[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Part 72

RIN 3150-AH93

List of Approved Spent Fuel Storage Casks: NUHOMS® HD Addition

AGENCY: Nuclear Regulatory Commission.

ACTION: Final rule.

SUMMARY: The Nuclear Regulatory Commission (NRC) is amending its regulations to add the NUHOMS® HD cask system to the list of approved spent fuel storage casks. This final rule allows the holders of power reactor operating licenses to store spent fuel in this approved cask system under a general license.

DATES: The final rule is effective on (**30 days from the date of publication in the Federal Register**).

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SUPPLEMENTARY INFORMATION:

Background

Section 218(a) of the Nuclear Waste Policy Act of 1982, as amended (NWPA), requires that "[t]he Secretary [of the Department of Energy (DOE)] shall establish a demonstration program, in cooperation with the private sector, for the dry storage of spent nuclear fuel at civilian nuclear power reactor sites, with the objective of establishing one or more technologies that the [Nuclear Regulatory] Commission may, by rule, approve for use at the sites of civilian nuclear power reactors without, to the maximum extent practicable, the need for additional site-specific approvals by the Commission." Section 133 of the NWPA states, in part, that "[t]he Commission shall, by rule, establish procedures for the licensing of any technology approved by the Commission under Section 218(a) for use at the site of any civilian nuclear power reactor."

To implement this mandate, the NRC approved dry storage of spent nuclear fuel in NRC-approved casks under a general license by publishing a final rule in 10 CFR Part 72 entitled "General License for Storage of Spent Fuel at Power Reactor Sites" (55 FR 29181; July 18, 1990). This rule also established a new Subpart L within 10 CFR Part 72, entitled "Approval of Spent Fuel Storage Casks," containing procedures and criteria for obtaining NRC approval of spent fuel storage cask designs.

Discussion

On May 5, 2004, and as supplemented on July 6, August 16, October 11, October 28, November 19, 2004; February 18, March 7, April 14, May 20, May 24, August 16, 2005; and January 24, February 15, and September 19, 2006, the certificate holder, Transnuclear, Inc. (TN), submitted an application to the NRC to add the NUHOMS® HD cask system to the list of NRC-approved casks for spent fuel storage in 10 CFR 72.214. The NUHOMS® HD System provides for the horizontal storage of high burnup spent pressurized water reactor fuel assemblies in a Dry Shielded Canister (DSC) that is placed in a horizontal storage module (HSM) utilizing an OS-187H transfer cask (TC). The system is an improved version of the Standardized NUHOMS® System described in Certificate of Compliance (CoC) No. 1004. The NUHOMS® HD System has been optimized for high thermal loads, limited space, and radiation shielding performance. The -32PTH DSC included in this system is similar to the -24PTH DSC submitted for licensing as Amendment No. 8 to the Standardized NUHOMS® System. The -32PTH DSC will be transferred during loading operations using the OS-187H TC. The OS-187H TC is very similar to the OS-197 and OS-197 TCs described in the final safety analysis report for the Standardized NUHOMS® System. The -32PTH DSC will be stored in an HSM, designated the HSM-H. The HSM-H is virtually identical to the HSM-H submitted for licensing as Amendment No. 8 to the Standardized NUHOMS® System. The NRC staff performed a detailed safety evaluation of the proposed CoC request and found that an acceptable safety margin is maintained. In addition, the NRC staff has determined that there continues to be reasonable assurance that public health and safety and the environment will be adequately protected.

The NRC published a direct final rule (71 FR 25740; May 2, 2006) and the companion proposed rule (71 FR 25782) in the Federal Register to add the NUHOMS® HD cask system to the listing in 10 CFR 72.214. The comment period ended on July 17, 2006. Six comment letters were received on the proposed rule. The comments were considered to be significant and adverse and warranted withdrawal of the direct final rule. A notice of withdrawal was published in the Federal Register on July 13, 2006; 71 FR 39520.

Based on NRC review and analysis of public comments, the staff has modified, as appropriate, Technical Specifications (TS) and the Approved Contents and Design Features, for the NUHOMS® HD system. The staff has also modified its preliminary Safety Evaluation Report (SER). In particular, regarding the potential for the dry shielded canister to corrode in a coastal marine environment, TN committed to specifying a weathering steel for Independent Spent Fuel Storage Installations (ISFSIs) located near a coastal marine environment. The staff made corresponding changes to the SER and added a requirement to TS 4.4.1 to capture this commitment for the HSM-H.

The proposed TS and SER have been revised in response to Comment 2. Specifically, based on questions from the staff regarding this issue, TN committed in a September 19, 2006, letter to add the following to Section 3.4.1.4 of the Safety Analysis Report for the NUHOMS HD design: "If an independent spent fuel storage installation site is located in a coastal salt water marine atmosphere, then any load-bearing carbon steel DSC support structure rail components of any associated HSM-H shall be procured with a minimum 0.20 percent copper content for corrosion resistance." This commitment has also been captured in NUHOMS® HD TS 4.4.1 for the HSM-H, and the staff made corresponding changes to SER Section 3.2.1 to document its evaluation.

The NRC finds that the TN NUHOMS® HD cask system, as designed and when fabricated and used in accordance with the conditions specified in its CoC, meets the requirements of 10 CFR Part 72. Thus, use of the TN NUHOMS® HD cask system, as approved by the NRC, will provide adequate protection of public health and safety and the environment. With this final rule, the NRC is approving the use of the TN NUHOMS® HD cask system under the general license in 10 CFR Part 72, Subpart K, by holders of power reactor operating licenses under 10 CFR Part 50. Simultaneously, the NRC is issuing a final SER and CoC that will be effective on **[insert date the rule is effective]**. Single copies of the CoC and SER are available for public inspection and/or copying for a fee at the NRC Public Document Room, O-1F21, 11555 Rockville Pike, Rockville, MD.

Discussion of Amendments by Section

Section 72.214 List of approved spent fuel storage casks.

CoC No. 1030 is added to the list of approved spent fuel storage casks.

Summary of Public Comments on the Proposed Rule

The NRC received six comment letters on the proposed rule. The commenters included representatives from industry and members of the public. Copies of the public comments are available for review in the NRC's Public Document Room, O-1F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland.

