TRANSNUCLEAR
AN AREVA COMPANY

December 22, 2010
E-30031

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

Subject: Transnuclear, Inc. (TN) Application for the TN-40 Transportation Packaging for Spent Fuel, Revision 13, Docket No. 71-9313, TAC No. L24106

Based on discussions with the NRC Staff, changes have been made to the TN-40 Transportation Application Safety Analysis Report (SAR) in the areas of the lid bolt analysis, top end beam stiffness, and fuel drop analysis.

The changed SAR pages are provided herein as Enclosures 2 and 3, for the proprietary and non-proprietary SAR versions, respectively. Enclosure 1 provides instructions for SAR page removal and insertion.

This submittal includes proprietary information which may not be used for any purpose other than to support your staff's review of the application. In accordance with 10 CFR 2.390, I am providing an affidavit (Enclosure 4) specifically requesting that you withhold this proprietary information from public disclosure.

Should the NRC staff require additional information to support review of this application, please do not hesitate to contact Mr. Donis Shaw at 410-910-6878 or me at 410-910-6930.

Sincerely,

Robert Grubb
Chief Operating Officer

cc: Meraj Rahimi (NRC SFST) (8 copies of this cover letter and Enclosures 1, 2, and 4, provided in a separate mailing)

Enclosures:

1. TN-40 Revision 13 SAR Page Replacement Instructions
2. Changed Pages for the TN-40 Application Safety Analysis Report, Revision 13, Proprietary Version
3. Changed Pages for the TN-40 Application Safety Analysis Report, Revision 13, Non-proprietary Version
4. Affidavit Pursuant to 10 CFR 2.390

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NMSSOL

AFFIDAVIT PURSUANT
TO 10 CFR 2.390

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

I, Robert Grubb, depose and say that I am Chief Operating Officer 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 Enclosure 2 and is listed below:

- Portions of Safety Analysis Report Appendix 2.10.7
- Portions of Safety Analysis Report Appendix 2.10.11

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 certain safety analysis report analyses related to the design of the TN-40 transportation cask, 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 transportation 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.

Robert Grubb
Chief Operating Officer, Transnuclear, Inc.

Subscribed and sworn to me before this 22nd day of December, 2010.

Notary Public

My Commission Expires: 10/17/2011

Enclosure 1 to TN E-30031

TN-40 Revision 13 SAR Page Replacement Instructions

Proprietary Version

Old page	Revision 13 Replacement Page
Cover Page	Cover Page
2.10.7-ii	2.10.7-ii
2.10.7-3	2.10.7-3
2.10.7-6	2.10.7-6
2.10.7-6a	2.10.7-6a
2.10.7-6b	2.10.7-6b
2.10.7-6c	2.10.7-6c
2.10.7-7	2.10.7-7
2.10.7-30	2.10.7-30
2.10.7-37	2.10.7-37
2.10.7-38	2.10.7-38
2.10.11-i	2.10.11-i
New page	2.10.11-ii
2.10.11-4	2.10.11-4
2.10.11-5	2.10.11-5
2.10.11-6	2.10.11-6
2.10.11-7	2.10.11-7
2.10.11-8	2.10.11-8
2.10.11-25	2.10.11-25
2.10.11-27	2.10.11-27
2.10.11-28	2.10.11-28
2.10.11-29	2.10.11-29
New page	2.10.11-30
New page	2.10.11-31
New page	2.10.11-32
New page	2.10.11-33
New page	2.10.11-34
New page	2.10.11-35
7-3	7-3
7-8	7-8
7-11	7-11
7-12	7-12
7-13	7-13
New page	7-13a
New page	7-13b
New page	7-13c
New page	7-13d

Non-proprietary Version

Old page	Revision 13 Replacement Page
Cover Page	Cover Page
2.10.7-1	2.10.7-i
2.10.11-i	2.10.11-i
7-3	7-3
7-8	7-8
7-11	7-11

Enclosure 1 to TN E-30031

TN-40 Revision 13 SAR Page Replacement Instructions

Old page	Revision 13 Replacement Page
7-12	7-12
7-13	7-13
New page	7-13a
New page	7-13b
New page	7-13c
New page	7-13d

Enclosure 3 to TN E-30031

Changed Pages for the TN-40 Application Safety Analysis Report, Revision 13, Non-proprietary Version

NON-PROPRIETARY

TRANSNUCLEAR, INC.

