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Ref. # 10CFR50.73(a)(2)(1)  
10CFR50.73(a)(2)(v)

William J. Cahill, Jr.  
Executive Vice President

April 2, 1990

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)  
DOCKET NOS. 50-445 AND 50-446  
BLOCKING OF FLUX DOUBLING ACTUATION  
LICENSEE EVENT REPORT 90-003-00

Gentlemen:

Enclosed is Licensee Event Report 90-003-00 for Comanche Peak Steam Electric Station Unit 1, "Blocking of Flux Doubling Actuation Due to Personnel Error."

Sincerely,

*William J. Cahill, Jr.*  
William J. Cahill, Jr.

By: *Roger D. Walker*  
Roger D. Walker  
Manager of Nuclear Licensing

JDS/vld  
Enclosure

c - Mr. R. D. Martin, Region IV  
Resident Inspectors, CPSES (3)

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NRC FORM 906		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED OMB NO. 3150-0104 EXPIRES: 4/30/92			
<b>LICENSEE EVENT REPORT (LER)</b>				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.			
Facility Name (1) <b>COMANCHE PEAK - UNIT 1</b>			Docket Number (2) <b>015101010141415</b>		Page (3) <b>1</b> OF <b>019</b>		
Title (4) <b>BLOCKING OF FLUX DOUBLING ACTUATION DUE TO PERSONNEL ERROR</b>							
Event Date (5)		LER Number (6)		Report Date (7)			
Month	Day	Year	Year	Sequential Number	Revision Number		
03	05	90	90	01013	010		
Operating Mode (8) <b>5</b>		This report is submitted pursuant to the requirements of 10 CFR § . (Check one or more of the following) (11)					
Power Level (10) <b>01010</b>	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.40b(c)	<input checked="" type="checkbox"/> 60.73(a)(2)(iv)	<input type="checkbox"/> 79.71(b)			
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 60.36(a)(1)	<input type="checkbox"/> 60.73(a)(2)(v)	<input type="checkbox"/> 79.71(c)			
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 60.36(a)(2)	<input type="checkbox"/> 60.73(a)(2)(vi)	Other (Specify in Abstract below and in Text, NRC Form 306A)			
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 60.73(a)(2)(i)	<input type="checkbox"/> 60.73(a)(2)(vii)(A)				
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 60.73(a)(2)(ii)	<input type="checkbox"/> 60.73(a)(2)(vii)(B)				
	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 60.73(a)(2)(iii)	<input type="checkbox"/> 60.73(a)(2)(viii)				
Licensee Contact For This LER (12)							
Name <b>D. NORMAN HOOD</b>			Telephone Number <b>8117 819171-15181819</b>				
Area Code <b>SUPERVISOR COMPLIANCE</b>							
Complete One Line For Each Component Failure Described in This Report (13)							
Cause	System	Component	Manufacturer	Reportable To NRCDB			
Supplemental Report Expected (14)				Expected Submission Date (15)	Month	Day	Year
<input type="checkbox"/> Yes (If yes, complete Expected Submission Date)				<input checked="" type="checkbox"/> No			
Abstract (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)							
<p>On March 5, 1990 at 2048 CST, Operations personnel were restoring Train A Solid State Protection System (SSPS) to a normal configuration from a test configuration. Both Source Range Flux Doubling (SRFD) actuation signals were blocked in accordance with the procedure and were to remain blocked for 10 minutes after restoring SSPS (at 2049 CST) to prevent inadvertent actuation in accordance with the Unit Supervisor's orders. Blocking both signals was addressed under an existing Limiting Condition for Operation Action Requirement (LCOAR) which was entered during testing to ensure restoration of the disabled Neutron Flux Source Range Channel N-31 (SRN31).</p> <p>The LCOAR was exited at 2052 CST after SRN31 was restored. However, both SRFD actuation signals were not restored until 0125 CST on March 6, after the Shift Technical Advisor (STA) noticed that the SRFD blocked permissives were illuminated. Both signals were unavailable for approximately 4 - 1/2 hours.</p> <p>The root cause was personnel error. A contributing factor was that the operating staff did not recognize that the blocked permissives were illuminated.</p> <p>Corrective actions include the issuance of a Standing Order which requires (1) STAs to review each Technical Specification Action Statement entry and exit and (2) Operators to address each lit annunciator on the control board prior to assuming licensed duties.</p>							

NRC FORM 306A U.S. NUCLEAR REGULATORY COMMISSION <b>LICENSEE EVENT REPORT (LER)                  TEXT CONTINUATION</b>		APPROVED OMB NO. 3160-0106 EXPIRES: 4/30/92 ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3160-0106) OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.	
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Text (if more space is required, use additional NRC Form 306A's) (17)

