

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-346/90021(DRS)

Docket No. 50-346

License No. NPF-3

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

Facility Name: Davis-Besse Nuclear Power Station

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

Inspection Conducted: October 15 through November 5, 1990

Inspectors: M. J. Kopp 11/19/90
M. J. Kopp Date
G. M. Hausman 11/19/90
G. M. Hausman Date
Approved By: Ronald N. Gardner 11/19/90
Ronald N. Gardner, Chief Date
Plant Systems Section

Inspection Summary

Inspection on October 15 through November 5, 1990 (Report No. 50-346/90021(DRS))

Areas Inspected: Special announced safety inspection of previously identified unresolved items concerning environmental qualification (EQ) and the instrumentation system for assessing plant conditions during and following an accident as specified in Regulatory Guide (RG) 1.97, Revision 3 (Modules 30703, 2515/76, and 2515/087); SIMS Number 67.3.3.

Results: In the areas inspected, no deviations were identified. Based on this inspection, the inspectors concluded that actions have been taken to resolve nine of the twelve unresolved items identified in Inspection Reports No. 50-346/82004(DRS), No. 50-346/86024(DRS) and No. 50-346/88038(DRS).

DETAILS

1. Persons Contacted

Toledo Edison Company (TE)

- L. Storz, Plant Manager
- S. Jain, Engineering Director
- +V. Watson, Design Engineering Manager
- +E. Caba, Performance Engineering Manager
- *+G. Honma, Compliance Supervisor
- +P. Jacobsen, Design Engineering Supervisor
- +C. Butcher, Design Engineering Supervisor
- +M. Borysiak, Senior Engineer
- +G. Stoner, Senior Quality Assurance Auditor
- +L. Simon, Senior Performance Technologist
- E. Johnson, Environmental Qualification Engineer
- +K. Filar, Licensing Engineer
- N. Peterson, Licensing Engineer

Cleveland Electric Illuminating Company (CEI)

- S. Litchfield, Lead Environmental Qualification Engineer

U. S. Nuclear Regulatory Commission (USNRC)

- +P. Byron, Senior Resident Inspector, Davis-Besse

+Denotes those participating in the interim site exit meeting on October 17, 1990.

*Denotes those participating in the final exit on November 5, 1990.

2. Licensee's Actions Regarding Previously Identified NRC Findings

a. (Closed) Bulletin 82-04 (346/82004-BB):

This bulletin identified several deficiencies with Bunker Ramo electrical penetrations which utilized a hard epoxy module design. The bulletin stated that there were potential generic safety implications and requested licensees to review the information contained in the bulletin for applicability to their facilities. Concerning the Davis-Besse facility, NUREG/CR-3795 concluded (Criteria for Closeout of Bulletin, page 3, and Table B.1, page B-2) that the licensee had provided an acceptable response which indicated that there were no affected assemblies installed in the plant. Therefore, this item is closed.

b. (Closed) Unresolved Item (346/86024-01(DRS)):

This item concerned the high range radiation monitors and the ability of the Rockbestos coaxial cables connected to the monitors to meet the RG 1.97 accuracy criteria. The EQ files did not adequately address performance of the cables at low radiation levels combined with thermally induced high leakage currents. The inspectors determined that the vendor, Sorrento Electronics, had filed a 10 CFR Part 21 notification with the NRC concerning the Rockbestos cables. The notification stated that a review of the cable qualification report for the Rockbestos cables revealed that the dielectric insulation resistance of the cables at high temperatures (350°F) was 2.66 MOhm and that the minimum value needed to meet the RG 1.97 accuracy requirements was 5.00 MOhm.

During this inspection, the inspectors reviewed the licensee's time-lag heat transfer calculation, "Insulation Resistance of Rockbestos Cable RSS-6-113/LD," C-ECS-038.02-100, dated December 5, 1988. The calculation identified the worst case insulation resistance value for the installed cables and determined the overall accuracy of the associated radiation monitor. The analysis concluded that the accuracy requirements would be met for a dose rate greater than approximately 1.45 rads/hour. The inspectors noted that the indicators would not be on scale until an actual dose rate of 2 rads/hour was reached. Therefore, because the accuracy requirements would be met when the indicators were on scale the analysis appeared to be acceptable and the inspectors had no further concerns.

This unresolved item is closed.

c. (Closed) Unresolved Item (346/86024-02(DRS)):

This item concerned the Amphenol electrical penetration assemblies identified in EQ file DB1-003A. The inspectors noted that the EQ test report did not include data which demonstrated that the 1.0 MOhm insulation criteria was satisfied.

