DISTRIBUTION:
Document Control (50-445/446)
NRC PDR
L PDR
PRC System
NSIC

LB#1 Rdg.
MRushbrook
SBurwell
DEisenhut/RPurple
Attorney, OELD
ELJordan, DEQA:IE
JMTaylor, DRP:IE
ACRS (16)
SDiab
BSheron

DEC 2 3 1982

Docket Nos.: 50-445
and 50-446

Mr. R. J. Gary, Executive
Vice President & General Manager
Texas Utilities Generating Company
2001 Bryan Tower
Dallas, Texas 75201

Dear Mr. Gary:

Subject: Withdrawal of Commitment to Modify Design for Boron Dilution Concerns at Comanche Peak Steam Electric Station, Units 1 and 2

In Amendment 14 to the Comanche Peak Steam Electric Station (CPSES) FSAR, a commitment was made to modify the Nuclear Instrumentation System to provide an alarm and mitigation scheme that provides additional protection against boron dilution events. The CPSES design as described in the CPSES FSAR Sections 15.4.6 and 7.6.11 (and the CPSES Safety Evaluation Report Section 15.2.3.1) includes a commitment to modify the plant design to provide a flux doubling alarm, the automatic closure of valves to isolate dilution sources and the automatic opening to valves to supply borated water to the Reactor Coolant System.

In a letter dated September 13, 1982, you advised that CPSES is withdrawing its commitment to provide the flux doubling alarm and automatic valve operations described in the FSAR prior to fuel load. Further, this letter indicated that CPSES is re-evaluating the boron dilution issue to question whether such alarms and automatic operations are needed to provide protection against boron dilution events.

The purpose of this letter is to respond to your letter of September 13, 1982, and to clarify the NRC staff position relative to the boron dilution event, especially as it applies to CPSES and other Near Term Operating License (NTOL) plants. First, we would like to point out that the NRC position relative to the boron dilution event for OLs has been, and continues to be, Standard Review Plan Section 15.4.6. The enclosure to this letter provides a discussion of our position and the current status of the boron dilution issue. With respect to the withdrawal of your commitment to implement the related design changes "prior to the initial fuel load," we note that the SER has found the station design acceptable as presently described in the FSAR. If the station is not going to conform to the FSAR relative to this matter at fuel load, we will require that you provide additional information concerning the interim measures you intend to implement for protection against boron dilution events, or justify why it is acceptable to operate the plant in modes susceptible to boron dilution events.

8301030296 821223
PDR ADOCK 05000445
A PDR

OFFICE ▶							
SURNAME ▶							
DATE ▶							

If you have questions concerning the staff position on boron dilution or the additional information needed to support the withdrawal of your commitment, please call or have the Project Manager arrange a meeting.

Sincerely,

Original signed by:
B. J. Youngblood
B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosure:
RSB Position on Boron
Dilution

cc w/encl.: See next page

OFFICE	DL:LB#1	DSI:RSB	DSI:RSB	DL:LB#1			
SURNAME	SBBurwell/lg	SDiab	BSheron	BJYoungblood			
DATE	12/09/82	12/10/82	12/10/82	12/23/82			

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981—335-960

Mr. R. J. Gary
Executive Vice President and
General Manager
Texas Utilities Generating Company
2001 Bryan Tower
Dallas, Texas 75201

cc: Nicholas S. Reynolds, Esq.
Debevoise & Liberman
1200 Seventeenth Street, N. W.
Washington, D. C. 20036

Spencer C. Relyea, Esq.
Worsham, Forsythe & Sampels
2001 Bryan Tower
Dallas, Texas 75201

Mr. Homer C. Schmidt
Manager - Nuclear Services
Texas Utilities Services, Inc.
2001 Bryan Tower
Dallas, Texas 75201

Mr. H. R. Rock
Gibbs and Hill, Inc.
393 Seventh Avenue
New York, New York 10001

Mr. A. T. Parker
Westinghouse Electric Corporation
P. O. Box 355
Pittsburgh, Pennsylvania 15230

