

## **SAFETY EVALUATION REPORT**

**Docket No. 72-8  
Calvert Cliffs Nuclear Power Plant  
Independent Spent Fuel Storage Installation  
Materials License No. SNM-2505  
Amendment No. 7**

### **Summary**

This Safety Evaluation Report (SER) documents the review and evaluation of an amendment to Special Nuclear Materials (SNM) License No. 2505 for the Calvert Cliffs Nuclear Power Plant Independent Spent Fuel Storage Installation (ISFSI). By application dated May 16, 2005, as supplemented on September 29, 2005, and October 28, 2005, Calvert Cliffs Nuclear Power Plant, Inc. (CCNPP) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 72.56, "Application for amendment of license," to amend the license to incorporate changes to the updated safety analysis report to alter the design basis limit for the dry shielded canister (DSC) internal pressure from 50 psig to 100 psig.

The NRC staff has reviewed the application, including the justifications for the proposed changes. As discussed in further detail below, based on the statements and representations in the application, as supplemented, the staff agrees that this change does not have an adverse effect on public health and safety, and the environment.

### **1.0 Introduction and General Description**

CCNPP is in the process of upgrading portions of its ISFSI to use a modified Transnuclear, Inc. NUHOMS-24P DSC: the NUHOMS-32P. The NUHOMS-32P DSC will store eight more assemblies than the current NUHOMS-24P DSC using the same external and internal shell dimensions. As part of this upgrade CCNPP previously submitted a license amendment request in a letter dated December 12, 2003. The December 12, 2003, license amendment request included revisions to the technical specification to support the use of the NUHOMS-32P DSC. The NRC staff evaluated CCNPP's December 12, 2003, request and in a letter dated June 10, 2005, the NRC issued license Amendment 6 to SNM-2505 based on CCNPP's December 12, 2003, request.

CCNPP's May 16, 2005, license amendment request also supports the use of the NUHOMS-32P DSC. Subsequent to the December 12, 2003, submittal, CCNPP completed a 10 CFR 72.48 evaluation that was required to be done to support the use of the NUHOMS-32P DSC. This evaluation identified an additional change that would alter a design basis limit for a fission product barrier as described in the final safety analysis report (as updated), which requires a license amendment pursuant to 10 CFR 72.48(c)(2)(vii). The design basis limit that is altered to accommodate the 32P DSC design is internal pressure, which is increased from 50 psig to 100 psig. This safety evaluation report (SER) documents the review and evaluation of CCNPP's May 16, 2005, request to change this design basis limit.

## 2.0 Structural

The NRC staff has reviewed CCNPP's structural analysis contained in its May 16, 2005, letter. CCNPP's analysis uses a pressure load of 100 psig to calculate the maximum NUHOMS 32P DSC pressure boundary stress intensities, an increase of 50 psig from the value used for the existing NUHOMS 24P analysis. The higher design pressure for the 32P DSC was needed to accommodate the higher heat load associated with a 32P canister. CCNPP stated in its May 16, 2005, submittal that the calculated DSC component stress intensities for the 100 psig case were within ASME Code allowables. Based on the staff's review of the May 16, 2005, submittal, CCNPP was provided three requests for additional information (RAIs) on August 3, 2005. The RAIs requested that CCNPP provide the following information:

- C Provide the detailed supporting calculations and ANSYS analyses for the NUHOMS 32P that would substantiate the stresses listed in Table 2 of Attachment 1 to the May 16, 2005, amendment request letter.
- C Provide justification for considering the shear load produced by internal pressure acting on the inner cover plate to be the only load acting on the top end pressure boundary weld as described in Section 4.2.2. of Attachment 4 of the May 16, 2005, amendment request letter.
- C Provide selected references contained in Attachment 4 to the May 16, 2005, amendment request letter.

The applicant provided responses to each one of these RAIs on September 29, 2005. The staff has reviewed Enclosures 1 through 4, of Attachment 1, of the September 29, 2005, letter and has concluded that the issues raised by the staff in the above mentioned RAIs have been adequately addressed.

The staff particularly has reviewed and found acceptable the analysis and the results presented in the Enclosure 2, of the Attachment 1, titled, Proprietary Trans-nuclear Inc. Calculation, "NUHOMS-32P DSC Structural Analysis," Document No. 1095-34, Revision No. 5. The staff has also reviewed and found acceptable the alternate analysis presented for NUHOMS 32P in Appendix A titled "Alternate Analysis and Evaluation of the 32P DSC," to this Calculation.

