Calvert Cliffs Nuclear Power Plant

1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

CENG
a joint venture of
Constellation Energy · EDF

CALVERT CLIFFS
NUCLEAR POWER PLANT

June 19, 2012

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Independent Spent Fuel Storage Installation; Docket No. 72-8
Response to Request for Supplemental Information for Amendment Request No. 10 (TAC No. L24608)

REFERENCES:

(a) Letter from G. H. Gellrich (CCNPP) to Document Control Desk, dated December 8, 2011, License Amendment Request: High Burnup NUHOMS-32PHB Dry Shielded Canister and Horizontal Storage Modules

(b) Letter from J. Goshen (NRC) to G. H. Gellrich (CCNPP), dated April 9, 2012, Request for Supplemental Information for Amendment Request No. 10 to Materials License No. SNM-2505 for the Calvert Cliffs Independent Spent Fuel Storage Installation (TAC No. L24608)

Calvert Cliffs submitted a license amendment request (Reference a) to change the Independent Spent Fuel Storage Installation Technical Specifications to support use of newer dry shielded canisters and horizontal storage modules. The Nuclear Regulatory Commission requested supplemental information in Reference (b). Responses to the request for supplemental information are contained in Attachment (1).

One of the Transnuclear, Inc. calculations (Enclosure 3) contains information that is proprietary to Transnuclear, Inc. Therefore, it is accompanied by an affidavit (Attachment 2) signed by Transnuclear, Inc., the owner of the information. 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 2.390(b)(4). Accordingly, it is requested that the information proprietary to Transnuclear, Inc. be withheld from public disclosure. A non-proprietary version of the calculation is provided in Enclosure 4 for public disclosure.

This supplemental information does not change the environmental assessment provided in Reference (a) and the categorical exclusion set forth in 10 CFR 51.22(c)(11) is still valid. There are no regulatory commitments identified in this letter.

NM5526

Should you have questions regarding this matter, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

Christopher R. Costanzo

Christopher R. Costanzo
Plant General Manager

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

I, Christopher R. Costanzo, being duly sworn, state that I am Plant General Manager - Calvert Cliffs Nuclear Power Plant, LLC (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.

Christopher R Costanzo

Subscribed and sworn before me, a Notary Public in and for the State of Maryland and County of Calvert, this 19 day of June, 2012.

WITNESS my Hand and Notarial Seal:

Wendy L Hunter

Notary Public
Wendy L. Hunter
NOTARY PUBLIC
Calvert County, Maryland
My Commission Expires 1/8/2014

My Commission Expires:

Date

CRC/PSF/bjd

Attachments: (1) Response to Request for Supplemental Information for Amendment Request No. 10
Enclosures: 1 NUH32PHB.0101, Revision 2
NUH32PHB-0403, Revision 0
NUH32PHB-0407, Revision 0
Calculation 1095-38, Revision 0
2 NUH32PHB-0400, Revision 1
3 **Proprietary** - NUH32PHB-0201, Revision 0
4 Non-Proprietary - NUH32PHB-0201, Revision 0
5 The File Listing for 2 DVDs Containing ANYSY Data Files
(2) Proprietary Affidavit for NUH32PHB-0201, Revision 0

cc: J. Goshen, NRC

(Without Enclosures 3 and 5)
N. S. Morgan, NRC
W. M. Dean, NRC
Resident Inspector, NRC
S. Gray, DNR
C. Haney, NMSS

ATTACHMENT (1)

RESPONSE TO REQUEST FOR SUPPLEMENTAL INFORMATION FOR AMENDMENT REQUEST NO. 10

Calvert Cliffs Nuclear Power Plant, LLC
June 19, 2012

ATTACHMENT (1)

RESPONSE TO REQUEST FOR SUPPLEMENTAL INFORMATION FOR AMENDMENT REQUEST NO. 10

RSIs

1.0 GENERAL

1-1 Provide revised Updated Final Safety Analysis Report (UFSAR) pages that identify and discuss and incorporate the new NUHOMS®-32PHB Dry Storage Canister (DSC) and Horizontal Storage Module (HSM) designs. Additionally, provide the 10 CFR 72.48 evaluations that are applicable and provide the basis for the revised UFSAR pages.

The information provided in Attachment 1 of LAR 2505-10 does not provide an acceptable level of detail required by the staff to perform its detailed evaluation. Specifically, the submittal should provide a detailed explanation of the designs, along with detailed discussions of the similarities and differences to previous designs evaluated and approved by the staff. There should be detailed discussions of specific design basis events applicable to the new systems along with narratives of how the calculations support the licensee's conclusions.

This information is required per 10 CFR 72.24.