TN-40

TRANSPORTATION PACKAGING

SAFETY ANALYSIS REPORT

Revision 13
December 2010

7135 Minstrel Way, Suite 300 • Columbia, MD 21045

Appendix 2.10.7
STRUCTURAL EVALUATION OF THE FUEL ROD CLADDING UNDER ACCIDENT IMPACT

PROPRIETARY INFORMATION WITHHELD UNDER 10 CFR 2.390

Appendix 2.10.11

PROPRIETARY INFORMATION WITHHELD UNDER 10 CFR 2.390

7.1.2.3 Once within 4 hours of placing the first fuel assembly into the cask. Verify that dissolved boron concentration in the spent fuel pool water and water to be added to the cask cavity is greater than 1800 ppm.

7.1.2.4 Load the pre-selected spent fuel assemblies into the basket compartments.

7.1.2.5 Once prior to closure of cask, verify the identity of each fuel assembly. This verification shall be performed by two independent individuals.

7.1.2.6 To maintain maximum gap requirements, prepare and install the cavity spacer plate in the cask. The nominal dimensions of the spacer plate should be 0.75 in. thick x 71.75 in. O.D.

7.1.2.7 Configure the lid prior to installation so that water may be drained through the drain port and that helium can be used to fill the cask as the water is drained. Using the lift beam and the lid lifting slings, lower the lid onto the cask shell flange over the two alignment pins.

7.1.2.8 Engage the lift beam on the upper (top) trunnions, and lift the cask so that the top of the cask is above the pool water surface, and install some of the lid bolts. The lid bolts should be hand tight.

Note: Throughout this procedure, all bolt threads are to be coated with Nuclear Grade Neolube, Loctite N-5000, or equivalent.

7.1.2.9 Using the drain port in the lid, drain water from the cask and fill the resulting void space with helium. This may be done either before or after lifting the cask out of the pool depending on the maximum lift capacity. If the pool contains borated water, the effects of adding this non-borated water to the pool must be considered. While lifting the cask out of the pool, the exterior of the cask may be rinsed with clean demineralized water to facilitate decontamination.

7.1.2.10 Move the cask to the decontamination area and disengage the lift beam.

7.1.3 Preparation for Transport

Caution: The maximum potential for worker exposure exists during the decontamination of the cask and other operations near the lid, after the water is pumped out of the cask. Worker exposure can be minimized by use of temporary shielding (lead "bean bags," plastic neutron shielding, etc.), and by minimizing the exposure time and maximizing the distance, as well as using any measures to facilitate decontamination.

7.1.3.1 Decontaminate the cask until acceptable surface contamination levels are obtained.

7.2.2.6 Loosen the lid bolts and remove all but six lid bolts, approximately equally spaced.

7.2.2.7 Attach the cask to the crane using a lift beam. Attach the lid lifting equipment.

7.2.2.8 Attach the fill and drain lines to the drain port and the vent port.

7.2.2.9 Ensure that appropriate measures are in place for proper handling of steam. Both fill and drain lines should be designed for a minimum of 100 psig steam, to prevent steam burns and radiation exposures due to a possible line failure.

7.2.2.10 Lower the cask into the spent fuel pool cask pit. Lower the cask until the top surface is just above the water level.

Note: If the maximum lift weight is not exceeded, the cask may be filled with pool water before lowering the cask into the pool or while the cask is partially submerged in the spent fuel pool.

7.2.3 Contents Removal

7.2.3.1 Begin pumping pool or demineralized water into the cask through the drain port, at a rate of 1 gpm, while continuously monitoring the exit-pressure (see Figure 7-2). Continue pumping the water at a rate of 1 gpm for at least 80 minutes. By this time, the water level in the cask will have reached the active fuel length. If the pool contains borated water, the effects of adding non-borated water to the pool must be considered.

7.2.3.2 The flow rate can then be gradually increased, while monitoring the pressure at the outlet. If the pressure gage reading exceeds 55.3 psig, close the inlet valve until the pressure falls below 50 psig. Re-flooding may then be resumed.

7.2.3.3 When the cask is full of water, remove the hoses from the drain and vent ports Remove the remaining six lid bolts.

