Certificate of Compliance

FOR DRY SPENT FUEL STORAGE CASKS

10 CFR PART 72

1. a. CERTIFICATE NUMBER: 1005
   b. REVISION NUMBER: 0
   c. PACKAGE IDENTIFICATION NUMBER: USA/72-1005
   d. PAGE NUMBER: 1
   e. TOTAL NUMBER OF PAGES: 3

2. PREAMBLE This certificate is issued to certify that the cask and contents, described in item 5 below, meet the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 72,"Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste."

3. THIS CERTIFICATE is issued on the basis of a safety analysis report of the cask design. Model No.: TN-24

   a. PREPARED BY (Name and Address)

   Transnuclear, Inc.
   Two Skyline Drive
   Hawthorne, NY 10532-2120

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   TN-24 Dry Storage Cask Topical Report

   c. DOCKET NUMBER 72-1005

4. CONDITIONS This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72, as applicable, and the conditions specified below.

Effective Date:
November 4, 1993
Expiration Date:
November 30, 2013

FOR THE NUCLEAR REGULATORY COMMISSION

Charles J. Haughney

Charles J. Haughney, Chief
Storage and Transport Systems Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

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2. PREAMBLE This certificate is issued to certify that the cask and contents, described in Item 5. below, meet the applicable safety standards set forth in 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste."

3. THIS CERTIFICATE is issued on the basis of a review of the safety analysis report (SAR) and the determination that the cask design meets the applicable requirements of 10 CFR Part 72 as discussed in the staff's Safety Evaluation Report (SER).

   SAFETY ANALYSIS REPORT IDENTIFICATION

   Transnuclear, Inc., "TN-24 Dry Storage Cask Topical Report."

   SAFETY EVALUATION REPORT IDENTIFICATION

   U.S. Nuclear Regulatory Commission, "Safety Evaluation Report Related to the Topical Report for the TN-24 Storage Cask Submitted by Transnuclear Inc.," dated July 1989.

4. CONDITIONS This certificate is conditional upon fulfilling the requirements of 10 CFR Part 72 Subpart L, as applicable, and the conditions specified below.

5. CASK

   a. Model No: TN-24

b. Description

The TN-24 cask is designed for the storage and shipment of irradiated fuel assemblies. This certificate addresses spent fuel handling, transfer, and storage on an NRC licensed nuclear reactor site but does not address any use of this cask for offsite transportation of spent fuel.

The TN-24 cask body is a cylinder made of SA-350, Grade LF3 forged steel with a wall thickness of 248 mm (9.75 in.) and a 286 mm (11.25. in.) thick welded closure on the bottom end. The top of the cask is sealed by a lid which is 292 mm (11.5 in.) thick. The cask is 5105 mm (201 in.) long and 2407 mm (94.75 in.) in diameter. When fully loaded, with fuel and water, the cask weighs 103 tonne (113 tons); unloaded it weighs 75 tonne (83 tons).

The cask body has six attachment points for bolt-on trunnions. Four of these are located near the top of the cylindrical steel forging, spaced 90 degrees apart, and are used for lifting the cask. Two trunnion supports, 180 degrees apart, located near the bottom are used when rotating the cask to or from a horizontal position.

The fuel basket is designed to hold 24 PWR fuel assemblies. The basket is made of 11 mm thick copper plated borated stainless steel plates formed into 221 mm square cavities. The spacing of the plates provide water flux traps for criticality control during fuel loading.

A protective cover is bolted to the cask body to provide weather protection for the lid penetrations. The lid uses a double barrier seal system with two metallic O-rings forming the seal. The annular space between the O-rings is maintained above the pressure in the cask to prevent flow into or out of the cask. The TN-24 cask has three containment penetrations; one cask cavity drain, one cask cavity vent, and one interseal overpressure port. Each of these penetrations is in the lid.

Neutrons from the fuel are attenuated by borated polymer material 137 mm (5.38 in.) thick encased in a steel shell on the outside of the cask.

c. Drawing

The TN-24 cask is described by drawings in the TSAR.

d. Basic Components

The Basic Components of the TN-24 cask, that are important to safety, are listed in Section 3.4 of the TSAR.

