



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20565

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO TOPICAL REPORT RXE-88-102-P

"TUE-1 DEPARTURE FROM NUCLEATE BOILING CORRELATION"

AND RXE-88-102-P-SUPPLEMENT 1

TEXAS UTILITIES ELECTRIC COMPANY, ET AL.

COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 1

DOCKET NOS. 50-445 AND 50-446

1.0 INTRODUCTION

Texas Utilities Electric Company (TU Electric), the licensee for the Comanche Peak Steam Electric Station, Unit 1, submitted topical report RX-88-102-P, "TUE-1 Departure from Nucleate Boiling Correlation" and RX-88-102-P, Supplement 1, that described the development of the correlation to evaluate the departure from nucleate boiling (DNB) heat flux for Westinghouse 17x17 fuel assemblies with R type mixing vane grids and Advanced Nuclear Fuel (ANF) 17x17 fuel assemblies. The TU Electric reports RXE-88-102-P and RXE-88-102-P, Supplement 1 (References 1 and 2) documenting the TUE-1 correlation were submitted for the plant specific applications as a method to assess the DNB safety limit for operational transient analysis in support of fuel reload at Comanche Peak.

The NRC staff, with technical assistance from the Idaho National Engineering Laboratory (INEL), reviewed these topical reports. The review covered TU Electric's submittals and the response (Reference 3) by TU Electric to the staff's October 4, 1991, letter requesting additional information. The staff has adopted the findings recommended in our consultant's Technical Evaluation Report (TER) which is attached to this Safety Evaluation.

2.0 EVALUATION

The staff performed its evaluation of the TUE-1 correlation, the data base supporting development of the correlation, and the statistical characterization of the correlation described in RXE-88-102-P and its supplement. The evaluation of the TUE-1 correlation and review findings are described in detail in the attached INEL TER.

3.0 CONCLUSION

On the basis of the staff review and our consultant's evaluation of the TU Electric TUE-1 DNB correlation, we concur in our consultant's findings with restrictions on applicability modified as follows:

- (1) The TUE-1 DNB correlation shall be restricted to evaluations of the Westinghouse 17x17 fuel with R-grid mixing vane fuel or ANF 17x17 fuel for the range of fuel design parameters given in Table 1. It is also applicable to fuel assemblies of these types which have been reconstituted with dummy stainless steel or zirconium base alloy rods with the limitation that it cannot be applied to fuel rods which share a single subchannel with two or more "cold" rods.
- (2) Should any of the conditions fall outside the ranges identified in Item (1) above, then DNB shall be assumed to occur.
- (3) The use of the TUE-1 DNB correlation shall be limited to assessments with the VIPRE-01 computer code as described in EOE-88-102-P. Application is restricted to VIPRE-01 since other codes may not predict the same local hydraulic conditions as that calculated by VIPRE-01, which was used to develop the correlation and predict the test data.
- (4) The VIPRE-01 computer program shall be modified to clearly identify in the output from the code that the geometric or thermal hydraulic conditions have fallen outside of the range of application for the TUE-1 correlation.
- (5) The TUE-1 DNB correlation is to be used only for evaluation of steady state overpower and Chapter 15 transients, excluding LOCA, at the Comanche Peak Steam Electric Station

TABLE 1: Range of Application for the TUE-1 Correlation

Pressure:	485 to 2435	psia
Local Mass Flux:	0.93 to 3.53	Mlbm/hr-ft ²
Local Quality	-0.15 to 0.30	
Local Heat Flux:	0.14 to 1.15q	MBTU/hr-ft ²
Inlet Subcooling:	30 to 350	BTU/lbm
Mixing Vane Grid Spacing:	20 to 32	inches
Heated Length:	96 to 168	inches
Wetted Hydraulic Diameter:	0.37 to 0.51	inches
Heated Hydraulic Diameter:	0.46 to 0.58	inches

Note: Range of application data taken from page 2-5 of RXE-88-102-P.

Based on the review discussed in Section 2.0 of this safety evaluation, the staff concludes that TU Electric Topical Reports RX-88-102-P and RX-88-102-P, Supplement 1, provide an acceptable basis for the TUE-1 DNB correlation to be used for steady state overpower conditions and reload applications to Chapter 15 transient analyses, excluding LOCA.

4.0 REFERENCES

1. Letter (Log-TXX-89025, File #10010 915.1) from J. W. Beck (TU Electric) to USNRC submitting RXE-88-102-P, "TUE-1 Departure from Nucleate Boiling Correlation," January 31, 1989.
2. Letter (Log # TXX-901055, File #10010 915) from W. J. Cahill, Jr. (TU Electric) to USNRC submitting Supplement 1 to RXE-88-102-P, "TUE-1 DNB Correlation," December 28, 1990.
3. Letter (Log # TXX-91402,, File #10010 915) from W. J. Cahill, Jr. (TU Electric) to USNRC, submitting Response to Request for Additional Information on RXE-88-102, October 30, 1991.

Attachment:
Technical Evaluation Report