

lennessee Valley Authority, 1101 Merket Street, Chattanciega, Tennessee, 3740.

Joseph R. P.; aum Ace Preiz" ant, Nuclear Operator

April 4, 1991

U.S. Nuclear Regulatory Commission ATTN: Document Control Desk Washington, D.C. 20555

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET NO. 50-327 - FACILITY OPERATING LICENSE DPR-77 - LICENSEE EVENT REPORT (LER) 50-327/91005

The enclosed LER provides details concerning the discovery that portions of the carbon dioxide fire protection system had been inoperable without complying with the corresponding technical specification action provisions. This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation prohibited by technical specifications.

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Very truly yours,

TENNESSEE VALLEY AUTHORITY

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Enclosure cc: See page 2

U.S. Nuclear Regulatory Commission

April 4, 1991

cc (Enclosure):

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Approved OMB No. 3150-0104 Expires 4/30/92

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

On Morch 5, 1991, at approximately 1315 Eastern standard time (EST), with Units 1 and 2 in Mode 1, while performing a regularly scheduled fire protection surveillance instruction, it was discovered that the in arface wiring between panel O-L-619 and the IB-B diesel generator (D/G) room carbon dickide (CO₂) system had been incorrectly terminated. This was the result of inappropriate personnel actions. At this time, the CO₂ and fire protection systems were inoperative (because of the on-going performance of surveillance testing) and compensatory measures were in place. Supervision and engineering were notified at this time. Their review concurred that a wiring discrepancy existed. The shift operations supervisor (SOS) was notified at approximately 1400 EST. The D/G building fire protection and suppression was placed back in-service, except the IB-B D/C room CO₂ system where fire watches remained in-place until the problem was corrected. Work orders were also initiated to inspect the other diesel building and plant fire protection panels for similar situations. The problem on fire protection panel 0-L-619 was corrected and the system was declared operable at 1100 EST on March 6, 1991. NRC Form 366A (6=89)

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LICENSEE EVENT REPORT (LER)

TEXT CONTINUATION

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EXT (If more space is required, use additional NRC Form 3664's) (17) DESCRIPTION OF EVENT

On March 5, 1991, at approximately 1315 Eastern standard time (EST), with Unit 1 and Unit 2 in Mode 1 (100 percent power, reactor coolant system [RCS] pressure at 2238 pounds per square inch gauge [psig], and RCS average temperature at 578 degrees Fahrenheit [F]; and 100 percent power, RCS pressure at 2235 psig, and RCS average temperature at 578 degrees F, respectively), it was discovered that the carbon dioxide (CO2) fire protection system (EIIS Code KQ) for the 18-8 diesel generator (D/G) (EIIS Code EK) was inoperable as the result of an incorrectly terminated wire. Investigation of the event concluded that the incorrect termination had most likely occurred during previous surveillance testing on April 13, 1990. Limiting Condition for Operation (LCO) 3.7.11.3 requires that a continuous fire watch with backup fire suppression equipment be established within one hour, if the D/G room CO2 system is inoperable. The CO2 system must be returned to operable status within 14 days, or a Special Report submitted in accordance with Specification 6.9.2 within 30 days, detailing the cause of the inoperability and the plans and schedule for restoring the system to operable status. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable to LCO 3.7.11.3. At approximately 0840 EST on March 5 the diesel generator building CO2 system had been removed from service to support testing of the fire detection system. Fire watches were established in accordance with LCO 3.7.11.3 at this time.