David J. Preister
Assistant Attorney General
Environmental Protection Division
P. O. Box 12548, Capitol Station
Austin, Texas 78711

Mrs. Juanita Ellis, President
Citizens Association for Sound
Energy
1426 South Polk
Dallas, Texas 75224

Mr. Robert G. Taylor
Resident Inspector/Comanche Peak
Nuclear Power Station
c/o U. S. Nuclear Regulatory
Commission
P. O. Box 38
Glen Rose, Texas 76043

Mr. John T. Collins
U. S. NRC, Region IV
611 Ryan Plaza Drive
Suite 1000
Arlington, Texas 76011

ENCLOSURE

RSB POSITION ON BORON DILUTION

Introduction and Background

Recently we received a letter from Texas Utilities Generating Company (TUGCO), and telephone calls from Florida Power and Light (FPL) relative to the postulated inadvertent boron dilution event in their OL plants Comanche Peak 1/2 and St. Lucie 2, respectively. In both of the above instances, the utility took the position that they are reevaluating their commitment to provide design features in their plant to prevent or mitigate the worst postulated boron dilution event. For example, TUGCO, in its R. Gary to H. Denton letter, dated September 13, 1982, has withdrawn its commitment to provide the flux doubling alarm and automatic valve operation as described in the Comanche Peak FSAR and the Staff Safety Evaluation Report. The above utilities have referenced as the basis for their positions a letter from R. Clark, of the NRC, to R. Uhrig, of FPL, dated April 26, 1982. That letter addressed the boron dilution event relative to the St. Lucie-1 plant which is an operating plant that was under staff review for fuel reload and stretch power. Mr. R. Clark in his April 26, 1982 letter advised FPL that the NRC no longer required that they install the alarms which they have earlier committed to install. In the same letter, Mr. Clark also advised Mr. Uhrig of FPL that the NRC did not plan to restore the requirement for alarms at St. Lucie-1. The above Clark to Uhrig letter relied on a boron dilution evaluation report prepared by contractors for the Safety Program Evaluation Branch (SPEB). Mr. Clark's letter provided the SPEB report as an enclosure.

Discussion

The inadvertent boron dilution concern has been under scrutiny by both the NRC staff and the nuclear industry. The efforts to address the above concern are highlighted by the following documents: (1) the Standard Review Plan (SRP) Section 15.4.6, NUREG-75/087 and NUREG-0800; (2) a notification by Westinghouse of an unreviewed Safety Question under 10 CFR 50.59, dated July 8, 1980; (3) a letter from N. DeMuth, Los Alamos National Laboratory, to R. Curtis, NRC, "Analysis of Unmitigated Boron Dilution Events," November 18, 1981; (4) the SPEB report, enclosure to letter from R. Clark, NRC to R. Uhrig, FPL, April 26, 1982; (5) SASA Program Technical Note, "Unmitigated Boron Dilution Events at Zion-1," LA-SASA-TN-82-2, March 1982 conducted for the NRC by Los Alamos National Laboratory as part of the SASA (severe accident sequence analysis) program; and (6) Experiment Data Report for LOFT Boron Dilution Experiment L6-6, NUREG/CR-2733, EGG-2197, June 1982.

Reviews of most of the above documents, namely (3) through (6); have not been completed by the NRC staff and, as such, have not been adopted as a NRC position, particularly with respect to OL applicants. Our position is stated as follows:

(1) An acceptable method for meeting the criteria of SRP Section 15.4.6 is that the plant satisfy one of the following:

a) For plants with no automatic protective features to terminate boron dilution events, and no alarms to alert the operator to an unplanned boron dilution event, the consequences of an unmitigated boron dilution event should be evaluated and shown to meet the staff's acceptance criteria for anticipated operational occurrences.

