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Constellation Energy
Nuclear Generation Group

June 15, 2009

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
License Amendment Request: Allow Increased Burnup Fuel to be Loaded into NUHOMS-32P Dry Shielded Canister

Pursuant to 10 CFR 72.56, the Calvert Cliffs Nuclear Power Plant, Inc. hereby requests an amendment to Materials License No. SNM-2505 by incorporating the changes described below into the Technical Specifications for the Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI).

The supply of fuel assemblies meeting the current fuel storage requirements in the ISFSI Technical Specifications will be exhausted by the end of 2009. In order to continue with ISFSI loading operations, Calvert Cliffs is requesting several changes to the ISFSI Technical Specifications to allow fuel with a higher burnup to be stored. These changes would expand the gamma and neutron source allowed for selected fuel assemblies, increase the burnup limit for fuel assemblies, and change the allowable air temperature rise in the horizontal storage module. No physical changes to the dry shielded canister or the horizontal storage module are proposed.

The environmental assessment and technical basis for this proposed change are provided in Attachment (1). Marked-up Technical Specification pages are provided in Attachment (2). Attachments (4) through (11) contain calculations provided to support the technical basis described in Attachment (1).

The proposed amendment to the Calvert Cliffs ISFSI Technical Specifications has been reviewed by our Plant Operations Review Committee. They concluded that implementing this license amendment will not result in an undue risk to the health and safety of the public.

Two Transnuclear, Inc. calculations (Attachments 7 and 9) that support our technical basis contain information proprietary to Transnuclear, Inc. Therefore, they are 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 requested that the information that is proprietary to Transnuclear, Inc. be withheld from public disclosure. The non-proprietary versions of these calculations (Attachments 8 and 10) are included for public disclosure.

NMSS01
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The fuel assemblies meeting storage requirements of the current ISFSI Technical Specifications are expected to be transferred to the Calvert Cliffs ISFSI by late 2009. Future transfers will require approval of this proposed amendment. In order to maintain appropriate space in the Unit's spent fuel pools, we must load fuel in 2010. Therefore, we request approval of this change by June 1, 2010.

Should you have questions regarding this matter, please contact Mr. Jay S. Gaines at (410) 495-5219.

Very truly yours,

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

I, James E. Spina, 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 County, this 15 day of June, 2009.

WITNESS my Hand and Notarial Seal:

Notary Public

Wendy L. Hunter
NOTARY PUBLIC
Calvert County, Maryland
My Commission Expires 01/01/10

My Commission Expires: 01/01/2010
Date

JAS/PSF/bjd

Attachments:

(1) Evaluation of the Proposed Change
(2) Marked Up Technical Specification Pages
(3) Transnuclear, Inc. Proprietary Affidavit
(4) CCNPP Calculation, "Source Terms for ISFSI 32P Burnup Extension," Document No. CA06721, Revision No. 0
(5) CCNPP Calculation, "Loading and Transfer Dose Rates for ISFSI 32P Burnup Extension," Document No. CA06750, Revision No. 0
(6) CCNPP Calculation, "Horizontal Storage Module Dose Rates for ISFSI 32P Burnup Extension," Document No. CA06751, Revision No. 0
(7) Proprietary Transnuclear, Inc. Calculation, "NUHOMS® 32P CE 14x14 Fuel Cladding Strength Under Accident Side Drop Conditions," Document No. NUH32P+.0201, Revision No. 1
(8) Nonproprietary Transnuclear, Inc. Calculation, "NUHOMS® 32P CE 14x14 Fuel Cladding Strength Under Accident Side Drop Conditions," Document No. NUH32P+.0201, Revision No. 1
(9) Proprietary Transnuclear, Inc. Calculation, "End Drop Structural Evaluation of CE 14x14 Fuel Assembly in a 32P+ DSC," Document No. NUH32P+.0202, Revision No. 1
(10) Nonproprietary Transnuclear, Inc. Calculation, "End Drop Structural Evaluation of CE 14x14 Fuel Assembly in a 32P+ DSC," Document No. NUH32P+.0202, Revision No. 1
(11) Transnuclear, Inc. Calculation, "Thermal Analysis of NUHOMS® 32P+ DSC for Vacuum Drying Condition," Document No. NUH32P+.0401

cc: J. M. Goshen, NMSS

(Without Attachments 7 & 9)
D. V. Pickett, NRC
S. J. Collins, NRC
Resident Inspector, NRC
S. Gray, DNR
M. F. Weber, NMSS
E. W. Brach, NRC

ATTACHMENT (1)

