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March 4, 1992

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Group Vice President

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NO. 50-445
A CONDITION THAT COULD HAVE PREVENTED THE
FULFILLMENT OF THE SAFETY FUNCTION
LICENSEE EVENT REPORT 92-003-00

Gentlemen:

Enclosed is Licensee Event Report 92-003-00 for Comanche Peak Steam Electric Station Unit 1, "Use of Nonconservative Input Assumptions Leading to Inadequate Boron Dilution Event Analysis."

Sincerely,

William J. Cahill, Jr.

JET/tg

c - Mr. R. D. Martin, Region IV
Resident Inspectors, CPSES (2)

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NRC FORM 308		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED OMR NO. 3150-0104 EXPIRES 4/30/92	
LICENSEE EVENT REPORT (LER)				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.8 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.	
Facility Name (1) COMANCHE PEAK - UNIT 1				Docket Number (2) 015101010141415	Page (3) 1 OF 016
Title (4) USE OF NONCONSERVATIVE INPUT ASSUMPTIONS LEADING TO INADEQUATE BORON DILUTION EVENT ANALYSIS					
Event Date (5)		LER Number (6)		Report Date (7)	
Month	Day	Year	Sequential Number	Revision Number	Month Day Year
01	2	92	003	0	01 2 92
Operating Mode (9)		This report is submitted pursuant to the requirements of 10 CFR 43.61 (Check one or more of the following) (11)		Facility Name	
1		<input type="checkbox"/> 20.402(b) <input type="checkbox"/> 20.405(a)(1)(i) <input type="checkbox"/> 20.405(a)(1)(ii) <input type="checkbox"/> 20.405(a)(1)(iii) <input type="checkbox"/> 20.405(a)(1)(iv) <input type="checkbox"/> 20.405(a)(1)(v)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv) <input type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/> 50.73(a)(2)(vi) <input type="checkbox"/> 50.73(a)(2)(vii)(A) <input type="checkbox"/> 50.73(a)(2)(vii)(B) <input type="checkbox"/> 50.73(a)(2)(viii)	
Power Level (10)		<input type="checkbox"/> 20.405(a)(1)(vi) <input type="checkbox"/> 20.405(a)(1)(vii)		<input type="checkbox"/> 73.71(b) <input type="checkbox"/> 73.71(c) Other (Specify in Abstract below and in Text, NRC Form 306A)	
11010					
Licensee Contact For This LER (12)					
Name		Area Code		Telephone Number	
D.E. BUSCHBAUM		81117		819171-15181511	
Complete One Line For Each Component Failure Described in This Report (13)					
Cause	System	Component	Manufacturer	Reportable To NRC/RS	Reportable To NRC/RS
Supplemental Report Expected (14)					Expected Submission Date (15)
<input type="checkbox"/> Yes (If y's, complete Expected Submission Date)					Month Day Year
<input checked="" type="checkbox"/> No					
Abstract (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)					
<p>During a Quality Assurance surveillance of selected event analyses for Comanche Peak Unit 2, deficiencies were identified in the vendor's assumptions and methodologies for analysis of the inadvertent boron dilution event. The deficiencies were determined to be applicable to Unit 1, and rendered invalid the Mode 3, 4, and 5 boron dilution event analyses. The condition was caused by the use of inadequate analysis inputs. Corrective actions included reanalysis using plant specific data, corrections to licensing basis documents, and reliance on compensatory measures.</p>					

NRC FORM 305A

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED LMB NO. 3150-0104

EXPIRES: 4/30/92

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.5 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 (5150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC, 20503.

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Text (If more space is required, use additional NRC Form 305A's) (17)

I. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

A condition that alone could have prevented the fulfillment of the safety function of a system needed to mitigate the consequences of an accident.

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

On February 3, 1992, Comanche Peak Steam Electric Station (CPSES) Unit 1 was in Mode 1, Power Operation, with the reactor at 100 percent of rated thermal power.

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

Due to nonconservatisms in the analysis of the inadvertent boron dilution event described in Chapter 15.4.6 of the CPSES Final Safety Analysis Report (FSAR), the Boron Dilution Mitigation System (BDMS) (EIS:JC) is considered to be incapable of performing its intended function under certain conditions.

D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

On November 1, 1991, TU Electric completed a Quality Assurance Surveillance of the Westinghouse non-LOCA analyses for CPSES Unit 2. Among the deficiencies noted was a lack of justification within the boron dilution event methodology supporting the use of generic data for event analysis. The deficiency was determined to be applicable to CPSES Unit 1; however, technical evaluation of the significance to Unit 1 was delayed pending confirmation of the deficiency by the vendor.

TU Electric pursued clarification of the issues with the vendor, with the emphasis on the potential for the existence of an adverse impact on the Unit 1 event analysis and the impact on the operability of the Unit 1 Boron Dilution Mitigation System. On February 3, 1992, the vendor informed TU Electric via teleconference that reanalysis performed using CPSES Unit 1, cycle 1 data resulted in the failure to meet the

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 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 20502.	
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acceptance criteria (contained in section 15.4.6 of the Standard Review Plan) for boron dilution events occurring in Modes 4 and 5. This rendered invalid the Comanche Peak licensing basis boron dilution event analysis described in Chapter 15.4.6 of the FSAR. The system was declared inoperable, and on February 3, 1992, at approximately 1837 CST, the NRC was notified of the condition via the Emergency Notification System. Further evaluation on February 14 resulted in similar results for the Mode 3 analysis.