Comments on the Transnuclear, Inc., NUHOMS® HD Cask System

Several of the commenters provided specific comments on the NRC staff's preliminary SER and the TS. To the extent possible, the comments on a particular subject are grouped together. The listing of the Transnuclear, Inc., NUHOMS® HD cask system within 10 CFR 72.214, "List of approved spent fuel storage casks," has not been changed as a result of the public comments. A review of the comments and the NRC staff's responses follow:

Comment 1: Three commenters raised issues with using Boral® for criticality control. One commenter pointed to documented widespread evidence of Boral degradation; e.g., in

Spain, Boral was banned from all casks after evidence of Boral's swelling and hydrogen generation was found in laboratory testing, and in the U.S., Boral has exhibited swelling, blistering, and instances of major hydrogen gas generation in dry cask fuel storage applications. Two commenters noted that NRC issued Generic Safety Issue No. 196 to study the Boral degradation problem. Other remarks concerning Boral are noted as follows: (1) The problem has been occurring for 20 to 30 years; (2) Boral problems occur on a random basis, and it is impossible to predict the product's performance because of uncertainty in the level of porosity in the aluminum boron carbide core of the cladded product; (3) Boral was the material choice in past years mainly because there were no economical alternatives; (4) The use of Boral was understandable 10 or even 5 years ago because fully dense metallic neutron absorbers were not commercially available then, but now aluminum alloy-based neutron absorbers with high boron content are produced by several suppliers; (5) Boral is used today only because of its cost savings to the cask supplier, and is it worth putting the health and safety of workers who load the cask at risk; (6) From a metallurgical point of view, the most consistent performance will be demonstrated from an aluminum boron carbide neutron absorbing product which exhibits 100 percent of theoretical density, and only a fully dense neutron absorber will completely eliminate the potential of swelling and hydrogen gas generation phenomenon.

Response: The NRC is aware that canisters containing BORAL™ may generate hydrogen while the canister is submerged in the spent fuel pool during short-term loading operations. This was observed at the Columbia Generating Station in 2002. BORAL™ will react with the spent fuel pool water during loading operations and generate hydrogen. The magnitude of the hydrogen generation could depend on many factors, such as pool water chemistry, batch-to batch variations, time-at-temperature, etc. The hydrogen generation does not decrease the efficacy of the material as a neutron absorber. As is the case with most casks licensed by the NRC, the SAR for the NUHOMS® HD describes hydrogen generation mitigating procedures. Vendors of casks certified by NRC have recommended that the utilities monitor for hydrogen gas during loading operations and state that a purge be used when hydrogen gas concentration exceeds 2.4 percent prior to or during root-pass welding of the lid.

The NRC is aware that BORAL™ can swell or blister under high temperatures and hydrostatic pressures as was observed in Spain. In October 2003, the NRC received a letter from the Empresa Nacional de Residuos Radiactivos, S. A. (ENRESA) concerning this matter in the Spanish cask. However, it is our understanding that the Equipos Nucleares, S.A (ENSA) test conditions, under which blistering was observed, were conducted at high heat-up rates and high hydrostatic pressures, well beyond those for operating conditions for the dry cask storage systems in the U.S. It is also our understanding that the high heat-up rates and hydrostatic pressures did not permit the liquid to drain prior to expanding, thereby leading to blistering. This was due to low porosity of the BORAL™ matrix structure which does not facilitate water egress under the conditions mentioned above. The letter from ENRESA concerning this matter in the Spanish cask and the BORAL™ blistering never stated that BORAL™ has been banned from use in Spain. Note that no U.S. vendors or utilities have reported any BORAL™ blistering during loading operations or manufacturer acceptance testing of a cask.

The staff in the Spent Fuel Storage and Transportation Division have shared data and reports with the staff in the office of Nuclear Regulatory Research concerning GSI-196, BORAL™ degradation. All data, reports, and letters (domestic and foreign) provided to ascertain criticality implications of BORAL™ degradation in the context of dry cask storage of spent fuel have shown that the efficacy was not reduced in BORAL™ used in dry cask storage systems.

Blistering or swelling in BORAL™ has been reported to occur under wet storage conditions in the spent fuel pools at both domestic and foreign reactors. For example, in September 2003, FPL Energy Seabrook, LLC, reported bulging of the BORAL™ coupon used to monitor the performance of the spent fuel pool racks. The bulging of this coupon was due to blistering. FPL's examination and analysis of the coupon indicated no loss in the B-10 areal density.

Neutron attenuation and radiography measurements have been conducted on the BORAL™ test coupons – both seal-welded and vented – subjected to multiple wetting/drying cycles and varying heat-up rates to simulate wet storage and typical cask loading conditions. In the many test reports reviewed by the NRC staff, blistering usually occurred in the low-porosity (low B4C content) coupons. The data reported that the boron-10 areal density in the blistered specimens remained unaffected. Thus, neutron attenuation efficacy was not affected in the BORAL™. Note that the Seabrook licensee, who reported blistering in the BORAL™ coupons after about 7 years of wet storage in the spent fuel pool, reportedly demonstrated no loss of effectiveness as a neutron absorber.

The NRC is aware that other neutron absorber materials are now available to the cask vendors; however, the NRC does not recommend any brand of material to the vendors. To date, tests have shown that the BORAL™ material still performs its intended function with or without the blisters being present.

The NRC staff does not dispute the advantages of the near-theoretical-density neutron absorber materials, which have become available in recent years. However, blistering has not been shown to affect dose to worker involved in the cask loading process. Additionally, if hydrogen gas is detected during the loading operations, the vendors and licensees can use mitigating procedures to vent and purge the cask. This procedure is recommended prior to welding; thus, worker safety can be ensured.

The staff does agree that this problem of blistering and hydrogen generation has not been reported in the absorber materials that have a 100-percent dense matrix. However, the NRC has reviewed evaluations by the Energy Power Research Institute (EPRI) and cask vendors, and for the most part, the boron areal density (10B/cm2) in the blistered specimens remained unaffected. Thus, neutron attenuation was not affected, and there was no impact on BORAL's effectiveness as a neutron absorber.