CCNPP Response 1-1:

As described in Reference 1 we may not have clearly characterized the nature of our original request. We are requesting approval of only the Technical Specification changes described in Reference 2. The differences between our current licensing basis and the proposed DSC, transporter and horizontal storage module (HSM-HB) designs are evaluated under 10 CFR 72.48 and certain aspects do not require prior Nuclear Regulatory Commission (NRC) approval. These aspects were not included in Reference 2 and the information is not required. The current version of the 10 CFR 72.48 evaluation is an internal plant document and is available for review on-site.

Revised Updated Safety Analysis Report (USAR) pages have not yet been developed and are not provided. Note that 10 CFR 72.70(c)(6) requires that updates to the final safety analysis report be filed with the Commission every 24 months after the initial license is granted. Additionally, 10 CFR 72.70(c)(5) requires that the update include all changes implemented up to a maximum of six months prior to the date of filing. The proposed DSC, associated transporter and HSM-HB are not scheduled for implementation (use) until 2014. Therefore, the USAR update is not required to be developed and submitted to the NRC until at least the fall of 2014.

5.0 STRUCTURAL EVALUATION

5-1 Provide detailed design information for the new NUHOMS®-32PHB DSC and HSM designs.

The staff finds that, "approval for a new Nutech Horizontal Modular Storage (NUHOMS®)-32PHB design is being requested." Other than the statements such as, "The proposed NUHOMS®-32PHB DSC design is similar to the NUHOMS®-32P DSC design currently in use at Calvert Cliffs," and "The HSM-HB is similar to the horizontal storage module HSM-H with flat stainless steel heat shields described in the Updated Final Safety Analysis Report [UFSAR] for the standardized NUHOMS System, Appendix P and [for the] NUHOMS®HD System," the application does NOT include technical justifications or evaluations against normal conditions, off normal conditions, and design basis accident conditions inherent in dry storage service.

For example, staff noted the following materials which are needed for a license amendment were not included in the application:

- *drawings specific to the 32PHB canister and HSM*
- *detailed information on the new 1X12 array pad*

- *the effects of normal conditions, off normal conditions, and design based accident conditions on the new 32PHB canister and HSM*

The application should contain content consistent with NUREG-1567 to ensure information that is needed to perform a detailed evaluation is provided. Certain information in NUREG-1567 may not be applicable as long as a reasonable justification is provided for exclusion in the application. Also, the staff notes that certain information regarding this amendment application may have been approved under a general certificate of compliance, and may be directly applicable. If this is the case, specific references to the approved design may be used provided they include the exact application, revision, configuration, etc. and how they correspond to the specifics of this amendment application to facilitate the review of the application.

This information is required per 10 CFR 72.24.

CCNPP Response 5-1:

As described in Reference 1 we may not have clearly characterized the nature of our original request. We are requesting approval of only the Technical Specification changes described in Reference 2. The differences between our current licensing basis and the proposed DSC, transporter and horizontal storage module (HSM-HB) designs are evaluated under 10 CFR 72.48 and certain aspects do not require prior Nuclear Regulatory Commission (NRC) approval. These aspects were not included in Reference 2 and the information is not required.

5-2 Provide analyses justifying acceptability for a 40-year storage lifetime for the new NUHOMS® 32PHB DSC and HSM designs.

The staff is currently completing its evaluation of Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI) license renewal for a period of an additional 40 years. The licensee provided no detailed evaluation or justification for the acceptability of 40-year storage time for the new designs.

This information is required per 10 CFR 72.24.

CCNPP Response 5-2:

As identified in Reference 2, the design of the HSM-HB and the proposed DSC are very similar to the existing HSM and DSCs. The existing HSM and DSCs are discussed in Reference 3, and were the subject of the NRC staff evaluation for license renewal for the ISFSI. The physical differences between the existing HSM and DSC and the proposed ones are shown below.

The HSM-HB module design is similar to the design of the existing HSMs. The HSM-HB design was reviewed against Table 3.4-1 in Attachment (1) of Reference 3. The following differences were noted:

- The HSM-HB has a thicker roof (3 feet 8 inches vs. 3 feet) but is made of the same material as the existing HSMs. The existing HSMs have been evaluated for aging management effects and an aging management program is required to manage the effects from the environment. Given the materials and service are the same, this conclusion reasonably applies to the concrete structure of the HSM-HB. The aging management program can also be applied to the new HSM-HBs when they enter an extended period of operation.
- The door is inset in DSC opening, with increased thickness but is made of the same material as the original door. The existing door has been evaluated for aging management effects and an aging management program is required to manage the effects of the environment. Given the materials and service are the same, this conclusion reasonably applies to the door of the HSM-HB. The

aging management program can also be applied to the new HSM-HB doors when they enter an extended period of operation.