On March 5, 1991, at 1315 EST, while performing Surveillance Instruction (SI)-234.3 "Technical Specification Fire Detectors" at the D/G building on panel 0-L-619, electricians discovered that wire GCX(R) of cable FE729 was not terminated in the correct position. SI-234.3 performs channel functional tests of the fire detection instruments associated with panels 0-1-600, -601, and -619 (D/G building panels); operational checks of associated detector alarms; operational checks of detector and alarm supervision circuits; and operational checks of nonsupervised circuits between the fire protection panels and actuated equipment. CO2 cut out switches are utilized in conjunction with the lifting of leads and/or jumpers, to prevent the inadvertent actuation of the CO2 system during this testing. The incorrectly terminated wire was discovered when the electricians were preparing to perform the step in SI-234.3 which lifts wire GCX(R) off of the normally open (NO) terminal. This wire was found to be terminated on the normally closed (NC) terminal instead of the NO terminal. Because of the apparent disc. epancy, work was stopped and the electricians notified their foreman. Upon a rival (1330 EST) at the panel, the foreman concurred with the electricians. The foreman then called the appropriate system engineer, and the engineer proceeded to the D/G building and inspected the fire protection panel. He also agreed that the wiring was incorrect. Because the incorrectly terminated wire could prevent the 1B-B D/G CO2 system from functioning properly, the foreman and one of the electricians went to the control room to inform the SOS of the problem. At the

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TEXT (If more space is required, use additional NRC Form 366A's) (17) DESCRIPTION OF EVENT (Continued)

same time, the system engineer went back to his desk to initiate a Problem Evaluation Report (PER). The fire watches were notified to stay in place until the panel wiring could be corrected and declared operable. At this point, the D/G fire protection was put back in service except, for the 18-8 D/G room CO_2 . The decision was made to delay return of the 18-8 CO_2 system to service until the next day to ensure that all appropriate evaluations were performed. The fire watches remained on duty until the next morning when the panel wiring was corrected and the system declared operable. The panel was declared operable at 1100 EST on March 6, 1991.

CAUSE OF EVENT

The cause of this event is attributed to inappropriate personnel actions. The main contributing factor to this event is considered to be failure of the second party verification to identify the incorrectly terminated wire. In this case, one wire was re-terminated one terminal down on the terminal block and this action was inappropriately verified by a second employee. Although it cannot be conclusively determined when this error was made, the last documented case of anyone working in this section of panel 0-L-619, based on a review of equipment history, was on April 13, 1990 during the performance of SI-234.3. It is, therefore, concluded that the 1B-B D/G CO₂ system was inoperable from April 13, 1990, to March 6, 1991.

Because of the elapsed time between the incorrect wire termination and its discovery, the factors leading to the event cannot be determined exactly. Discussions with personnel involved in the April 1990 performance of SI-234.3, and a review of SI-234.3, indicate that it was not clearly understood, nor clearly defined as to what the second signoff in the procedure actually reflected. Similarly, the overall requirements for verification as discussed in Administrative Instruction -37, "Independent Verification" were considered to be unclear and not well understood.

The location and configuration of the panels was also evaluated to identify possible contributing factors. Lighting in the area of the panels was not a factor. Though the orientation of the panels makes the wire terminations somewhat difficult, it is reasonably expected that these tasks should be correctly performed under the given conditions. NRC Form 366A

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In summary, the root cause in this incident has been determined to be inappropriate personnel action in incorrectly terminating the affected wire. Although it cannot be conclusively determined when this event took place, the evidence points to the last performance of SI+234.3 in April of 1990. Additionally, second party verification was not correctly performed in that it did not identify the incorrectly terminated wire.

ANALYSIS OF EVENT

This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation prohibited by technical specifications.

The CO₂ fire protection system and the associated detectors and controls are described in Sequoyah Updated Final Safety Analysis Report section 9.5.1 and in Sequoyah Technical Specification (TS) bases sections 3/4.3.3.8 and 3/4.7.11. This equipment ensures that adequate warning and suppression capability is available to detect, confine, and extinguish fires in portions of the plant where safety-related equipment is located. The collective capability of the fire protection systems minimizes potential damage to the safety-related equipment. A simplified logic diagram of the 1B-B D/G room fire protection system is shown on the attached figure.

