NRC Form 366
(9-83)

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

LICENSEE EVENT REPORT (LER)

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Sequoyah, Unit 2	0 5 0 0 0 3 2 8	1 OF 0 8

TITLE (4)
A Centrifugal Charging Pump (CCP) Placed In The Pull-To-Lock Position While The Second CCP Was Inoperable Resulted In An Inadvertent Entry Into Technical Specification 3.0.3

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 3	0 9	8 8	8 8	0 1 0	0 0	0 3	2 5	8 8		0 5 0 0 0
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OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
3		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	XX 50.73(a)(2)(v)	73.71(c)
0 0 0		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)	XX 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
Don Siska B. E. Kilgore, Plant Operations Review Staff	AREA CODE 6 1 5 — 8 7 0 - 7 0 8 7

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)		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)

On March 9, 1988, at approximately 1930 EST, with unit 2 in mode 3 (hot standby), a Nuclear Regulatory Commission (NRC) inspector discovered the handswitch for centrifugal charging pump (CCP) 2A-A was in the "pull-to-lock" position. Following an investigation of this incident, TVA determined that CCP 2A-A had been in the "pull-to-lock" position since approximately 1316 EST that afternoon, and therefore, had been inoperable since that time. Upon further investigation, TVA determined that CCP 2B-B, which had previously been out of service to perform maintenance, had also been inoperable until approximately 1440 EST that same day. As a result, unit 2 had inadvertently entered Technical Specification (TS) Limiting Condition for Operation (LCO) 3.0.3 and had been in that LCO for approximately 1 hour and 24 minutes. Upon discovery of this event, Operations personnel immediately returned CCP 2A-A to service by placing it in the "auto" position. The event was caused by the day shift reactor operator not recognizing that placing the CCP in the "pull-to-lock" position would result in the CCP being inoperable during plant operation in mode 3. The failure to recognize the inoperability of a CCP when it is in the "pull-to-lock" position was most likely the result of the day shift operator not fully understanding a TS interpretation. To prevent recurrence of this event, TVA is reviewing all TS interpretations currently in use and evaluating other TS to determine if a TS change is necessary to clarify the CCP operability requirements. In addition, TVA has initiated changes to administrative procedures and will provide additional training to Operations personnel relating to the use of TS during off-normal plant operations.

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

DESCRIPTION OF EVENT

On March 9, 1988, at approximately 1930 EST, with unit 2 in mode 3 (0 percent power, 1,750 psig, 454 degrees F), a Nuclear Regulatory Commission (NRC) inspector discovered the handswitch for centrifugal charging pump (CCP) (EIIS Code BQ) 2A-A was in the "pull-to-lock" position. Following an investigation of this incident, TVA determined that CCP 2A-A had been in the "pull-to-lock" position since approximately 1316 EST that afternoon, and therefore, had been inoperable since that time. Upon further investigation, TVA determined that CCP 2B-B, which had previously been out of service to perform maintenance, had also been inoperable until approximately 1440 EST that same day. As a result, unit 2 had inadvertently entered Technical Specification (TS) Limiting Condition for Operation (LCO) 3.0.3 and had been in that LCO for approximately 1 hour and 24 minutes. The action associated with this LCO requires at least one CCP to be returned to operable status within one hour or the plant must be placed in an operational mode in which the applicable CCP LCOs do not apply.

On March 8, 1988, at approximately 2154 EST, CCP 2B-B was declared inoperable to perform maintenance on the CCP speed increaser oil pump (in accordance with work request (WR) B253339), and LCOs 3.1.2.4 and 3.5.2 were entered. During plant operation in mode 3 (hot standby), these LCOs allow up to 72 hours for either pump to be out of service before a reduction in plant power and/or reactor coolant system (RCS) (EIIS Code AB) temperature must be initiated. At approximately 0945 EST on March 9, 1988, the day shift reactor operator (RO) assumed shift as the unit 2 lead RO. This RO had been assigned and trained as a lead operator for unit 2 restart; however, he had been assigned to Sequoyah Nuclear Plant (SQN) unit 1 (which has been in cold shutdown since August 1985) for the previous 10 days. At approximately 1311 EST, the RO was notified by Mechanical Maintenance personnel that the repair work on CCP 2B-B had been completed, and the pump was ready for postmaintenance testing in accordance with Technical Instruction (TI)-96.1, "Vibration Observations - Pumps and Motors - Units 1 and 2." The RO subsequently started CCP 2B-B and, at approximately 1316 EST, stopped CCP 2A-A and placed it in "pull-to-lock," assuming this to be an acceptable operable condition. At approximately 1440 EST, the postmaintenance test on CCP 2B-B was complete, WR B253339 was approved, and the RO declared CCP 2B-B operable and exited LCOs 3.1.2.4 and 3.5.2.

