in the runback mode.

The 13.8 KV bus fast transfer design as described in the FSAR appeared to satisfy the above mentioned GDC 17 requirement in that the following FSAR statements indicate the automatic fast transfer is independent of the operational mode and occurs anytime the main generator is lost (i.e., the main generator supply of auxiliary power is interrupted):

Appendix 3D, page 3D-15, last paragraph "...In the event the main generator unit is lost, station auxiliaries will be transferred automatically by fast bus transfer schemes to the offsite power..."

Section 8.3.1.1, page 8-6, second paragraph "...The system will have a fast transfer to the reserve power source following a turbine generator or reactor trip, without loss of auxiliary load..."

However, as noted above, the automatic fast transfer depends on the status of the generator output breakers.

As a result of the IE and NRR reviews, RIII sent an Immediate Action Letter to TECo on October 31, 1978, which documented actions taken or to be taken by TECo to correct the design deficiency. The specified actions enabled the plant to operate with an alternate electrical alignment (i.e., station auxiliaries normally supplied from offsite power) and satisfy the provisions of GDC 17. TECo concluded that operation with that alignment did not represent an unreviewed safety question. The inspectors verified that TECo took all of the specified actions as listed below:

- \* Station auxiliary loads were being powered from offsite power via the startup transformers.
- \* A safety evaluation was completed under the provisions of 10 CFR 50.59(a) which determined that no unreviewed safety question exists while operating on the startup transformers rather than the auxiliary transformer.

- \* Thermal power did not exceed 25% as specified in the Immediate Action Letter.
- \* Controls were developed and implemented which delineate control room operator and dispatcher actions in the event degraded frequency conditions are experienced on the offsite grid.

Section 3.8.1.1.a of the Technical Specifications requires that two independent circuits between the offsite transmission network and the onsite Class IE distribution system shall be operable when the reactor is in Modes 1, 2, 3 and 4. That specification was approved by NRR based on the premise that the plant satisfied all GDC 17 requirements including the requirement that one offsite power source be designed to be available within a few seconds following a loss-of-coolant accident. As discussed above, the unit power supply (supply to station auxiliaries) was not capable of being automatically transferred to the offsite power sources in the event the main generator is lost, due to conditions other than generator faults, concurrent with or subsequent to the opening of the generator output breakers. Therefore, the plant did not meet the GDC 17 requirement and, consequently, the TS 3.8.1.1.a operability requirement. This is considered to be an item of noncompliance of the Infraction level. A response to this matter is not required since the licensee's corrective actions have been verified by RIII personnel and are acceptable. RIII understands that no fast transfer design changes to allow normal operation with station auxiliaries supplied from the auxiliary transformer will be made unless a licensee safety evaluation determines that unreviewed safety questions or Technical Specification changes are not involved.

#### 7. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) on August 31 and September 29, 1978. In addition, Mr. Smith met with Mr. Murray on November 1, 1978. The inspectors summarized the scope and findings of the inspection. The licensee's representatives made the following remarks in response to certain of the items discussed by the inspectors.

Acknowledged the inspectors remarks regarding the fast transfer design deficiency. (Paragraph 6)

Stated they would review and revise as appropriate their procedures to insure that adequate guidance is provided by the operators for blocking and resetting SFAS actuated equipment. On October 11, 1978, via a telecom, the representative of the licensee stated that their review would be completed by December 1978. (Paragraph 4)

Acknowledged the inspector's comments on selected licensee event reports stating that they would review the specific items. (Paragraph 3)

In addition to the above exit interviews, Mr. Knop discussed the apparent Item of Noncompliance with Mr. Murray in a telephone conversation on November 16, 1978.