7.2.3.4 Lower the cask and place it in the cask loading area of the pool.

7.2.3.5 Raise the lift beam from the cask, removing the cask lid. *If the cask contains a cavity spacer plate, remove it also.*

7.2.3.6 Unload the spent fuel assemblies in accordance with the site procedures.

7.2.3.7 At least one lid penetration must be completely open (both port cover and quick-disconnect fitting removed) prior to installation of the lid. Using the lift beam and lid lifting slings, lower the lid placing it on the cask shell flange, over the two alignment pins.

outer shell for transport. The accessible surfaces of the cask shall be visually inspected for evidence of cracks in the carbon steel shell.

This procedure assumes all TN-40 casks that are in storage have lid bolts that are to be replaced with higher strength bolts as shown on the current SAR drawing, 10421-71-1 *and that a cavity spacer plate is installed to minimize the gap between fuel assembly top nozzles and the inner surface of the lid prior to shipping. The nominal dimensions of the spacer plate should be 0.75 in. thick x 71.75 in. O.D.*

7.4.1.1 Verify each fuel assembly in the cask satisfies the loading requirements listed in Certificate of Compliance 9313. This verification shall be performed by two independent individuals.

7.4.1.2 Review the maintenance records of the cask for situations where air may have leaked into the cask while it was in its storage configuration, i.e., while on the storage pad. If air has leaked into the cask while it was in its storage configuration, perform an evaluation prior to transportation of the fuel cladding for potential rod splitting due to exposure to an oxidizing atmosphere using the methodology given in ISG-22.

7.4.1.3 The assigned burnup loading value for each fuel assembly shall be obtained from a source controlled by the site's QA program and traceable to the TOTE or BURNUP output corresponding to when the fuel assembly was discharged from the reactor for the final time.

7.4.1.4 The assigned burnup loading value for each fuel assembly shall be from the TOTE or BURNUP computer codes. The value from these codes shall be reduced by a 1.04 factor to account for burnup uncertainties.

Note: The following steps may be performed at the ISFSI site. However, space and equipment requirements may require all operations to be performed at the plant loading area. The following steps permit either option.

A. Storage Area

7.4.1.5 Disconnect the overpressure system from the monitoring panel. Depressurize the overpressure tank and disconnect the tubing at the protective cover.

Note: The following 4 steps may not be necessary if preparation is done on the storage pad

7.4.1.6 Position the cask transporter over the cask.

7.4.1.7 Engage the lifting arms and lift the cask to the designated lift height.

7.4.1.8 Move the cask to the loading area.

7.4.1.9 Lower the cask down onto the floor, disconnect the cask transporter and remove the transporter from the loading area.

B. Loading Area

7.4.1.10 Remove the protective cover.

7.4.1.11 Remove the overpressure tank assembly, including the overpressure port cover and the top neutron shield.

7.4.1.12 Remove the vent port cover.

7.4.1.13 Collect a cavity gas sample through the vent port quick-disconnect coupling.

7.4.1.14 Analyze the gas sample for radioactive material and add necessary precautions based on the cavity gas sample results.

Note: *If degraded fuel is suspected, additional measures, appropriate for the specific conditions, are to be planned, reviewed, and approved by appropriate site personnel, as well as implemented to minimize worker exposure and radiological releases to the environment. These additional measures may include provision of filters, as well as respiratory protection and other methods to control releases and exposure to ALARA.*

7.4.1.15 In accordance with the site requirements, vent the cavity gas through the vent port until atmospheric pressure is reached.

7.4.1.16 Remove the vent port quick-disconnect and the drain port cover. Attach the vent port adapter and the drain port quick-disconnect, if utilized.

7.4.1.17 Loosen the lid bolts and remove all but six lid bolts, approximately equally spaced.

7.4.1.18 Attach the cask to the crane using a lift beam. Attach the lid lifting equipment.

7.4.1.19 Attach the fill and drain lines to the drain port and the vent port.

7.4.1.20 Ensure that appropriate measures are in place for proper handling of steam. Both fill and drain lines should be designed for a minimum of 100 psig steam, to prevent steam burns and radiation exposure due to a possible line failure.

7.4.1.21 Lower the cask into the spent fuel pool cask pit. Lower the cask until the top surface is just above the water level.

