George Vanderheyden
Vice President
Calvert Cliffs Nuclear Power Plant
Constellation Generation Group, LLC

1650 Calvert Cliffs Parkway
Lusby, Maryland 20657
410.495.4455
410.495.3500 Fax

Constellation Energy

May 16, 2005

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant; Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Independent Spent Fuel Storage Installation; Docket No. 72-8
License Amendment Request: Change to the Dry Shielded Canister Design Basis Limit Requiring NRC Prior Approval Pursuant to 10 CFR 72.48 to Support the ISFSI NUHOMS®-32P Upgrade

REFERENCES:
(a) Letter from G. Vanderheyden (CCNPP) to Document Control Desk (NRC), dated December 12, 2003, License Amendment Request: Revision to the Technical Specifications to Support the ISFSI NUHOMS®-32P Upgrade

(b) 10 CFR 72.214, List of Approved Spent Fuel Storage Casks, Certificate Number 1004

Pursuant to 10 CFR 72.56, the Calvert Cliffs Nuclear Power Plant, Inc. (CCNPP) hereby requests an Amendment to Materials License No. SNM-2505 to incorporate the changes described below into the Updated Safety Analysis Report (USAR) for the Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI).

Calvert Cliffs Nuclear Power Plant, Inc. is in the process of optimizing its dry spent fuel storage capacity by upgrading portions of its ISFSI to use the Transnuclear NUHOMS®-32P Dry Shielded Canister (DSC). The NUHOMS®-32P system will safely store eight more assemblies than the current NUHOMS®-24P canister using the same external and internal shell dimensions. The NUHOMS®-32P storage capacity is optimized by removing the space between the locations of each fuel assembly and by slightly reducing the size of the storage locations. The NUHOMS®-32P design will allow CCNPP to reduce the minimum number of canister loadings each year, which will result in less total annual radiological dose at CCNPP.

As part of the upgrade process, we have previously submitted a license amendment request to revise the ISFSI Technical Specifications required for the 32P DSC (Reference a). We have now completed the 10 CFR 72.48 evaluation required for the implementation of the 32P upgrade. Our evaluation identified two changes which require Nuclear Regulatory Commission prior approval. One of the changes involves a new evaluation methodology [72.48(c)(2)(viii)] to use boron credit in lieu of burnup credit for the criticality analysis. That change has already been submitted as part of the license amendment request for

A P01

the Technical Specification revision (Reference a). The present amendment request addresses a change that would alter a design basis limit for a fission product barrier as described in the USAR, 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. Despite the increase in internal pressure for the 32P design, due to structural improvement, the resulting stress values are in fact lower than the stress values for the existing 24P DSC and a previously approved similar design, NUHOMS®-32PT DSC (Reference b). Therefore, the structural integrity of the confinement boundary is maintained under the proposed design pressure limit of 100 psig for all specified normal operation, off-normal operation, and accident conditions.

The environmental assessment and technical basis for this proposed change are provided in Attachment (1). Applicable pages from the proposed USAR Chapter 12 are provided in Attachment (2). Chapter 12 will be created for information that is specific to the 32P DSC design. Attachments (4) and (5) contain calculations provided to support the technical basis described in Attachment (1).

The Transnuclear, Inc. calculation that supports our safety analyses in Attachment (1) contains information proprietary to Transnuclear, Inc. Therefore, it is accompanied by an affidavit signed by Transnuclear, Inc., the owner of the information (Attachment 3). The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission, and addresses with specificity the considerations listed in 10 CFR 2.790(b)(4). Accordingly, it is respectfully requested that the information that is proprietary to Transnuclear, Inc. be withheld from public disclosure. The non-proprietary version of these evaluations are included in this transmittal for public disclosure.

We plan to start loading NUHOMS®-32P DSCs beginning October 1, 2005, in preparation for the early 2006 Unit 1 refueling/reactor vessel head replacement outage. To help us meet this schedule, we request that you review and approve this request by August 31, 2005.

Should you have questions regarding this matter, please contact Mr. L. S. Larragoite at (410) 495-4922.

Very truly yours,

STATE OF MARYLAND :
: **TO WIT:**
COUNTY OF CALVERT :

I, George Vanderheyden, being duly sworn, state that I am Vice President - Calvert Cliffs Nuclear Power Plant, Inc. (CCNPP), and that I am duly authorized to execute and file this License Amendment Request on behalf of CCNPP. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other CCNPP employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

Subscribed and sworn before me, a Notary Public in and for the State of Maryland and County of St. Mary's, this 16th day of May, 2005.