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At approximately 1500 EST, the evening Operations shift crew entered the main control room to begin shift turnover. However, since the evening shift RO (who was being held over on overtime) had not stood shift as the unit 2 lead operator since March 4, 1988, the Operations shift log for the previous five days had to be reviewed before shift turnover could begin. During this time, there was a high level of activity in the main control room, and the oncoming RO actively assisted the day shift RO by answering phone calls. Following the review of the Operations shift logs, the oncoming RO began shift turnover by initiating performance of Appendix B1, "Systems Status Checklist," to Administrative Instruction (AI)-5, "Shift Relief and Turnover." When the oncoming RO reached the item in Appendix B1 to AI-5 that required the position of CCP 2A-A handswitch to be recorded, the RO observed that it was in the "pull-to-lock" position and asked the day shift RO if both CCPs were operable. After a brief discussion, it was concluded that both CCPs were operable, and the oncoming RO placed a checkmark in Appendix B1 of AI-5 indicating that the CCP 2A-A handswitch was in the "auto" position when, in fact, the handswitch was in the "pull-to-lock" position. At 1630 EST, approximately 1 hour and 30 minutes after entering the main control room, shift turnover was completed and the oncoming RO assumed responsibilities as the unit 2 lead operator.

At approximately 1930 EST, a second evening shift turnover was initiated. Since this shift relief was occurring at a nonscheduled time, the oncoming RO did not complete a new AI-5, Appendix B1; rather, he reviewed and signed the checklist previously completed by the offgoing RO. Also, at approximately this time, an NRC inspector discovered that CCP 2A-A was in the "pull-to-lock" position and asked both the offgoing and oncoming ROs if both CCPs were operable. Following a brief discussion among the offgoing RO, the oncoming RO, the balance of plant (BOP) operator, and the NRC inspector, the oncoming RO entered LCO 3.5.2, returned the CCP 2A-A handswitch to the "auto" position, then exited LCO 3.5.2. When the unit 2 assistant shift supervisor (Asst. SS) returned to the main control room from the plant area, approximately 3 to 10 minutes after the discovery of the incident, he was briefed on the event by the oncoming RO. During this discussion, the offgoing RO noted the error in Appendix B1 of AI-5 relating to the CCP 2A-A handswitch position, changed the checkmark indicating "auto" to "pull-to-lock," and initialed beside the change. The oncoming RO and the Asst. SS continued to evaluate the situation by reviewing the SQN TS and TS Interpretation Manual for approximately 20 minutes. At approximately 2000 EST, the NRC inspector asked the Operations shift supervisor (SS) if he was aware of the incident. The SS had not been made aware of the event at this time. Shortly thereafter, the SS, the Asst. SS, and the shift technical advisor (STA) discussed the event and determined that LCO 3.0.3 may have been entered inadvertently. The SS then gave instructions to inform appropriate SQN management personnel of the event and initiated a detailed investigation.

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On March 10, 1988, as part of the ongoing investigation of the event, it was confirmed that the day shift RO had indeed placed the CCP 2A-A handswitch in the "pull-to-lock" position at the time he stopped the pump for postmaintenance testing of CCP 2B-B. Thus, LCO 3.0.3 had been in effect from approximately 1316 EST to 1440 EST on March 9, 1988, a period of approximately 1 hour and 24 minutes. Upon concluding that LCO 3.0.3 had been in effect, NRC was notified in accordance with 10 CFR 50.72. Further investigation of this event revealed that the STA log, written on March 9, 1988, at 2020 EST, was in error. The log entry stated that the SS, the Asst. SS, and the STA were immediately notified of the event. As described previously, there was a delay of approximately 30 minutes from the time the event was discovered until the time the SS was notified.