- Slotted plates and holes in the DSC support rails are used, and are made of the same material as the original support rails. The existing support rails have been evaluated for aging management effects and an aging management program is required to manage the effects of the environment. Given the materials and service are the same, this conclusion reasonably applies to the support rails in the HSM-HB. The aging management program can also be applied to the new support rails when they enter an extended period of operation.
- Inlet vents use attenuation pipes attached to the inside of the bird screen which are the same material as the original HSM ventilation air openings. While the attenuation pipes are included for ALARA dose reduction, their presence is not credited in the safety analyses for the HSM-HB, and therefore, they do not add a new intended function for the ventilation air openings. The existing ventilation air openings have been evaluated for aging management effects. That evaluation determined that there were no aging management effects that required aging management activities to address. Given the materials and service are the same, this conclusion reasonably applies to the attenuation pipes in the HSM-HB.

The proposed DSC design is similar to the design of the existing DSC. The proposed DSC and contained fuel designs were reviewed against Table 3.2-1 and Table 3.3-1 in Attachment (1) of Reference 3. The following differences were noted:

- The fixed neutron absorber plate material is different. Borated aluminum alloy was evaluated for aging management activities as part of the ISFSI license renewal. The proposed DSC uses an aluminum boron carbide metal matrix composite core clad in aluminum for the neutron absorber plate. Accelerated corrosion testing has shown that this material has good corrosion resistance in simulated pressurized water reactor spent fuel pool water. Furthermore, the maximum assembly neutron source-term for the proposed DSC is only about 60% higher than that allowed for the existing design, so the Reference 3, Appendix B conclusion that depletion of the boron in the absorber plates would be negligible over a 60 year period continues to apply. Since the design of the proposed DSC basket is the same, the environment of the absorber plate material is the same, i.e., sheltered. No aging management activities were determined necessary for the neutron absorber plate material. Given that the materials are similar and the service is the same, this conclusion reasonably applies to the neutron absorber plate in the proposed DSC.
- Solid aluminum rails are used to support the fuel basket. The existing rails are also aluminum (although not solid) and were evaluated for aging management activities as part of ISFSI license renewal. That evaluation determined that there were no aging management effects that required aging management activities to address. Given the materials and service are the same, this conclusion reasonably applies to the solid rails in the proposed DSC.
- In addition to fuel with Zircaloy-4 cladding, the proposed DSCs may also contain fuel with Zirlo or M5 cladding. Both of these cladding alloys show superior performance compared to Zircaloy-4 in the areas of waterside corrosion and hydrogen pick-up during operation. Therefore, they are expected to perform as well or better than Zircaloy-4 clad fuel in the inert storage environment inside the proposed DSC.

Note that the proposed DSC and HSM-HB are not constructed yet and have not seen the 20 years of service assumed during the license renewal review for the existing HSM structure and DSCs. Furthermore, the duration of operation of the HSM-HB modules under the proposed period of extended operation of the Calvert Cliffs ISFSI will not exceed the 40 years already approved for nearly identical

components under the NUHOMS General License (Reference 4). Finally, regardless of their service life, Calvert Cliffs intends to include the HSM-HB and proposed DSCs in the ISFSI Aging Management Program described in Reference 3. This includes placing those components into the next lead canister inspection as noted by NUREG-1927, Appendix E.

5-3 Provide an explanation of why structural calculations provided by Calvert Cliffs in LAR 2505-9 have not been superseded by the supplied TN Calculation NUH32PHB-0212, "CCNPP-FC Transfer Cask Structural Evaluation - Accident Conditions, 7SG Side Drop and 7SG Top End Drop Cases."

The staff has previously reviewed and evaluated the calculations provided by CCNPP in LAR 2505-9. The staff approved that amendment which revised CCNPP's original structural accident analysis basis methodology. After an initial review of TN Calculation NUH32PHB-0212 it appears methodology previously evaluated by the staff in SNM 2505, Amendment No. 9 was not utilized in LAR 2505-10.

This information is required per 10 CFR 72.24.

CCNPP Response 5-3:

The reason that the calculations approved in Amendment 9 have not been superseded is that we continue to use the DSC that was the subject of those calculations. Therefore, those design basis calculations need to be maintained for the Amendment 9 DSC design. Additionally, note that the LS-DYNA calculations that were the source of the staff effort in Amendment 9 were performed to provide input to structural calculations determining the effect of a DSC drop on the fuel, and did not supersede the results of prior structural calculations for the transfer cask components. The calculation provided in Reference 2 (NHU32PHB-0212) addresses the effect of a DSC drop on the transfer cask.

5-4 Provide justification or evaluation of how the use of the new transporter that will be used in loading campaigns for the new NUHOMS®32PHB DSC does not affect the structural design basis assumptions used in transportation events.

LAR 2505-10 identified a new type of transporter that will be used to transport the NUHOMS®-32PHB DSCs. The licensee provided no justification that this does not change the current CCNPP ISFSI design basis assumptions.

This information is required per 10 CFR 72.24.

