

SAFETY EVALUATION REPORT

**Docket No. 72-1007
Ventilated Storage Cask (VSC-24)
Certificate of Compliance No. 1007
Amendment No. 3**

SUMMARY

By application dated March 29, 2000, as supplemented June 8, 2000, BNFL Fuel Solutions Corporation (BFS or the applicant) requested an amendment to Certificate of Compliance No. 1007 (certificate) for the Pacific Sierra Nuclear Associates (PSNA) VSC-24 system in License Amendment Request (LAR) 00-01. The certificate is held by PSNA, which is a partnership between Sierra Nuclear Corporation and BFS.

The application requested changes to the certificate, including its attachment, and Revision 0 of the Safety Analysis Report (SAR) for the VSC-24 system to modify the allowable fuel specifications by removing the minimum burnup requirement for Combustion Engineering (CE) 16x16 fuel assemblies.

Based on the statements and representations in the application, as supplemented, the staff agrees that the VSC-24 system, as amended, meets the requirements of 10 CFR Part 72.

1.0 GENERAL

The applicant requested that the minimum burnup limitations in the fuel specifications for CE 16X16 fuel be replaced with minimum boron concentrations in the VSC-24 basket water, relative to initial enrichment, during loading and unloading operations. The purpose of the changes is to allow loading of CE 16X16 fuel that would not meet the existing fuel specifications. No other previously reviewed and accepted fuel or cask parameters were changed as a result of this amendment. As a result of the narrow scope of LAR 00-01, only the SAR criticality analysis and fuel loading and unloading specifications were revised. The staff's criticality evaluation is discussed below along with the proposed Technical Specification (TS) changes.

The staff has reviewed these changes and finds them acceptable. These changes are consistent with or supported by the analyses that have been previously reviewed and approved by the staff. These changes have no adverse impact on the design and operation of the cask and will not affect the ability of the cask to meet the requirements of 10 CFR Part 72.

2.0 CRITICALITY EVALUATION

The applicant performed a criticality analysis for the CE 16x16 fuel assemblies in the VSC-24 using the KENO V.a code in the SCALE 4.1 system. The applicant modeled the fuel assemblies, the VSC-24 cask and varied the amount of spent fuel pool soluble boron at five different enrichments. The applicant determined the minimum amount of boron such that the calculated k-effective, including bias and uncertainty, was less than 0.95, for optimum moderation at each enrichment. Staff found the applicant's analysis appropriate and results acceptable.

The applicant also evaluated various permutations of the fuel assembly to determine the effect on reactivity using XSDRNPM code in the SCALE system. The applicant varied such items as pellet diameter, cladding thickness, and rod outer diameter. The applicant determined that the maximum increase in k-infinite was less than 0.001. Staff found the applicant's analysis appropriate and results acceptable.

The staff performed confirmatory criticality calculations to determine the k-effective for enrichments at the various uranium weight percent limits (i.e., from 1.2% to 4.2%) for the CE 16X16 fuel and found the applicant's data acceptable.

The applicant performed a benchmarking analysis for the code and cross-section set used in the criticality evaluation. Based on the results of 14 critical experiments included in NUREG/CR-6361, "Criticality Benchmark Guide for Light-Water-Reactor Fuel in Transportation and Storage Packages," the applicant appropriately concluded there was a trend in the data based on rod pitch. The applicant further determined that the total correction for the bias and statistical uncertainty was greater than a 0.0225 change in k. Staff found the applicant's analysis appropriate and results acceptable.

The staff performed an analysis on the applicant's bias data to establish a set of upper subcritical limit (USL) equations using USL Method 1, "Confidence Band with Administrative Margin," as described in Section 4 of NUREG/CR-6361. The staff determined that the USL for the CE 16x16 fuel assemblies was 0.9287, consistent with the applicant's bias correction.

3.0 CONDITIONS FOR CASK USE AND TECHNICAL SPECIFICATIONS

The proposed certificate changes for this amendment are as follows:

1. Removed the "Basis" from all TSs in accordance with revised NRC TS format.
2. TS 1.2.1, "Fuel Specification," changed to eliminate use of Figure 1, "Fuel Criticality Acceptability Curve," for CE 16X16 fuel; and
3. TS 1.2.6, "Boron Concentration in the MSB Cavity Water," changed to require use of Figure 3, "CE 16X16 Fuel Boron Concentration Curve," when loading CE 16X16 fuel assemblies.

4. TS 1.2.7, "MSB Vacuum Pressure During Drying," changed text from "...shield lid plug..." to "...shield lid fitting..." for accuracy.
5. Certificate Section 2.b., "Cask Description," changed text to remove ambiguity.
6. Certificate Section 3, "Heavy Loads," changed text for consistency with TS 1.1.4.
7. Certificate Section 4, "Quality Assurance," changed text for consistency with TS 1.1.3.
8. Certificate Section 5, "Operating Procedures," changed text to remove ambiguity.

The staff has reviewed these changes, as discussed in this SER, and have found them acceptable.

CONCLUSION

The certificate is revised to modify the allowable fuel specifications by removing the minimum burnup requirement for CE 16x16 fuel assemblies. This change does not affect the ability of the VSC-24 to meet the requirements of 10 CFR Part 72.

Issued with Certificate of Compliance No. 1007, Amendment No. 3,
on May 11 , 2001.