NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Sequoyah, Unit 1 | 0 5 0 0 0 3 2 7 | 1 OF 0 6 |

TITLE (4) Unclear Planning Of Work Activities Resulted In A Loss Of Power To A 6.9 kV Shutdown Board And Subsequent Start Of All Four Diesel Generators

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAMES | DOCKET NUMBER(S) |
| 0 6 | 2 9 | 8 8 | 8 8 | 0 2 6 | 0 0 | 0 7 | 2 1 | 8 8 | Sequoyah, Unit 2 | 0 5 0 0 0 3 2 7 |
| | | | | | | | | | | 0 5 0 0 0 |

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

| OPERATING MODE (9) | 5 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| POWER LEVEL (10) | 0 0 0 | 20.402(b) | 20.405(c) | XX | 50.73(a)(2)(iv) | 73.71(b) |
| | | 20.405(a)(1)(i) | 50.36(c)(1) | | 50.73(a)(2)(v) | 73.71(c) |
| | | 20.405(a)(1)(ii) | 50.36(c)(2) | | 50.73(a)(2)(vii) | OTHER (Specify in Abstract below and in Text, NRC Form 366A) |
| | | 20.405(a)(1)(iii) | 50.73(a)(2)(i) | | 50.73(a)(2)(viii)(A) | |
| | | 20.405(a)(1)(iv) | 50.73(a)(2)(ii) | | 50.73(a)(2)(viii)(B) | |
| | | 20.405(a)(1)(v) | 50.73(a)(2)(iii) | | 50.73(a)(2)(x) | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (AREA CODE) |
|---|---|
| Don Sista<br>J. A. Naik, Plant Operations Review Staff | 6 1 5 8 7 0 - 6 8 6 2 |

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 |
|---|---|---|---|---|---|---|---|---|---|
| A | E A | I L | W 1 2 0 | Yes | | | | | |
| | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE) | XX NO | | | | |


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

At approximately 2259 EDT on June 29, 1988, unit 1 was in mode 5 (cold shutdown) and unit 2 was in mode 1 at 70 percent power when all four standby diesel generators (D/Gs) received an emergency start signal. All four D/Gs started as designed, and D/G 1B-B was subsequently loaded with shutdown board 1B-B loads automatically. No other D/Gs were loaded since the other 6.9 kV shutdown boards remained energized. The immediate cause of the automatic start of all four D/Gs was an undervoltage condition on 6.9 kV shutdown board 1B-B that resulted from a short circuit during the performance of a work request on a breaker indicating light. The short circuit tripped feeder breaker 1722 and created a loss of power condition to 6.9 kV shutdown board 1B-B which actuated the associated undervoltage relays which then sent an emergency start signal to all four D/Gs.

The root cause of this event was unclear WR planning. Although the WR contained instructions for lifting the wires associated with the indicating light assembly before initiating the repair or replacement work (if needed), these instructions were not interpreted by the craft personnel as being a requirement. Hence, the work was initiated without lifting the wires.

To prevent recurrence of this event, TVA will instruct WR planners to ensure that each WR on an indicating light assembly that can affect ESF equipment contains a requirement to take the appropriate action necessary to prevent a potential undervoltage condition (e.g., lifting the leads or swapping to the alternate feeder breakers) before work on an indicating light assembly can begin. In addition to improved WR planning, TVA will also review this event with Operations personnel to ensure they are aware of the potential problems that can arise from such routine activities as changing out indicating lamps. This review will emphasize the necessity of carefully removing the burnt-out lamps to prevent the potential for breaking the lamp while leaving the base inserted in the socket.




IE22
1/1

DESCRIPTION OF EVENT

At approximately 2259 EDT on June 29, 1988, unit 1 was in mode 5 (0 percent power, atmospheric pressure, 124 degrees F) and unit 2 was in mode 1 (70 percent power, 2235 psig, 565 degrees F) when all four standby diesel generators (D/Gs) (EIIS code EK) received an emergency start signal as a result of an undervoltage condition on 6.9 kilovolt (kV) shutdown board 1B-B (EIIS Code EB). All four D/Gs started as designed, and D/G 1B-B was subsequently loaded with shutdown board 1B-B loads automatically. No other D/Gs were loaded since the other 6.9 kV shutdown boards remained energized.