Comment 2: One commenter stated that the structural steel frame used to support the DSC poses a serious risk to public health and safety. The commenter made the following points: (1) From contact with the air and humidity in the environment, these structurals can corrode from the inside as well as from the outside. Particularly at coastal sites, anything that can corrode will corrode and even stainless develops stress corrosion cracks. (2) The upright tubes make up the only support structure for the fuel-filled canister. They cannot be inspected from the outside of the NUHOMS because they cannot be seen. All primary supports must be inspected periodically, and it is a fatal flaw to have a fuel storage canister perched about 6 feet in the air on top of a steel frame which cannot be inspected at all, and a dangerous sort of design for unrestricted use around our country, including the plants in salt air environments, including those located on the two coasts.

Response: Regarding Part (1), above, it is widely recognized that corrosion is a significant concern in coastal marine environments due to the wind borne salts deposited upon structures. Based on questions from the staff regarding this issue, TN committed in a September 19, 2006, letter to add the following to Section 3.4.1.4 of the Safety Analysis Report for the NUHOMS® HD design: "If an independent spent fuel storage installation site is located in a coastal salt water marine atmosphere, then any load-bearing carbon steel DSC support structure rail components of any associated HSM-H shall be procured with a minimum 0.20 percent copper content for corrosion resistance." This commitment has also been captured in NUHOMS® HD TS 4.4.1 for the HSM-H. Consequently, the TN design incorporates a requirement to use atmospheric corrosion resisting steels (a.k.a., weathering steels) when the spent fuel storage site is near a coastal marine environment.

A significant body of technical literature exists which provides corrosion rate data for a variety of steel alloys exposed to the elements at coastal sites. From this data, TN recognized that weathering steels provide ample corrosion resistance in a coastal marine atmosphere. This corrosion resistance would assure that the accumulated corrosion loss over a 20-year license period would be immaterial to the structural integrity of the support steel inside the HSM-H.

It should be noted that the data used to determine the required corrosion allowance are for samples fully exposed to the elements. It is known that samples which are fully shielded from the sun and rain show a significantly lower corrosion rate than that for the fully exposed samples. The structural steel of the HSM-H is entirely enclosed inside a ventilated concrete structure that totally shields the steel from sunlight and precipitation. TN chose to employ the higher corrosion rate data for fully exposed samples as the basis for their corrosion allowance. This provides an added degree of conservatism to their design.

In addition to the use of corrosion-resisting steels, TN has specified the application of a corrosion resistant coating over the support steel. The coating may be one of several systems. One system consists of an inorganic zinc primer with an epoxy overcoat. This is an industry-recognized, high performance, long-lived, industrial coating system that is designed to withstand very severe environments. Although the coating is specified, it is not credited in the corrosion rate calculations that are part of the structural steel design margins.

The staff finds that the use of corrosion-resisting steel with a calculated corrosion rate derived from a more severe exposure environment is appropriate. Additionally, the staff finds that the use of a coating system, and the fact that the steel is enclosed in a dry, interior-like environment, provides addition protection against corrosion. Thus, the staff finds that this TN design provides reasonable assurance that the system will not experience any significant corrosion during the 20-year license period at a coastal spent fuel storage site.

Regarding Part (2), the commenter is correct that the canister, in some models of the HSM, is supported in the vertical direction by a series of columns or legs, six in total, that are made of structural steel tubing. These columns are part of a three-dimensional welded and bolted frame anchored vertically and horizontally to the reinforced concrete storage module. The three pairs of columns that are less than 3.5 feet long, each, support a cross beam which then provides support at three locations for each of the two support rails. The framing design concept is similar to that used in structural steel framing of multi-story buildings, tankage support systems, and other applications where a three-dimensional framing concept is appropriate. In this case, since the frame is provided with lateral supports at the location of each column to the reinforced concrete horizontal storage module, the frame is considered to be a braced-frame and, therefore, has limited lateral deflection that can occur at the top of the frame. The design concept is not considered to be unique, out-of-the-ordinary, or a dangerous design configuration for this intended use. The design conditions, that represent the environment in which the frame must function, have been incorporated into the design criteria. In other models of the HSM, the support rails are supported directly on the reinforced concrete storage module by embedded anchors. The NUHOMS® HD support rails are supported and anchored in this manner.

The commenter used the term "primary support" and indicated that all primary supports must be inspected periodically. While the NUHOMS® HD can be used at a nuclear power plant, the certification of the dry spent fuel storage system is carried out under 10 CFR Part 72 and not 10 CFR Part 50. Consequently, the assertion made by the commenter that "all primary supports" must be inspected periodically may be in reference to a requirement in 10 CFR 50.55a(f), for inservice testing requirements for nuclear power reactor facilities for various classes of components. These 10 CFR Part 50 requirements do not apply to the passive systems that are under the jurisdiction of 10 CFR Part 72. The design criteria used for the design of the NUHOMS® HD system, to support the canisters in the horizontal storage module, are sufficiently robust so that periodic inservice inspections of these structural components are not deemed to be necessary. It is correct that there is a requirement that is identified in 10 CFR 72.122(f) related to testing and maintenance of systems and components that are important to safety. Such systems and components are to be designed to permit inspection. The NUHOMS® HD rail support system could be visually inspected by remote operations using fiber optics into the HSM-H via the vent system, or the HSM-H can be opened, the canister extracted into the transfer cask, and the rail supports inspected, after appropriate radiation surveys and procedures are met. The environmental concern in Part (2) of the comment is addressed in Part (1) response.

Comment 3: A commenter raised the following concern with respect to flooding: Section 4.6.3 of the Generic Technical Specification states that flood "levels up to 50 feet and water velocity of 5 fps" are allowed. The commenter was concerned about the flooding condition in which the floodwater rises to fill the inlet ducts in NUHOMS® (all of the air inlet ducts in the NUHOMS® module lie at the ground level). He questioned that if the floodwater rises high enough to block off the air flow through the inlet ducts, then what cools the DSC. He concluded that, without the ventilation airflow, the DSC would overheat and may even explode from pressure buildup. It seemed to the commenter that TN considered only the case of deep submergence flood in the safety evaluation, which is not a risky condition because the CSC is cooled by the flood water. The commenter further stated that low flood level is a risky condition since the DSC is several feet above the ground, and a flood of any height that remains below the DSC will choke off the ventilation air and cause the DSC to overheat. The commenter was surprised that NRC would issue “general certification” to a ventilated cask like this one to be used in flood plains, considering that there are many “nukes” on river basins that are in the potential flood zone. The commenter further stated that the condition of partial height flood should be given full technical consideration.

