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Jack L. Wilson
Vice President, Sequoyah Nuclear Plant

May 2, 1991

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 2 - DOCKET NO. 50-328 - FACILITY OPERATING LICENSE DPR-79 - LICENSEE EVENT REPORT (LER) 50-328/91002, REVISION 1

The enclosed LER has been revised to provide the final results of the investigation and evaluation of this event involving the failure to comply with Sequoyah's technical specification (TS) action statement. This event was reported March 21, 1991, in accordance with 10 CFR 50.73 (a)(2)(i) as an operation prohibited by TSs. The revisions to the LER are indicated by revision bars in the right margin.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. L. Wilson

J. L. Wilson

cc: see page 2

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NRC Form 366 (6-89) | U.S. NUCLEAR REGULATORY COMMISSION | Approved OMB No. 3150-0104 Expires 4/30/92

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): Sequoyah Nuclear Plant, Unit 2 | DOCKET NUMBER (2): 0 5 0 0 0 3 2 8 | PAGE (3): 1 OF 0 9

TITLE (4): Failure to comply with Technical Specification Action Statement and establish the appropriate compensatory measures.

EVENT DAY (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 2	1 1	9 1	9 1	0 0 2	0 1	0 5	0 2	9 1		0 5 0 0 0

OPERATING MODE (9): 1

POWER LEVEL (10): 1 0 0

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

__ 20.402(b)	__ 20.405(c)	__ 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
__ 20.405(a)(1)(iii)	XX 50.73(a)(2)(i)	__ 50.73(a)(2)(viii)(A)	Abstract below and in
__ 20.405(a)(1)(iv)	__ 50.73(a)(2)(ii)	__ 50.73(a)(2)(viii)(B)	Text, NRC Form 366A)
__ 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)
C. H. Whittemore, Compliance Licensing	6 1 5 8 4 3 - 7 2 1 0

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

SUPPLEMENTAL REPORT EXPECTED (14): __ YES (If yes, complete EXPECTED SUBMISSION DATE) | X NO

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

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

On February 19, 1991, with Unit 2 in Mode 1, it was determined that on February 11, 1991, Unit 2 had operated in a condition prohibited by Technical Specification (TS) 3.3.3.8 Limiting Condition for Operation (LCO) action statement (a). Action statement (a) requires a fire watch to be established within an hour upon entering the LCO. On February 11, 1991, fire protection panel 0-L-630 was removed from service for maintenance, and Operations entered LCO 3.3.3.8. Because of the expected short duration, no fire watch was established. Operations ordered the work stopped and return of the panel to normal when all four fire pumps started unexpectedly. Operations prematurely exited the LCO when informed that the panel had been returned to normal. Communications between Operations personnel and Maintenance personnel was inadequate causing Operations to consider the panel to be operable. Troubleshooting later revealed the panel was inoperable and Operations was notified. LCO 3.3.3.8 was re-entered. Unit 2 operated approximately six hours without establishing a fire watch. Multiple causes and contributing factors have been identified, including an inadequate procedure, poor communication, inadequate training, and failure to follow procedures. Corrective actions are being taken to address these items.

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

DESCRIPTION OF EVENT

On February 19, 1991, with Unit 2 in Mode 1 (100 pe. power, 2,235 pounds per square inch gauge and 578 degrees Fahrenheit), it was deter ed that on February 11, 1991, the unit had operated in a condition prohibited by technical specifications (TS) in that limiting condition for operation (LCO) 3.3.3.8 "Fire Detection Instrumentation" required fire detectors were inoperable (in 10 zones), without the required compensatory measures being established. On February 11, 1991, at 0935 Eastern standard time (EST) LCO 3.3.3.8 was entered to accommodat a work request (WR) to replace the control unit that furnishes power for the dete or and audible signal circuits (CP-30 module) on fire protection (EIIS code KP) panel 0-L-630. With the number of operable fire detection instruments less than the minimum number operable required in Table 3.3-11, LCO 3.3.3.8 requires that "Within 1 hour establish a fire watch patrol to inspect the zone(s) with the inoperable instrument(s) at least once per hour, unless the instrument(s) is located inside the containment, then inspect the containment at least once per 8 hours or monitor the containment air temperature at least once per hour at the locations listed in Specification 4.6.1.5." The LCO was exited approxima ely six hours later without a fire watch being established or monitoring of the containment air temperature being performed.