CCNPP Response 5-4:

As described in Reference 1 we may not have clearly characterized the nature of our original request. We are requesting approval of only the Technical Specification changes described in Reference 2. The differences between our current licensing basis and the proposed DSC, transporter and horizontal storage module (HSM-HB) designs are evaluated under 10 CFR 72.48 and certain aspects do not require prior Nuclear Regulatory Commission (NRC) approval. These aspects were not included in Reference 2 and the information is not required.

6.0 THERMAL EVALUATION

6-1 Provide the information identified in NUREG-1567, Sections 6.4 and 6.5.

Providing the application in a format that follows this guideline versus just providing individual calculation packages will assist the staff to provide a timely, detailed technical review. LAR 2505-10 requests the staffs approval of the use of new HSM-HBs and NUHOMS®-32PHB DSCs. However,

details of the HSM-HB and NUHOMS-32PHB DSCs design were not provided in the application. The application should include sufficient information to ensure that a thermal evaluation can be completed. Without this information identified in NUREG-1567, Sections 6.4 and 6.5, the staff cannot begin to perform a thermal evaluation for the following requests to:

- *Upgrade portions of the Calvert Cliffs ISFSI to allow use of the prefabricated HSM-HBs for future expansion,*
- *Approve a new NUHOMS®-32PHB canister design and a new modular high burnup horizontal storage module for use at the Calvert Cliffs ISFSI,*
- *Increase the number of horizontal storage modules allowed to be installed within the existing ISFSI site from 120 to 132,*
- *Approve the modified or new Technical Specifications (TS): 3.1.1(5) , 3/4.3.2, 3/4.3.3, and 3/4.4.1.*

For example, Sections 6.4 .1, 6.4.2, 6.4.3, 6.4.4, 6.4.5, 6.5.1, 6.5.2. 6.5.3. 6.5.4, and 6.5.5 are relevant considering that the amendment is based on: 1 new fuel content (high burnup fuel) with increased maximum fuel assembly heat loads, 2 a new dry shielded canister, 3 a new modular high burnup horizontal storage module, 4 an increased number of horizontal storage modules, 5 modified or new TS: 3.1.1(5), 3/4.3.2, 3/4.3.3, and 3/4.4.1.

This information is required per 10 CFR 72.24 and 72.56.

CCNPP Response 6-1:

As described in Reference 1 we may not have clearly characterized the nature of our original request. We are requesting approval of only the Technical Specification changes described in Reference 2. The differences between our current licensing basis and the proposed DSC, transporter and horizontal storage module (HSM-HB) designs are evaluated under 10 CFR 72.48 and certain aspects do not require prior Nuclear Regulatory Commission (NRC) approval. These aspects were not included in Reference 2 and the information is not required.

NUREG-1567, Sections 6.4, Acceptance Criteria and 6.5, Review Procedures, provide guidance to the staff of the NRC for reviewing applications for license approval or renewal for commercial ISFSIs. The NUREG is laid out for a new application and contains guidance for reviewing the applicants Final Safety Evaluation Report. Our request (Reference 2) is not for the approval of a new design, therefore, much of the requested information exceeds that necessary to address the proposed Technical Specification changes. NUREG-1567, Sections 6.4 and 6.5 address: 1) decay heat removal for normal, off-normal and accident conditions in the canister, transporter and storage module, 2) material temperature limits for fuel cladding and other materials important to safety, 3) thermal loads and environmental conditions for the site, and 4) analysis methods and calculations. This information was provided in Reference 2 to extent that it was needed to support the specific Technical Specification change requested.

6-2.a Provide the documents for the following references listed in Calculation No. NUH32PHB-0408, Revision 1:

Design Criteria Document, "Design Criteria Document (DCD) for the NUHOMS® 32PHB System for Storage", Transnuctear, Inc., Document No. NUH32PHB.0101 , Rev. 2.
Calculation, "Thermal Evaluation of NUHOMS® 32PHB DSC for Storage and Transfer Conditions", Transnuclear, Inc., Calculation No. NUH32PHBM0403, Rev. 0.
Calculation, "Fuel Effective Thermal Properties for 32PHB DSC Design", Transnuclear, Inc., Calculation No. NUH32PHB·0407. Rev. 0,

Calculation, "Effective Fuel Properties for Vacuum Drying", Transnuclear, Inc., Calculation No. 1095-38, Rev. 0.

CCNPP Response 6-2.a:

The following documents are contained in Enclosure 1.

NUH32PHB.0101, Revision 2
NUH32PHB-0403, Revision 0
NUH32PHB-0407, Revision 0
Calculation 1095-38, Revision 0

6-2.b Provide the document for the following reference listed in Calculation No. NUH32PHB-0401, Revision 1:

Calculation, "Benchmarking of the ANSYS Model of the OS200FC Transfer Cask", Transnuclear, Inc., NUH32PHB-0400, Rev. 1.