Before this event occurred, at approximately 2248 EDT, Operations personnel had authorized the performance of Work Request (WR) B292853 to repair/replace the red indicating light assembly for breaker 1722. This breaker, which is normally closed, is the normal feeder breaker for 6.9 kV shutdown board 1B-B from 6.9 kV unit board 1C (EIIS Code EA). The indicating light assembly, which is energized when the subject breaker is closed, is located on panel 1-M-1 in the main control room (EIIS Code NA) and is an integral part of the 250 volt DC control circuit (EIIS Code EI) for breaker 1722. That is, the indicating light assembly is connected in series with the trip coil for breaker 1722 and serves a two fold purpose; (1) it provides positive indication that breaker 1722 is closed, and (2) it provides positive indication that continuity exists through the breaker trip coil (see attached figure).

Shortly after receiving Operations approval to perform WR B292853, Electrical Maintenance (EM) personnel identified the indicating light assembly in need of replacement and attempted to locate the specific set of wires associated with the assembly. EM personnel then cut one of the tie wraps that was holding the subject wires in place to gain access to the assembly. As soon as the tie wrap was cut; however, the indicating light assembly fell apart, and feeder breaker 1722 tripped. As a result, feeder breaker 1726 also tripped, 6.9 kV shutdown board lost power, and the logic for an automatic start of all four D/Gs (i.e., an undervoltage condition on any one of the four 6.9 kV shutdown boards) was satisfied.

Following the start of all four D/Gs, D/G 1B-B automatically tied on to the 1B-B shutdown board and began supplying the required electrical loads associated therewith. Operations personnel immediately stopped all work under WR B292853 and entered the action statement of Limiting Condition for Operation (LCO) 3.7.7.a (unit 1), "Control Room Emergency Ventilation System," and LCO 3.8.2.1 (unit 2), "AC Distribution System - Operating." The normal feeder breakers for 6.9 kV shutdown boards 1A-A, 2A-A and 2B-B were then verified to be in the closed position. The control fuses associated with feeder breaker 1722 were pulled by Operations personnel, and the replacement of the red indicating light assembly in accordance with WR B292853 was allowed to continue.

At approximately 2329 EDT, the Assistant Shift Operations Supervisor (ASOS) initiated the shutdown of D/Gs 1A-A, 2A-A, and 2B-B in accordance with the System Operating Instruction (SOI)-82 series of instructions and realigned the subject D/Gs for standby operation. The ASOS allowed D/G 1B-B to continue to operate in the isochronous mode pending the replacement of the indicating light assembly. At approximately 0011 EDT on June 30, 1988, replacement of the indicating light assembly was completed, and breaker 1722 was closed. Shortly thereafter, feeder breaker 1726 was closed, the associated blackout relays were reset, and offsite power from 6.9 kV unit board 1C was being supplied to shutdown board 1B-B in parallel with onsite power from D/G 1B-B. At this point, the action requirements of LCOs 3.7.7.a (unit 1) and 3.8.2.1 (unit 2) were exited. At approximately 0017 EDT, D/G 1B-B was shut down and realigned for standby operation in accordance with SOI-82.2, "Diesel Generator 1B-B."

CAUSE OF EVENT

The immediate cause of the automatic start of all four D/Gs was an undervoltage condition on 6.9 kV shutdown board 1B-B that resulted from the trip of feeder breaker 1722. As shown in the attached figure, the indicating light assembly for breaker 1722 is connected in series with the subject breaker's trip coil as part a 250 volt DC control circuit. The circuit is designed to provide breaker position indication and verification of trip coil continuity. The resistance of the light and its internal ceramic resistor limit the current flow through the trip coil such that the current is well below the value at which a breaker trip will occur. However, when EM personnel cut the tie wrap that was holding the wires to the indicating light assembly the internals of the assembly fell apart and caused a momentary short circuit across the assembly. As a result of the short circuit, the trip coil experienced the full 250 volts and, as designed, tripped feeder breaker 1722. The trip of feeder breaker 1722 caused breaker 1726 to trip and created a loss of power condition to 6.9 kV shutdown board 1B-B. The loss of power to the shutdown board actuated the associated undervoltage relays which then sent an emergency start signal to all four D/Gs.

The root cause of this event was unclear WR planning. Although the WR contained instructions for lifting the wires associated with the indicating light assembly before initiating the repair or replacement work (if needed), these instructions were not interpreted by the craft personnel as being a requirement. Hence, the work was initiated without lifting the wires. In addition, although members of the Work Control Group (WCG) recognized that the indicating light replacement work could result in an undesired trip of shutdown board 1B-B's feeder breaker, they authorized the work without verifying that appropriate preventive measures against a potential undervoltage condition would be taken.