On January 14, 1991, Surveillance Instruction (SI)-234.7 "Technical Specification Fire Detectors," was performed by Maintenance Electrical Group (MEG) on fire panel 0-L-630. Fire panel 0-L-630 monitors the fire detectors in the Unit 2 annulus and reactor coolant pump (RCP) areas. During the testing of panel 0-L-630, a deficiency was initiated on the trouble buzzer. The trouble buzzer was found to function intermittently. This deficiency was not considered to affect the TS acceptance criteria of SI-234.7. The balance of the SI-234.7 testing of panel 0-L-630 was completed and the SI was closed out with the non-TS deficiency. WR C045526 was initiated to correct the buzzer deficiency.

Planning was performed for the WR and the applicable portion of SI-234.7 was specified as the required post maintenance test (PMT). The WR was initially worked on January 24, 1991. Troubleshooting determined that the CP-30 module required replacement, however the operability of the detection system was not affected. The WR was returned to Maintenance for additional planning.

Physical Security Instruction (PHYSI)-13 "Fire Protection Program," Attachment C, describes the administrative controls required to be established before removing TS fire protection equipment from service. Section 2.0 and Section 3.2.1 of PHYSI-13, Attachment C delineate the responsibili and require documentation for authorization of equipment to be removed from service and notification of the shift operations supervisor (SOS). The Attachment C permit is the administrative instrument used to document the removal, approval, and return of fire protection equipment, etc., from service.

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DESCRIPTION OF EVENT

On February 11, 1991, the PHYSI-13, Attachment C permit originally written for the January 14, 1991, performance of SI-234.7 was extended by Fire Operations to cover WR C045526. This PHYSI-13 attachment permit should have been closed out when the January 14, 1991, performance of SI-234.7 was completed. PHYSI-13 intends that an Attachment C permit be prepared for each task. The SOS was not notified as required by PHYSI-13 by the fire captain that a TS fire protection system was being removed from service.

At approximately 0900 EST on February 11, 1991, WR C045526 was approved for work by the Unit 1 assistant shift operations supervisor (ASOS) by telephone, even though panel 0-L-630 is a Unit 2 panel. The WR was implemented in this manner for three reasons: (1) The Unit 1 ASOS routinely signs for common equipment work activities, (2) the unique identifier for the panel designated it as a common panel (0-L-630), and (3) the Unit 2 ASOS was out of the control room responding to a fire alarm as the fire incident commander at this time. Additionally, the Unit 2 operators were informed before initiation of work on panel 0-L-630.

At approximately 0935 EST panel 0-L-630 was removed from service for replacement of the module and LCO 3.3.3.8 was entered. This panel is removed from service by positioning switch, SW-1, to the disconnect position. This switch manipulation disconnects panel 0-L-630 from the System 13 computer, rendering the fire detection equipment actuated from panel 0-L-630 inoperable. The result of the switch manipulation requires Operations to enter LCO 3.3.3.8. Operations personnel entered LCO 3.3.3.8 at 0935 EST. The SW-1 switch is located inside panel 0-L-630. There is a label adjacent to SW-1 which reads "Caution depressing SR 32 switch inops system LCO 3.3.3.8." The CP-30 module was replaced and the wire connections were being verified before performing the Postmodification Test (PMT) when Operations observed multiple automatic start signals to the fire pumps. Operations then contacted Maintenance personnel at panel 0-L-630 and instructed them to stop work and return the panel to normal in order to exit the LCO. Panel 0-L-630 SW-1 switch was returned to its normal position. Maintenance personnel verified the power-on light was illuminated and the absence of trouble alarms on panel 0-L-630. At approximately 1005, Maintenance personnel reported to the main control room (MCR) that the panel was returned to normal. The craft personnel then went to the MCR to discuss the situation with Operations. The discussion did not reveal the cause of all four fire pumps receiving auto start signals, but at the time of the discussion the fire pump auto start problem had cleared. MEG personnel left the MCR without discussing the PMT for the CP-30 module replacement. Operations did not question MEG personnel about the status of the PMT for this activity. The Unit 2 ASOS was under the impression that the panel was operable and exited LCO 3.3.3.8 at 1005.

At 1040 EST, Fire Operations personnel observed water on the floor in the area of fire protection deluge valves and upon further inspection determined that deluge valves 2-FCV-26-219 and -223 were actuated (open), the headers were charged to the Unit 2 annulus and RCPs, and that the valves would not reset. The manual isolation valves were closed by Fire Operations personnel and LCO 3.7.11.2. was entered.

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

DESCRIPTION OF EVENT

LCO 3.7.11.2 states: "With one or more of the above required spray and/or sprinkler systems inoperable, within one hour establish a continuous fire watch with backup fire suppression equipment for those areas in which redundant systems or components could be damaged; for other areas establish an hourly fire watch patrol."