CCNPP Response 6-2.b:

This calculation (NUH32PHB-0400, Revision 1) is contained in Enclosure 2.

6-3.c Provide the document for the following reference listed in Calculation No. NUH32PHB-0402, Revision 0:

Calculation, "NUHOMS®-32PHB Weight Calculation of DSC/TC System", Transnuclear, Inc., NUH32PHB-0201, Rev. 0

This information is required per 10 CFR 72.24.

CCNPP Response 6-2.c:

The requested calculation (NUH32PHB-0201, Revision 0) is contained in Enclosures 3 (proprietary version) and 4 (non-proprietary version).

9.0 CONFINEMENT EVALUATION

9-1 Provide adequate detailed information to support a confinement evaluation of the changes to the CCNPP ISFSI.

LAR 2505-10 requests the staff's approval of the use of new HSM-HBs and NUHOMS®-32PHB DSCs. However, details of the HSM-HB and NUHOMS®-32PHB DSCs design were not provided in the application. The application should include sufficient information to ensure that a confinement evaluation can be completed. Please refer to the guidance in Chapter 9 of NUREG-1567 (especially Sections 9.4 and 9.5). This should be considered when determining the extent of information necessary for the staff to perform a confinement evaluation. For example, Sections 9.4.4, 9.5.1, 9.5.2, 9.5.4, etc. are relevant considering that the amendment is based on high burnup fuel and on a new dry shielded canister. Drawings defining "top shield plug closure weld" and "top closure confinement weld" would also aid in understanding the confinement boundary.

This information is required per 10 CFR 72.24.

CCNPP Response 9-1:

See CCNPP Response 9-2.

9-2 Specify the helium leak rates (i.e., 10^{-7} ref-cc/sec) of the entire confinement boundary, including longitudinal and circumferential shell welds, shell to baseplate weld, base metal, etc.

Section 3.0 (J) of LAR 2505-10, Attachment (1) states that a radio nuclide confinement analysis was not provided because the canister is "leaktight". The application then specifies that the helium leak rate for the NUHOMS®-32PHB DSC top shield plug closure weld and the siphon and vent port cover welds would be limited to 10^{-7} ref-cc/sec. However, the acceptable leak rates of longitudinal and circumferential shell welds, shell to baseplate weld, base metal, etc., were not specified in the application, and using this method of certifying leak-tightness applies to the entire boundary.

This information is required per 10 CFR 72.24.

CCNPP Response 9-2:

The procurement specification for the proposed DSC requires that the boundary welds meet a leak rate sufficient to be considered "leaktight" in accordance with Interim Staff Guidance 5, Confinement Evaluation. As described in Interim Staff Guidance 5, no additional confinement evaluation is required.

Observations

S-1 Provide the ANSYS data files identified in Table 1 of Calculation No.: NUH32PHB-0212, Revision 1.

These files may be necessary to perform a detailed review of the model input assumptions and values and to validate the results of the analysis. Additionally, the staff may perform independent confirmatory analyses, and the data files would facilitate that effort.

CCNPP Response S-1:

The requested ANSYS data files are contained in Enclosure 5.

T-1 Provide the ANSYS input and output data files and the Excel data files identified in:

Tables 8-2 and 8-3 of Calculation No. NUH32PHB-0408, Revision 1,
Table 8-2 of Calculation No. NUH32PHB-0406, Revision 2,
Table 8-2 of Calculation No. NUH32PHB-0401, Revision 1,
Tables 8-1 and 8-3 of Calculation No. NUH32PHB-0402, Revision 0.

These files may be necessary to perform a detailed review of the model input assumptions and values and to validate the results of the analysis. Additionally the staff may perform independent confirmatory analyses, and the data files are necessary to facilitate that effort. Also provide the ANSYS output files (e.g. .rth) associated with the above calculations. The staff specifically prefers text-based files with an appropriate level of comments to allow for a timely technical review.

CCNPP Response T-1:

The requested ANSYS input and output data files are contained in Enclosure 5.

T-2 Provide CCNPP's evaluation of the potential issues identified in NRC Information Notice 2011-10: "Thermal Issues Identified During Loading of Spent Fuel Storage Casks" ADAMS Accession No. ML111090200.

CCNPP Response T-2:

Information Notice 2011-10 was evaluated in accordance with our operating experience program. The evaluation was performed considering our existing loading processes and DSC designs. While enhancements were identified based on this operating experience, no Technical Specification or calculational gaps were identified. The enhancements were entered into our corrective action program.

T-3 Evaluate the effect on local air temperature at the ISFSI due to the addition of 12 HSMs to a total of +132, as well as the increase in decay heat for the new HSM-HB and NUHOMS®-32PHB-DSCs. Also address how this local air temperature change will potentially impact the decay heat removal of the currently licensed HSMs and the newly requested HSM-HBs on the ISFSI pad if, for example, a wind gust were to blow hotter local air near the ISFSI into one of the HSM or HSM-HB cooling vents.