The licensee was requested, per NRC letter dated January 31, 1989, to provide the NRC with a copy of the EQ test documentation for the electrical penetration assemblies installed at Davis-Besse. The NRC staff's subsequent review concluded that insufficient insulation resistance data had been taken during the loss of coolant accident (LOCA) test in that failures occurred and no follow-up testing was performed. Therefore, it was determined that functional operability of the electrical penetrations had not been demonstrated. The NRC staff required the licensee to furnish the plans and schedule to either qualify, test or replace the subject penetrations with qualified assemblies. The licensee responded to the NRC in a letter dated May 1, 1989, which stated that spare EQ penetration assemblies would be removed from the plant and tested after the scheduled February 1990 outage. The licensee indicated

during this inspection that the EQ test results would be incorporated into the EQ file when completed.

This unresolved item is closed. However, should the test results prove to be unacceptable, this issue will be reopened.

d. (Closed) Unresolved Item (346/88038-01(DRS)):

This item concerned the lack of qualified cable entrance seals installed on EQ ASCO solenoid valves. The licensee stated that seals were not required because all ASCO solenoid valves located in harsh environments would fail to the safe position in the event of an accident. However, the inspectors noted that Information Notice (IN) 88-86, Supplement 1, documented the potential for spurious actuation of ASCO solenoid valves due to the existence of ground fault paths during accident conditions.

During this inspection, the inspectors reviewed the licensee's analysis of IN 88-86. The analysis indicated that the ground fault detection circuit installed at Davis-Besse resulted in a net resistance of 100,000 Ohms to ground. This circuit configuration would not allow a leakage current of sufficient magnitude to flow in the circuit and cause actuation of the solenoid valves. In addition, the control circuit design utilizes a set of contacts at both ends of the coil which prevent a ground fault from providing a complete circuit for the coil to be energized. The licensee's analysis appeared to be acceptable and the inspectors had no further concerns.

This unresolved item is closed.

e. (Open) Unresolved Item (346/88038-02(DRS)):

During the previous NRC RG 1.97 inspection, the inspectors noted that the plant design did not include redundant instrument channels from sensor to display for steam generator level, steam generator pressure, and reactor coolant system (RCS) hot leg level (core coolant inventory).

During this inspection, the inspectors reviewed the instrumentation loop schematics for these variables, and discussed the issues with the licensee and the Instrumentation and Control Systems Branch (SICB) in NRR. RG 1.97, Table 1, Paragraph 2, addresses redundancy and states, "... Within each redundant division of a safety system, redundant monitoring channels are not needed except for steam generator level instrumentation in two-loop plants." The licensee interpreted this statement to mean that redundancy was only required for the steam generator level instrument channels, and not for other RG 1.97 variables. However, NRR/SICB stated that this statement only applied to the steam generator level variable and that redundant instrument channels for other Category 1 instrumentation was required. As a

result of this discussion, the following actions were agreed upon:

- The licensee committed to install two redundant steam generator level instrument channels for each steam generator prior to plant restart from refueling outage number 7, tentatively scheduled for September 1991.
- The installation of two redundant steam generator pressure instrument channels remained unresolved pending further review by NRR.
- NRR/SICB stated that the RCS hot leg level instrumentation was considered acceptable based upon NRR's acceptance of NUREG-0737, Item II.F.2.

This unresolved item remains open pending NRR review of the licensee's March 19, 1990 submittal concerning the steam generator pressure instrumentation.

f. (Closed) Unresolved Item (346/88038-03(DRS)):

During the previous NRC RG 1.97 inspection, the inspectors noted during the inspection walk-down that various exceptions were taken by the licensee with respect to physical separation requirements.

During this inspection, the inspectors reviewed the licensee's existing documentation and instrumentation and determined that the Davis-Besse Updated Safety Analysis Report (USAR), Section 8.1.5, Design Bases, does not require specific compliance with RG 1.75 requirements since plant design pre-dated the issuance of RG 1.75. In addition, the Davis-Besse USAR, Section 8.3.1.2.25 permits, within enclosures (control boards, instrument cabinets, distribution panels, motor control centers, etc.), the routing, bundling, or forming of non-class 1E cables with class 1E cables provided certain specific requirements are maintained and that any deviations to these requirements are documented and analyzed.

The inspectors concluded, based upon the above information and discussions with NRR/SICB, that the licensee meets RG 1.97 separation requirements. Therefore, this unresolved item is closed.

g. (Open) Unresolved Item (346/88038-04(DRS)):

During the previous NRC RG 1.97 inspection, a review of the control room normal ventilation status (CRNVS) instrumentation revealed that, contrary to RG 1.97, Honeywell pressure switches PS-5301 and PS-5311 were installed as non safety-related devices.

During this inspection, the inspectors noted that the CRNVS instrument channel interfaced with a safety-related circuit where qualified isolation did not appear to be provided. The inspectors discussed the CRNVS pressure switch circuitry with the licensee and with NRR/SICB. The licensee had classified the CRNVS instrument loop as Category 1, Type A. RG 1.97, Revision 3, classifies CRNVS as Category 2, type D. It appeared to the inspectors that this instrument loop meets the Category 2 criteria. The licensee committed to evaluate their designation of this variable as Category 1, Type A to determine if CRNVS can be downgraded and to document this review. The licensee also committed to review the circuit to determine if proper isolation of the circuit was provided.

