TRANSNUCLEAR
AN AREVA COMPANY

May 12, 2010
E-29396

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

Subject: TN-68 Updated Final Safety Analysis Report (UFSAR), Revision 5, and 10 CFR 72.48 Summary Report for the Period 05/13/08 to 05/12/10, Docket 72-1027

Reference: Letter from Robert Grubb (TN) to NRC Document Control Desk, "TN-68 Updated Final Safety Analysis Report (UFSAR) Update to Revision 4 per 10 CFR 72.248 and TN-68 Summary Report per 10 CFR 72.48(d)(2) for the Period 12/30/06 to 05/12/08, Docket 72-1027," May 12, 2008 (E-26455)

Pursuant to 10 CFR 72.248, Transnuclear, Inc., (TN) has updated the TN-68 UFSAR to Revision 5. This update incorporates changes implemented by TN pursuant to 10 CFR 72.48, through the date of this letter. Changes are identified with revision bars and italicized text. The changed UFSAR pages are provided as Enclosure 1 and Enclosure 2 for the Proprietary and Non-proprietary versions, respectively. The changed pages are identical except that the UFSAR Cover Sheet indicates "Proprietary" or "Non-Proprietary." UFSAR page change instructions are provided as Enclosure 3.

I certify that this submittal accurately presents changes made since the date of the submittal referenced above.

Also, pursuant to 10 CFR 72.48(d)(2), TN hereby submits the 72.48 summary report for the TN-68 System for the period 05/13/08 to 05/12/10, as Enclosure 4.

Should you have any questions regarding this submittal, please do not hesitate to contact Mr. Donis Shaw at 410-910-6878 or me at 410-910-6881.

Sincerely,

Jayant Bondre, PhD
Vice President - Engineering

cc: Eric Benner (NRC SFST) (5 copies, provided in a separate mailing)

Enclosures:

1. Replacement Pages for the TN-68 UFSAR, Revision 5, Proprietary Version
2. Replacement Pages for the TN-68 UFSAR, Revision 5, Non-Proprietary Version
3. UFSAR Page Replacement Instructions
4. 72.48 Summary Report for the TN-68 System for the Period 05/13/08 to 05/12/10

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NMSS01

NMSS

Enclosure 2 to TN E-29396

Replacement Pages for the TN-68 UFSAR, Revision 5, Non-Proprietary Version

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NON-PROPRIETARY

TN-68 DRY STORAGE CASK UPDATED FINAL SAFETY ANALYSIS REPORT

Transnuclear, Inc.
7135 Minstrel Way, Suite 300
Columbia, Maryland 21045

Rev. *5*, 5/*10*

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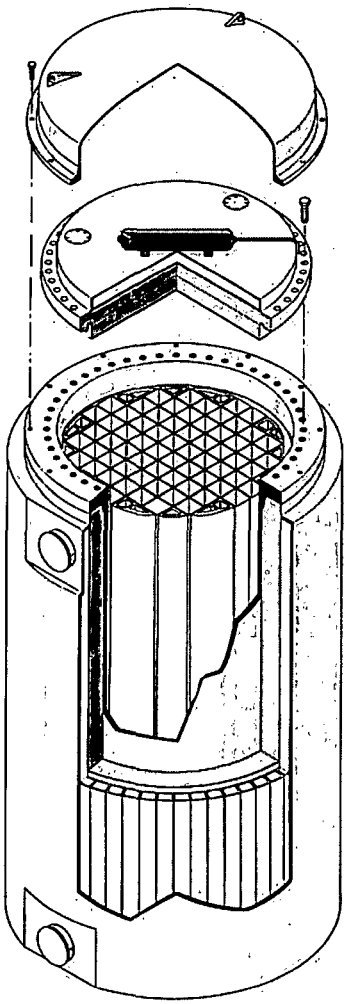

Non-Proprietary

TN-68 DRY STORAGE CASK

UPDATED FINAL SAFETY ANALYSIS REPORT

TRANSNUCLEAR

TN-68 DRY STORAGE CASK

UPDATED FINAL SAFETY ANALYSIS REPORT

Non-Proprietary

4.8 Effective Fuel Properties

4.8.1 Discussion

The finite element models of the TN-68 cask consider the fuel assemblies as a homogenized material occupying the volume within the basket where the fuel assemblies are stored. Effective values for density, specific heat, and thermal conductivity are determined for this homogenized material for use in the finite element models.

The TN-68 cask is capable of handling a variety of intact and damaged spent BWR fuel assemblies. In order to determine conservative thermal properties of the homogenized fuel assembly, all of the BWR fuel assembly types to be stored in the TN-68 cask are studied. The lowest effective thermal conductivity, density, and specific heat of the studied fuel assemblies are selected to apply in the finite element model. Use of these properties would conservatively predict bounding maximum temperatures for the components of the TN-68 cask.

In order to bound the effect of the damaged fuel assemblies on cask components and fuel cladding maximum temperatures, the effective thermal properties of damaged fuel are calculated assuming changes in fuel rod pitch and rupture of fuel rods.

The characteristics of the fuel assemblies to be stored in the TN-68 cask are listed in Table 5.2-1. A channel internal width of 5.278" is considered for all fuel assembly types. The methodology to calculate the effective fuel properties are described in Sections 4.8.3 and 4.8.4. The results are discussed in Section 4.8.5.