EVALUATION OF THE PROPOSED CHANGE

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1.0 SUMMARY DESCRIPTION

The supply of fuel assemblies meeting the current fuel storage requirements in the Independent Spent Fuel Storage Installation (ISFSI) Technical Specifications will be exhausted by the end of 2009. Specifically, the current ISFSI Technical Specification burnup limit of 47,000 megawatt-days per metric ton uranium (MWd/MTU) will be insufficient to allow all of the horizontal storage modules (HSMs) currently constructed to be filled. However, there are numerous standard Combustion Engineering, Inc. (CE) 14x14 fuel assemblies in the spent fuel pool with discharge burnups between 46,250 MWd/MTU and 52,000 MWd/MTU. Increasing the burnup limit to 52,000 MWd/MTU would be sufficient to allow more of the HSMs to be utilized.

In order to continue with ISFSI loading operations, Calvert Cliffs Nuclear Power Plant (Calvert Cliffs) is requesting several changes to the ISFSI Technical Specifications to allow fuel with a higher burnup to be stored there. These changes would expand the gamma and neutron sources allowed for selected fuel assemblies, increase the burnup limit for fuel assemblies, and change the allowable air temperature rise in the HSM. No physical changes to the dry shielded canister (DSC) or the HSM are proposed.

This proposed change will allow us to continue loading HSMs in our ISFSI.

2.0 DETAILED DESCRIPTION

The Calvert Cliffs ISFSI is a NUHOMS-24P and NUHOMS-32P dry storage system designed by Transnuclear, Inc. Calvert Cliffs has a site-specific materials license for the ISFSI. The NUHOMS-24P and NUHOMS-32P system uses a reinforced concrete HSM to store fuel that is sealed in a stainless steel DSC. Each DSC holds 24 or 32 spent fuel assemblies depending on its design. 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. Seventy-two HSMs have been built. Forty-eight HSMs were loaded with NUHOMS-24P DSCs, the rest are being loaded with NUHOMS-32P DSCs.

Proposed changes to the Calvert Cliffs ISFSI Technical Specifications are described below and shown on the marked up pages in Attachment (2).

- Technical Specification 2.1, Fuel to be Stored at ISFSI – This Technical Specification ensures that the fuel assembly radiation source is below design values. To accomplish this, the Technical Specification provides limits on the neutron and gamma sources allowed in each fuel assembly. The proposed change would allow an increased neutron and gamma source for fuel assemblies stored in NUHOMS-32P DSCs. The NUHOMS-32P DSC neutron source is increased to 4.175×10^{8} neutrons/sec/assembly to support storage of the higher burnup fuel. A new gamma source for the NUHOMS-32P DSC of 1.61×10^{15} MeV/sec/assembly is added to allow fuel that reaches the Technical Specification Limiting Condition for Operation (LCO) 3.1.1(5) assembly thermal limit with a minimum cooling time of seven years to be loaded. The existing gamma source specification is reworded to indicate its applicability only to NUHOMS-24P canisters.
- LCO 3.1.1(3), Fuel to be Stored at ISFSI – This Technical Specification ensures that the fuel assemblies stored in the DSCs meet the design requirements of the canisters. One of the design requirements stated in this Technical Specification is the maximum assembly average burnup limit allowed for the stored fuel. The current burnup limit is 47,000 MWd/MTU. This limit applies to the NUHOMS-24P and NUHOMS-32P DSCs. The proposed change would increase maximum allowable assembly average burnup to 52,000 MWd/MTU for the NUHOMS-32P DSCs. The maximum assembly average burnup limit for the NUHOMS-24P DSCs would remain the same.

- LCO 3.4.1.1, Maximum Air Temperature Rise – This Technical Specification limits the air temperature rise from the HSM inlet to the outlet. This provides assurance that the fuel is being adequately air cooled while in the HSM. The proposed amendment would raise the allowable air temperature rise from the HSM inlet to the HSM outlet from 60°F to 64°F.

No physical changes to the NUHOMS-32P DSC, the transfer cask, or the HSMs are proposed. All of the major steps for loading a DSC, such as vacuum drying and welding are the same for the NUHOMS-32P DSC containing the higher burnup fuel as for the NUHOMS-32P DSC containing fuel currently approved. No changes to the standard CE 14xl4 fuel assembly physical dimensions, weight, maximum allowable thermal source (0.66 kW/assembly) or maximum initial enrichment (4.5 wt% ^{235}U) allowed to be stored in the ISFSI are being proposed.