The system engineer was notified by the Maintenance personnel that the fire pumps had started and that Operations had informed them to get out of the panel. The Maintenance personnel requested the system engineer to provide assistance on this issue. The system engineer then went to the MEG shop to review the System 13 printout. The printout revealed that at approximately 1005 EST SW-1 was restored to its normal position and that every zone in the panel was actuated. These zone actuations would cause the fire pumps to start and the deluge valves to actuate. Also, while reviewing the printout and during discussions with the MEG foreman, the system engineer determined that the panel was inoperable because the PMT had not been performed. Also, while reviewing the printout, the system engineer received a call from Fire Operations informing him that the two deluge valves (2-FCV-26-219 and -223) were actuated and would not reset. The system engineer and craft foreman then went to the Fire Operations office and informed Fire Operations that a fire watch was needed because of an incomplete PMT on panel 0-L-630 in accordance with the requirements of LCO 3.3.3.8. Fire Operations called the SOS to discuss the need for a fire watch. The SOS decided a fire watch was not needed; however, the panel PMT and LCO 3.3.3.8 were not discussed, only the deluge valve problem was discussed. The SOS was apparently only considering the inoperable deluge valves and LCO 3.7.11.2. The system engineer then went to the MCR at approximately 1130 EST, surveyed the System 13 console, and observed that each zone from panel 0-L-630 was in alarm status. He then notified the Fire Operations captain that this was the reason the deluge valves would not reset. The system engineer then asked the SOS if he was still in the LCO and the SOS replied that he had not instructed anyone to exit it. The SOS was again apparently referring to LCO 3.7.11.2 and the system engineer was referring to LCO 3.3.3.8. The system engineer then went to the Unit 2 ASOS and asked if his log reflected exiting LCO 3.3.3.8; and the response was yes. The systems engineer informed the Unit 2 ASOS of the incomplete PMT on Panel 0-L-630. The Unit 2 ASOS and the Unit 2 unit operator then lined out their 1005 EST log entries that stated LCO 3.3.3.8 had been exited.

At 1212 EST, the isolation valves were opened, and LCO 3.7.11.2 was exited. The SOS assumed that Panel 0-L-630 was still operable. At approximately 1230 EST, the MEG craft foreman called Fire Operations to determine if a fire watch had been posted as required by LCO 3.3.3.8. The MEG foreman was told that the SOS had discussed the problem with the Fire Operations captain and had determined that a fire watch was not needed because the deluge valves were actuated and the headers were charged. The MEG foreman did not further question the Fire Operations captain, since the SOS said no fire watch was needed.

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DESCRIPTION OF EVENT

The WR C045526 was replanned to wire check panel 0-L-630 and work was resumed. The troubleshooting of panel 0-L-630 identified a loose wire connection on the interconnected control wiring of the CP-30 module. This problem was corrected. The applicable section of SI-234.7 (the PMT) was successfully completed and panel 0-L-630 was declared operable. LCO 3.3.3.8 was exited at 1537 on February 11, 1991.

The system engineer continued to pursue the issues involved and initiated an investigation that resulted in the discovery and verification on February 19, 1991, that a firewatch was not established for a period of approximately six hours.

CAUSE OF EVENT

There are various factors that contributed to this event as described below. Exiting of LCO 3.3.3.8 before completion of the PMT on panel 0-L-630 and failing to establish the compensatory measures, resulted from inadequate communications between Maintenance and Operations personnel relative to operability requirements. Additionally, this condition was exacerbated by the accumulation of the unexpected events, i.e., automatic starting of the fire pumps and deluge valve charging.

The root cause of failing to establish a fire watch was weaknesses in the established methods and the administrative controls for removing fire protection equipment from service. The flexibility allowed by PHYSI-13 circumvented the SOS and limited the ability of the SOS to carry out his responsibilities. The procedure specifies that the Fire Operations foreman will authorize the removal of TS fire protection equipment from service. The Fire Operations foreman is required to notify the SOS, but this requirement does not adequately ensure that the SOS has full cognizance over and control of equipment for which he is responsible. This situation was aggravated by an overall lack of attention to detail and a failure to ask questions.

The implementation of the existing procedure was inadequate. The PHYSI-13, Attachment C permit that was used did not adequately address the required compensatory measures and did not address the task that was being performed. The Fire Operations foreman did not notify the SOS of the issuance of the PHYSI-13, Attachment C permit that allowed removal of panel 0-L-630. There was a lack of understanding by craft foreman and Fire Operation personnel concerning their responsibilities in properly communicating to Operations personnel relating to operability of fire protection equipment.