WITNESS my Hand and Notarial Seal:

Janet L. Scully
Notary Public

My Commission Expires:

March 25, 2007
Date

GV/GT/bjd

Attachments:
(1) Technical Basis and Environmental Assessment
(2) Draft Updated Safety Analysis Report Pages
(3) Transnuclear, Inc. Proprietary Affidavit
(4) Proprietary Transnuclear, Inc. Calculation, "NUHOMS®-32P DSC Structural Analysis," Document No. 1095-34, Revision No. 3
(5) Non-Proprietary Transnuclear, Inc. Calculation, "NUHOMS®-32P DSC Structural Analysis," Document No. 1095-34, Revision No. 3

cc: J. M. Sebrosky, NRC

(Without Attachments)
R. V. Guzman, NRC
S. J. Collins, NRC
Resident Inspector, NRC
R. I. McLean, DNR

ATTACHMENT (1)

TECHNICAL BASIS AND

ENVIRONMENTAL ASSESSMENT

TABLE OF CONTENTS

1.0 DESCRIPTION

2.0 PROPOSED CHANGE

3.0 BACKGROUND

4.0 TECHNICAL ANALYSIS

5.0 ENVIRONMENTAL ASSESSMENT

6.0 PRECEDENCE

7.0 REFERENCES

ATTACHMENT (1)

TECHNICAL BASIS AND ENVIRONMENTAL ASSESSMENT

1.0 DESCRIPTION

Calvert Cliffs Nuclear Power Plant, Inc. (CCNPP) is in the process of optimizing its dry spent fuel storage capacity by upgrading portions of its Independent Spent Fuel Storage Installation (ISFSI) to use the Transnuclear NUHOMS®-32P Dry Shielded Canister (DSC). The NUHOMS®-32P system will safely store eight more assemblies than the current NUHOMS®-24P canister using the same external and internal shell dimensions. The NUHOMS®-32P storage capacity is optimized by removing the space between the locations of each fuel assembly and by slightly reducing the size of the storage locations. The NUHOMS®-32P design will allow CCNPP to reduce the minimum number of canister loadings each year from four (using the 24P design) to three (with the 32P design). This will result in less total annual radiological dose at CCNPP.

As part of the upgrade process, we have previously submitted a license amendment request to revise the ISFSI Technical Specifications required for the 32P DSC (Reference 1). We have now completed the 10 CFR 72.48 evaluation required for the implementation of the 32P upgrade. Our evaluation identified two changes which require Nuclear Regulatory Commission prior approval. One of the changes involves a new evaluation methodology [72.48(c)(2)(viii)] to use boron credit in lieu of burnup credit for the criticality analysis. That change has already been submitted as part of the license amendment request for the Technical Specification revision (Reference 1). The present amendment request addresses a change that would alter a design basis limit for a fission product barrier as described in the Updated Safety Analysis Report, 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. As described in the technical analysis section, despite the increase in internal pressure for the 32P design, the resulting stress values are in fact lower than the stress values for the 24P due to structural improvement for the 32P design.

2.0 PROPOSED CHANGE

The design pressure limit for the DSC has been increased from 50 psig to 100 psig to accommodate the 32P design. For information that is specific to the 32P DSC, we are creating a new Chapter 12 in the Updated Safety Analysis Report. Applicable pages of this chapter for the proposed change are provided in Attachment (2).

3.0 BACKGROUND

The existing Calvert Cliffs ISFSI is a NUHOMS®-24P dry storage system designed by Transnuclear, Inc. (formerly known as VECTRA Technologies, Inc.; Pacific Nuclear Fuel Services, Inc.; and Nutech Engineers, Inc.). Calvert Cliffs Nuclear Power Plant, Inc. operates its ISFSI under a site-specific material license. The NUHOMS®-24P system uses a reinforced concrete horizontal storage module (HSM) to store spent fuel that is sealed in a stainless steel DSC. Each DSC holds 24 spent fuel assemblies. The HSM provides radiological shielding and physical protection for the DSC and has internal air flow passages to provide natural circulation cooling for decay heat removal. The Calvert Cliffs ISFSI is licensed for 120 HSMs; 72 HSMs have already been built. A total of 48 HSMs will be loaded with the NUHOMS®-24P DSC.

