AREVA

May 24, 2012
E-32690

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Subject: Revision 2 to Transnuclear, Inc. (TN) Application for Amendment 3 to Standardized Advanced NUHOMS® Certificate of Compliance No. 1029, Supplemental Information (Docket No. 72-1029; TAC No. L24607)

Based on discussions with the NRC staff, this submittal provides supplemental information for the CoC 1029 Amendment 3 application. Enclosure 2 provides changed UFSAR pages containing information regarding the equation for the determination of fuel assembly decay heat and information regarding design basis source terms. Enclosures 3 and 4 provide a summary listing of files associated with the vacuum drying operation, and the computer files associated with that operation, respectively.

Certain portions of this submittal include proprietary information which may not be used for any purpose other than to support the NRC staff's review of the application. In accordance with 10 CFR 2.390, I am providing an affidavit (Enclosure 1) specifically requesting that you withhold this proprietary information from public disclosure. Enclosure 5 provides a public version of changed proprietary UFSAR pages. Enclosure 4 is entirely proprietary and therefore no public version is provided.

Should the NRC staff require additional information to support review of this application, please do not hesitate to contact Mr. Don Shaw at 410-910-6878 or me at 410-910-6881.

Sincerely,

Jayant Bondre

Jayant Bondre, PhD
Vice President - Engineering

NMSS26
NMSS

TRANSNUCLEAR INC.
7135 Minstrel Way • Suite 300 • Columbia, MD 21045
Tel: 410-910-6900 • Fax: 410-910-6902
www.transnuclear.com

cc: Steve Ruffin (NRC SFST) (cover letter and Enclosures 1, 2, 3, and 4)

Enclosures:

1. Affidavit Pursuant to 10 CFR 2.390
2. Changed Pages for UFSAR Chapter B.5 (proprietary)
3. Listing of Computer Files Contained in Enclosure 4
4. Computer Files Associated with CoC 1029 Amendment 3, Revision 2 (proprietary)
5. Public Version of UFSAR Chapter B.5 pages

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 Enclosures 2 and 4 and is listed below:

- Enclosure 2, Portions of CoC 1029 UFSAR
- Enclosure 4, Certain computer files associated with CoC 1029

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, included in the above referenced document, should be withheld.

1) The information sought to be withheld from public disclosure involves portions of the safety analysis report, and computer files, related to the design 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 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.

[signature]
Jayant Bondre
Vice President, Transnuclear, Inc.

Subscribed and sworn to me before this 24th day of May, 2012.

[signature]
Notary Public

My Commission Expires 10 / 17 / 2015

ZORA M. DOUGHERTY
My Commission Expires
NOTARY PUBLIC
10-17-2015
HOWARD COUNTY, MD

Listing of Computer Files Contained in Enclosure 4

Disk ID No. (size)	Discipline	System/ Component	File Series (topics)	Number of files
DVD-1 (2.51 GB)	**Thermal**	NUHOMS® 32PTH2 Storage Conditions	1-VacuumDrying-32.0 kW – **Directory** Vacuum Drying Thermal Evaluation of 32PTH2 DSC with 32.0 kW heat load	11
DVD-2 (2.51 GB)	**Thermal**	NUHOMS® 32PTH2 Storage Conditions	2-VacuumDrying-37.2 kW – **Directory** Vacuum Drying Thermal Evaluation of 32PTH2 DSC with 37.2 kW heat load	11

Enclosure 5 to TN E-32690

Public Version of UFSAR Chapter B.5 pages

near the AHSM-HS where the dose rates are substantially larger than at the other locations near the AHSM-HS: at the bottom air inlet vents in the front face of the module and air outlet vents on the AHSM-HS roof. The response function that simulates penetration and streaming of source particles to the vent opening on top of the AHSM-HS roof slab is used in the current analysis for ranking sources for the AHSM-HS. The OS200FC TC model allows an estimate of dose rates on the side of the transfer cask. Collectively, these locations are referred to as locations of interest. Source terms with the same source energy structure can then simply be multiplied by the response functions to get the dose rate at the locations of interest. It is also reasonable to expect that if some radiological source results in bounding dose rates at the location of interest, it would result in bounding dose rates at all other locations where dose rates are calculated.

However, shielding evaluations with full scale models may result in dose rates at the locations of interest that differ from those obtained herein using the response function since the ranking of the radiological sources (determination of the source that results in the highest dose rates) is the only concern in the current analysis. Therefore, the simplified shielding models of the OS200FC *TC* and the AHSM-HS employed herein are acceptable for the purpose of determining the fuel assembly BECT parameters resulting in the bounding source.