3.0 TECHNICAL EVALUATION

A. Revision to Technical Specification 2.1

Addition of Design Basis New Gamma Source Term

Limiting Condition for Operation 3.1.1 currently limits the fuel to be loaded in the ISFSI to CE 14x14 assemblies with a maximum initial enrichment not to exceed 4.5 weight percent ^{235}U, assembly average burnup not to exceed 47,000 MWd/MTU, heat output not to exceed 0.66 kW, and a minimum cooling time as specified in the ISFSI Updated Safety Analysis Report (USAR). Technical Specification 2.1 permits fuel not specifically meeting the requirements of LCO 3.1.1 for maximum burnup and post-irradiation time to be stored if it meets the minimum cooling time listed in the Calvert Cliffs ISFSI USAR Table 9.4-1 and the neutron and gamma source requirements of this specification. An evaluation was performed (Attachment 4) that determined that an assembly gamma source strength of 1.61×10^{15} MeV/sec would bound the standard CE 14x14 assemblies in the spent fuel pool for the cooling time required to reach 0.66 kW. The bounding gamma source actually occurs for lower burnup assemblies that reach 0.66 kW with a relatively short cooling time. Table 1 lists the new gamma source spectrum for the NUHOMS-32P DSC using the previously approved 18-group structure. This gamma source was based on an assembly with an enrichment of 4.3 weight percent ^{235}U, a burnup of 40,000 MWd/MTU, and seven years cooling time.

Table 1. Proposed Assembly Photon Source for Extended Burnup NUHOMS-32P DSC

Emean (MeV)	γ/sec	MeV/sec
0.0100	1.12E+15	1.13E+13
0.0250	2.45E+14	6.12E+12
0.0375	3.04E+14	1.14E+13
0.0575	1.96E+14	1.13E+13
0.0850	1.31E+14	1.11E+13
0.1250	1.33E+14	1.67E+13
0.2250	1.15E+14	2.59E+13
0.3750	5.92E+13	2.22E+13
0.5750	2.00E+15	1.15E+15
0.8500	2.73E+14	2.32E+14
1.2500	8.94E+13	1.12E+14
1.7500	1.88E+12	3.28E+12
2.2500	4.62E+11	1.04E+12
2.7500	1.71E+10	4.70E+10
3.5000	2.13E+09	7.46E+09
5.0000	5.48E+06	2.74E+07
7.0000	6.31E+05	4.42E+06
9.5000	7.26E+04	6.90E+05
Total	4.67E+15	1.61E+15

Changing the existing gamma source to apply to NUHOMS-24P

This is an administrative change and has no safety impact. The existing gamma source has a notation added to show that it applies only to the NUHOMS-24P DSCs. The added gamma source will be applicable to the NUHOMS-32P DSCs. All of DSCs loaded through 2009 meet the more restrictive gamma source term irrespective of whether they are NUHOMS-24P or NUHOMS-32P DSCs.

Revision of the existing neutron source term

Limiting Condition for Operation 3.1.1 currently limits the fuel to be loaded in the ISFSI to CE 14x14 assemblies with a maximum initial enrichment not to exceed 4.5 weight percent, assembly average burnup not to exceed 47,000 MWd/MTU, heat output not to exceed 0.66 kW, and a minimum cooling time as specified in the ISFSI Updated Safety Analysis Report (USAR). Technical Specification 2.1 permits fuel not specifically meeting the requirements of LCO 3.1.1 for maximum burnup and post-irradiation time to be stored if it meets the minimum cooling time listed in the Calvert Cliffs ISFSI USAR Table 9.4-1 and the neutron and gamma source requirements of this specification. With the proposed increase in fuel assembly burnup requested by this license amendment request, the allowed neutron source term for this higher burnup fuel must also be increased to ensure it bounds this fuel at the cooling time required to reach 0.66 kW. An evaluation was performed (Attachment 4) that determined that an assembly neutron source strength of 4.175×10^8 neutrons/second would bound the standard CE 14x14 assemblies in the spent fuel pool for the cooling time required to reach 0.66 kW. Note that while the bounding gamma source occurs for assemblies with short times to cool to 0.66 kW, the bounding neutron source occurs for high burnup, low enriched assemblies that take much longer to cool to 0.66 kW. The bounding neutron source was based on an assembly with an initial enrichment of 3.4 weight percent ^{235}U, a 52,000 MWd/MTU discharge burnup, and 16 years decay. Since the 8-group energy spectrum used for the NUHOMS-24P and NUHOMS-32P shielding calculations had only two groups covering the 3-20 MeV energy range, an equivalent but more resolved 44-group energy spectrum used for current shielding analyses was utilized for the NUHOMS-32P DSC neutron dose calculations. This 44-group energy spectrum is provided in Table 2, and a comparison with the previous 8-group energy spectrum is included in Attachment (4).