The staff needs to understand how the local air temperature immediately around the ISFSI HSMs has been impacted by the HSMs licensed for the ISFSI, as well as how the local air temperature will be impacted by increasing the number of HSMs and increasing the decay heat within the newly requested HSM-HB. The staff also needs to determine how the local air temperature change will impact the decay heat removal of the currently licensed HSMs and the newly requested HSM-HBs if the local air were blown into the HSM or HSM-HB cooling vents.

CCNPP Response T-3:

The ambient air flows into the HSM cavity through the inlet vents located on the bottom of the side wall and the hot air leaves the HSM through the outlet vents located at the top of the side walls towards the gap between the roof slabs of the adjacent HSMs. There is an elevation difference of 14 ft between the inlet vent and the roof of the HSM.

For the HSM-HB, the air intake is located on the front wall of the HSM-HS and the hot air leaves the HSM-HB through the outlet vents located at the top of the HSM-HB roof with a direction perpendicular to the intake airflow direction. There is an elevation difference of 18.5 ft between the inlet vent and the roof of the HSM-HB.

Due to the elevation differences and directions of inlet and outlet vents, the effect of local hot air exiting the HSM / HSM-HS vents is concentrated at the top of HSM /HSM-HB roofs and will be dispersed by any wind gust upwards such that it is unlikely to impact the air temperature at the intakes of HSM / HSM-HB. Further, the decay heat from each DSC is dissipated to the HSM/HSM-HB cavity air by convection such that the heat dissipation from the HSM/HSM-HB walls is small and its effect on local air temperature is insignificant.

It should be noted that the HSM and HSM-HBs are installed in separate rows such that the higher decay heat from HSM-HB cannot affect the performance of HSM. The thermal evaluation of the HSM-HB considers that each HSM-HB is loaded with the maximum allowable heat load such that no heat dissipation occurs through the side and back walls. This assumption bounds the effect of adjacent HSM-HBs on the evaluated HSM-HB. The same assumptions were considered for evaluation of the existing HSMs.

T-4 The staff has identified that Pressurized Water Reactors that utilize Westinghouse CaskWorks software may have been provided faulty computer files. The specific files are used as the source for

the isotopes and elements for SCALE that may have been referencing Boiling Water Reactor light element values in NUREG/CR-5625 Table 3.11. Provide confirmation whether this is applicable to the Calvert Cliffs ISFSI. Provide confirmation if the error in question is incorporated into any version(s) of CaskWorks software that has been or will be used at the Calvert Cliffs ISFSI and how the error will be corrected. Describe all types of situations where CaskWorks software has been and will be used at the Calvert Cliffs ISFSI. Provide confirmation if any casks have been or will be loaded using the CaskWorks software at the Calvert Cliffs ISFSI. If this error is part of any versions(s) of CaskWorks software that has been or will be used at the Calvert Cliffs ISFSI, describe how this error impacts: 1) the confinement releasable source term for loaded casks that are not leaktight, 2) criticality calculations, 3) shielding calculations, 4) thermal decay heat calculations and component temperatures, and indirectly impacts 5) materials and 6) structural. Also confirm if the confinement, criticality, shielding, and thermal calculations are bounding with this error. Modify the appropriate calculations / model files, sections of the application, and TS if the results are not bounding.

CCNPP Response T-4:

Calvert Cliffs does not use the Westinghouse CaskWorks software for demonstrating compliance with ISFSI Technical Specifications during the fuel selection process or performing any other safety-related analysis.

CR-1 Provide justification for using value added pellets (VAP) as the bounding fuel lattice in the calculational analysis performed in Section 6.4 of NUH32PHB-0600.

*The staff identified discussion in Section 6.4.2 of NUH32PHB-0600 that specified that the inward configurations for the VAP and AREVA fuel lattices were more reactive than the centered configurations. However, Table 6.4.4 only shows the effects of changing borated water density for the VAP fuel lattice. Staff recognizes that the optimum guide tube results in Table 6.4-3 show a difference of two sigma (2*σ) between the two fuel lattices. However based on the density curve in Table 6.4-4 given for VAP, the applicant has not demonstrated that the AREVA fuel would not yield a higher k-effective for the water densities shown in the table.*

CCNPP Response CR-1:

Table 6.4-11 of NUH32PHB-0600 runs cases from VF=0.7 to 0.8 for both VAP and AREVA fuel at the limiting poison plate height and slot width. It demonstrates that VF=0.75 is the peak density for both fuel types, and demonstrates VAP is the more reactive lattice throughout that water density range.

It should also be noted that a similar comparison between the three CE 14x14 assembly types was performed for the Calvert Cliffs Unit 1 and 2 spent fuel pools. That evaluation, which is described in Section 9.7.2.1 of the Calvert Cliffs UFSAR, also came to the conclusion that Westinghouse VAP fuel is more reactive than similarly enriched Westinghouse standard fuel and AREVA fuel.