Zone 3 and Zone 4 provide cross-zoned protection for the 1B-B D/G room, i.e., fire detectors in both Zones 3 and 4 must actuate to start the CO₂ discharge timer for flow control valve (FCV) 39-25. The incorrectly terminated wire would have the effect of adding a "NOT" gate to the Zone 3 cross zone logic. In the incorrect configuration, a CO₂ actuation signal from Zone 3 would be present as long as no Zone 3 fire detectors were actuated. This would allow the CO₂ actuation timer to be started (and sealed in) if a Zone 4 detector actuated. However, if a Zone 3 detector actuated before a Zone 4 detector the "NOT" gate (incorrectly terminated wire) would clear the Zone 3 CO₂ actuation signal, preventing the cross-zone logic from actuating the "O₂ dump timer for FCV-39-25.

The ability of the Zone 3 and 4 (18-B D/G) detectors to actuate in response to a fire was not affected by the incorrectly terminated wire. Actuation of these detectors is alarmed in the main control room and would provide Operations personnel the necessary warning to respond to a fire. Additionally, the manual actuation capability of the CO_2 system was not affected and actuation of 1B-B CO_2 system could be accomplished from outside of the 1B-B D/G room upon indications or warnings of a fire.

Similarly the high pressure fire protection system was not affected by the wiring error.

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Routine inspections are made in the D/G building as part of the OSLA-99 outside assistant unit operator (AUO) routine. These inspections, performed on a shiftly basis, provide routine checks of cleanliness of the 1B-B D/G room, minimizing the potential for fires in the room.

In summary, though the CO₂ system for the 1B-B D/G room had been technicall¹⁰ inoperable since April 13, 1990, adequate fire detection and suppression equipment remained available and functional. Consequently, this event did not adversely impact the health and safety of the p¹ olic or plant personnel.

CORRECTIVE ACTION

When the incorrect wire termination was discovered, technical specification compensatory measures were already in place because of the fire protection testing (SI-234.3) that was in progress. These compensatory measures remained in place until the problem was corrected and the system was declared operable.

Work orders were initiated on March 5, 1991, to correct the incorrect wiring. The wire was rolled to the correct position and the panel was tested on March 6, 1991. The other end of this wiring (that goes to the CO₂ panel) was also checked on March 6, 1991 to ensure no other problems existed. Panel O-L-619 was returned to service at 1100 EST on March 6.

Secause this event is attributed to inappropriate personnel actions, the event has been reviewed with the personnel involved in the April 1990 SI-234.3 performance. This review emphasized the intent and importance of self-verification and verification signatures. The event is also being reviewed with other Electrical Maintenance personnel during regularly schoduled electrical shop meetings. Additionally, a Site Dispatch will be prepared and Histributed to Sequoyah personnel emphasizing the intent and importance of self-verification and verification signatures.

To ensure clear guidance is provided concerning verifications, AI-37 will be reviewed for clarity, consistency, and scope. Procedure revisions will be scheduled and made as necessary following this review.

A work order was written to check the interface wiring of the remaining fire protection panels at the diesel building. This identified one additional wiring discrepancy relative to the corresponding wiring diagrams. This discrepancy did not affect system performance, as the "correct" and "incorrect" terminals are electrically connected by a jumper. This discrepancy was concluded to have existed since construction because the wire is not lifted as part of periodic testing, and "torque paint" was still present on the terminal screws.

Additionally, another work order was written to check the interface wiring of the remaining plant fire protection panels. This work is currently scheduled to be completed May 3, 1991. The result of this wiring check will indicate if the panel O-L-619 error is an isolated event, or an indication of a broader problem.

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ADDITIONAL INFORMATION

Three Licensee Event Reports (327/84023, 327/84041, and 328/88026, Revision 1) were identified that described events involving incorrectly terminated wiring. The causes of and corrective actions for these events involved incorrectly or inadequately labeled wires. As described previously, proper identification of the wiring, both physically and in the procedures, was not a factor.

COMMITMENTS

- A Site Dispatch will be prepared and distributed to Sequoyah personnel emphasizing the intent and importance of self-verification and verification signatures. This will be completed by May 3, 1991.
- AI-37 will be reviewed for clarity, consistency, and scope. This review will be completed by May 3, 1991.
- An inspection to check the wiring of the remaining fire protection panels will be performed. This inspection will be completed by May 3, 1991.

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