Table 2. Proposed Assembly Neutron Source for the Extended Burnup NUHOMS-32P

Group	Emin (MeV)	Emax (MeV)	Neutrons/sec	Group	Emin (MeV)	Emax (MeV)	Neutrons/sec
1	1.40E+01	2.00E+01	0.000E+00	20	1.66E+00	1.80E+00	1.640E+07
2	1.20E+01	1.40E+01	7.343E+04	21	1.57E+00	1.66E+00	1.091E+07
3	1.00E+01	1.20E+01	4.500E+05	22	1.50E+00	1.57E+00	9.098E+06
4	8.00E+00	1.00E+01	1.525E+06	23	1.44E+00	1.50E+00	7.771E+06
5	7.50E+00	8.00E+00	1.233E+06	24	1.33E+00	1.44E+00	1.556E+07
6	7.00E+00	7.50E+00	1.648E+06	25	1.20E+00	1.33E+00	1.924E+07
7	6.50E+00	7.00E+00	2.438E+06	26	1.00E+00	1.20E+00	2.992E+07
8	6.00E+00	6.50E+00	3.643E+06	27	8.00E-01	1.00E+00	2.910E+07
9	5.50E+00	6.00E+00	5.460E+06	28	7.00E-01	8.00E-01	1.680E+07
10	5.00E+00	5.50E+00	7.343E+06	29	6.00E-01	7.00E-01	1.678E+07
11	4.50E+00	5.00E+00	1.017E+07	30	5.12E-01	6.00E-01	1.443E+07
12	4.00E+00	4.50E+00	1.330E+07	31	5.10E-01	5.12E-01	3.280E+05
13	3.50E+00	4.00E+00	2.145E+07	32	4.50E-01	5.10E-01	9.839E+06
14	3.00E+00	3.50E+00	2.662E+07	33	4.00E-01	4.50E-01	8.198E+06
15	2.50E+00	3.00E+00	3.467E+07	34	3.00E-01	4.00E-01	1.583E+07
16	2.35E+00	2.50E+00	1.310E+07	35	2.00E-01	3.00E-01	3.838E+03
17	2.15E+00	2.35E+00	1.833E+07	36	1.50E-01	2.00E-01	1.919E+03
18	2.00E+00	2.15E+00	1.456E+07	37	1.00E-01	1.50E-01	1.919E+03
19	1.80E+00	2.00E+00	2.124E+07	38 - 44	1.00E-02	1.00E-01	0.000E+00
						Total	4.175E+08

Additionally, dose rates for design basis conditions were recalculated assuming the increased neutron and gamma source terms for the NUHOMS-32P DSC (Attachments 5 and 6). Independent Spent Fuel Storage Installation Technical Specification dose limits remain satisfied for the HSMs and there are no Technical Specification changes required for a change in dose rates. Dose rates at the ISFSI site fence will remain within the limits of 10 CFR 20.1301 for an individual during loading operations. The effects of both neutron and gamma radiation on the HSM concrete were determined to remain negligible for an extended burnup NUHOMS-32P DSC.

Of the design basis accidents listed in the Calvert Cliffs ISFSI USAR, those potentially impacted by the increased NUHOMS-32P DSC neutron and gamma sources are the transfer cask drop, blockage of HSM air inlets/outlets, and the forest fire event. The evaluation of the impact of the increased neutron and gamma sources (Attachments 5 and 6) determined that the increases in accident dose for these events are minimal and the 10 CFR 72.106 regulatory limit continues to be met.

B. Revision to LCO 3.1.1(3)

Spent fuel assemblies for the NUHOMS-24P or the NUHOMS-32P DSCs currently have to meet a maximum assembly average burnup of not more than 47,000 MWd/MTU. An evaluation has been performed for the NUHOMS-32P DSCs to determine the effect of storing fuel assemblies with an increased assembly average burnup of up to 52,000 MWd/MTU.

As fuel burnup increases, cladding wall thickness may decrease due to in-reactor formation of zirconium oxide or zirconium hydride. For design basis accidents, where the structural integrity of the cladding is evaluated, Reference 1 requires that cladding stress calculations use an effective cladding thickness that is reduced by those amounts (determined via oxide thickness measurements or use of an approved code). Review of oxide measurements for Calvert Cliffs fuel determined that a maximum oxide thickness of 125 microns would be bounding for fuel with a maximum assembly average burnup of 52,000 MWd/MTU. The only NUHOMS-32P design basis accident where structural integrity of the fuel cladding is evaluated is the cask drop event. The integrity of fuel assemblies contained within a NUHOMS-32P DSC, following postulated 75g side and end drops, was analyzed (Attachments 7 and 9). The results confirm that cladding integrity is maintained during these cask drop event accidents for fuel with a maximum assembly average burnup of 52,000 MWd/MTU.