Response function entries are determined for the important primary gamma energy range of 0.6 MeV to 3.0 MeV since this energy range contributed to more than 98% of the primary gamma dose rates for the zones depicted on Figure B.2.1-1. Neutron response functions are based on the Cm-244 Watt fission spectrum which account for the neutron radiation and the secondary gamma (n,γ) sources. The response functions for both the AHSM-HS and OS200FC TC are presented in Table B.5.5-13 and Table B.5.5-14, respectively. *Detailed results are discussed in Section B.5.4.9.*

B.5.2.2.2 <u>Fuel Qualification Methodology</u>

Fuel qualification is performed to determine acceptable combinations of burnup and enrichment for the spent fuel assemblies as shown in Table B.2.1-6. Radiation sources from each of these burnup and enrichment combinations are calculated using SAS2H/ORIGEN-S and are ranked in the order of their importance to dose rates *using the response functions*. The cooling times employed for these evaluations are such that the resulting fuel assembly satisfies the decay heat limitations per Figure B.2.1-1, including *the* minimum *allowed* cooling time of 5.0 years. Therefore, the calculated cooling times for the ranking of the radiological sources correspond to the minimum required cooling times for fuel assemblies in order to qualify for loading as a function of assembly enrichment and burnup. These sets of radiological sources are converted to sets of dose rates using the response functions. BECT combinations resulting in the largest dose rates are identified and employed in TRITON\T-DEPL depletion models to calculate design basis radiological source terms from four axial exposure regions of the design basis fuel assembly. The design basis radiological source terms calculated with TRITON\T-DEPL models are shown in Table B.5.5-21 through Table B.5.5-23.

The source terms are calculated using a constant cycle specific power of 30 MW to maximize actinide production rate. One day of down time is conservatively assumed in the depletion models. The cobalt concentration used in the various hardware materials and the total for the entire fuel assembly are selected to maximize the gamma source terms. Boron concentration, moderator temperature, and density values are selected in the depletion model to

Decay heat values in watts per fuel assembly are very well represented with an equation of this form:

$$f(Bu,En,T) = P(Bu,En) \times (G \times \exp(-H \times T) + I \times \exp(-J \times T)),$$

where

$$P(Bu,En) = A + B \times Bu + C \times \ln(En) + D \times Bu^2 + E \times \ln(En)^2 + F \times Bu \times \ln(En),$$

and

$$A = -55.1,\ B = 55.4,\ C = 226,\ D = 0.691,\ E = 63.4$$

$$F = -19.7,\ G = 1.75,\ H = 0.483,\ I = 0.310,\ J = 0.022.$$

The variables in $f(Bu,En,T)$ correspond to assembly average burnup in GWd/MTU, assembly average enrichment in wt. % U-235, and cooling time in years. The following are the additional considerations when using the DHE.

- Fitting parameters of the DHE are determined using decay heat data at certain burnup and enrichment combinations. The DHE is only applicable to the burnup and enrichment combinations designated as analyzed regions 1 and 2 only in Chapter 2, Table B.2.1-6.
- Fitting parameters of the DHE are determined using decay heat data corresponding to cooling times in the range of 5 to 32 years. The decay heat values obtained beyond this range of cooling times are not fully validated. However, the DHE results in conservative decay heat values at cooling times greater than 32 years, and the extent of the conservatism increases with cooling times greater than 32 years.
- The DHE can under predict the decay heat values for cooling times between 5.0 to 6.0 years. However, the extent of the under prediction does not exceed 6%, and gradually decreases when the cooling time is 6.0 years. Therefore, a 6% margin should be added to the decay heat values predicted with the DHE.
- The DHE equation results in conservative decay heat values when cooling times are greater than 6.0 years. The extent of conservatism is within 3.0 % for cooling times between 6.0 to 28.0 years.
- The results predicted with the DHE are also applicable to fuel assemblies with control components (CCs).

Proprietary information withheld pursuant to 10 CFR 2.390.

B.5.2.4 Qualification of Fuel Assemblies with Reconstituted Fuel Rods

A reconstituted fuel assembly is defined as a fuel assembly where fuel rods are replaced with fuel or non-fuel (reconstituted) rods and could undergo further irradiation. It is assumed in the shielding analysis that the replacement rods have the same length and outer diameter as the fuel rods they replace. It is assumed when analyzing fuel assemblies with replacement rods undergoing further irradiation, the reconstitution occurred at the end of the first irradiation cycle.

Proprietary information on pages B.5.4-5 and B.5.4-6 withheld pursuant to 10 CFR 2.390.

Table B.5.5-30
Not Used.

Proprietary information on pages B.5.5-31b through B.5.5-31cc withheld pursuant to 10 CFR 2.390.