CR-2 The staff noticed that Section 6.4.3 of NUH32PHB-0600 provides a B_{10} areal density 23.4 mg/cm^2 that was used in previous calculations. For the current criticality the areal density was increased to 24.3 mg/cm^2 to achieve sufficient margin. The staff requests justification for the licensee's method of increasing the areal density to achieve margin (assumed by decreasing reactivity) and whether that is considered to be conservative.

CCNPP Response CR-2:

It is good engineering practice to provide physical means that increase safety margin. The proposed DSC design was altered to increase the areal density of boron in the plates used for criticality control in the DSC. In this case, the areal density of the B_{10} in the plate in the proposed DSC was set at 27.0 mg/cm^2. This provides additional margin to the upper subcritical limit (USL). Since we are only allowed to credit up to 90% of the specified areal density in the calculations, we used 24.3 mg B_{10}/cm^2 in the calculations. Note that sensitivity studies were done using an areal density of 23.4 mg B_{10}/cm^2. Final calculation cases were performed that show that 24.3 mg B_{10}/cm^2 areal density provided acceptable results with margin (below the USL).

CR-3 Provide justification for the use of multiple upper subcritical limits (USLs) in evaluating spacing effects identified in Section 6.4.3 of NUH32PHB-0600 regarding the evaluation of transfer cask drop accidents. As part of this evaluation, the spacing between the rods was varied to account for potential defamation of fuel rods. However, the licensee specified multiple USLs as a function of spacing between rods. The staff requires that the referenced analysis used to support this method be provided.

CCNPP Response CR-3:

Only the limiting USL of 0.9410 is utilized in NUH32PHB-0600 (Reference 2, Enclosure 2). Section 6.5.2 of NUH32PHB-0600 (pages 27-28) provides the basis for selecting 0.9410 as the limiting value. The NUH32PHB-0603 calculation (Reference 2, Enclosure 3) provides the detailed basis for the USL functions used in Table 6.5-1 of NUH32PHB-0600, with one of the function specifically addressing rod pitch.

REFERENCES

1. Letter from G. H. Gellrich (CCNPP) to Document Control Desk (NRC), dated March 29, 2012, Supplemental Information re: License Amendment Request: High Burnup NUHOMS-32PHB Dry Shielded Canister and Horizontal Storage Modules
2. Letter from G. H. Gellrich (CCNPP) to Document Control Desk (NRC), dated December 8, 2011, License Amendment Request: High Burnup NUHOMS-32PHB Dry Shielded Canister and Horizontal Storage Modules
3. Letter from G. H. Gellrich (CCNPP) to Document Control Desk (NRC), dated September 17, 2010, Site-Specific Independent Spent Fuel Storage Installation (ISFSI) License Renewal Application
4. NUH-003, Updated Final Safety Analysis Report for the Standardized NUHOMS Horizontal Modular Storage System for Irradiated Nuclear Fuel, Revision 10, Transnuclear, Inc.

ATTACHMENT (2)

PROPRIETARY AFFIDAVIT FOR NUH32PHB-0201, REVISION 0

Calvert Cliffs Nuclear Power Plant, LLC
June 19, 2012

AFFIDAVIT PURSUANT
TO 10 CFR 2.390

Transnuclear, Inc.)
State of Maryland) SS.
County of Howard)

I, Jayant Bondre, depose and say that I am a Vice President of Transnuclear, Inc., duly authorized to execute this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.390 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought is contained in a calculation as listed below:

- Calculation "NUHOMS® 32PHB Weight Calculation of DSC/TC System", Calculation Number NUH32PHB-0201, Revision 0.

This document has been appropriately designated as proprietary.

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

Pursuant to the provisions of paragraph (b) (4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1) The information sought to be withheld from public disclosure involves portions of a calculation related to the design and analysis of dry spent fuel storage systems, which are owned and have been held in confidence by Transnuclear, Inc.

2) The information is of a type customarily held in confidence by Transnuclear, Inc. and not customarily disclosed to the public. Transnuclear, Inc. has a rational basis for determining the types of information customarily held in confidence by it.

3) Public disclosure of the information is likely to cause substantial harm to the competitive position of Transnuclear, Inc. because the information consists of descriptions of the design and analysis of dry spent fuel storage systems, the application of which provide a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Transnuclear, Inc., take marketing or other actions to improve their product's position or impair the position of Transnuclear, Inc.'s product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

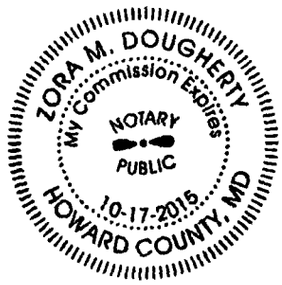
Further the deponent sayeth not.