Response: Regarding low level floods in the situation when the bottom vents are blocked, evaporative cooling will cool the upper volume of the HSM and the DSC as demonstrated below. A thermal analysis of a typical HSM and DSC with a fuel heat load of 24kW in accident conditions demonstrates that the DSC support steel maximum temperature is 615°F, and the DSC shell maximum temperature is 642°F. These component temperatures would provide evaporation of the water in the bottom of the HSM. The evaporated water would cool the DSC and the upper volume of the HSM. The staff notes that the NUHOMS® HD technical specification maximum heat load is 34.8kW. Even at the higher heat loads, staff believes that evaporative cooling will prevent the DSC from overheating. In addition, the flood water will help cool the submerged portion of the HSM cavity. Therefore, the staff concludes that the DSC will not overheat, and the resulting DSC internal pressures will not exceed the design pressure.

Comment 4: One commenter believed that TS 4.6.3 was unclear in the statement that NRC has allowed “seismic loads of up to 0.3g horizontal and up to 0.2g vertical” on the system.

The commenter asked for the location in the storage facility to which the g-loads correspond - at the C.G. of the storage system or at the pad surface on the module's centerline, and also asked if the g-load limits include the effect of soil-structure interaction alluded to in Paragraph 4.2.2. Another commenter assumed that the 0.3g horizontal and 0.2g vertical seismic events (per page 4-7 of Design Features in the Certificate) are free-field accelerations at the site and stated that they will get amplified at the pad due to soil-structure interaction. The on-the-pad accelerations will be further magnified at the rails due to the flexibility of the DSC support structure. Combine that with the rattling impulse from the fuel and you may well have a canister rolling off the rails.

Response: The permissible seismic loads of 0.3 g horizontal and 0.2 g vertical noted by the first commenter are the maximum values at the top of the HSM-H/the top of the supporting basemat/pad the NUHOMS® HD system is allowed to be subjected to. The design of the HSM-H and the NUHOMS® HD system is based on the amplified response spectra value of 0.37 g in the orthogonal horizontal directions and 0.20 g in the vertical direction on the 0.3 g and 0.2 g values respectively. The 0.30 g horizontal and 0.20 g vertical values also reflect the resulting maximum permitted accelerations at the top of the basemat/pad after a soil-structure interaction analysis has been performed, if necessary, by the cask system user for the specific site using the site-specific free field g-values. What is left unstated is the fact that where a soil-structure interaction analysis must be performed by the user, the resulting amplified response value at the center of gravity of the loaded HSM-H must not exceed 0.37 g in the horizontal direction and 0.20 g in the vertical direction. Based on the proposed rule, if either of these values were exceeded, the NUHOMS® HD system could not be used.

The interpretation of the second commenter is not what is reflected in the TS as is discussed above. The TS g-values are not generally consistent with the free-field acceleration values at most sites.

The design conditions have included analyses of the canister in place on the rail support system under the design lateral loads from the seismic events, and there is no canister roll off from the rail support system.

Comment 5: One commenter found that the DSC support structure is not restrained against all four walls of the concrete module. A 45-ton container resting unsecured on the rails that are not even braced against the four walls looks like a physically unstable arrangement. The commenter asked if this configuration had been analyzed to ensure that failure from resonance would not occur during the earthquake. The commenter stated that he could not find any evidence of such an evaluation in the TSAR or the NRC's SER.

Response: It is unclear to the NRC staff the source and basis for these comments. The comments do not relate to the NUHOMS® HD system. There is no document identified as the TSAR (Topical Safety Analysis Report) associated with this docket application (72-1030). This terminology was associated with applications submitted in the late 1980s and early 1990s (e.g., TN-24 and TN-32 cask systems). The commenter's description of the DSC support structure does not match that of the NUHOMS® HD system. For the NUHOMS® HD system, the DSC support structure consists of a pair of structural steel rails of 12-inch deep wide-flange sections that are anchored to the reinforced concrete horizontal storage module at the bottom flanges, and connected by two struts and are, therefore, considered braced. This configuration is provided in the Safety Analysis Report for the NUHOMS® HD system. The seismic analysis determined amplified accelerations based on the frequency analysis so that any issue of resonance has been incorporated into the analysis and then into the design of the individual members.

Comment 6: One commenter believed that being able to remove the container at the end of 20 years of licensed life should be an important safety consideration. The commenter inquired and found that no plant that has loaded a NUHOMS® in the country has ever attempted to remove the container after a few years of storage. The commenter wanted to know what would happen if the aging of the rails' and container's surfaces under years of weathering were to cause the canister to bind to the rails.

Response: The canister itself is constructed of stainless steel. The top of the support beam has a stainless steel cover plate welded along its entire length. This stainless steel plate forms the surface upon which the canister rests and also serves as a sliding surface for canister installation or removal operations. This plate may be lubricated if desired.

Long-term experiments, wherein stainless steel samples were exposed to the weather at coastal marine sites, have demonstrated that stainless steel is highly resistant to atmospheric corrosion under those conditions. In the case of the TN NUHOMS® HD design, the canister and related support rails are shielded from direct exposure to the weather (being enclosed in a ventilated enclosure). This sheltering from the direct weather would result in little, if any, corrosion compared to the already insignificant amounts that could occur if these components were fully exposed to the weather. Absent corrosion, there is no likelihood that the canister would bind to the support rails. Because of this, and the fact that a lubricant (grease) could be applied to the rails, if desired, the staff believes it to be highly unlikely that any difficulty would arise during a removal operation, even after extended time.

Comment 7: A commenter asked what would happen if uneven settlement of the pad from the heavy weight of the module were to cause the canister to bind to the rails.