In addition, Reference 1, also places specific limits on peak cladding temperatures for high burnup fuel during normal loading and storage conditions, and off-normal and accident conditions. Reference 1 peak cladding temperature acceptance criteria (in italics) and discussion of how each is met for a NUHOMS-32P DSC is provided below:

1. *The maximum calculated fuel cladding temperature should not exceed 400°C (752°F) for normal conditions of storage and short-term loading operations (e.g., drying, backfilling with inert gas, and transfer of the cask to the storage pad).*

   Both the current design basis steady-state analyses and the transient analyses presented in Attachment (11) demonstrate that peak cladding temperatures do not exceed the more restrictive Reference 1 limit of 752°F for normal storage and short term loading operations.

2. *During loading operations, repeated thermal cycling (repeated heatup/cooldown cycles) may occur but should be limited to less than 10 cycles, with cladding temperature variations that are less than 65°C (117°F) each.*

   For the NUHOMS-32P, Attachment (11) provides a transient evaluation of the blowdown, vacuum drying, and helium backfill process for the NUHOMS-32P DSC which demonstrate that this criteria is satisfied. Backfilling the DSC with helium after the first vacuum drying causes a one-time temperature drop, which is not considered as a repeated thermal cycling. The subsequent re-evacuation of the DSC under helium atmosphere after completion of the leak test does not reduce the pressure sufficiently to decrease the thermal conductivity of helium, and therefore, no significant change in the peak cladding temperature occurs during this second short vacuum drying step.

3. *For off-normal and accident conditions, the maximum calculated fuel cladding temperature should not exceed 570°C (1058°F).*

   The current peak cladding temperature limit for the NUHOMS-24P and NUHOMS-32P DSCs is 1058°F, and off-normal and accident conditions meet this limit. Since the physical design of the NUHOMS-32P DSC, transfer cask, and HSM remain unchanged for this effort, and the maximum assembly heat load Technical Specification limit of 0.66 kW is not being changed, no reanalysis of off-normal or accident peak cladding temperatures was required.

In addition to the transfer cask drop event discussed above, other Calvert Cliffs ISFSI USAR design basis events potentially impacted by the use of fuel assemblies with a higher average burnup are the accidental pressurization event and the DSC leakage event. The accidental pressurization event considers the failure of all fuel rods within a sealed NUHOMS-32P DSC. Evaluation of this event assuming all 32 assemblies in the DSC had an assembly average burnup of 52,000 MWd/MTU demonstrated that the internal pressure of the DSC would remain below the design limit. The DSC leakage event involves a non-mechanistic release to the environment of the gap inventory of Kr-85 fission gas from all fuel rods contained in the DSC. The gap inventory of Kr-85 was increased to account for storage of higher burnup fuel using the current approved American Nuclear Society(ANS)/American National Standards Institute (ANSI)-5.4-82 method (from 5.13% at 47,000 MWd/MTU to 9.35% at 52,000 MWd/MTU). The change in the gap inventory of Kr-85 was found to result in a minimal increase in the DSC leakage accident dose that remained well within the 10 CFR 72.106 regulatory limit.

C. Revision to LCO 3.4.1.1

This ISFSI Technical Specification establishes a air temperature rise limit of less than or equal to 60°F for the existing loaded DSCs. This Technical Specification limit was selected to limit the temperature of the hottest fuel rod stored in any DSC to less than 635°F at a 70°F ambient air temperature. The proposed change will increase this temperature rise limit to 64°F.

The current approved safety analyses for the NUHOMS-32P DSC loaded with fuel meeting the 0.66 kW thermal limit supports this change. These analyses predict a 64°F temperature rise would occur from the HSM inlet to the HSM outlet and demonstrate that the peak fuel cladding temperature is 620°F for a maximum air inlet temperature of 103°F. This is below the peak cladding temperature that forms the basis for this Technical Specification.

Conclusion

The proposed license amendment supports changing the ISFSI Technical Specifications as described above without impacting safety. We have demonstrated that as a result of these proposed changes 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 is there 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.