6. Cask fabrication activities shall be conducted in accordance with the reviewed and approved quality assurance program submitted with the TSAR.

7. Notification of cask fabrication schedules shall be made in accordance with the requirements of §72.232(c), 10 CFR Part 72.

8. Casks of the Model Number TN-24 authorized by this certificate are hereby approved for general use by holders of 10 CFR Part 50 licenses for nuclear reactors at reactor sites under the general license issued pursuant to §72.210, 10 CFR Part 72, subject to the conditions specified by §72.212 and the attached Conditions for Cask Use.

9. Effective Date:
November 4, 1993

Expiration Date:
November 30, 2013

FOR THE NUCLEAR REGULATORY COMMISSION

Charles J. Haughney, Chief
Storage and Transport Systems Branch
Division of Industrial and
Material Nuclear Safety, NMSS

CONDITIONS FOR CASK USE

CERTIFICATE OF COMPLIANCE

72-1005

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TABLES

1.0 INTRODUCTION

These Conditions for Cask Use govern the safety of the receipt, possession, and storage of irradiated nuclear fuel at an Independent Spent Fuel Storage Installation (ISFSI) and the transfer of such fuel between a Nuclear Power Station and its ISFSI.

1.1 GENERAL CONDITIONS

1.1.1 Operating Procedures

Written operating procedures shall be prepared for cask handling, movement, emplacement, surveillance, and maintenance.

1.1.2 Quality Assurance

Activities at the ISFSI shall be conducted in accordance with the requirements of Appendix B, 10 CFR Part 50.

1.2 PREOPERATIONAL CONDITIONS

The user shall not allow the initial loading of spent nuclear fuel in the TN-24 cask until the following preoperational license conditions are satisfied:

(1) A training module shall be developed for the Station Training Program establishing an ISFSI Training and Certification Program which will cover the following:

a. Cask Design (overview)
b. ISFSI Facility Design (overview)
c. Certificate of Compliance Conditions (overview)
d. Fuel loading/unloading and cask handling procedures
e. Abnormal Event Procedures

(2) A training exercise (Dry Run) of cask loading and handling activities shall be held which shall include but not be limited to:

a. Moving a cask in and out of spent fuel pool area.
b. Loading a fuel assembly (using dummy assembly).
c. Cask sealing and cover gas backfilling operations.
d. Moving cask to and placing it on the storage pad.
e. Returning the cask to the reactor spent fuel pool.
f. Unloading the cask assuming fuel cladding failure.
g. Cask decontamination.

2.0 FUNCTIONAL AND OPERATING LIMITS

2.1 FUEL TO BE STORED AT ISFSI

2.1.1 Specification

The spent nuclear fuel to be received and stored at the ISFSI in TN-24 casks shall meet the following requirements:

(1) Only irradiated 14 x 14, 15 x 15, and 17 x 17 PWR fuel assemblies with Zircaloy fuel rod cladding may be used. Total assemblies per cask $\leq$ 24.

(2) Maximum initial enrichment shall not exceed 3.5 weight percent U-235 for fuel stored in the copper plated stainless steel basket, which was reviewed and found acceptable.

(3) Maximum assembly average burnup shall not exceed 35,000 megawatt-days per metric ton uranium and specific power shall not exceed 37.5 MW/MTU.

(4) Maximum heat generation rate shall not exceed 1.0 kilowatt per fuel assembly.

(5) Fuel shall be intact, unconsolidated fuel. Partial fuel assemblies, that is, fuel assemblies from which fuel pins are missing must not be stored unless dummy fuel pins are used to displace an amount of water equal to that displaced by the original pins.

(6) Fuel assemblies known or suspected to have structural defects sufficiently severe to adversely affect fuel handling and transfer capability shall not be loaded into the cask for storage.

(7) A procedure shall be developed for the documentation of the characterizations performed to select spent fuel to be stored in

the casks. Such procedure shall include independent verification of fuel assembly selection by an individual other than the original individual making the selection.