Response: Uneven settlement of the pad, commonly referred to as differential settlement, is not expected to occur, and if it were to occur, it is highly unlikely that it would result in any differential movement between the two supporting rails for the canister that would cause binding of the canister to the rails. The reinforced concrete pad, and the reinforced concrete horizontal storage module, represent a very stiff structural combination, so that relative movement between the support rails cannot be logically projected, based on the structural response from any differential settlement across the supporting base pad. Further, the adequacy of the pad to support the horizontal storage module, without detrimental settlements, is required under the requirements of 10 CFR 72.212. The adequacy must be maintained under static and dynamic loads of the storage cask system, considering potential amplification of earthquakes through soil-structure interaction, soil liquefaction, and other soil instabilities due to vibratory ground motion, if these conditions exist at a site. Binding of the canister to the support rails from settlement or differential movement is not expected under any design condition.

Comment 8: A commenter asked what would happen if the 60 kips of permissible extraction force to remove the container is not sufficient. The commenter stated that this scenario is ignored in the Technical Specification of TN's TSAR.

Response: See also response to Comment 5 regarding a document misidentified as TN's TSAR. If settlement/differential settlement of a limited magnitude were to develop over the years, the transport trailer is equipped with hydraulic jacks/positioners and alignment system identified as the skid positioning system that is normally used for the alignment of the transfer cask. This same system can be used to accommodate effects resulting from limited settlement/differential settlement between the basemat/storage pad and the approach slab. If a situation were to develop where the support skid positioning system could not accommodate the magnitude of the movement, the approach slab can be modified or other measures taken.

Comment 9: A commenter stated that the NUHOMS® HSM is much heavier and bigger than the previous models, noting that each loaded module weighs over 200 tons, and questioned the ground underneath the NUHOMS® housing settling over the years under the weight of the modules. The commenter also cited NRC's SER on page 3-7, "It is assumed that an axial load of 80 kips is required for insertion, and 60 kips for extraction," and stated that this seems backwards. More force will be needed to extract the canister than to insert it (when the rail is new and greased). The commenter questioned how you square the safety concern if, because of settlement and weather effects, 60 kips is not enough to pull the canister out, and how will the NUHOMS® be emptied of fuel if the canister binds to the rails. The commenter believes that this is a huge concern to people living near the NUHOMS® sites. He further stated that the minimum the NRC could do is to require that a demo of canister extractions at a couple of sites loaded with NUHOMS for 10 years (or more) be done to prove that the horizontally loaded canister can be successfully extracted.

Response: With regard to the commenter's concern about the weight of NUHOMS® HSM and the 80-kip insertion load and the 60-kip extraction load, it is noted that as stated in the SER on page 3-7, these are the design load conditions under normal operation loading conditions. In the off-normal operation loading condition, the extraction force can be allowed to reach 80 kips under that design condition. The dry cask storage system has been evaluated against the regulatory requirements for retrievability of the spent fuel, and no demonstration of canister extraction from the horizontal storage module is deemed necessary at some time after 10 years of storage. The extraction system has been determined to be capable of functioning during the term of the certificate.

Comment 10: A commenter stated he could not find any evaluation of safety for the following scenarios when the DSC is being inserted into the HSM:

Scenario 1: The transfer cask skid has been unfastened from the trailer, the transfer cask lid has been removed making the DSC axially unrestrained, but before the skid has been fastened to the HSM and the hydraulic ram has been engaged to the DSC grapple ring. An earthquake during this period, depending on its magnitude, has the potential to cause uncontrolled DSC movement and cause a significant radiation exposure event to the workers that could be potentially deadly to the workers.

Scenario 2: The DSC has been installed in the HSM, but the HSM lid (a heavy circular lid that also restrains the DSC in the axial direction) is not yet in place. An earthquake during this period could cause a major radiation exposure event that could be potentially deadly to the workers.

Response: Scenario 1: For the described scenario, the position of the transfer cask for the NUHOMS® HD system, before the lid is removed, is on the transfer trailer, with the cask within several feet of the open HSM-H cavity, after the centerlines of the HSM-H and the cask have been verified to be approximately coincident. The lid of the cask is then removed. The transfer trailer is then backed to within a few inches of the face of the HSM-H, the trailer brakes are set, and the tractor is disconnected from the trailer and moved away. The transfer trailer vertical jacks are positioned which locate the vertical position of the cask in its approximate insertion orientation. The skid tie-down bracket fasteners are removed, and the position of the cask is corrected, as needed for alignment, using the hydraulic skid positioning system, and then the optical survey equipment and reference marks are used for adjusting the final alignment. The skid positioning system is then used for that final alignment, and the canister is then inserted into the HSM-H access opening docking collar. The transfer cask is then secured to the HSM-H using the cask restraints.

A large seismic event, during the period of time from when the transfer cask lid is removed, while several feet from the HSM-H, until the transfer cask is anchored to the HSM-H with a sufficiently large horizontal axial component, could overcome the frictional resistance that keeps the canister inside the transfer cask. This would not, however, be an uncontrolled DSC movement, since the DSC inside the transfer cask has only an approximately 1/4-inch radial gap, which controls the movement to essentially longitudinal/axial movement with the maximum lateral position of the DSC changing by approximately 1/64th-inch for each inch of longitudinal/axial movement. The longitudinal/axial movement is limited by the distance of several feet between the transfer cask opening and the face of the HSM-H. A longitudinal/axial movement of 3 to 5 feet of the DSC from the transfer cask opening would not constitute an uncontrolled DSC movement, since that longitudinal/axial movement is limited by the face of the HSM-H module.

The possibility of the hypothesized scenario is considered to be much less than what is considered significant for design accident conditions arising from handling and storage of spent nuclear fuel. The seismic event, to produce the hypothesized movement, must have a large enough component of acceleration in the longitudinal/axial direction of the positioned transfer cask that can be at any point on the compass, and the event must occur within a time period of 2 to 4 hours which, on an annual basis, would occur only 3 to 5 times per year for a given facility. If such a remote accidental event were ever to occur, plant operations personnel would respond by placing temporary shielding with equipment over any exposed portion of the DSC.