4.8.2 Summary of Material Properties

The following properties are considered for UO_2 (fuel pellet) and Zircaloy (fuel cladding) for calculation of the effective fuel properties.

	k	**Cp**	**ρ**	**Emissivity**
Material	**(Btu/hr-in-°F)**	**(Btu/lbm-°F)**	**(lbm/in^3)**	**(---)**
UO_2	*See Table Below*	0.0560 [18]	0.396 [18]	---
Zircaloy	0.6019 [17]	0.0657 [17]	0.237 [18]	0.74 [17]

Temperature, (°F)	*80*	*260*	*440*	*620*	*800*	*980*	*1160*	*1340*
Thermal Conductivity of UO_2 (Btu/hr-in-°F) [26] and [27]	*0.191*	*0.177*	*0.163*	*0.149*	*0.137*	*0.127*	*0.118*	*0.111*

This evaluation is conducted based on un-irradiated UO_2 conductivity of 0.1926 Btu/hr-in-°F taken from Ref. [17]. The effect of using un-irradiated UO_2 conductivity on the maximum fuel cladding temperature is less than 1 °F and considered as insignificant.

The conductivities of helium and air as backfill gas are listed in Section 4.2. The air conductivity is used for vacuum drying conditions. The vacuum drying process generally does not reduce the pressure sufficiently to reduce the thermal conductivity of the water vapor and air in the cask cavity. Therefore, air conductivity is assumed for the backfill gas for vacuum drying conditions and the effect of water vapor conductivity is neglected for conservatism. For other conditions, the conductivity of helium is used for backfill gas.

The measured emissivity of stainless steel is 0.46 [10]. For conservatism, an emissivity of 0.2 is considered for the fuel compartments in calculation of the transverse effective fuel conductivity.

24. Polymerweb, http://www.polymerweb.com/_datash/pp1.html
25. Shoenberger, J. E., Tom, J. G., "Polypropylene Fibers in Portland Cement Concrete Pavements", U.S. Department of Transportation, Final Report, Report # DOT/FAA/RD-92/9, 1992.
26. *K. Minato, et., al., "Thermal Conductivities of Irradiated UO_2 and (U, Gd) O_2 Pellet", Journal of Nuclear Materials, 300 (2002) 57-64.*
27. *C. Ronchi, et., al., "Effect of Burn-up on the Thermal Conductivity of Uranium Dioxide up to 100,000 MWd/t", Journal of Nuclear Materials, 327 (2004) 58-76.*

UFSAR Page Replacement Instructions

Proprietary Version	
Current Page	**Replacement Page**
UFSAR Binder Cover, Rev. 4	UFSAR Binder Cover (no revision indicated)
UFSAR Binder Spine, Rev. 4	UFSAR Binder Spine (no revision indicated)
UFSAR Cover Sheet, Rev. 4	UFSAR Cover Sheet, Rev. 5
Page 4.8-1, Rev. 4	Page 4.8-1, Rev. 5
none	Page 4.8-1a, Rev. 5
Page 4.13-2, Rev. 4	Page 4.13-2, Rev. 5
Non-Proprietary Version	
Current Page	**Replacement Page**
UFSAR Binder Cover, Rev. 4	UFSAR Binder Cover (no revision indicated)
UFSAR Binder Spine, Rev. 4	UFSAR Binder Spine (no revision indicated)
UFSAR Cover Sheet, Rev. 4	UFSAR Cover Sheet, Rev. 5
Page 4.8-1, Rev. 4	Page 4.8-1, Rev. 5
none	Page 4.8-1a, Rev. 5
Page 4.13-2, Rev. 4	Page 4.13-2, Rev. 5

72.48 Summary Report for the TN-68 System for the Period 05/13/08 to 05/12/10

LR 721027-025 Rev. 0

Change Description

Based on NRC Information Notice 2009-23, "Nuclear Fuel Thermal Conductivity Degradation," this licensing review evaluated the impact of irradiated UO_2 pellet conductivity and thermal performance on the TN-68 storage cask.

Evaluation Summary

The TN-68 cask is designed for storage of BWR fuel assemblies. The effective fuel conductivities in the TN-68 cask design are calculated based on ANSYS models using un-irradiated UO_2 conductivity. A sensitivity study was performed to document the effect of calculating the effective fuel assembly conductivities with irradiated UO_2. The effective fuel assembly conductivity, with irradiated UO_2 conductivity considered, is approximately 2% lower than that with un-irradiated UO_2 conductivity at operating temperatures of 800 °F. This sensitivity analysis demonstrated that the effect of fuel conductivity degradation due to irradiation of UO_2 on the maximum fuel cladding temperature is limited to 1 °F.

The internal pressure of the cask cavity is proportional to the average cavity gas temperature. An increase of 1 °F for the cavity gas temperature increases the internal pressure by only 0.1 % for operating temperatures from 300 °F to 800 °F. Therefore, the effect of considering irradiated UO_2 on the cask cavity pressure is insignificant.

The irradiated UO_2 conductivity does not affect the cask structure directly. The impact of the irradiated UO_2 on the thermal stresses of cask shells, and therefore on the structural function is insignificant.

There is no adverse impact on the confinement capabilities of the cask as there are no new leak paths introduced and the effect of irradiated UO_2 on the cavity internal pressures is insignificant, as discussed above.

There is no adverse impact on shielding, as the irradiated UO_2 conductivity does not change the source term limits of the fuel assemblies nor impact the shielding properties of the materials.

There is no adverse impact on criticality. There will be no dispersal or reconfiguration of pellet material. The structure, the geometry, and the neutron absorbing capability of the basket materials remain unaffected by the irradiated UO_2 conductivity.

There is no adverse impact on operations. The temperature limits for operations, such as vacuum drying, remain unaffected. The increase of the maximum fuel cladding temperature for these operations is insignificant. Therefore, there are no required changes to the procedures for loading, unloading, or any other cask handling operations.

These results demonstrated that considering the effects of irradiated UO_2 conductivity does not adversely affect the system design functions and all eight 72.48 evaluation criteria are met.