(8) Immediately prior to insertion of a spent fuel assembly into a cask, the identity of the assembly shall be independently verified by two individuals.

2.1.2 Basis

The design criteria and subsequent safety analysis assumed certain characteristics and limitations for the fuels that are to be received and stored. Specification 2.1.1 ensures that these bases remain valid by defining the type of spent fuel, maximum initial enrichment, irradiation history, and maximum thermal heat generation.

2.2 TN-24 DRY STORAGE CASK

2.2.1 Specification

The TN-24 Dry Storage Casks used to store spent nuclear fuel at an ISFSI shall have the operating limits shown in Table 2-1.

2.2.2 Basis

The design criteria and subsequent safety analysis of the TN-24 assumed certain characteristics and operating limits for the use of the casks. This specification ensures that those design criteria are not exceeded.

Table 2-1 TN-24 OPERATING LIMITS

	Operating Limit
Max. Lifting Height without bottom impact limiter	18 inches
Removable Contamination	
. Beta and gamma	$\leq$ 2200 dis/min/100 cm^2
. Alpha	$\leq$ 220 dis/min/100 cm^2
Dose Rate	
. 2 m Distance	$\leq$ 10 mrem/hr
. Surface	$\leq$ 200 mrem/hr
Two Vacuum Drying Procedures	$\leq$ 10 mBar (hold for 30 min.)
Initial Interseal Pressure	5.8 atmospheres $\pm$ 5%
Initial Helium Helium Pressure (Cask Cavity)	2.2 atmospheres $\pm$ 5%
Cask Tightness (at closure): (Standard He-Leak Rate)	
. Primary Cover Seal	$\leq 10^{-6}$ std cc/s
. Pressure Monitoring System	$\leq 10^{-6}$ std cc/s
Max. Specific Power of One Fuel Assembly	1.0 kW

2.3 LIMITING CONDITION - HANDLING HEIGHT

2.3.1. Specification

This specification applies to handling of a cask being used for spent fuel storage outside of the Fuel Building and Crane Enclosure Building. The TN-24 dry storage cask shall not be handled at a height greater than 18 inches without a bottom impact limiter.

2.3.2 Basis

The drop analysis performed for the TN-24 dry storage casks for postulated cask drop incidents on the ISFSI storage pad indicates that the fuel basket and cask body have sufficient ductility and toughness to sustain a drop of 18 inches or less without using an impact limiter without sustaining unacceptable damage to the casks and fuel basket. This limiting condition ensures that the handling height limits will not be exceeded at the storage pad or in transit to and from the reactor.

2.4 DRY STORAGE CASK SURFACE CONTAMINATION

2 4.1 Specification

Initial removable contamination on the dry storage cask shall not exceed 2200 dis/min/100 cm^2 from beta-gamma sources, and 220 dis/min/100 cm^2 from alpha sources.

2.4.2 Basis

Compliance with this limit ensures that the decontamination requirements of 49 CFR 173.443, will be met over the lifetime of the cask in storage.

2.5 DRY STORAGE CASK INTERNAL COVER GAS

2.5.1 Specification

The dry storage cask shall be backfilled with helium to 2.2 atmospheres ± 5%.

2.5.2 Basis

The thermal analysis performed for the dry storage casks assumes the use of helium as a cover gas. In addition, the use of an inert gas (helium) is to ensure long-term maintenance of fuel clad integrity.

2.6 IMPACT LIMITER

2.6.1 Specification

The dry storage cask shall have an upper impact limiter attached during transport and storage. The cask shall not be lifted higher than 18 inches without a lower impact limiter attached. The impact limiters shall be as described in the following letters: E-10843 and E-10867 dated April 29, 1989, E-10929 dated May 25, 1989, and E-10995 dated June 7, 1989.

2.6.2 Basis

The impact limiters will ensure that the cask is not damaged in the unlikely event of a drop or tip over.