Scenario 2: The operations' procedures identify that upon disengagement of the transfer cask from the HSM-H, the canister's axial seismic restraint is installed. This is a design feature that uses a structural steel embedment in the reinforced concrete of the HSM-H as the anchor point for the retainer device. The commenter's assumption that the HSM-H lid or door is the axial retainer for the canister is incorrect.

Comment 11: One commenter stated that the DSC is pushed into the HSM module using a simple hydraulic ram that has no redundant load handling features. A simple failure such as loss of hydraulic pressure during the pushing operation would leave the DSC in a partially inserted configuration. The commenter believed that a single failure proof ram system should be required or TN should demonstrate that a ram failure halfway through the DSC pushing process can be dealt with using credible recovery measures. The commenter did not believe that NRC has ever considered this issue or that TN has ever been asked to provide an answer.

Response: The functioning of the ram operating system is not considered to be a system that is safety related since the canister is confined and shielded during the period of ram operations. A failure in the location, as hypothesized by the commenter, presents an operational problem, but no significant issues are created. The corrective action would be to repair the operating system of the ram. NRC has considered this scenario, and the NRC agrees with the safety classification of the ram assembly that it is "Not Important To Safety" as identified in Table 2-5 of the application's Safety Analysis Report.

Comment 12: A commenter stated that the DSC, according to NRC's SER, can survive the drop from 80 inches height, but is concerned about how will one lift a dropped DSC from the pad. The DSC seems to have no lifting or handling attachments except for the grapple, which is useable only to engage the ram for a horizontal push.

Response: The commenter is correct in that there are no lifting or handling attachments other than the grapple ring for a loaded canister. The DSC is placed into the transfer cask within the fuel pool and then is loaded with spent fuel and then, after removal from the fuel pool and preparation for transfer, the closed cask is moved on the transfer trailer in a horizontal orientation to a location outside the fuel handling building. The transfer trailer and cask with the DSC closed inside are moved to the pad area. The DSC is not lifted out of the transfer cask, but is pushed out of the cylindrical transfer cask directly into the HSM-H in a horizontal position, with the transfer cask coupled to the HSM-H, creating a connecting tunnel space completely enclosing the DSC. This operating procedure makes the possibility of a dropped DSC on the pad extremely unlikely and an accident that is beyond the design basis accident. If a beyond design accident condition were to arise where a loaded and unshielded DSC had to be lifted, the first step would be to provide temporary shielding and probably execute a remote lift in the horizontal position with a device brought in for special use. Such special procedures can be developed for an accident condition response. It should be noted that the 80-inch side drop is for the DSC inside the transfer cask.

Comment 13: A commenter stated that NRC should require a “real stiff foundation” underneath the NUHOMS® to support the weight of the NUHOMS®. At present, the commenter sees nothing in the proposed certificate that requires a strong support foundation to be built. He believes this to be a serious oversight.

Response: The weight of the NUHOMS-HD system, as installed in-place, including the HSM-H, the DSC, and the spent fuel, is to be supported by the ISFSI basemat or pad. That structure is identified in accordance with 10 CFR 72.3 as **“**Not Important to Safety.**”** The basemat or pad is designed, constructed, maintained, and tested as a commercial grade item designed to be in compliance with 10 CFR 72.212(b)(2). This regulation requires that the user of the NUHOMS® HD cask system must evaluate and establish that the following criteria are met**:**

(1) The cask storage pads and areas have been designed to adequately support the static and dynamic loads of the storage casks, considering potential amplification of earthquakes through soil-structure interaction and soil liquefaction potential or other soil instability due to vibratory ground motion.

(2) For the HSM-H loaded with a filled -32 PTH DSC, the weight is approximately 207.5 tons that is distributed over the pad area that, as a minimum, is approximately 200 square feet.

(3) The static load bearing pressure on the supporting soil material would normally be approximately 2075 pounds per square foot, a common value used for residential and commercial building foundations on fine-grained soils.

(4) The loading on the foundation is not considered to be structurally significant or unusually high.

Comment 14: A commenter expressed the following concerns pertaining to storing fuel horizontally in a hot state:

(1) After searching the public filings by TN on this docket and Docket No. 72-1004, the commenter could not find a single evaluation of the consequences of storing fuel horizontally over long periods of time. In discussions between Westinghouse and a utility, the conclusion that they reached was that "additional analyses and evaluation will be needed to determine whether it is permissible to store Westinghouse's fuel horizontally."

(2) A lot of fuel is already in NUHOMS® at many sites. Who knows what is happening to all of the fuel stored outside of the fuel supplier's (Westinghouse's) specifications, because you cannot go and examine its condition.

Response: Question 1 - After searching the TN filings, one document was found in which Westinghouse stated that "...additional analyses and evaluation may be needed...." The NRC staff independently performed a generic analysis of spent fuel stored horizontally under the design service condition and for the service life of the NUHOMS storage system. This analysis looked at the structural capability of the spent fuel materials to perform in the horizontal position without degrading spent fuel performance.

There are two sources of stress in the fuel cladding, when in the horizontal orientation, that could result in creep: internal pressurization of the fuel rod and gravity. Two possible sources of deformation of the cladding are possible under the horizontal position: from bending and creep. The bending stress and the hoop stress are both considerably less than the yield stress under internal pressure and a horizontal position. The bending deflection, at the center of the span between the grid spacers, due to the downward gravitational load of the fuel, is approximately 3 millimeters. No changes occur in the stresses or radial growth as a result of storage in the horizontal position. The creep deformation is self limiting under both stresses due to the decreasing temperature of the fuel with time. If the initial maximum temperature is kept below 400 degrees C, as recommended by Interim Staff Guidance (ISG)-11, then the creep deformation under the maximum allowable pressurization is less than 1 percent over a 20-year storage period. No cladding failure is expected at this strain level. The additional downward load, due to the gravitational force from the unsupported, approximately 300 grams of fuel, between the grid spacer supports, increases the longitudinal stress by no more than 1 percent of the material strength and results in a minuscule increase of the hoop stress; therefore, no more additional creep is expected in the horizontal orientation than in the vertical orientation.

