Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

October 21, 1999
NOC-AE-000675
G20.02.01
G21.02.01
10 CFR 50.90
10 CFR 50.46

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

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498 and STN 50-499
Response to Verbal Request for Additional Information on
Proposed License Amendment Associated with an
Operator Action for a Small-Break Loss-of-Coolant-Accident

References: 1) Letter NOC-AE-000151, from T. H. Cloninger to U.S. Nuclear Regulatory Commission, dated July 28, 1998

2) Letter from U. S. Nuclear Regulatory Commission to W. T. Cottle, dated April 16, 1999

3) Letter NOC-AE-000545, from S. E. Thomas to U.S. Nuclear Regulatory Commission, dated May 31, 1999

South Texas Project Nuclear Operating Company's (STPNOC) requested an amendment to credit use of operator action in analysis of small break loss of coolant accidents (Reference 1). The U. S. Nuclear Regulatory Commission (NRC) sent a request for additional information (RAI) (Reference 2) on this request, and STPNOC provided a response (Reference 3). The NRC asked for clarification on items included in the response. The requested clarification is attached.

This response contains no commitments not specifically made in separate correspondence.

If questions arise, please contact Mr. M. E. Kanavos at (361) 972-7181, or me at (361) 972-7162.

S. E. Thomas
Manager
Design Engineering

SET/MEK/MTVN

A001

cc:

Ellis W. Merschoff
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Thomas W. Alexion
Project Manager, Mail Code 13H3
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Cornelius F. O'Keefe
Sr. Resident Inspector
c/o U. S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77404-0910

J. R. Newman, Esquire
Morgan, Lewis & Bockius
1800 M. Street, N.W.
Washington, DC 20036-5869

M. T. Hardt/W. C. Gunst
City Public Service
P. O. Box 1771
San Antonio, TX 78296

A. Ramirez/C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

Jon C. Wood
Matthews & Branscomb
One Alamo Center
106 S. St. Mary's Street, Suite 700
San Antonio, TX 78205-3692

Institute of Nuclear Power
Operations - Records Center
700 Galleria Parkway
Atlanta, GA 30339-5957

Richard A. Ratliff
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3189

D. G. Tees/R. L. Balcom
Houston Lighting & Power Co.
P. O. Box 1700
Houston, TX 77251

Central Power and Light Company
ATTN: G. E. Vaughn/C. A. Johnson
P. O. Box 289, Mail Code: N5012
Wadsworth, TX 77483

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

ATTACHMENT 1

RESPONSES TO
NRC VERBAL REQUEST FOR
ADDITIONAL INFORMATION (VRAI)

Response to Verbal Request for Additional Information on
Operator Action for a Small-Break Loss-Of-Coolant Accident
South Texas Project, Units 1 And 2

STP Nuclear Operating Company (STPNOC) responses to verbal requests for additional information (RAI) by the U. S. Nuclear Regulatory Commission (NRC) staff concerning operator action during small break loss of coolant accident (SBLOCA) are provided below. NRC requests are represented in bold, italicized text, with responses immediately following in plain text.

RAI (1) ***Provide a more explicit discussion of the times associated with the proposed operator action to demonstrate why they should be considered conservative and bounding. Include:***

a) Actions assumed in SBLOCA analyses to be taken by the operators during the first ten minutes of the design basis accident;

b) The elapsed time assumed in the analysis between the start of the design basis SBLOCA and completion of the operator action;

c) A comparison of actual operator times recorded during simulator testing with those times assumed in the SBLOCA analysis, using the procedure designated as equivalent in your response to the RAI (Reference 1);

d) The approximate time necessary for operators to actually complete the proposed operator action once it was called for by the equivalent procedure;

e) And, the reason that times assumed in the limiting design basis SBLOCA analysis are expected to remain conservatively bounding for actual operator response times.

Response to RAI (1)

Using approved methodologies, Westinghouse performed an analysis of the STP limiting Small Break Loss of Coolant Accident (SBLOCA) with the proposed operator action. This analysis assumed that operators took no action whatsoever to respond to the transient during the first ten minutes following control room indication of the initiating event. The analysis also assumed forty-five minutes from the time of the initiating event to completion of the proposed operator action. Using these assumptions, the analysis calculated that peak clad temperature (PCT) would reach approximately 1654 degrees Fahrenheit. This is significantly less than the maximum allowable PCT of 2200 degrees Fahrenheit.

STPNOC also conducted simulator exercises to measure operator response times for a procedure that is equivalent to the draft procedure that includes the proposed operator action. STPNOC provided to the NRC (Reference 1) a description of the equivalent procedure, and a copy of the draft new procedure with proposed operator action. The

STPNOC Training Department used the simulator to test ten operator crews on the equivalent procedure in order to verify adequate performance. Actual simulator times recorded for the crews were all significantly less than the forty-five minutes assumed in the SBLOCA analysis. The slowest crew took nineteen minutes and forty-two seconds to complete the equivalent procedure from receipt of the alarm to completion of the operator action. All crews completed the operator action well within three minutes after reaching the step in the procedure that directs the operator action to be performed.