The inverse count rate ratio (ICRR) data used in the Comanche Peak analyses of the inadvertent boron dilution event is based on plant data which was the most limiting of all the data available in the late 1970s. This data, along with a nominal flux-multiplication (20) setpoint, provided the basis for the detection mechanism following an inadvertent boron dilution event. The flux-doubling signal actuates the protective function of the boron dilution mitigation system to isolate the dilution source and initiate a re-boration of the RCS.

Comanche Peak Unit 1 plant-specific data provided to the vendor for analysis is not bounded by the most-limiting known data from the 1970s. Furthermore, the methodology is no longer conservative with respect to the 20 setpoint; instrumentation uncertainties were not considered in developing an equivalent "trip setpoint" presented in the CPSES Unit 1 Technical Specifications.

The effect on the Comanche Peak licensing basis is that the inadvertent boron dilution analyses for Modes 3, 4 and 5 are no longer bounding. Comanche Peak Unit 1 has demonstrated a characteristic for the ICRR data which is not bounded by the vendor analysis performed to determine the times of the flux doubling signal. Preliminary analyses using the Comanche Peak plant-specific ICRR data and revised instrument uncertainties do not yield acceptable results.

E. THE METHOD OF DISCOVERY OF EACH COMPONENT OR SYSTEM FAILURE, OR PROCEDURAL OR PERSONNEL ERROR

While performing a Quality Assurance Surveillance of the Westinghouse non-LOCA analysis for CPSES Unit 2, the auditor (utility, non-licensed) identified a deficiency in the vendor analysis of the licensing basis boron dilution event. The deficiency was subsequently determined to be applicable to Unit 1.

NRC FORM 366A LICENSEE EVENT REPORT (LER) TEXT CONTINUATION		U.S. NUCLEAR REGULATORY COMMISSION APPROVED OMB NO. 3150-0104 EXPIRES 4/30/90 ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.5 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.	
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<p>II. <u>COMPONENT OR SYSTEM FAILURES</u></p> <p>A. FAILURE MODE, MECHANISM, AND EFFECT OF EACH FAILED COMPONENT</p> <p>There have been no failed components identified as having contributed to this event.</p> <p>B. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE</p> <p>No failed components have been identified.</p> <p>C. SYSTEMS OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURE OF COMPONENTS WITH MULTIPLE FUNCTIONS</p> <p>No failed components have been identified.</p> <p>D. FAILED COMPONENT INFORMATION</p> <p>No failed components have been identified.</p> <p>III. <u>ANALYSIS OF THE EVENT</u></p> <p>A. SAFETY SYSTEM RESPONSES THAT OCCURRED</p> <p>Not applicable - no safety system responses occurred as a result of this event.</p> <p>B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY</p> <p>The condition existed at the time of issuance of the low power operating license on February 8, 1990. The BDMS was declared inoperable on February 3, 1992, and will remain so until a License Amendment is obtained.</p>			

NRC FORM 306A

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 4/30/92

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION:

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 80.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-890), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

The purpose of the Boron Dilution Mitigation System is to ensure that an inadvertent boron dilution event occurring with the plant in Mode 3, Hot Standby, Mode 4, Hot Shutdown, or Mode 5, Cold Shutdown, will be automatically terminated prior to dilution sufficient to result in a total loss of shutdown margin. The acceptance criteria are described in Section 15.4.6 of the Standard Review Plan, and focus on maintaining fuel cladding integrity by ensuring that the Departure From Nucleate Boiling Ratio remains above the minimum limit, and ensuring that the integrity of the Reactor Coolant System pressure boundary is not challenged by a system pressure increase following a return to criticality from Modes 3, 4 or 5.

An evaluation was performed by the Reactor Systems Branch of the Nuclear Regulatory Commission to determine the safety significance of an unmitigated boron dilution event as part of the resolution of Generic Issue 22. The results are described in Generic Letter 85-05, in which the staff concluded that the power excursion during a boron dilution event is "self-limiting," and that "these type of boron dilution transients should not exceed the staff's acceptance criteria." In addition, vendor performed analysis demonstrates that fuel failures are not expected due to the power increase following a return to criticality resulting from an inadvertent boron dilution event. It is concluded that the condition does not adversely impact the safe operation of CPSES Unit 1 or the health and safety of the public.

IV. CAUSE OF THE EVENT

The cause of the condition is the use of inadequate analysis inputs and methodology by the vendor in performing the boron dilution event analysis. The adequacy of generic data used in the initial analysis of the boron dilution event was not verified using plant specific data. Instrument uncertainties associated with the source range instrumentation were not incorporated into the analysis.

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V. CORRECTIVE ACTIONS

1. Deficiencies identified during QA surveillance activities will be addressed by the vendor in accordance with the CPSES Quality Assurance Program requirements.
2. The design basis of the BDMS will be revised to reflect accurately the current functional capabilities of the system with respect to boron dilution events.
3. A request for Licensee Amendment has been submitted, and, contingent upon approval by the NRC, the boron dilution flux doubling instrumentation channel will be removed from CPSES Unit 1 Technical Specification 3/4.3.1, "Reactor Trip System Instrumentation."

VI. PREVIOUS SIMILAR EVENTS

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