UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

Enclosure 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO FROSSTEY-2 COMPUTER CODE

VERMONT YANKEE NUCLEAR POWER CORPORATION

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

1.0 INTRODUCTION

By a letter from L. W. Capstick, Vermont Yankee Nuclear Power Corporation (VYNPC), to the U.S. Nuclear Regulatory Commission (NRC), dated December 16, 1987, the licensee, VYNPC, submitted the proprietary FROSSTEY-2 fuel performance computer code for NRC review. The original FROSSTEY code was previously approved for non-LOCA analyses licensing applications. VYNPC has acquired additional fuel performance data to improve the FROSSTEY-2 code. The licensee intends to apply the FROSSTEY-2 code for LOCA initial conditions, end-of-life limiting conditions, and transient analysis initial conditions. The licensee also incorporated gadolinia burnable absorber material properties in the FROSSTEY-2 code for neutronic licensing calculation.

The NRC staff was supported in this review by our consultant, the Pacific Northwest Laboratories (PNL). The staff has adopted the findings recommended in our consultant's Technical Evaluation Report (TER), which is attached, as modified by this Safety Evaluation.

2.0 EVALUATION

The attached TER provides the safety evaluation. PNL has reviewed the FROSSTEY-2 code according to the licensee's request for licensing applications in normal operation, transient, and LOCA conditions. Section 3.0 provides the staff conclusions.

Also, in response to staff concerns, the licensee has stated that the currently approved core-wide and hot channel 1-D methodologies do represent the changes due to control rod insertion in the axial power shape during the transient.

3.0 CONCLUSIONS

The staff has reviewed the FROSSTEY-2 code. Based on recommendations in the attached PNL TER, the staff approves the FROSSTEY-2 code for licensing applications including steady-state analyses, LOCA initial conditions, and transient initial conditions for burnups up to 60,000 MWd/MTU rod average with the following conditions:

(1) For transient applications, the input data are required to include the manufacturing uncertainties for hot channel analysis for both PWR and BWR applications.

(2) For BWR transient CPR applications, the licensee is required to evaluate and use the worst axial power shape prior to the transient for core wide and hot channel analyses for each reload cycle.

(3) Also for BWR transient CPR applications, the licensee is required to evaluate and use a peak rod axial power history shape to conservatively bound the axial gap conductance.

Principal Contributor: S. L. Wu

Date: September 24, 1992