CAUSE OF EVENT

Immediate Causes

a. The day shift RO did not recognize that placing the CCP handswitch in the "pull-to-lock" position would result in the CCP being inoperable during plant operation in mode 3.

b. The subsequent shift turnover did not identify that the pump was inoperable because of the switch position being in the "pull-to-lock" position.

c. The CCP 2A-A handswitch position was incorrectly logged in the System Status Checklist (Appendix B1) of Administrative Instruction (AI)-5, "Shift Relief and Turnover."

d. The System Status Checklist (Appendix B1) of AI-5 was not completed for the nonscheduled shift turnover, and subsequently, the incorrect CCP handswitch position was not identified.

e. The inoperable condition of 2A-A CCP was not immediately reported to SS.

f. STA log entry for March 9, 1988, at 2020 EST, was in error. The SS, Asst. SS, and STA were not immediately notified.

g. Writeover in the System Status Checklist (Appendix B1) of AI-5 by the evening shift RO is contradictory to the requirements for a QA document.

Root Causes

a. Management did not adequately consider the potential effects of temporarily assigning operators to a cold shutdown unit and back to the operating unit (mode 3). This resulted in the operator being confused on operability requirements for a CCP in the "pull-to-lock" position.

b. Management direction regarding detail of operator log entries and operator communication was less than adequate. This resulted in a misleading log entry on the status of CCP 2A-A and a failure to communicate status changes of safety-related equipment.

c. AI-5 does not adequately address nonscheduled shift turnovers. This resulted in the evening shift relief RO not performing a new, independent AI-5.

d. The TS interpretation concerning the operability of a CCP in the "pull-to-lock" position is not consistent with current plant management philosophy.

e. A discrepancy exists between Section B of GOI-3, "Plant Shutdown from Minimum Load to Cold Shutdown," (precaution for solid water operation) and TS 3.1.2.4 (CCPs needed for reactivity control). GOI-3 requires one CCP to be locked out when RCS temperature is less than 350 degrees F (mode 4), while TS 3.1.2.4 requires both CCPs to be operable (modes 1 through 4).

ANALYSIS OF EVENT

This event is being reported in accordance with 10 CFR 50.73, paragraphs a.2.i.b and a.2.v.d.

During normal plant operation, the CCPs provide reactor coolant pump seal injection, core reactivity control through the addition of borated water, and allow for the addition of other chemicals to the primary system (e.g., lithium for corrosion control) necessary to maintain the proper RCS chemistry. However, since chemical and reactivity control are not performed automatically and one CCP was continuously running, this event did not have any effect on normal plant operations.

During accident conditions, the CCPs provide automatic high head safety injection flow to the RCS following a safety injection signal (SIS) (EIIS Code JE). Specifically, at least one train of high head safety injection flow (assuming a single failure of the redundant train) is required to show acceptable results for the loss of coolant accident (LOCA) and the main steam line break (MSLB) accident. The potential effects of one CCP in the "pull-to-lock" position on the LOCA and MSLB accidents are discussed below.

During a LOCA the CCPs provide high head safety injection flow to the RCS to make up for some of the water lost through the primary system pipe break. In this case, although CCP 2B-B was administratively declared inoperable, the pump was actually being run as part of a successful postmaintenance test. Thus, if a LOCA had occurred during this time, the resultant SIS would have realigned the train "B" high head SIS valves and CCP 2B-B would have provided the necessary high head safety injection flow. If it is assumed that one CCP was in the "pull-to-lock" position and the other CCP was otherwise inoperable (e.g., because of single failure considerations), no high head safety injection flow would have been initiated. However, following any safety injection signal, plant operators are instructed by Emergency Procedure E-0, "Reactor Trip or Safety Injection," to verify that both CCPs are running and providing flow through the boron injection tank (BIT). In this case (i.e., one CCP in the "pull-to-lock" position and the other CCP inoperable), plant operators would not be able to verify flow through the BIT and would then take the action necessary to place at least one CCP in service. Thus, the event described herein did not significantly compromise the ability of plant safety systems to mitigate the consequences of a LOCA.