4.0 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.*

   Revision to Technical Specification 2.1, "Fuel To Be Stored at ISFSI"

   This Technical Specification ensures that the fuel assembly radiation source is below design values. To accomplish this, the Technical Specification provides limits on the neutron and gamma sources allowed in each fuel assembly. The proposed change would allow increased neutron and gamma sources for fuel assemblies stored in NUHOMS-32P dry shielded canisters (DSCs). The proposed revision to this Technical Specification adds a new design basis value. No effluents are released from the Independent Spent Fuel Storage Installation (ISFSI) during operation and the proposed changes have no impact to DSC loading activities. Therefore, there is no significant change in the type or significant increase in the amounts of any effluents that may be released offsite from the proposed revisions to Technical Specification 2.1.

Revision to Limiting Condition for Operation (LCO) 3.1.1(3), "Fuel to be Stored at ISFSI"

Spent fuel assemblies for the NUHOMS-24P or the NUHOMS-32P DSCs currently have to meet a maximum assembly average burnup of not more than 47,000 megawatt-days per metric ton uranium (MWd/MTU). A re-evaluation has been performed for the NUHOMS-32P DSCs to determine the effect of storing fuel assemblies with an increased assembly average burnup of 52,000 MWd/MTU. No effluents are released from the ISFSI during operation and the proposed changes have no impact to DSC loading activities. Therefore, there is no significant change in the type or significant increase in the amounts of any effluents that may be released offsite from the proposed revisions to LCO 3.1.1(3).

Revision to LCO 3.4.1.1, "Maximum Air Temperature Rise"

This ISFSI Technical Specification establishes an air temperature rise limit of less than or equal to 60°F for the existing loaded DSCs. This Technical Specification limit was selected to limit the temperature of the hottest fuel rod stored in any DSC to less than 635°F at a 70°F ambient air temperature. The proposed change will increase this temperature rise limit to 64°F. This new limit does not present a challenge to DSC integrity. No effluents are released from the ISFSI during operation and the proposed changes have no impact to DSC loading activities. Therefore, there is no significant change in the type or significant increase in the amounts of any effluents that may be released offsite from the proposed revisions to LCO 3.4.1.1.

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

Revision to Technical Specification 2.1, "Fuel To Be Stored at ISFSI"

The proposed increase in the assembly neutron and gamma source term results in a minor change in dose rates for some loading and transfer activities and horizontal storage module (HSM) dose locations, but the analysis of the increases shows that dose rates and accumulated dose will remain well below any limit. Therefore, there is no significant increase in individual or cumulative occupational radiation exposure from the proposed revisions to Technical Specification 2.1.

Revision to LCO 3.1.1(3), "Fuel to be Stored at ISFSI"

With regard to fuel assembly average burnup limit increase, evaluations have determined that the increased fuel assembly average burnup limit results in minimal increases in the results of the applicable accident dose analyses and the dose remains well below any limit. The structural integrity of the canisters and fuel has been evaluated for normal operations, off-normal operations, and accident analysis and is shown to be maintained. Therefore, there is no significant increase in individual or cumulative occupational radiation exposure from the proposed revisions to LCO 3.1.1(3).

Revision to LCO 3.4.1.1, "Maximum Air Temperature Rise"

The ISFSI Technical Specification establishes an air temperature rise limit of less than or equal to 60°F for the existing loaded DSCs. This Technical Specification limit was selected to limit the temperature of the hottest fuel rod stored in any DSC to less than 635°F at a 70°F ambient air temperature. The proposed change will increase this temperature rise limit to 64°F. The peak cladding temperature stays below the cladding temperature assumed as the basis for the Technical Specification. Therefore, there is no significant increase in individual or cumulative occupational radiation exposure from the proposed revisions to LCO 3.4.1.1.

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.*

Revision to TS 2.1, "Fuel To Be Stored at ISFSI" and LCO 3.1.1(3), "Fuel to be Stored at ISFSI"

Technical Specification 2.1 ensures that the fuel assembly radiation source is below design values. To accomplish this, the Technical Specification provides limits on the neutron and gamma source terms allowed in each fuel assembly. The proposed change would allow an increased neutron and gamma source term for fuel assemblies stored in NUHOMS-32P DSCs.

The proposed revision to Technical Specification LCO 3.1.1(3) adds a new design basis value. Spent fuel assemblies for the NUHOMS-24P or the NUHOMS-32P DSCs currently have to meet a maximum assembly average burnup of not more than 47,000 MWd/MTU. A re-evaluation has been performed for the NUHOMS-32P DSCs to determine the effect of storing fuel assemblies with an increased assembly average burnup of 52,000 MWd/MTU.

