RAS M-203

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NEC-JH_35

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 229 TO FACILITY OPERATING LICENSE NO. DPR-28

ENTERGY NUCLEAR VERMONT YANKEE, LLC

AND ENTERGY NUCLEAR OPERATIONS, INC.

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

Proprietary information pursuant to
Title 10 of the *Code of Federal Regulations* Section 2.390
has been redacted from this document.
Redacted information is identified by blank space enclosed within double brackets.

Template Secy-028

DS-03

implementation of the proposed EPU. Based on this, the NRC staff concludes that spent fuel storage at VYNPS will continue to meet the requirements of draft GDC-40, 42, and 66 following implementation of the proposed EPU. Therefore, the NRC staff finds the proposed EPU acceptable with respect to spent fuel storage.

2.8.7 Additional Review Area - Methods Evaluation

2.8.7.1 Application of NRC-approved Analytical Methods and Codes

The analyses supporting safe operation at EPU conditions are required to be performed using NRC-approved licensing methodology, analytical methods and codes. In general, the analytical methods and codes are assessed and benchmarked against measurement data, comparisons to actual nuclear plant test data and research reactor measurement data. The validation and benchmarking process provides the means to establish the associated biases and uncertainties. The uncertainties associated with the predicted parameters and the correlations modeling the physical phenomena are accounted for in the analyses. NRC-approved licensing methodology, topical reports and codes specify the applicability ranges. The generic licensing topical reports (LTR) covering specific analytical methods or code systems quantify the accuracy of the methods or the code used. The safety evaluation reports approving topical reports include restrictions that delineate the conditions that warrant specific actions, such as obtaining measurement data or obtaining further NRC approval. In general, the use of NRC-approved analytical methods is contingent upon application of these methods and codes within the ranges for which the data were provided and against which the methods were evaluated. Thus, a plant-specific application does not entail review of the NRC-approved analytical methods and codes.

To implement the proposed EPU and maintain the current 18-month cycle, a higher number of maximum powered bundles are loaded into the core and the power of the average bundles is also increased, making the core radial power distribution flatter. Due to an increased two-phase pressure drop and higher coolant voiding, the flow in the maximum powered bundles decreases. This effect leads to a higher bundle power-to-flow ratio and higher exit void fraction. Since the maximum powered bundles set the thermal limits, EPU operation reduces the margins to thermal limits.

Table 2.8.7-1 below shows the predicted operating conditions for the maximum powered bundles for VYNPS as shown in Table 6-2 of Attachment 3 to Reference 25. Figures 2.8.7-1 through 2.8.7-4 show plots for some of these parameters for VYNPS throughout the core cycle.

Table 2.8.7-1 Ranges of Operational Experience

Metric	VYNPS Prediction
[[	
	]]

As shown, the VYNPS maximum exit void fraction is 87% and the core average bundle exit void fraction is 76%.

2.8.7.2 Applicability of Neutronic Methods

2.8.7.2.1 Methods Review Topics

In Enclosure 3 to a letter dated March 4, 2004, (Reference 69) GE provided its evaluation of the impact of operation at higher void conditions on all of GE's licensing methodologies. The generic evaluation was also based on core thermal-hydraulic conditions that bound the EPU conditions (void fraction 90% or greater). Specifically, operation with a large number of bundles operating at high in-channel void fractions could potentially affect the following topics:

1. Assumptions made in the generation of the lattice physics data that establish the neutronic feedback (see SE Section 2.8.7.2.2).

2. Accuracy of the fuel isotopics generated considering the method employed in the lattice physics (see SE Section 2.8.7.2.2).

3. Assumptions made in the generation of the neutronic parameters in assuming 0% bypass voiding, although voiding is present during some transients (see SE Section 2.8.7.2.2).

4. Applicability of the thermal-hydraulic correlations used to model physical phenomena (see SE Section 2.8.7.3).