A contributing cause of this event is the difficulty in removing the small lamps associated with the indicating light assemblies. The excessive force that is sometimes required to remove the lamps can result in a broken lamp (with the base of the lamp remaining inside the socket), or it can result in broken socket (both of which occurred in this event). Either of these cases necessitates repair or replacement of the indicating light assembly and increases the potential for an unwanted trip of the associated breaker.

ANALYSIS OF EVENT

This event resulted in an inadvertent actuation of engineered safety feature (ESF) equipment and is therefore being reported in accordance with 10 CFR 50.73, paragraph a.2.iv.

The emergency onsite power system is the 1E power source that is designed to supply backup power to ESF equipment in the event of a postulated accident followed by a loss of offsite power. Sufficient power is available to mitigate the consequences of a postulated accident and allow the unit to shut down and be maintained in a safe shutdown condition. To ensure that the D/Gs can start and load within the times assumed in the Sequoyah Nuclear Plant (SQN) Final Safety Analysis Report (FSAR), there are several different off-normal plant conditions that result in automatic D/G starts. A loss of voltage on one of the 6.9 kV shutdown boards will cause all four D/Gs to start because the loss of one shutdown board may be indicative of an impending loss of other boards. A safety injection signal (EIIS Code JE) and a degraded voltage for a predetermined period of time will also cause an automatic start of all four D/Gs. Since at least one shutdown board on each unit must be energized to mitigate the consequences of postulated accidents, and since one train of the emergency onsite power system is assumed to fail during the accident, all four D/Gs are automatically started.

In this event, all four D/Gs started as designed and D/G 1B-B tied on to 6.9 kV shutdown board 1B-B and began supplying the power necessary to run the associated ESF equipment. The other three D/Gs did not tie on to their respective shutdown boards because they remained energized with offsite power. As a result of the D/G response, sufficient power was available at all times during this event to run the ESF equipment necessary to mitigate the consequences of any design basis accident. Hence, there were no significant safety consequences associated with this event.

CORRECTIVE ACTION

As immediate corrective action following the D/G starts, plant operators verified that the normal feeder breakers for 6.9 kV shutdown boards 1A-A, 2A-A and 2B-B were in their normal position and that the boards were therefore energized and capable of supplying necessary equipment with available offsite power. Immediate operator actions also included the suspension of work activities associated with WR B292853 and the verification that D/G 1B-B had tied on to 6.9 kV shutdown board 1B-B and was capable of supplying the ESF loads associated therewith.

To prevent recurrence of this event, TVA will instruct WR planners to ensure that each WR on an indicating light assembly that can affect ESF equipment contains a requirement to take the appropriate action necessary to prevent a potential undervoltage condition (e.g., lifting the leads or swapping to the alternate feeder breakers) before work on an indicating light assembly can begin. In addition to improved WR planning, TVA has restructured the WCG at SQN. The newly restructured WCG is composed of a multidiscipline staff including engineers, technicians, senior reactor operators, etc. The WCG now utilizes a system concept that provides expertise in specific areas and facilitates the identification of potential problems. As a result, TVA anticipates better control over SQN work activities.

TVA will also review this event with Operations personnel to ensure they are aware of the potential problems that can arise from such routine activities as changing out indicating lamps. This review will emphasize the necessity of carefully removing the burnt-out lamps to prevent the potential for breaking the lamp while leaving the base inserted in the socket.

ADDITIONAL INFORMATION

There have been 21 previously reported occurrences of inadvertent D/G starts; however, only 1 of these events has been attributed to unclear planning - SQRO-50-327/87058.