Inattention to detail is evidenced by a general lack of knowledge about the specifics of work being done, status of equipment, and LCO action statement adherence by involved personnel. The situation was aggravated further by reliance on others to do the right thing by Operations personnel; questions were not asked that if answered, could have made the situation understood by involved personnel. The established methods and administrative controls for removing fire protection equipment from service contributed largely to this non-questioning attitude.

In consideration of the above factors, it was determined that inadequate communications and failure to follow procedures and processes were the root causes of this event, with contributing causes including weaknesses in established methods and controls, lack of a questioning attitude and understanding among personnel, and inattention to detail.

ANALYSIS

Fire protection panel 0-L-630 contains circuits for the detector zones listed below and their associated protected equipment:

Zone	Protected Equipment
332	Unit 2 Reactor Building Annulus
333	Unit 2 Reactor Building Annulus
353	Unit 2 Lower Reactor Compartment Coolers
355	Unit 2 Upper Reactor Compartment Coolers
362	Unit 2 Reactor Coolant Pump, 1
363	Unit 2 Reactor Coolant Pump, 1
370	Unit 2 Reactor Coolant Pump, 4
371	Unit 2 Reactor Coolant Pump, 4
374	Unit 2 Reactor Building Annulus
375	Unit 2 Reactor Building Annulus

The actions of LCO 3.3.3.8 requiring monitoring of containment air temperature and placement of fire watches in the annulus were not met for approximately six hours.

Four of the detector zones (332, 333, 374, and 375) provide automatic cross zone detection and actuation of 2-FCV-26-223. This valve supplies temperature actuated sprinklers for the annulus cable trays.

Four of the detector zones (362, 363, 370, and 371), provide automatic cross zone detection and actuation of 2-FCV-26-223. This valve supplies temperature actuated sprinklers for each of the four RCPs.

The other two detector zones (353 and 355), provide detection only. Zone 353 provides photoelectric smoke detection to the four lower compartment cooling units. Zone 355 provides photoelectric smoke detection to the four upper compartment cooling units.

There are no redundant detection and suppression systems installed for the subject areas, except, manually initiated standpipe hose stations in the reactor building annulus and in lower containment. Even though no fire watch was established in the annulus within one hour after the panel was removed from service, resulting in the fire detectors being inoperable, the annulus areas and RCP areas' automatic fire suppression system remained operable for the majority of the six hour period, except from 1040 to 1135 EST when the deluge valves were isolated, as it was charged with high pressure fire water. Had a fire occurred, the appropriate temperature actuated sprinkler initiation would have taken place. Additional detection was operable in fire zones 358, 359, 366, and 367 for RCP 2 and 3 areas. As a result of this capability and the short duration of the condition there was no significant adverse effect on nor danger to the plant or health and safety of the plant or public.

The analysis of this incident revealed that the plant's position relative to LCOs 3.7.11.2 and 3.3.3.8 needed clarification. It was determined that LCOs 3.7.11.1 and 3.3.3.8 are both applicable when fire detection and fire suppression equipment are inoperable.

CORRECTIVE ACTION

The immediate corrective action was to complete the PMT and return the panel to service.

Interim corrective action included issuing a night order to licensed personnel and Fire Operations personnel covering the removal of TS fire protection equipment from service until PHYSI-13 can be revised to adequately control the process of removing TS fire protection equipment from service. Under this night order only an SRO will authorize TS fire protection equipment to be removed from service by personally signing PHYSI-13 attachment C permits. Plant work documents, i.e., WRs, SIs, PMs etc., related to fire protection equipment will require a separate PHYSI-13 Attachment C. A telephone call is not acceptable. Additionally, a training letter has been issued reinforcing the requirement that an SRO sign off applicable paperwork before an LCO is exited.

PHYSI-13 will be revised to adequately control the process of removing TS fire protection from service. In addition PHYSI-13 will be revised to clearly define the process and responsibilities of the Fire Operations supervisor. Establishing the SOS as responsible for authorization of plant work documents related to fire protection will: reduce the potential for miscommunication, clearly define the controls for removing equipment from service, and improve the implementation of compensatory measures. Operations and Fire Operations personnel will be trained on this event and their responsibilities as delineated in the revised PHYSI-13 will be emphasized. Additionally, Maintenance personnel will be trained on this event; with added emphasis on the importance of proper communications.