The accident dose for the DSC with the proposed neutron and gamma source terms meets the 10 CFR 72.106 regulatory limit. Therefore, the consequences from a radiological accident are not increased.

Of the events listed in the Calvert Cliffs ISFSI Updated Safety Analysis Report, those potentially impacted by the use of fuel assemblies with a higher average burnup are the transfer cask drop, DSC leakage, accidental pressurization of the DSC, blockage of HSM air inlets/outlets, and the forest fire event. The effect of a higher average burnup and increased neutron and gamma source-terms on each event was evaluated. The results of the evaluations determined that the results would be bounded by the existing evaluations in the ISFSI Updated Safety Analysis Report.

Therefore, there is no significant increase in the potential for or consequences from radiological accidents from the proposed revisions to Technical Specification 2.1 and LCO 3.1.1(3).

Revision to LCO 3.4.1.1, "Maximum Air Temperature Rise"

The ISFSI Technical Specification establishes an air temperature rise limit of less than or equal to 60°F for the existing loaded DSCs. This Technical Specification limit was selected to limit the temperature of the hottest fuel rod stored in any DSC to less than 635°F at a 70°F ambient air temperature. The proposed change will increase this temperature rise limit to 64°F.

Calculations have been completed assuming fuel assemblies at the current and future Technical Specification limits are loaded into a NUHOMS-32P DSC. The evaluation assumes an outside temperature of 103°F and predicted a 64°F temperature rise would occur from the HSM inlet to the HSM outlet. The peak fuel assembly cladding temperature under these conditions is calculated to be 620°F. This is below the peak fuel assembly cladding temperature that forms the basis for this Technical Specification. Therefore, there is no significant increase in the potential for or consequences from radiological accidents from the proposed revision to LCO 3.4.1.1.

5.0 PRECEDENT

The proposed 52,000 MWd/MTU fuel burnup limit proposed for the NUHOMS-32P DSC design is bounded by the 60,000 MWd/MTU limit of the approved NUHOMS®-32PTH DSC design, which is similar to the Calvert Cliffs NUHOMS-32P design, has been approved by the Nuclear Regulatory Commission as part of the license granted to Transnuclear, Inc. Certificate of Compliance 72-1030.

6.0 REFERENCES

1. Spent Fuel Project Office Interim Staff Guidance 11, Revision 3, Cladding Considerations for the Transportation and Storage of Spent Fuel

ATTACHMENT (2)

MARKED UP TECHNICAL SPECIFICATION PAGES

Calvert Cliffs Nuclear Power Plant, Inc.
June 15, 2009

2.0 FUNCTIONAL AND OPERATING LIMITS

2.1 FUEL TO BE STORED AT ISFSI

SPECIFICATION: Any fuel not specifically filling the requirements of Section 3.1 for maximum burnup and post irradiation time may be stored if it meets the minimum cooling time listed in the Calvert Cliffs ISFSI SAR Table 9.4.1 and all the following requirements are met:

Neutron Source Per Assembly (NUHOMS-24P)	≤ 2.23×10^8 n/sec/assembly, with spectrum bounded by Table 3.1-4 of the Calvert Cliffs ISFSI SAR
Neutron Source Per Assembly (NUHOMS-32P)	≤ ~~[illegible]~~ 4.175 x 10^8 n/sec/assembly, with spectrum bounded by Table 3.1-4 of the Calvert Cliffs ISFSI SAR
Gamma Source Per Assembly (NUHOMS-24P)	≤ 1.53×10^{15} MeV/sec/assembly with spectrum bounded by that shown in Table 3.1-4 of the Calvert Cliffs ISFSI SAR
Gamma Source Per Assembly (NUHOMS-32P)	≤ 1.61×10^{15} MeV/sec/assembly with spectrum bounded by that shown in Table 3.1-4 of the Calvert Cliffs ISFSI SAR

APPLICABILITY: This specification is applicable to all spent fuel to be stored in the Calvert Cliffs ISFSI.

ACTION: If the requirements of the above specification are not met, do not load the fuel assembly into a DSC for storage.

3/4.1 FUEL TO BE STORED AT ISFSI

LIMITING CONDITION FOR OPERATION

3.1.1 The spent nuclear fuel to be received and stored at the Calvert Cliffs ISFSI shall meet the following requirements:

(1) Only fuel irradiated at the Calvert Cliffs Units 1 or 2 may be used. (14 x 14 CE type PWR Fuel)

(2) Maximum initial enrichment shall not exceed 4.5 weight percent U-235.