Question 2 - The cask vendors specify the range of parameters for the fuel to be stored in the CoC. The worst case fuel is analyzed as in paragraph (1), above. The fuel is evaluated when it is removed from the reactor to determine if it falls in the specified envelope. If it is in this envelope, no adverse fuel performance is expected.

Comment 15: A commenter stated that, in the future, the fuel that will be stored will have burned longer in the reactor. The commenter believed that the NRC should perform a careful safety evaluation before permitting even more fuel, particularly well burned fuel, to be stored horizontally. The commenter cited NRC's SER on page 4-6 that reads: "The NUHOMS HD DSC only undergoes a one-time temperature drop during backfilling of the DSC with helium gas. Because this is a one-time event, the DSC does not undergo any thermal cycling." The commenter stated that the SER evidently assumes that the fuel will never be unloaded, unpackaged, and reloaded after it has been vacuum dried and backfilled. If that was the underlying basis of the SER, the commenter believed that the certificate should be restricted to only once-through loading such that there is no likelihood of thermal cycling of the fuel.

Response: The staff has performed a safety evaluation and analyzed the effects of these parameters on the storage of fuel as provided in the guidance contained in ISG-11, Rev. 3. Higher burnup fuels will have the following characteristics:

(1) a higher cladding stress caused by a higher internal pressure due to an increased fission gas release from the pellets;

(2) a higher hydrogen content in the cladding resulting in a decrease in mechanical properties; and

(3) a higher heat generation rate.

As long as the fuel burnup is below the approved in-reactor burnup limit (currently 62.5 GWd/MTU), and is maintained in a nonoxidizing atmosphere below 400°C, there are no active degradation mechanisms that would cause cladding breaches to occur under normal storage conditions. In addition, the structural review must include mechanical properties of the cladding at the limit of the approved burnup to determine the behavior of the fuel under off-normal and accident conditions.

The staff has evaluated the issue of thermal cycling on the behavior of irradiated fuel. Two issues of concern were thermal shock during reflood, if wet unloading occurs, and hydride reorientation. Reflood analysis is required in every SAR to evaluate the ability of the cladding to tolerate the thermal shock to the cladding due to the rapid submergence of the hot fuel in the cool pool water. For the NUHOMS® HD unloading operation, the maximum fuel cladding temperature during cask reflood is calculated to be significantly less than the vacuum drying condition because of the presence of water vapor. Consequently, during cask reflood, a lower temperature rise is expected when compared with that for the cask vacuum drying operations.

Hydride reorientation, which might degrade the mechanical properties of the cladding, occurs when hydrogen goes into solution and is subsequently precipitated under stress during cooling. A number of studies indicate that thermal cycling may contribute to the phenomena of reorientation. As one condition, to limit the occurrence of hydride reorientation in the cladding during storage, drying, etc, ISG-11, Rev. 3, limits the number of thermal cycles that the fuel can experience to 10 or less. Thermal cycling is only a concern if thermal cycling takes place early in the storage period when the fuel is relatively hot.

Under normal storage conditions, there are no mechanisms to degrade the fuel to the point where a loaded cask would have to be opened prematurely. At later times in the storage period, when unloading and repackaging are expected to occur, the temperatures will be at a lower maximum temperature due to the reduced decay heat, and as a result, less hydrogen (the solubility decreases exponentially with temperature) will be able to go into solution during these operations. In addition, the maximum stress in the rods will be less than at the initial vacuum drying, due to the lower temperature during unloading and repackaging. As a result, hydride reorientation, and consequently thermal cycling, is not of concern during unloading later in the storage period.

Comment 16: A commenter stated that "NRC's SER says that 'The application performed dynamic impact analysis using LS-DYNA 3D on a cask-pad-soil finite element model....'" The commenter believed that this was not true, and noted that the FSAR shows that the applicant used a cookbook approach, developed by EPRI in the time when LS-DYNA was not widely used, which is considered to be unconservative by most experts. The commenter further stated that, according to the experts he consulted, a true LS-DYNA analysis would have shown much greater g-loads under an 80-inch drop. Therefore, in the commenter's opinion, the SAR analysis on which the NRC has relied is inadequate and unconservative.

Response: The analytical method used by the applicant referred to by the commenter was performed as described in the NRC's SER using NUREG/CR-6608, dated February 1998, using LS-DYNA 3D. This is a commercial finite element dynamic analysis software package capable of three-dimensional representations. The DYNA 3D software package used in the development of the analysis procedure described in NUREG/CR-6608 by Lawrence Livermore National Laboratory is the comparable software package that has been used in the national laboratories. The analytical approach used in NUREG/CR-6608 is considered by NRC as an acceptable method of evaluation for low-velocity impacts such as a dropped cask. It is recognized that, in this approach, the transfer cask internals that include the canister, the fuel basket, and the spent fuel are modeled only by their mass and their mass distribution.

Comment 17: A commenter believed that the tornado missile analysis in Chapter 11 of the NUHOMS® FSAR does not consider the damaging scenario of missile impact. The commenter stated that all of the analysis assumes impact over the concrete walls. The most dangerous impact would occur if the missile were to hit the fasteners that keep the door of the

HSM in place. If the fastener fails from the missile impact, then the door will come loose and the canister will be exposed and people nearby will be irradiated. The commenter did not see any evaluation of this scenario in TNs FSAR or NRC's SER.

Response: The scenario proposed by the commenter, while not specifically identified, is encompassed by and bounded by the scenarios specifically discussed in the referenced documents. First, it is necessary to have an accurate understanding of the physical configuration of the door of the HSM-H and the opening for the door on the front wall of the HSM-H base assembly. The door thickness is a total of 2.53 feet made up of 0.65 feet of steel and the remainder being concrete. Approximately 97 percent of that total thickness of the door is inside the plane of the outside face of the HSM-H, filling the recessed hole. The door is supported within the hole on two radial bearing pads that support the door on the 1.875-foot thickness of concrete of the 2.53-foot door thickness. The door is not supported in the vertical direction by the fasteners that the commenter addressed. The failure of one of those fasteners, as a result of a local missile impact, would not dislodge the door from the HSM-H base unit, and the door's radiation shielding capability would remain. Since the relevant missiles used to evaluate local missile damage effects all have physical dimensions and resulting damage zone dimensions much less than the spacing of the subject fasteners, multiple fastener loss is not likely. The fasteners' minimum spacing is approximately 5 feet, whereas the missiles considered relevant have maximum dimensions of approximately 1.5 feet. Even with multiple fastener failures, the thick door assembly will most likely remain in the deeply recessed opening after a local missile strike on the door's steel exterior since the door assembly would have to move axially outward nearly 2 feet in order for the HSM-H to be rendered to a condition with an open door.