To optimize the storage of spent fuel assemblies at Calvert Cliffs, a new higher capacity DSC design called the NUHOMS®-32P DSC was developed. As indicated above, the NUHOMS®-32P system will store eight more assemblies than our current NUHOMS®-24P canister using the same external and internal shell dimensions. We expect to load a total of 72 HSMs with the NUHOMS®-32P canister at CCNPP.

The DSC is a vessel for the confinement of spent nuclear fuel and provides an inert environment to ensure the long-term integrity of the spent fuel. Each DSC contains an outer leak-tight shell and an internal basket assembly. The outer shell provides the structural strength, shielding, and a leak-tight chamber for containing helium. The major difference between the NUHOMS®-32P and 24P DSC is the internal basket assembly. The NUHOMS®-24P design includes 24 stainless steel guide sleeves (one for each spent fuel assembly), 9 perforated carbon or stainless steel spacer discs, and 4 stainless steel or carbon steel support rods. The nine spacer discs are spaced out along the length of the DSC at locations that approximately coincide with the spent fuel assemblies' eight spacer grids and the single lower retention grid. The spacer discs are not structurally attached to the DSC shell walls or inner cover plates. The guide sleeves traverse the length of the DSC cavity through openings in the nine spacer discs. Four support rods are used to maintain the spacer disc locations. The support rods traverse the length of the DSC cavity through the spacer discs, and are structurally welded to the spacer discs.

The NUHOMS®-32P DSC increases the number of stainless steel guide sleeves to 32 (one for each spent fuel assembly) and uses an egg-crate design made of stainless steel and aluminum (borated and unborated plates) to support the guide sleeves. This egg-crate design is similar to the Transnuclear TN-68 basket assembly currently in use at a number of nuclear plants. Both the guide sleeves and the egg-crate components run the full length of the DSC cavity. This allows the guide sleeves to be in contact with the egg-crate components over the whole length of the DSC cavity verses only at spacer discs in the NUHOMS®-24P design. As with the 24P design, the basket assembly is not attached to the DSC shell walls or cover plates.

One additional difference is in the location of the vent and siphon ports. They have been moved from the DSC shell wall (24P location) to the DSC shield plug (32P location). This change was to improve the welding operation of the shield plug to the DSC shell.

All the major steps for loading and unloading a DSC (welding, vacuum drying, etc.) are the same for the NUHOMS®-24P and 32P systems. The DSC is loaded into a transfer cask for transporting to and from the HSM.

4.0 TECHNICAL ANALYSIS

As part of the design evaluation process for the NUHOMS®-32P DSC, all components were analyzed for structural integrity. The NUHOMS®-32P DSC confinement boundary consists of the DSC shell, lead plus top casing plate, siphon/vent block, alignment block, top shield plug lifting lug round bar, bottom cover plate, and the associated structural joint welds. Table 1 below summarizes the geometrical comparison of key dimensions for major confinement components of NUHOMS®-32P, NUHOMS®-24P, and NUHOMS®-32PT. The NUHOMS®-32PT DSC design is similar to NUHOMS®-32P DSC and has been approved by the NRC (Reference 2).

Attachments (4) and (5) contain the detailed structural integrity analysis performed by Transnuclear, our ISFSI vendor. The 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. The design pressure of 100 psig was selected to protect the DSC from rupture and leakage during an accident. The structural analysis included cases for normal

and off-normal handling and transport of the DSC, and accident conditions such as an end drop of a fully loaded DSC. Accidental pressurization of the DSC was analyzed for the following two scenarios:

- DSC in storage in the HSM with ambient temperature of 103°F, the air outlet/inlet vents blocked for up to 48 hours, and fission gases leaked out of the cladding.
- DSC in transit at an ambient temperature of 103°F, and DSC accidentally dropped causing the fission gases to be leaked out of the cladding.