Actual measured times are nominal and may vary from time to time, but are expected to remain well within the forty-five minutes assumed in the analysis and thus continue to be conservatively bounded by that analysis. Given the margin between measured operator performance and the forty-five minute assumption used in the analysis, no rationally postulated variance in actual operator performance would exceed the assumed analysis value. This demonstrates that operator performance during an SBLOCA transient can be relied upon to assure an actual PCT that is lower than the 1654 degrees Fahrenheit PCT calculated by the analysis. These results support a reasonable conclusion that use of the proposed operator action represents no reduction in plant operating safety.

RAI (2) ***Provide a statement to be included in the STP UFSAR that confirms conservatism and use of measurement uncertainty for parameters assumed in SBLOCA analyses.***

Response to RAI (2)

The STP UFSAR will be changed at the next update to include the following sentence in the section on SBLOCA:

> Processes that specify input parameters for STP small break LOCA analysis assure that those values important to small break LOCA PCT calculations include applicable uncertainty and conservatively bound actual plant conditions.

The sentence will be included in paragraph 15.6.6.4.2, found on Page 3 of 26, of Attachment 5, of NOC-AE-00151, our submittal dated July 28, 1998. A copy of this page is attached hereto (ATTACHMENT 2), indicating the point of insertion. It is also shown below in context (added sentence is underlined and italicized to provide clarity):

15.6.6.4.2 Input Parameters and Initial Conditions: (Refer to Section 15.6.5.4.2 for information about large break LOCA.)

Table 15.6-15 lists important input parameters and initial conditions used in the Δ94 RSG small break LOCA analysis.

The analysis presented in this section was performed with a reactor vessel upper head temperature equal to the RCS cold leg temperature consistent with the STP Δ94 RSG design.

The analyses evaluated a range of operating temperatures ($582.3°F \leq T_{AVG} \leq 593.0°F$) plus RCS temperature uncertainties of $\pm 6°F$, and a range of Main Feedwater (MFW) temperatures ($390.0°F \leq T_{MFW} \leq 440.0°F$).

The bases used to select the numerical values that are input parameters to the analysis have been conservatively determined from extensive sensitivity studies (Refs. 15.6-17 through 15.6-19). Processes that specify input parameters for STP small break LOCA analysis assure that those values important to small break LOCA PCT calculations include applicable uncertainty and conservatively bound actual plant conditions. In addition, the requirements of Appendix K regarding specific model features were met by selecting models which provide a significant overall conservatism in the analysis. The assumptions made pertain to the conditions of the reactor and associated safety system equipment at the time the postulated LOCA occurs and include such items as the core peaking factors and the performance of the ECCS system. Decay heat generated throughout the transient is also conservatively calculated.

Reference:

1) Letter NOC-AE-000545, from S. E. Thomas to U.S. Nuclear Regulatory Commission, dated May 31, 1999

ATTACHMENT 2

MARKUP OF PAGE 3 OF 26

FROM
ATTACHMENT 5
OF
NOC-AE-00151
DATED JULY 28, 1998

MARKUP INSERT

Please insert the below sentence at the point indicated by its number on the following markup page:

INSERT 1:

Processes that specify input parameters for STP small break LOCA analysis assure that those values important to small break LOCA PCT calculations include applicable uncertainty and conservatively bound actual plant conditions.

- Credit for operator action to reduce the SG PORV setpoint (Ref: NRC SE for amendment)

The operator action credited in the small break LOCA analysis is to lower the SG PORV setpoints at least to 1000 psig within 45 minutes after accident initiation. The purpose of the action is to provide a more rapid cooldown of the primary side by depressurizing secondary side during a small break LOCA using the steam dumps first, then the SG PORVs, if steam dumps are unavailable. The SBLOCA analysis only takes credit for the SG PORVs, since the Steam Dumps are not safety-grade. The operator actions to lower secondary side pressure using either the SG PORV or the steam dumps are achievable from the plant control room. Consistent with the intent of the Emergency Operating Procedures (EOPs), the operator action credited in the small break LOCA analysis does not initiate a mitigating safety function, but facilitates the automatic mitigation capability of the SG PORVs.

15.6.6.4.2 Input Parameters and Initial Conditions: Refer to Section 15.6.5.4.2 for information about large break LOCA.

Table 15.6-15 lists important input parameters and initial conditions used in the Δ94 RSG small break LOCA analysis.

The analysis presented in this section was performed with a reactor vessel upper head temperature equal to the RCS cold leg temperature consistent with the STP Δ94 RSG design.

The analyses evaluated a range of operating temperatures ($582.3°F \leq T_{AVG} \leq 593.0°F$) plus RCS temperature uncertainties of $\pm 6°F$, and a range of Main Feedwater (MFW) temperatures ($390.0°F \leq T_{MFW} \leq 440.0°F$).

INSERT 1

The bases used to select the numerical values that are input parameters to the analysis have been conservatively determined from extensive sensitivity studies (Refs. 15.6-17 through 15.6-19). In addition, the requirements of Appendix K regarding specific model features were met by selecting models which provide a significant overall conservatism in the analysis. The assumptions made pertain to the conditions of the reactor and associated safety system equipment at the time the postulated LOCA occurs and include such items as the core peaking factors and the performance of the ECCS system. Decay heat generated throughout the transient is also conservatively calculated.

15.6.6.4.3 Results:

Large Break Results

Refer to Section 15.6.5.4.3 - Large Break Results

Small Break Results