**I. DESCRIPTION OF WHAT OCCURRED**

**A. PLANT OPERATING CONDITIONS BEFORE THE EVENT :**

On March 5, 1990 at 2000 CST, Comanche Peak Steam Electric Station (CPSES) Unit 1 was in Mode 5, Cold Shutdown. The Reactor Coolant System (RCS)(EIS:(AB)) temperature and pressure was approximately 155 degrees Fahrenheit and 375 pounds per square inch guage (psig), respectively. The RCS was borated to a level of approximately 2040 ppm. Operations personnel were performing surveillance testing of slave relays (EIS:(RLY)(JG)) in the Solid State Protection System (SSPS)(EIS:(JG)).

**B. REPORTABLE EVENT DESCRIPTION (INCLUDING DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES):**

**Event Classification:** 1) An event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident. 2) Any operation or condition prohibited by the plant's Technical Specifications.

On March 5, 1990 at 1937 CST, Operations personnel (utility-licensed) began testing Train B SSPS slave relays. The Train B SSPS 'Input Error Inhibit Switch' was placed in the 'Inhibit' position as required by the procedure at 1953 CST. The 'Inhibit' position removes Train B channel of SSPS from service and de-energizes the Neutron Flux Source Range Channel N32 (SRN32) (EIS:(CHA)(JC)), rendering the detector inoperable. Since Technical Specifications require both Source Range Channels to be operable, a Limiting Condition for Operation Action Requirement (LCOAR) had been entered into the Tracking Log at 1946 CST to ensure SRN32 was restored to an operable status within 48 hours as required by Technical Specification 3.3.1 Action Statement.

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Text (if more space is required, use additional NRC Form 306A's) (17)				
<p>At 2029 CST, prior to restoration of the Train B SSPS to a normal configuration, both Source Range Flux Doubling (SRFD) actuation signals were blocked in accordance with the procedure. Blocking the signals invoked a 4 hour LCOAR as required by Technical Specification 3.3.1 Action Statement and was addressed under the existing LCOAR. The Unit Supervisor ordered that the blocks remain for 10 minutes after the 'Input Error Inhibit Switch' was taken out of the 'Inhibit' position (at 2030 CST) as a precautionary measure to prevent an inadvertent SRFD actuation during the re-energization of SRN32. However, the LCOAR was exited in the Tracking Log at 2032 CST, 8 minutes prior to unblocking both SRFD actuation signals. Both SRFD actuation signals were unblocked at 2040 CST.</p> <p>At 2036 CST, while both SRFD actuation signals were still blocked from Train B SSPS testing, Operations personnel began testing Train A SSPS slave relays. A LCOAR had been entered into the Tracking Log at 2035 to ensure SRN31 was restored to operable status within 48 hours as required by Technical Specification 3.3.1 Action Statement. The Train A SSPS 'Input Error Inhibit Switch' was placed in the 'Inhibit' position at 2038 CST, removing Train A SSPS from service and de-energizing SRN31.</p> <p>At approximately 2048 CST, prior to restoration of Train A SSPS to a normal configuration, both SRFD actuation signals were blocked in accordance with procedure. Blocking both signals invoked a 4 hour LCOAR as required by Technical Specification 3.3.1 Action Statement which was addressed under the existing LCOAR. In accordance with the Unit Supervisor's orders, the signals were to remain blocked for 10 minutes after the 'Input Error Inhibit Switch' was taken out of the 'Inhibit' position as a precautionary measure to prevent inadvertent actuation. Train A SSPS 'Input Error Inhibit Switch' was placed in 'Normal' at 2049 CST. The Unit Supervisor closed the LCOAR in the Tracking Log at 2052 CST upon verifying that SRN31 was back in service. The Unit Supervisor did not ensure that both SRFD actuation signals were unblocked prior to closing the LCOAR.</p> <p>Both SRFD actuation signals remained blocked until the Shift Technical Advisor (STA) (utility-licensed), on the next shift, noticed that the SRFD blocked permissives were illuminated on the Main Control Board (EIS:(MCBD)(IB)). SRFD actuation signals were restored to service at 0125 CST. Both signals of SRFD actuation were unavailable for approximately 4 hours and 37 minutes.</p>				