The worst case loading combination [American Society of Mechanical Engineers (ASME) Code Level D] occurs when a 100 psig pressurized canister experiences an end drop accident. The calculated maximum stress in this case is 34.7 ksi. The component that experiences the maximum stress intensities is the DSC shell. The ASME Code allowable stress for this case is 64.4 ksi, thus this design provides adequate margin. Moreover, as summarized in Table 2, due to improvement in the structural design of the 32P DSC, the maximum stress values are actually lower than the values for the existing 24P DSC despite the doubling of the accident pressure load. The structural design improvement has also resulted in lower stresses than the previously approved similar design NUHOMS®-32PT.

The calculated stresses in the 32P DSC are lower than that of the 24P DSC due to the increased thickness of the stainless steel top cover plate. The stainless steel thickness in the top cover plate welded to the DSC shell is doubled from 0.375" thick to 0.75". To compensate for the increased thickness in the stainless steel, the lead thickness was reduced from 4.375" to 4.000" to maintain the overall thickness at 6.25", the same as the 24P DSC. The top cover plate design in 32PT DSC is different from the 32P DSC design. The thickness of 32PT top cover plate is 1.25" and has a separate shield plug (6.25" thick). The shield plug is neither welded to the top cover plate nor to the canister shell. As a result, no structural credit is taken for the shield plug during the analysis. The 32P design resulted in a much stiffer composite structure as evidenced by the lower stresses in the 32P DSC design than the 24P DSC and 32PT DSC designs. Therefore, the structural integrity of the confinement boundary is maintained under the proposed design pressure limit of 100 psig for all specified normal operation, off-normal operation, and accident conditions.

Table 1

NUHOMS DSC Geometries for Major Confinement Components

DSC Component	24P	32PT	32P
Shell	0.63" thick	0.50" thick	0.63" thick
Bottom Cover Plate	6.50" Composite of SS and Lead (1.75" SS + 4.25" Lead + 0.50" SS)	1.75"	6.50" Composite of SS and Lead (1.75" SS+ 4.25" Lead + 0.50" SS)
Top Cover Plate	6.25" Composite of SS and Lead (0.375" SS + 4.375" Lead + 1.50" SS)	1.25"**	6.25" Composite of SS and Lead (0.75" SS + 4.00" Lead + 1.50" SS)
Top Outer Cover Plate	1.25"	1.50"	1.25"
Accident Pressure Load	50 psi	105 psi	100 psi

** A 6.25" thick shield plug (steel) is supported by the support ring and not weld to the top cover plate.

Table 2

Structural Analysis Comparison - Maximum Calculated Stresses

DSC COMPONENT	TYPE OF STRESS *	CALCULATED MAXIMUM STRESSES (ksi)			LEVEL D ALLOWABLE STRESS
		24P	32PT**	32P	
Shell	$P_L + P_B$	59.6	55.8	34.7	64.4
Bottom Cover Plate	$P_L + P_B$	31.6	56.7	30.6	64.4
Top Cover Plate	$P_L + P_B$	26.5	46.3	10	64.4
Top Outer Cover Plate	$P_L + P_B$	63.2	55.9	33.1	64.4

* P_L = Local Member Stress; P_B = Bending Stress
** Reference 2

5.0 ENVIRONMENTAL ASSESSMENT

Pursuant to 10 CFR 51.41, Calvert Cliffs Nuclear Power Plant, Inc. has reviewed the environmental impact of the proposed amendment and has determined that it meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c)(11). Therefore, we have not provided a separate document entitled "Supplement to the Applicant's Environmental Report," as would be otherwise required by 10 CFR 51.60. Our determination for categorical exclusion is based on the following evaluation of the proposed amendment against the standards in 10 CFR 51.22(c)(11):

1. *There is no significant change in the type or significant increase in the amounts of any effluents that may be released offsite.*

   Analyses have shown, due to an improved much stiffer composite structural design, the maximum stress values for the NUHOMS®-32P Dry Shielded Canister (DSC) are lower than the values for the existing NUHOMS®-24P DSC. As a result, the structural integrity of the confinement boundary is maintained under the proposed design pressure limit of 100 psig for all specified normal operation, off-normal operation, and accident conditions. Therefore, there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite associated with the proposed amendment.

2. *There is no significant increase in individual or cumulative occupational radiation exposure.*

   Although the thickness of the lead shielding have been reduced for the NUHOMS®-32P design to improve the structural strength, it is compensated by the additional self-shielding provided by the NUHOMS®-32P basket design. The egg-crate basket design of the NUHOMS®-32P results in decreased dose rates for many loading activities, and horizontal storage module locations compared to the NUHOMS®-24P (Reference 1). Therefore, the occupational doses are not significantly increased.