Fire Operations and Maintenance personnel involved in the event have been counseled regarding the need for procedural compliance and clear communication of the status of work activities to control room personnel and the importance of TS operability.

After the PHYSI-13 procedure has been revised and implemented, a monitoring effort will be established to verify the proper implementation of the procedure. The results of this monitoring effort will be evaluated to determine the need for further training on fire protection equipment and processes.

SI-234.7 will be revised to require a PHYSI-13, Attachment C permit to be completed.

Operations and Fire Operations personnel involved with the event will be counselled and trained with regard to questioning attitude and inattention to detail when altering configuration of plant equipment.

The analysis of this incident revealed that the plant's position relative to LCOs 3.7.11.2 and 3.3.3.8 needed clarification. It was determined that LCOs 3.7.11.2 and 3.3.3.8 are both applicable when fire detection is inoperable and affects the automatic start of the fire suppression equipment. A night order has been issued to clarify this

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CORRECTIVE ACTIONS

Additional training will be developed for craft and fire operations personnel. This will be accomplished by evaluating the technical and LCO training needs related to fire protection and developing a training program based on this evaluation. The program will be developed by August 1, 1991, and the Fire Operations, Modification, and Maintenance Electrical Group (MEG) personnel will be trained by November 1, 1991.

The operator aid associated with the switch SW-1 on panel 0-L-630 is not adequate. An evaluation of the aids associated with fire protection has been performed and appropriate action taken (aids were removed from 28 panels that were evaluated as inadequate, inappropriate, or confusing).

The Site Quality organization was requested to perform an independent assessment of site fire protection and Appendix R-related problems identified between March 1990 and April 1991. This assessment was performed to identify any common causes for apparent adverse performance trends. The conclusions drawn from the assessment were that several areas should be addressed to affect performance improvements within the fire protection and Appendix R programs, e.g., training, responsibilities, and improved procedures. As a result, a team approach (headed by Corporate Fire Protection) was formulated to resolve these issues. The team will address the problems specifically identified in this assessment and also those identified by recent assessments and/or audits. A corresponding action plan is being developed. It is expected that specific and programmatic improvements resulting from this effort will assist in preventing recurrence of recently experienced problems. Upon definition of this action plan, a supplement to this LER will be provided as appropriate.

COMMITTMENTS

1. PHYSI-13 will be revised by May 3, 1991, to control the process of removing technical specification fire protection equipment from service by requiring an SRO to authorize the activity by signing the Attachment C permits. Additionally, a separate permit shall be completed for each work document, i.e., work requests, surveillance instructions and preventive maintenance activities related to fire protection. PHYSI-13 will also be revised to clearly delineate the responsibilities of the Fire Operations personnel and the plant Operations personnel in removing technical specifications fire protection equipment from service.

2. Operations and Fire Operations will be trained by June 1, 1991, on this event and their responsibilities as delineated in the revised PHYSI-13 will be emphasized.

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COMMITTMENTS

3. Maintenance personnel will be trained on this event; with added emphasis on the importance of proper communications. This will be accomplished by May 3, 1991.

4. SI-234.7 will be revised by May 3, 1991, to require a PHYSI-13, Attachment C permit to be completed.

5. Operations and Fire Operations personnel involved with the event will be counselled by May 1, 1991, with regard to the questioning attitude and inattention to detail when altering configuration of plant equipment.

6. After the PHYSI-13 procedure has been revised and implemented, a monitoring effort will be established to verify the proper implementation of the procedure. The results of this monitoring effort will be evaluated to determine the need for further training on fire protection equipment and processes.

7. The technical and LCO training needs related to fire protection for fire operations, modifications, and MEG personnel will be evaluated and developed into a training program by August 1, 1991.

8. Fire Operations, Modifications and MEG personnel will be trained in the technical and LCO program related to fire protection by November 1, 1991.

9. The team will address the problems specifically identified in this assessment and also those identified by recent assessments and/or audits. A corresponding action plan is being developed. It is expected that specific and programmatic improvements resulting from this effort will assist in preventing recurrence of recently experienced problems. Upon definition of this action plan, a supplement to this LER will be provided as appropriate.

ADDITIONAL INFORMATION

A search of the LER and NER data base was performed for similar incidents. Seventy-three incidents related to fire watches, miscommunications and entries into LCO 3.3.3.8 were discovered. The specific causes and therefore corrective actions taken for these events varied and it is unclear whether the specific corrective actions would have been expected to have prevented this occurrence.

As a result of a number of previous events involving fire protection and/or Appendix R program implementation, a broad assessment was conducted as previously described.

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