The staff agrees that the structural analysis provided in CCNPP's September 29, 2005, submittal demonstrates that the DSC component stress intensities are within the ASME Code allowables for Service Level D for the 100 psig DSC internal pressure load. Therefore, the staff finds the change to the design basis limit for a fission product barrier as described in the final safety analysis report (i.e., the increase in the 32P DSC design internal pressure from 50 psig to 100 psig) to be acceptable.

The staff notes that the September 29, 2005, RAI responses and the October 28, 2005, supplement included the following :

- C a change in the method of evaluation described in the final safety analysis report (FSAR)
- C a change in the allowable weld stresses from ASME Service Level C to Level D

Regarding the change in method of evaluation described in the FSAR, a plastic structural analysis of the 32P DSC shell was performed using the ANSYS computer code versions 5.5, 5.6, 6.0, and 8.1. This new plastic structural analysis is contained in the CCNPP September 29, 2005, RAI response and supplementary computer runs and calculations that were provided as part of this response. The staff notes that the 24P DSC shell was evaluated using an elastic analysis with an older version of the ANSYS computer code. The staff has reviewed this change in methodology contained in CCNPP's September 29, 2005, RAI response and concludes that it is acceptable.

Regarding the change in allowable weld stresses from ASME Service Level C to Service Level D , the 100 psig pressure in the DSC is due to the blocked vent condition for the Horizontal Storage Module which also conservatively assumes 100% of the fuel rods have ruptured. Because the blockage of inlet and outlet vents is an accident condition, the staff agrees that ASME Service Level D allowables are appropriate to be used for weld stress for the inner boundary weld (weld between the lead plug top casing plate and the DSC shell). The staff notes that this is a change from the 24P analysis where Level C allowables are used. The staff finds this change to the allowable weld stresses from ASME Service Level C to Service Level D to be acceptable.

The staff notes that the October 28, 2005, supplement states that the thermal analysis, which was used to develop the 100 psig DSC internal pressure load, was redone using a finite element model with a 14x14 uniform transverse mesh for each homogenized fuel assembly. This new analysis led to an accident storage DSC internal pressure increase of 0.9 psig from 98.5 psig to 99.4 psig and led to the aluminum basket plate temperature increasing from 717 EF to 727 EF.

The accident analysis that leads to the 100 psig DSC internal pressure load is a conservative bounding analysis that assumes 100% of the fuel rods in a DSC rupture during a cask drop and release fission gasses and fuel rod fill gas to the DSC cavity. It also assumes that the air vents for the Horizontal Storage Module (HSM) in which the DSC is placed are blocked for 48 hours. Therefore, because the 99.4 psig DSC internal pressure value is bounded by the 100 psig value used in the structural analysis and because the thermal analysis uses conservative assumptions, the staff finds the change in DSC internal pressure due to the new thermal analysis to be acceptable.

The staff also finds the change in the aluminum basket plate temperatures to be acceptable. The structural properties used for the aluminum basket plate in the structural analysis assumed a temperature of 725 EF. Although the new calculated value of 727 EF is above the 725 EF value used to derive the structural properties, the maximum stress in the basket does not occur in the high temperature region, and the 2 EF temperature difference has an imperceptible effect

on the material properties of the aluminum basket plate. Therefore, the staff finds the change in temperature of the aluminum basket plates to be acceptable due to the new thermal analysis.

### **3.0 Requirements for Noticing Proposed Action**

The staff considered the amendment's potential impact on the health and safety of the public. The staff finds that this license amendment does not involve any changes in the scope or type of operations presently authorized by the license. The staff has determined that the amendment does not present a genuine issue as to whether public health and safety will be significantly affected.

Accordingly, pursuant to 10 CFR 72.46(b)(2), immediate action on this amendment may be taken without notice of the proposed action or a notice of opportunity for hearing.

### **4.0 Environmental Review**

Pursuant to Part 51 of the Code of Federal Regulations, an Environmental Assessment (EA) has been prepared for this action and a Finding of No Significant Impact (FONSI) was issued. The EA and FONSI were published in the Federal Register on September 12, 2005 (70 FR 53812).

### **5.0 Conclusion**

The proposed revision to the ISFSI license does not affect prior staff conclusions and findings made in granting approval of Amendment 6. Based on the information provided in the application, as supplemented, the staff concludes that SNM-2505, as amended, meets the requirements of 10 CFR Part 72.

Issued with Materials License No. SNM-2505, Amendment No. 7, on November 2, 2005