(3) Maximum assembly average burnup shall not exceed 47,000 megawatt-days per metric ton uranium (NUHOMS-24P) or 52,000 megawatt-days per metric ton uranium (NUHOMS-32P).

(4) Minimum burnup shall exceed the minimum specified in SAR Figure 3.3-1. (Applicable only to NUHOMS-24P.)

(5) Maximum heat generation rate shall not exceed 0.66 kilowatt per fuel assembly.

(6) Fuel shall have cooled as specified in ISFSI SAR Table 9.4.1.

(7) Maximum assembly mass including control components shall not exceed 1450 lb.(658 kg).

(8) Fuel shall be intact unconsolidated fuel.

(9) Fuel assemblies known or suspected to have structural defects (other than pinhole leaks) sufficiently severe to adversely affect fuel handling and transfer capability shall not be loaded into the DSC for storage.

APPLICABILITY: This specification is applicable to all spent fuel to be stored in Calvert Cliffs ISFSI.

ACTION: If any fuel does not specifically meet the requirements for maximum burnup and post irradiation time (items 3 & 6 above), confirm to see if the requirements of Section 2.1 are satisfied. If any other requirements of the above specification are not satisfied, do not load the fuel assembly into a DSC for storage.

3/4.4 HORIZONTAL STORAGE MODULE (HSM)

3/4.4.1 MAXIMUM AIR TEMPERATURE RISE

LIMITING CONDITION FOR OPERATION

3.4.1.1 The air temperature rise from the HSM inlet to the HSM outlets shall not exceed 60°F (33.3°C). 64 35.6

APPLICABILITY: Applicable to all HSMs.

ACTION: If the temperature rise is greater than 60°F, (33.3°C) the air inlet and outlets should be checked for blockage. If any blockage is cleared and the temperature rise is still greater than 60°F, (33.3°C) the DSC and HSM cavity shall be inspected, using video equipment or other suitable means. Analysis of the existing conditions shall be performed to confirm that conditions adversely affecting the fuel cladding integrity do not exist. Subsequent actions to return to acceptable conditions such as, providing temporary forced ventilation and/or retrieval of the DSC and verification that an assembly fuel with no more than 0.66 kW was loaded shall be performed. 64 35.6 35.6

SURVEILLANCE REQUIREMENTS

4.4.1.1. The maximum air temperature rise from the HSM inlet to outlets shall be checked at the time the DSC is stored in the HSM, again 24 hours later, and again after 7 days.

4.4.1.2 The HSM shall be visually inspected to verify that the air inlet and outlets are free from obstructions when there is fuel in the HSM. The visual inspection frequency shall be every 24 hours.

ATTACHMENT (3)

TRANSNUCLEAR, INC. PROPRIETARY AFFIDAVIT

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 listed below:

1. Transnuclear, Inc. Calculation No. NUH32P+.0201, "NUHOMS® 32P CE14X14 Fuel Cladding Strength Under Accident Side Drop Conditions," Revision 1, December 8, 2008,

2. Transnuclear, Inc. Calculation No. NUH32P+.0202, "End Drop Structural Evaluation of CE 14x14 PWR Fuel Assembly in a 32P+ DSC," Revision 1, December 8, 2008.

These documents have 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 should be withheld.

1) The information sought to be withheld from public disclosure involves the structural analysis of two spent fuel storage dry shielded canister designs during certain transfer cask drop scenarios, 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) The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.390 with the understanding that it is to be received in confidence by the Commission.

4) The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

5) Public disclosure of the information is likely to cause substantial harm to the competitive position of Transnuclear, Inc. because:

    a) A similar product is manufactured and sold by competitors of Transnuclear, Inc.

b) Development of this information by Transnuclear, Inc. required expenditure of considerable resources. To the best of my knowledge and belief, a competitor would have to undergo similar expense in generating equivalent information.

c) In order to acquire such information, a competitor would also require considerable time and inconvenience related to the development of a design and analysis of a dry spent fuel storage system.

d) The information required significant effort and expense to obtain the licensing approvals necessary for application of the information. Avoidance of this expense would decrease a competitor's cost in applying the information and marketing the product to which the information is applicable.

e) The information involves 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.

f) In pricing Transnuclear, Inc.'s products and services, significant research, development, engineering, analytical, licensing, quality assurance and other costs and expenses must be included. The ability of Transnuclear, Inc.'s competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

Further the deponent sayeth not.

Jayant Bondre
Vice President, Transnuclear, Inc.

Subscribed and sworn to me before this 6th day of May, 2009.

Notary Public

My Commission Expires 10/14/2012