3.0 SURVEILLANCE REQUIREMENTS

Requirements for surveillance of various radiation levels, cask internal pressure, contamination levels, cask seal leak rates, and fuel related parameters are contained in this section. These requirements are summarized in Table 3-1 from details contained in Section 3.1 through 3.6.

The specified frequency for each Surveillance Requirement is met if the surveillance is performed within 1.25 times the interval specified in the frequency, as measured from the previous performance. For frequencies specified as "once," the above interval extension does not apply. If a required action requires performance of a surveillance or its completion time requires periodic performance of "once per...," the above frequency extension applies to the repetitive portion, but not to the initial portion of the completion time.

Table 3-1 SURVEILLANCE REQUIREMENTS SUMMARY

Section	Quantity or Item	Period
3.1.1	Cask Seal Testing	L
3.2.1	Cask Contamination	L
3.3.1	Dose Rates	
	Cask surface or up to 2 meters from cask surface	L
	Fence	Q
3.4.1	Safety Status Surveillance	Q
3.5.1	Pressure Monitoring Device Parameters	P & L
3.6.1	Alarm System	A

P - Prior to cask loading
L - During loading operations
Q - Quarterly--At least once per 92 days
A - Annually--At least once per 366 days

3.1 CASK SEAL TESTING

3.1.1 Specification

Prior to storage, the cask must be properly sealed and tested using a standard helium leak test as specified in Section 10.2.2.1 of the TSAR. The initial leak rate shall be less than of 10^{-6} std cc/sec.

3.1.2 Basis

The safety analysis of leak tightness of the cask as discussed in the topical report is based on the seals after 20 years being leak tight to 10^{-6} std cc/s. This check is done to ensure compliance with this design criteria.

3.2 CASK CONTAMINATION

3.2.1 Specification

After cask loading and prior to moving the cask to the storage pad, the cask shall be surveyed to ensure that removable surface contamination levels are less than 2200 dis/min/100 cm^2 from beta-gamma emitting sources, and 220 dis/min/100 cm^2 from alpha emitting sources.

3.2.2 Basis

This surveillance requirement will ensure compliance with the decontamination requirements of 49 CFR 173.443 during storage in the ISFSI.

3.3 DOSE RATES

3.3.1 Specification

The following dose rate measurements shall be made for the ISFSI:

(1) Cask Surface Gamma and Neutron Dose Rates: After completion of cask loading, gamma and neutron measurements shall be taken on the

outside surface (or within 2 meters of the cask surface). The combined gamma and neutron dose rates shall be less than the surface dose rate stated in Table 2-1 (or the specified rate at a distance of up to 2 meters from the cask surface).

(2) Dry Cask ISFSI Boundary: Doses shall be determined by measurement at the Dry Cask ISFSI site fence and shall be evaluated on a quarterly basis to demonstrate compliance with 10 CFR Part 20.

3.3.2 Basis

These measurements are necessary to assure compliance with the cask specifications and that the dose rates at the security fence meet Part 20 limits as additional casks are placed in storage.

3.4 SAFETY STATUS SURVEILLANCE

3.4.1 Specification

A visual surveillance of the ISFSI shall be performed on a quarterly basis to determine that no significant damage or deterioration of the exterior of the casks has occurred. Surveillance shall also include observation to determine that no significant accumulation of debris on cask surfaces has occurred.

3.4.2 Basis

The surveillance requirements shall ensure cask maintenance.

3.5 CASK INTERSEAL PRESSURE

3.5.1 Specification

The cask confinement integrity shall be monitored by use of a pressure monitoring device to verify the leak tightness of the cask. A functional test shall be performed during cask preparation.

3.5.2 Basis

This specification requires the cask cavity atmosphere be maintained and monitored to detect any possible leakage of cask seals.

3.6 ALARM SYSTEM

3.6.1 Specification

An alarm system to which all of the pressure monitoring devices are connected shall be installed at the storage site and functionally tested annually to ensure proper operation of the system.

3.6.2 Basis

The alarm system must be capable of alerting surveillance personnel of possible cask seal failure and must permit identification of the specific cask indicating a seal failure.