<p>NRC FORM 896A</p> <p style="text-align: center;">U.S. NUCLEAR REGULATORY COMMISSION</p> <p style="text-align: center;"><b>LICENSEE EVENT REPORT (LER)</b> <b>TEXT CONTINUATION</b></p>	<p style="text-align: right;">APPROVED OMB NO. 3150-0104 EXPIRES: 4/30/92</p> <p>ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 30.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC, 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC, 20503.</p>										
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<p>COMANCHE PEAK - UNIT 1</p>		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:10%;">Year</th> <th style="width:10%;">Sequential No.</th> <th style="width:10%;">Date</th> <th style="width:10%;">Revision Number</th> </tr> <tr> <td>1990</td> <td>0103</td> <td>-010</td> <td>014</td> </tr> </table>	Year	Sequential No.	Date	Revision Number	1990	0103	-010	014	<p>OF 019</p>
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Text (if more space is required, use additional NRC Form 896A's) (17)

Technical Specification 3.3.1 Action Statement 5 requires:

With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or within the next hour open the reactor trip breakers, suspend all operations involving positive reactivity changes and verify either valve 1CS-8455 or valves 1CS-8560, FCV-111B, 1CS-8439, 1CS-8441, and 1CS-8453 are closed and secured in position, and verify this position at least once per 14 days thereafter. With no channels OPERABLE complete all the above actions within 4 hours and verify the positions of the above valves at least once per 14 days thereafter.

Technical Specification 3.3.1 Action Statement 5 was not met since valves (EIS:(V)(CB)) 1CS-8455 and 1CS-8560 were found to have been open during the event. The reactor trip breakers (EIS:(BKR)(AB)) were open.

An event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident is reportable within 4 hours of occurrence under 10CFR50.72(b)(2)(iii)(D). After further review by management regarding potential reportability, the Nuclear Regulatory Commission Operations Center was notified of the event via the Emergency Notification System at approximately 1325 CST on March 6, 1990.

**C. STATUS OF STRUCTURES, SYSTEMS, OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT:**

Not applicable - no structures, systems, or components were inoperable at the start of the event that have been determined to have contributed to the event.

**D. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE, IF KNOWN:**

Not applicable - no component or system failures have been identified.

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<p><b>E. <u>FAILURE MODE, MECHANISM, AND EFFECT OF EACH FAILED COMPONENT:</u></b></p> <p>Not applicable - no failed components have been identified.</p> <p><b>F. <u>FOR FAILURES OF COMPONENTS WITH MULTIPLE FUNCTIONS, LIST OF SYSTEMS OR SECONDARY FUNCTIONS THAT WERE ALSO AFFECTED:</u></b></p> <p>Not applicable - no component failures have been identified.</p> <p><b>G. <u>FOR FAILURES THAT RENDERED A TRAIN OF A SAFETY SYSTEM INOPERABLE, AN ESTIMATE OF THE ELAPSED TIME FROM THE DISCOVERY OF INOPERABILITY UNTIL THE TRAIN WAS RETURNED TO SERVICE:</u></b></p> <p>A review of logs revealed that both of the available SRFD actuation signals were removed from service at approximately 2048 CST on March 5, 1990. Both SRFD actuation signals were discovered blocked at approximately 0120 CST on March 6, 1990 and restored at 0125 CST on March 6, 1990. SRFD actuation signals were unavailable for approximately 4 hours and 37 minutes.</p> <p><b>H. <u>THE METHOD OF DISCOVERY OF EACH COMPONENT OR SYSTEM FAILURE OR PROCEDURAL ERROR:</u></b></p> <p>The STA discovered the illuminated SRFD blocked permissives while reviewing the Main Control Board.</p>							

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**I. CAUSE OF THE EVENT:**

The root cause of the SRFD actuation signal being blocked for over 4 hours is a cognitive personnel error in that the Unit Supervisor (utility-licensed) did not follow approved procedures as detailed below:

- Procedural guidance on tracking Limiting Conditions for Operations (LCOs) was not followed. (1) The procedure requires that a LCOAR may be terminated only after a review determines that the Action Statement has been exited. Contrary to the approved procedure, the LCOAR was terminated prior to unblocking both SRFD actuation signals. (2) Whenever a train of SSPS is removed from service, an SSPS LCOAR shall be used which provides a list of Technical Specification Action Statements entered. Contrary to the approved procedure, the Unit Supervisor entered the LCOAR in the Tracking Log when Train A of SSPS was removed from service. The Unit Supervisor was not aware of the procedural requirement to use the SSPS LCOAR form.

The blocking of both flux doubling actuation signals by procedure may have been entered on the existing SSPS LCOAR or entered separately into the Tracking Log which is utilized to track short term entries and exits of an Action Statement. The addition of SRFD actuation signal blocking on the existing LCOAR was done appropriately.