Note: *If the maximum lift weight is not exceeded, the cask may be filled with pool water before lowering the cask into the pool or while the cask is partially submerged in the spent fuel pool.*

7.4.1.22 Begin pumping pool or demineralized water into the cask through the drain port, at a rate of 1 gpm, while continuously monitoring the exit-pressure (see Figure 7-2). Continue pumping the water at a rate of 1 gpm for at least 80 minutes. By this time, the water level in the cask will have reached the active fuel length. If the pool contains borated water, the effects of adding non-borated water to the pool must be considered.

7.4.1.23 The flow rate can then be gradually increased, while monitoring the pressure at the outlet. If the pressure gage reading exceeds 55.3 psig, close the inlet valve until the pressure falls below 50 psig. Re-flooding may then be resumed.

7.4.1.24 When the cask is full of water, remove the hoses from the drain and vent ports. Remove the remaining six lid bolts.

7.4.1.25 Lower the cask and place it in the cask loading area of the pool.

7.4.1.26 Raise the lift beam from the cask, removing the cask lid.

7.4.1.27 Decontaminate the lid as necessary and replace lid, vent port, drain port and OP port seals.

7.4.1.28 Inspect cask sealing surfaces and clean if necessary.

7.4.1.29 Install the cask cavity spacer plate.

7.4.1.30 At least one lid penetration must be completely open (both port cover and quick-disconnect fitting removed) prior to installation of the lid. Using the lift beam and lid lifting slings, lower the lid onto the cask shell flange over the two alignment pins.

7.4.1.31 Engage the lift beam on the upper (top) trunnions, and lift the cask so the top of the cask is above the pool water surface, and install some of the replacement lid bolts. The lid bolts should be hand tight.

Note: *Throughout this procedure, all bolt threads are to be coated with Nuclear Grade Neolube, Loctite N-5000, or equivalent.*

7.4.1.32 Using the drain port in the lid, drain the water from the cask in accordance with procedures. This may be done either before or after lifting the cask out of the pool. While lifting the cask out of the pool, the exterior of the cask may be rinsed with clean demineralized water to facilitate decontamination. If the pool contains borated water, the effects of adding non-borated water to the pool must be considered.

7.4.1.33 Disconnect the drain line.

7.4.1.34 Move the cask to the decontamination area and disengage the lift beam.

7.4.1.35 Install the remaining lid bolts and torque all bolts to 1125 ±25 ft-lb. Follow the torquing sequence shown in Figure 7-1. A circular pattern of torquing may be used after the final pass to eliminate further bolt movement.

7.4.1.36 Remove the plug from the neutron shield vent and reinstall the pressure relief valve, making sure that it is operable and set.

7.4.1.37 Evacuate the cask cavity using the Vacuum Drying System (VDS) to remove the remaining moisture, and verify the dryness as follows:

Remove any excess water from the seal areas through the passageways at the overpressure drain and vent ports.

If it is installed, remove the quick disconnect from the drain port, and install the drain port cover. Torque the bolts to 40 - 44 ft-lbs using the sequence shown in Figure 7-1. Higher torque may be specified if low alloy steel (Grade B7) port cover bolts are used in lieu of stainless steel bolts (Gr B8).

With the vent port quick disconnect removed to improve evacuation, connect the VDS to a flanged vacuum connector installed over the vent port. Purge or evacuate the helium supply lines and evacuate the cask to 4 millibar (4×10^{-4} MPa) or less. Make provisions to prevent or correct any icing of the evacuation lines, if necessary.

Close the valve at the cask and shut off or disconnect the vacuum pump. If, in a period of 30 minutes, the pressure does not exceed 4 millibar (4×10^{-4} MPa), the cask is adequately dried. Otherwise, repeat the vacuum pumping until this criterion is met within 36 hours.

Backfill the evacuated cask cavity with helium (minimum 99.99% purity), to slightly above atmospheric pressure. Then, remove the vacuum connector and immediately install the quick disconnect fitting.

Attach the vacuum/backfill manifold to the vent port fitting, purge or evacuate the helium supply lines, and re-evacuate the cask to below 100 millibar.

7.4.1.38 Isolate the vacuum pump and backfill the cask cavity to approximately 1.5 atm abs (7.4 psig) with helium (minimum 99.99% purity). Note: Equilibrium cavity pressure shall be 2.0 atm abs, maximum)

7.4.1.39 Install the vent port cover. For ports containing quick-disconnects, purge the cavity below the cover with helium. Install the port cover. (A partial pressure of 50% helium under the cover may be assumed for leak test calculations.) Torque the cover bolts to 40 - 44 ft-lb following the torquing sequence shown in Figure 7-1 prior to leak testing. This may be followed by torquing in a circular pattern to verify no motion. Higher torque may be

specified if low alloy steel (Grade B7) port cover bolts are used in lieu of stainless steel bolts (Gr B8).