COMMITMENTS

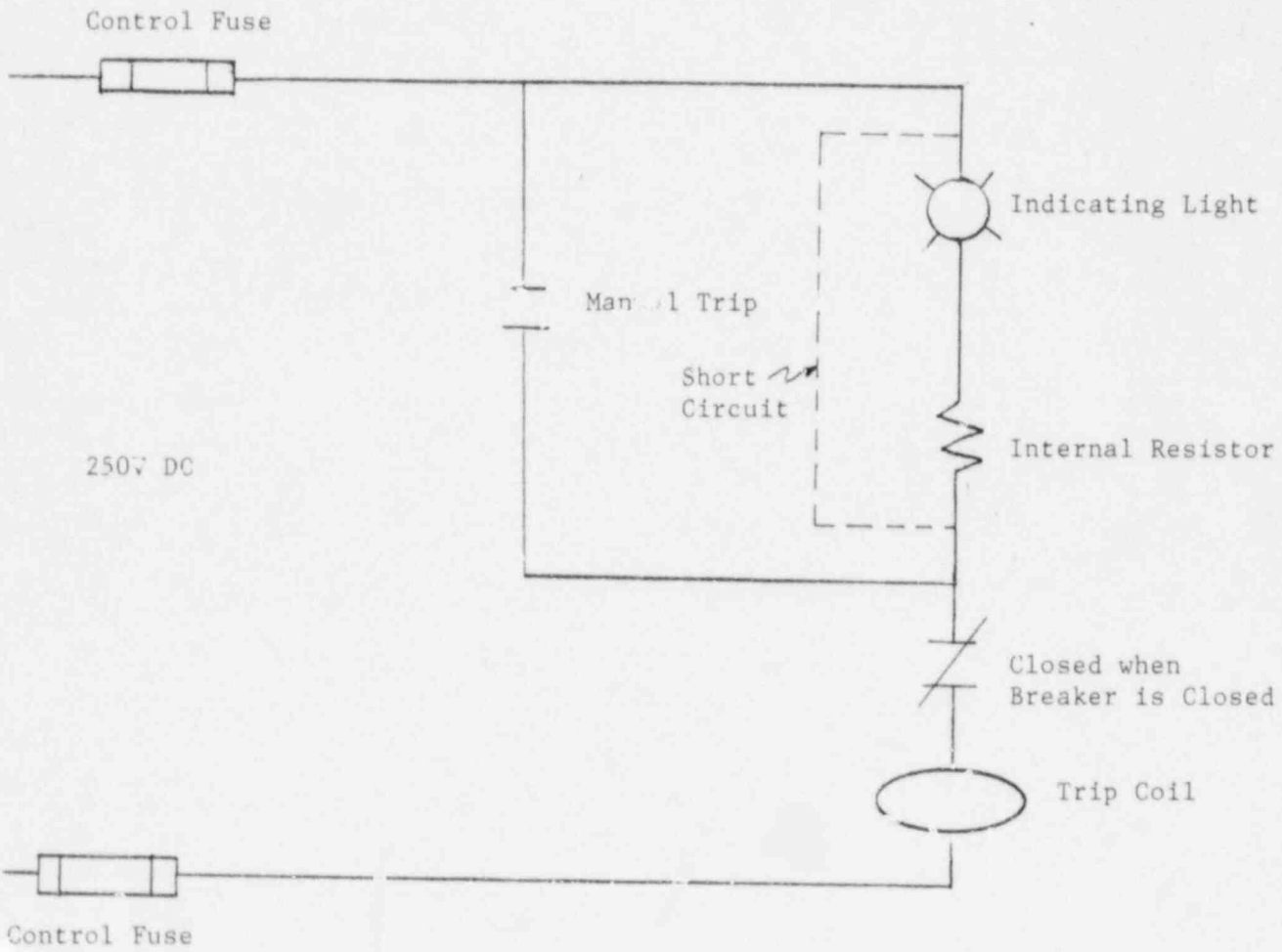
1. TVA will instruct WR planners to ensure that each WR on an indicating light assembly that can affect ESF equipment contains a requirement for preventing a potential undervoltage condition. These instructions will be issued by August 31, 1988.

2. TVA will review this event with Operations personnel to ensure they are aware of the potential problems associated with such routine activities as changing out indicating lamps. This review will be completed by August 31, 1988.

1023Q

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | PAGE (3) |
|---|---|---|---|---|---|
| Sequoyah, Unit 1 | 0 5 0 0 0 3 2 7 | 8 8 | — 0 2 6 | — 0 0 | 0 6 OF 0 6 |

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



TENNESSEE VALLEY AUTHORITY
Sequoyah Nuclear Plant
Post Office Box 2000
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July 21, 1988

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET NO. 50-327 - FACILITY OPERATING LICENSE DPR-77 - REPORTABLE OCCURRENCE REPORT SQRO-50-327/88026

The enclosed licensee event report provides details concerning unclear planning of work activities that resulted in a loss of power to a 6.9 kV shutdown board and subsequent start of all four diesel generators. This event is reported in accordance with 10 CFR 50.73, paragraph a.2.iv.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

S. J. Smith

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Plant Manager

Enclosure
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