- The Unit Supervisor did not ensure that procedure requirements to unblock the SRFD actuation signals were completed prior to accepting the surveillance test results. This is attributed to the Unit Supervisor's order to delay 10 minutes prior to restoring SRFD actuation signals as a precautionary measure. During that period, the Unit Supervisor and the Reactor Operator were distracted by other duties.

**Contributing Factors**

The operating staff did not recognize that the SRFD blocked permissives were illuminated.

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<p><b>J. <u>SAFETY SYSTEM RESPONSES THAT OCCURRED:</u></b></p> <p>Not applicable - there were no safety system responses and none were required.</p>					
<p><b>K. <u>FAILED COMPONENT INFORMATION:</u></b></p> <p>Not applicable - no failed components were involved.</p>					
<p><b>II. <u>ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:</u></b></p> <p>SRFD actuation signals provide protection against inadvertent boron dilution accidents during reactor shutdown by automatically transferring Centrifugal Charging Pump (EISS:(P)(CB)) suction from the Volume Control Tank (EISS:(TK)(CB)) to the Refueling Water Storage Tank (EISS:(TK)(BE)). This actuation occurs if one of two source range instruments detects an increase in neutron flux by a factor of two within ten minutes. SRFD actuation signals are required by Technical Specifications in Mode 5, Cold Shutdown, Mode 4, Hot Shutdown, and in Mode 3, Hot Standby (reactor startup excluded). The worst case scenario for a boron dilution event without automatic actuation of equipment would be during Mode 5 due to the less restrictive shutdown margin required by Technical Specifications as compared to Modes 4 and 3.</p> <p>Although an automatic safety function to mitigate the consequences of a boron dilution accident was defeated in Mode 5, the audible alarms (EISS:(ALM)(IB)) and visual indications in the Control Room listed below would prompt operators to take appropriate action to terminate and mitigate a boron dilution event in accordance with Alarm Response and Abnormal Condition Procedures. The manual actions are to (1) initiate emergency boration in the event of any unexplained or uncontrolled positive reactivity addition and (2) initiate the isolation of boron dilution flow paths.</p> <ul style="list-style-type: none"> <li>• Source range high flux at shutdown alarm;</li> <li>• Source range neutron flux doubling alarm; and</li> <li>• Indication of source range neutron flux count rates.</li> </ul>					



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No alarms or indication of any boron dilution event were received in the Control Room while the SRFD actuation signals were blocked. In addition, chemistry samples of the reactor coolant were taken and analyzed prior to the event at 1340 CST on March 5, while the SRFD signals were blocked at 2320 CST on March 5, and after the event at 0315 CST on March 6. The boron concentration levels were 2043 ppm, 2040 ppm and 2030 ppm, respectively. This confirmed that there were no significant boron concentration level changes during the time SRFD actuation signals were blocked.

Based on the above discussion, the event did not adversely affect the safe operations of CPSES Unit 1 nor the health and safety of the public.

### III. CORRECTIVE ACTIONS

#### A. ACTIONS TO PREVENT RECURRENCE:

##### Root Cause

Cognitive personnel error in that the Unit Supervisor did not follow approved procedures.

##### Corrective Actions

The Unit Supervisor has been counseled on the importance of following procedure requirements. To provide additional awareness, this Licensee Event Report will be reviewed by on shift licensed operators.

A Standing Order was issued on March 6, 1990 which requires that STAs review each Technical Specification Action Statement entry and monitor the removal and restoration of systems from service. This second verification will ensure the administrative requirements of LCO tracking procedure are met. This will also provide a second check that systems or functions are properly restored to service at the completion of an evolution such as slave relay testing.

The procedure on restoring SSPS will be revised to require an independent verification that SRFD actuation is in service whenever SSPS is taken out of a disabled configuration.

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**Contributing Factor**

Operating staff did not recognize that the SRFD blocked permissives were illuminated.

**Corrective Action**

The Standing Order issued on March 6, 1990 requires that prior to assuming licensed duties, the Reactor Operator and Balance of Plant Operator shall ensure their collective knowledge of the reason for each lit annunciator on the Main Control Board. This will help increase the Reactor Operators awareness of annunciators which are lit.

**B. ACTION TAKEN ON GENERIC CONCERNS IDENTIFIED AS A DIRECT RESULT OF THE EVENT.**

No generic concerns have been identified as a result of this event.

**IV. PREVIOUS SIMILAR EVENTS:**

There have been no previous similar events reported pursuant to 10CFR50.73.