7.4.1.40 Leak test the lid, vent and drain port cover seals by measuring the leakage of helium into the volume between the concentric metallic seals of the lid, vent and drain ports. The maximum acceptable cask seal leak rate is $1x10^{-4}$ ref cm^3/s. The leakage test shall be performed in accordance with ANSI N14.5 [1] using a method having adequate sensitivity to measure the maximum acceptable leakage rate. Use of a helium spectrometer is the preferred method for this test, although the gas pressure rise test could also be used because of the small volume of the cavity between inner and outer metallic seals. After the leakage test, replace the storage overpressure port cover with the transport overpressure port cover.

7.4.1.41 If the cask does not pass the leakage test, determine and correct the source of the leak. Repeat the leakage test.

7.4.1.42 If the cask still does not pass the leakage test, evaluate the test method or return the cask to the pool and replace the lid and port cover seals.

Note: If a leakage test as described below is to be performed, lower the cask into the base section of the test envelope. Prepare the loading area for conducting a leakage test of the TN-40 packaging. This test is conducted to demonstrate the integrity of the cask containment boundary. Lower the upper portion of the test envelope over the TN-40 and attach it to the lower portion containing the cask. Verify the interface between the two portions of the vessel is sealed. Evacuate the cavity between the cask and the test vessel and perform a leakage test in accordance with ANSI N14.5 [1] using a helium spectrometer with the cask backfill helium as the tracer gas. Verify that the cask containment meets the $1 X 10^{-5}$ ref cm^3/s limit.

Upon successful completion of the leakage test, the leakage test equipment is removed and the preparation process continues as outlined below. Note that this test does not replace the seal leakage test specified above in step 7.4.3.12.

7.4.1.43 Re-engage the lift beam to the upper (top) trunnions of the cask.

7.4.1.44 Move the transport vehicle with transport frame in place into the loading position and prepare the upending/downending frame.

7.4.1.45 Lift the cask, and place the rear trunnions on the rear trunnion supports of the upending/downending frame.

7.4.1.46 Rotate the cask from the vertical to the horizontal position.

7.4.1.47 Using a spreader bar and lifting straps, lift the cask from the upending/downending frame and lower it onto the transport frame

7.4.1.48 Perform a neutron and gamma dose rate survey over the entire surface of the cask to demonstrate the adequacy of the shielding design and to check if the surface dose rates are within the regulatory limits. Check surface contamination levels to verify that levels are within the regulatory limits. Perform an external temperature survey as described in Section 3.4.7 for monitoring thermal performance.

7.4.1.49 Install the tie-down straps.

7.4.1.50 Prior to installing the impact limiters, inspect them visually for damage. The impact limiters may not be used without repair if any wood has been exposed. Damage due to handling other than small dings and scratches must be evaluated for their effect on the performance during the hypothetical drop and puncture accidents.

7.4.1.51 Install the top impact limiter spacer on the front end (lid end) of the cask and then remove the spacer lifting eye bolts.

7.4.1.52 Install the front (top) and the rear (bottom) impact limiters onto the cask. Lubricate the attachment bolts with Loctite N-5000 or an equivalent and torque to 60 - 80 ft-lb in the final pass.

7.4.1.53 Install thirteen impact limiter attachment tie-rods between the front and the rear impact limiters.

7.4.1.54 Render the impact limiter lifting lugs inoperable by covering the lifting holes or installing a bolt inside the holes to prevent their inadvertent use.

7.4.1.55 Install the security seal on one tie-rod and lock sleeve.

7.4.1.56 Install the personnel barrier.

7.4.1.57 Check the temperature on all accessible surfaces to make sure that it is <185°F.

7.4.1.58 Perform a final radiation and contamination survey to satisfy the shield test requirements and to assure compliance with 10 CFR 71.47 and 71.87.

7.4.1.59 Apply appropriate DOT labels and placards in accordance with 49 CFR 172. Prepare the final shipping documentation.

7.4.1.60 Release the loaded cask for shipment.