3. *There is no significant construction impact.*

   The proposed changes do not involve construction of any kind. Therefore, there is no significant construction impact associated with the proposed amendment.

4. *There is no significant increase in the potential for or consequences from radiological accidents.*

   As discussed in Item (1) above, due to an improved much stiffer composite structural design, the maximum stress values for the NUHOMS®-32P DSC are lower than the values for the existing NUHOMS®-24P DSC. As a result, the structural integrity of the confinement boundary is maintained under the proposed design pressure limit of 100 psig for all specified normal operation, off-normal operation, and accident conditions. Therefore, there is no significant increase in the potential for or consequences from radiological accidents associated with the proposed amendment.

Conclusion

The proposed amendment supports the NUHOMS®-32P upgrade without impacting safety. We have demonstrated that as a result of the proposed increase in DSC design pressure limit, there is no significant change in the type or significant increase in the amounts of any effluents that may be released offsite, there is no significant increase in individual or cumulative occupational radiation exposure, nor there is a significant increase in the potential for or consequences of radiological accidents. Therefore, the proposed amendment has no impact on the long-term safe storage of spent fuel at the Calvert Cliffs ISFSI, and will not result in an undue risk to the health and safety of the public.

6.0 PRECEDENCE

The NUHOMS®-32PT DSC design which is similar to the NUHOMS®-32P design has been approved by the NRC (Reference 2)

7.0 REFERENCES

1. Letter from G. Vanderheyden (CCNPP) to Document Control Desk (NRC), dated December 12, 2003, License Amendment Request: Revision to the Technical Specifications to Support the ISFSI NUHOMS®-32P Upgrade
2. 10 CFR 72.214, List of Approved Spent Fuel Storage Casks, Certificate Number 1004

ATTACHMENT (3)

TRANSNUCLEAR, INC. PROPRIETARY AFFIDAVIT

AFFIDAVIT

STATE OF NEW YORK }
}
}
}
COUNTY OF WESTCHESTER }

Before me, the undersigned authority, personally appeared Alan Hanson who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Transnuclear, Inc. and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

ALAN HANSON

Sworn to and subscribed
Before me this 7 **day**
of April, 2005

ANNE MARIE CLEARY
Notary Public, State of New York
No. 01CL6001814
Qualified in Westchester County
Commission Expires Jan. 26, 20

(1) I am President of Transnuclear, Inc. and my responsibilities include reviewing the proprietary information sought to be withheld from public disclosure in connection with the licensing of spent fuel transport cask systems or spent fuel storage cask systems. I am authorized to apply for its withholding on behalf of Transnuclear, Inc.

(2) I am making this Affidavit in conformance with the provisions of 10CFR Section 2.790 of the commission's regulations and in conjunction with the Transnuclear application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Transnuclear in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) The following information is furnished pursuant to the provisions of paragraph 10CFR 2.790(b)(4) to determine whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Transnuclear.

(ii) The information is of a type customarily held in confidence by Transnuclear, is not customarily disclosed to the public and is transmitted to the commission in confidence.

(iii) The information sought to be protected is not now available in public sources to the best of our knowledge and belief and the release of such information might result in a loss of competitive advantage as follows:

(a) It reveals the distinguishing aspects of a storage system where prevention of its use by any of Transnuclear's competitors without license from Transnuclear constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a component or material, the application of which secures a competitive economic or technical advantage.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(5) The information is being transmitted to the commission in confidence and, under the provision of 10CFR Section 2.790, it is to be received in confidence by the Commission.

(6) The information sought to be protected is not available in public sources to the best of our knowledge and belief.

(7) The proprietary information sought to be withheld in this submittal is that which is contained in the proprietary version of:

Transnuclear Calculation 1095-34, Revision 3

(8) This information should be held in confidence because it provides details of materials qualification programs that were developed at significant expense. This information has substantial commercial value to Transnuclear in connecting with competition with other vendors for contracts.

The subject information could only be duplicated by competitors if they were to invest time and effort equivalent to that invested by Transnuclear provided they have the requisite talent and experience.

Public disclosure of this information is likely to cause substantial harm to the competitive position of Transnuclear, because it would simplify design and evaluation tasks without requiring a commensurate investment of time and effort.