During a MSLB accident, borated water from the high head safety injection system is necessary to mitigate the reactivity transient that accompanies the uncontrolled RCS cooldown associated with a MSLB. The addition of this borated water precludes a possible postreactor trip power excursion and ensures that the local heat flux at the hottest fuel pin in the core remains below the heat flux at which departure from nucleate boiling (DNB) is predicted to occur. If a main steam line break had occurred during this event, CCP 2B-B, which was being run as part of the postmaintenance test described above, would have been able to supply borated water to the core fast enough to mitigate the potential postreactor trip power excursion. In addition, even if CCP 2B-B was out of service when CCP 2A-A was in the "pull-to-lock" position, a MSLB could not have caused a postreactor trip power excursion because the RCS boron concentration at the time of the event was approximately 2,060 parts per million (ppm). With this boron concentration, the neutron multiplication factor (k-eff) of the core was well below 0.95; hence, an RCS cooldown of any credible magnitude could not have caused the core to become critical.

Thus, although TVA fully recognizes the significance of an inadvertent entry into TS LCO 3.0.3, there were no safety consequences associated with this event.

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CORRECTIVE ACTIONS

TVA has instituted several corrective actions to prevent recurrence of this event. These actions include changes to plant procedures, additional administrative controls, increased operator training, and a formal review of all TS interpretations currently in use. The following corrective actions will be taken by TVA.

1. Controls have been established to limit interchanging operators from a cold shutdown unit to an operating unit.

2. AI-6, "Log Entries and Review," (for operator log entries) has been revised to delineate the level of detail for log entries such as specifying switch positions.

3. AI-30, "Nuclear Plant Conduct of Operation," (for operator communication) has been revised to increase the level of communication among operators by specifying interface requirements that must be satisfied during control board manipulations that relate to changing switch positions or taking major equipment out of service.

4. AI-5 has been revised to require the completion of a checklist (Appendix B1) for nonscheduled shift relief.

5. A review of formal SQN technical specification interpretations (TSIs) has been performed for technical adequacy and clarity. In addition, the SQN TSI Manual has been removed from the main control room. No changed TSIs will be returned to the main control room until training of Operations personnel on TSI changes is conducted.

6. AI-5 has been revised to require the Asst. SS (SRO) to review the main control board status for abnormal conditions before assuming shift. A checklist type guidance will be provided and the review will be documented in the unit supervisor log.

7. The requirement in GOI-3 to put one CCP in the "pull-to-lock" position below 350 degrees F will be reevaluated.

8. Senior Office of Nuclear Power Management have addressed Operations personnel on the causes, conclusions, and corrective actions of this event.

9. Signs emphasizing plant operating mode have been placed in the main control room and auxiliary instrument room.

10. Technical Specifications 3.5.3 (mode 4) and 3.1.2.4 (modes 1 - 4) will be evaluated to determine if a change is needed to clarify the operability requirements of CCPs during mode 4 operation.

11. Training will be given on procedure changes and TSI changes.

12. Scenarios emphasizing the use of TSs will be incorporated into the operator simulator training program.

13. The STA log entry at 2020 EST and the AI-5, Appendix B1, 1500 time entry have been corrected in accordance with plant procedures.

Of the above described corrective actions, TVA will complete items 1 through 6, 8, 9, and 13 before restart (mode 2) of unit 2. All other corrective actions will be complete before restart (mode 2) of unit 1.

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TENNESSEE VALLEY AUTHORITY
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March 25, 1988

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 2 - DOCKET NO. 50-328 - FACILITY OPERATING LICENSE DPR-79 - REPORTABLE OCCURRENCE REPORT SQRO-50-328/88010

The enclosed licensee event report provides details concerning a centrifugal charging pump (CCP) that was placed in the "pull-to-lock" position while the second CCP was out of service for maintenance. As a result, unit 2 inadvertently entered Technical Specification (TS) 3.0.3 and remained in that TS for approximately 1 hour and 24 minutes. This event is reported in accordance with 10 CFR 50.73, paragraphs a.2.i and a.2.v.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

S. J. Smith
Plant Manager

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