The unresolved item is considered open pending further licensee review.

h. (Closed) Unresolved Item (346/88038-05(DRS)):

This item identified certain inaccuracies between the RG 1.97 instrument list and the RG 1.97 control room matrix list. The inspectors noted that the lists contained incorrect instrument numbers. The licensee committed to review the lists and correct any errors found.

During this inspection, the inspectors reviewed the RG 1.97 instrument list and the RG 1.97 control room matrix list and found that the licensee had corrected the discrepancies. The inspectors had no further concerns.

This unresolved item is closed.

i. (Closed) Unresolved Item (346/88038-06(DRS)):

During the previous NRC inspection, the inspectors noted that, contrary to RG 1.97, Revision 3, the indicators for boric water storage tank (BWST) level and containment narrow range (CNR) pressure (Category 1, Type A variables) were identified as non-class 1E devices. In addition, the inspection revealed that there was no control room indication for the Category 1, Type B core coolant inventory (RCS hot leg level) variable.

During this inspection, the inspectors reviewed the appropriate BWST level and CNR instrumentation drawings. This review showed that the indicators were powered via current loops from essential power sources through qualified class 1E isolators located within the safety features actuation system (SFAS) cabinets. During discussions with NRP, NRR/SICB stated that since the class 1E to non-class 1E interface (BWST level/CNR pressure variables to associated indicators) was made via qualified isolators and plant design pre-dated the issuance of RG 1.75 as well as IEEE 384-1974, the instrumentation complied with the intent of RG 1.97. Also,

the inspectors determined that the core coolant inventory (RCS hot leg level) instrumentation loops LT-5448A and LT-5448B provided indication in the control room via the Safety Parameter Display System (SPDS) computer display at computer points L721 and L720, respectively. The hot leg level monitoring system (HLLMS) was installed as part of the inadequate core cooling (ICC) instrumentation system to conform with NUREG-0737, Item II.F.2.

This unresolved item is closed.

j. (Closed) Unresolved Item (346/88038-07(DRS)):

During the previous NRC RG 1.97 inspection, the inspectors noted that for the recording of Category 1 essential variables, the licensee failed to provide class 1E recording devices.

During this inspection, the inspectors determined that the RG 1.97 variables were monitored by either the plant computer and/or the Safety Parameter Display System (SPDS). Qualified channel isolation was provided for the RG 1.97 class 1E instrumentation to non-class 1E plant computer and SPDS interface. The licensee stated that the signals to the computer systems were not essential for immediate operator information or action since direct indication is utilized for operational procedures and recorded information is only used for subsequent transient assessment. The inspectors discussed the above information with NRR/SICB. Since the subject recording instrumentation is not used for essential operator information or action and qualified channel isolation is provided for the class 1E to non-class 1E interface, the requirements of RG 1.97 are satisfied.

This unresolved item is closed.

k. (Open) Unresolved Item (346/88038-08(DRS)):

This item concerned identification of RG 1.97 instruments located on the control room panels. RG 1.97, Revision 3, requires identification of Category 1 and 2, Type A, B, and C instruments. However, the licensee deviated from this requirement in that a number of instruments have not been identified.

During this inspection, the inspectors informed the licensee that this item would be referred to NRR for review.

This unresolved item remains open pending further NRR review.

1. (Closed) Unresolved Item (346/88038-09(DRS)):

This item concerned RG 1.97 training for operators. The inspectors noted that the operators had not been trained or made adequately aware of the use of RG 1.97 instruments and that the Emergency Operating Procedures (EOPs) did not address the use of RG 1.97 instrumentation.

During this inspection, the inspectors reviewed the licensee's training records and verified that operators were trained and made aware of the use of RG 1.97 instruments. In addition, the licensee stated that the EOPs direct the operators to RG 1.97 instrumentation but do not specifically inform the operator that the instruments are RG 1.97 related. The inspector concluded that the licensee had taken adequate measures to resolve this item.

This unresolved item is closed.

3. Unresolved Items

An unresolved item is a matter about which more information is required in order to ascertain whether it is an acceptable item, an open item, a deviation, or a violation. Unresolved items remaining open during this inspection are discussed in Paragraphs 2.e, 2.g, and 2.k.

4. Exit Interview

The Region III inspectors met with the licensee's representatives (denoted in Paragraph 1) on October 17 and November 5, 1990, and discussed their findings at the conclusion of the inspection on November 5, 1990. The inspectors discussed the likely content of the inspection report with regard to documents or processes reviewed by the inspectors. The licensee did not identify any such documents or processes as proprietary.