Jayant Bondre
Vice President, Transnuclear, Inc.

Subscribed and sworn to me before this 15th day of June, 2012.

Notary Public

My Commission Expires 10/17/2015



ENCLOSURE 5

The File Listing for 2 DVDs Containing ANYSY Data Files

These DVDs have been provided to J. M. Goshen (NRC, NMSS)

Calvert Cliffs Nuclear Power Plant, LLC
June 19, 2012

Enclosure 5

The File Listing for 2 DVDs Containing ANYSY Data Files

Disk 1

0212 r1, Table 1

- agennuh32phbcaskmod4.zip
  - agennuh32phbcaskmod4.macro
- agennuh32phbcaskmod4lim.zip
  - agennuh32phbcaskmod4lim.macro
- arunnuh32phbcaskmod4limsd.zip
  - arunnuh32phbcaskmod4limsd.macro
- nuh32phbcaskmod4.zip
  - nuh32phbcaskmod4.db
  - nuh32phbcaskmod4.out
- nuh32phbcaskmod4g75sd6.rst
- nuh32phbcaskmod4g75sd6.zip
  - nuh32phbcaskmod4g75sd6.err
  - nuh32phbcaskmod4g75sd6.inp
  - nuh32phbcaskmod4g75sd6.mntr
  - nuh32phbcaskmod4g75sd6.out
- nuh32phbcaskmod4g75top8.rst
- nuh32phbcaskmod4g75top8.zip
  - arunnuh32phbcaskmod4.macro
  - nuh32phbcaskmod4g75top8.db
  - nuh32phbcaskmod4g75top8.inp
  - nuh32phbcaskmod4g75top8.out
- nuh32phbcaskmod4lim.zip
  - nuh32phbcaskmod4lim.inp
- postqnuh32phbcaskpathmod4.zip
  - postqnuh32phbcaskpathmod4.inp
  - postqnuh32phbcaskpathmod4.macro

Enclosure 5

The File Listing for 2 DVDs Containing ANYSY Data Files

Disk 2

NRC Request

0401 r1, Table 8-2
- 32PHB_HLZC2.MAC
- 32PHB_Mat1.inp
- 32PHB_Model.zip
  - 32PHB_Model.db
- 32PHB_TC_PP_LFC.inp
- 32PHB_TC_RAD_Horizontal.inp
- 32PHBTC_Mat.inp
- CCNPP-FC-TC.zip
  - CCNPP-FC-TC.db
- HTOT_HCL.MAC
- HTOT_VPL.MAC
- Macro.mac
- MassFlow_ConvCoeff_32PHB_29.6kw.xls
- Pressure Drop-CCNPP-FC-TC.xls
- Results.mac

0402 r0, Table 8-1, 8-3
- Table 8-1
  - CCNPP-FC-TC.zip
    - CCNPP-FC-TC-db
- Table 8-3
  - 32PHB_TC_PP.inp
  - 32PHB_TC_PP_FIRE.inp
  - 32PHB_TC_PP_PF.inp
  - 32PHB_TC_PP_VERT.inp
  - 32PHB_TC_RAD_Horizontal.inp
  - 32PHB_TC_RAD_Vertical.inp
  - 32PHBTC_Mat3.inp
  - 32PHBTC_Mat.inp
  - CCNPP-FC TC-material Prop.xls
  - Fire History.xls
  - Gamma_Gap_32PHB-TC-2.xls
  - Gamma_Gap_32PHB-TC.xls
  - HTOT_FIRE.MAC
  - HTOT_HCL.MAC
  - HTOT_VCL.MAC
  - HTOT_VPL.MAC

0406 r2, Table 8-2
- 32PHB_HLZC3.MAC
- 32PHB_HLZC4.MAC
- 32PHB_Mat1.inp
- 32PHB_Model.zip
  - 32PHB_Model.db
- 32PHB_TC_PP_23kw.inp
- 32PHB_TC_PP_26kv.inp
- 32PHB_TC_RAD_Horizontal1.inp
- 32PHB_TC_RAD_Horizontal.inp
- 32PHBTC_Mat.inp
- CCNPP-FC-TC.zip
  - CCNPP-FC-TC.db
- HTOT_HCL.MAC
- HTOT_VPL.MAC
- Marco.mac
- Results.mac

0408 r1, Tables 8-2, 8-3
- Table 8-2
  - 32PHB_HLZC2.MAC
  - 32PHB_HLZC2A.MAC
  - 32PHB_Mat1N.zip
    - 32PHB_MAT1H.inp
    - 32PHB_MAT1N.inp
  - 32PHB_Model.zip
    - 32PHB_Model.db
  - Macro.mac
  - Results.mac

- Table 8-3
  - 32PHB_VDY.xls
  - 32PHB_VDY_R-1.xls