b) For plants with either automatic protective features or audible alarms to alert the operator to unplanned boron dilution events, the applicant must show that:

i) If a single active failure can either disable the automatic protective features (and no backup alarm(s) exists), or disable the alarm(s), such that the operator would not be alerted to a boron dilution event by an audible alarm, then the consequences of an unmitigated boron dilution event should meet the staff's acceptance criteria for postulated accidents. Or,

ii) If a single active failure neither disables the automatic protective features, nor disables all available alarms which alert the operator to boron dilution events, then for plants with automatic protective features, the boron dilution event can be concluded to be successfully terminated. For plants with alarms and which rely on operator action, the boron dilution event can be considered successfully terminated if the allowable operator action times between time of alarm and time of loss of shutdown margin meet the criteria of SRP Section 15.4.6.

The staff will, on a case-by-case basis, consider administrative controls for physically preventing sources of unborated water from entering the primary system as an acceptable line of defense. Failures of administrative controls should be considered in the context of single failures.

With regard to relying on previous studies (i.e., documents 2, 3, 4, 5, 6) we offer the following observations:

(1) An internal Westinghouse evaluation concluded that a boron dilution event when the reactor is shutdown is a serious enough event to be reported as an Unreviewed Safety Question under 10 CFR 50.59.

(2) The DeMuth to Curtis letter of November 18, 1981, is an informal report describing results from the first part of a two-part study. It was stated in that letter that the first part was intended to provide a preliminary assessment of simulated boron dilution events in the Zion-1 plant. No evaluation was made as to the applicability of these results to other plant types. This assessment was relied upon in the SPEB report, which in turn

was used in the Clark to Uhrig letter as an argument to grant FPL relief from installing an alarm (see Ref. 4). It was also stated in the above letter that detailed analyses were to follow in the second part of the study. These detailed analyses are to simulate multidimensional effects in the vessel and reactivity feedback due to spatial and time-dependent boron concentration effects.

It is noteworthy that in the boron dilution analyses the time to criticality can vary widely and it depends on several plant specific features, such as the minimum shutdown margin, the sources of and the addition rate of the unborated water that may be injected in the RCS, and the plant physics parameters. For example, in the DeMuth to Curtis letter, Zion-1 is calculated to go critical 75 minutes after the start of the transient. However, the Comanche Peak FSAR calculated a time to criticality of only 7.5 minutes during a similar mode of operation.

(3) The SPEB report relies on document (3) above in assessing the consequences of an unmitigated boron dilution event. Specifically, it relies on an estimated return-to-power value of 3% of rated power. Although it has not been fully reviewed by the staff, the second part, document (5) above, of the above mentioned two-part study concluded that the return-to-power value for Zion-1, using the same assumptions as in the first part study, but with the modified code, is about 20% of rated power. In fact, if the transient continues without operator intervention, that study states that a return-to-power value of more than 150% of rated power is calculated. It is noteworthy that the above calculations which produce 3% and 20% return-to-power values are based on a non-water solid Reactor Coolant System (RCS). If the RCS were to be assumed in a water solid condition, the boron dilution event may produce a significantly higher return-to-power value.

Since this event is not a design basis for the low temperature overpressure protection system, significant overpressures in violation of Appendix G limits may occur. Moreover, unless a fuel damage analysis was conducted with such high return-to-power levels, the seriousness of the boron dilution event would not be properly assessed.

(4) The LOFT boron dilution experiment was designed to study the minimum time to reach criticality for two different LOFT core flow conditions. The underlying objective of the experiment is to study the nature of mixing between the unborated water being added and the highly borated water in existence prior to the transient.

Conclusion

In conclusion, we would like to point out that the only NRC position relative to the boron dilution event is reflected in the SRP Section 15.4.6. Furthermore, we will evaluate the analytical and experimental evidence pertaining to the boron dilution events. As a result of that evaluation, we may modify our position. However, until such an evaluation has been completed SRP Section 15.4.6 remains as the NRC position.

OFFICE ▶							
SURNAME ▶							
DATE ▶							