Comment 18: A commenter expressed concern with the way the canister is stored. The commenter stated that it seems that the canister is lying on a couple of rails, and it is held in place by gravity and nothing else (no straps, no frame, no structurals to restrain it).

Response: The commenter is correct that the canister is supported by two structural support rails. These are configured to create a cradle for the canister. The two rails of the cradle are each oriented at 30 degrees off the vertical centerline through the DSC as it is in the stored horizontal position. With the 60-degree angle between the rail supports, a simple calculation demonstrates that a side load, through the center of gravity of the DSC, would have to exceed approximately 0.55 grams to disturb the at-rest position of the stored cask. This value, for lateral load, exceeds the control limits that are placed on this system, regarding the sites where the system could be used, that results in a design transverse load of 0.41 grams on the DSC. In the longitudinal direction, the DSC is restrained from movement on the rail support system by the axial retainer system that restrains DSC movement, with respect to the HSM-H.

Comment 19: A commenter understood that the fuel is stored in the canister in a non-fixed manner and that during an earthquake, the fuel would move about in the canister. The commenter inferred from reading the Safety Analysis Report that most of the canister's weight is in the fuel. He stated that if most of the weight is free to move about in the canister, then there is a risk of the canister rolling over and falling down during an earthquake.

Response: The maximum values for comparing weight distribution for a loaded DSC are that 46.6 percent of the total weight of a loaded DSC is the weight of the spent fuel and the other 53.4 percent is the weight of the canister, the internal basket, and other hardware of the cask. The internal fuel basket is a cellular structure that provides a storage position 8.7 inches by 8.7 inches in cross-section for each of the 32 spent fuel assemblies that are stored. The orthogonal grid of the assemblage of these 32 cells is circumscribed by a circle created by metallic basket rails that transition from the grid configuration to a circle concentric with the inside surface of the canister. The radial space from the fuel basket and basket rails to the inside face of the canister is one-eighth of an inch. This configuration does not allow gross freedom of movement of the stored fuel, but only provides sufficient space to allow for loading and unloading of the spent fuel and for the thermal growth that is expected. Consequently, there is minimal lateral displacement of the spent fuel that can occur inside the canister.

Comment 20: A commenter stated that “After checking out Appendix 3.9.9.10.2 of the SAR, he/she did not find any time history analysis to determine if the canister bouncing or rolling might occur. The commenter stated that the effect of soil-structure interaction did not seem to be mentioned.

Response: As described in Section 3.9.9.10.2 of Appendix 3.9.9 of the Safety Analysis Report, the seismic design basis for the HSM-H and the stored spent fuel in the canister is based on the maximum peak accelerations at the top of the basemat, or pad structure, not exceeding 0.3 grams in the horizontal direction or 0.20 grams in the vertical direction. For the sites where soil-structure interaction analysis is considered important, the user of the NUHOMS® HD system will have to determine that these values are not exceeded. Additionally, as indicated in the Technical Specifications, Section 4.0, Design Features, amplified seismic response spectra from such an analysis would be produced. The HSM-H system, with the stored canister, is based on a limit of 0.37 grams in both transverse and longitudinal directions and 0.20 grams in the vertical direction, at the center of gravity of the HSM-H, with respect to the amplified response spectra. Within these limits of accelerations, there will be no uncontrolled motion of the canister that would result in a safety issue.

Summary of Final Revisions

The proposed TS and SER have been revised in response to Comment 2 to capture and document TN's commitment to add the following to Section 3.4.1.4 of the Safety Analysis Report for the NUHOMS® HD design: "If an independent spent fuel storage installation site is located in a coastal salt water marine atmosphere, then any load-bearing carbon steel DSC support structure rail components of any associated HSM-H shall be procured with a minimum 0.20 percent copper content for corrosion resistance."

Voluntary Consensus Standards

The National Technology Transfer and Advancement Act of 1995 (Pub. L. 104-113) requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless the use of such a standard is inconsistent with applicable law or otherwise impractical. In this final rule, the NRC is adding the NUHOMS® HD cask system to the list of NRC-approved cask systems for spent fuel storage in 10 CFR 72.214. This action does not constitute the establishment of a standard that establishes generally applicable requirements.

Agreement State Compatibility

Under the "Policy Statement on Adequacy and Compatibility of Agreement State Programs" approved by the Commission on June 30, 1997, and published in the Federal Register on September 3, 1997 (62 FR 46517), this rule is classified as Compatibility Category "NRC." Compatibility is not required for Category "NRC" regulations. The NRC program elements in this category are those that relate directly to areas of regulation reserved to the

NRC by the Atomic Energy Act of 1954, as amended (AEA), or the provisions of Title 10 of the Code of Federal Regulations. Although an Agreement State may not adopt program elements reserved to NRC, it may wish to inform its licensees of certain requirements via a mechanism that is consistent with the particular State's administrative procedure laws but does not confer regulatory authority on the State.

Finding of No Significant Environmental Impact: Availability

Under the National Environmental Policy Act of 1969, as amended, and the NRC regulations in Subpart A of 10 CFR Part 51, the NRC has determined that this rule, if adopted, would not be a major Federal action significantly affecting the quality of the human environment and, therefore, an environmental impact statement is not required. This final rule adds an additional cask to the list of approved spent fuel storage casks that power reactor licensees can use to store spent fuel at reactor sites without additional site-specific approvals from the Commission. The EA and finding of no significant impact on which this determination is based are available for inspection at the NRC Public Document Room, 11555 Rockville Pike, Rockville, MD. Single copies of the EA and finding of no significant impact are available from Jayne M. McCausland, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone (301) 415-6219, e-mail jmm2@nrc.gov.

Paperwork Reduction Act Statement

This final rule does not contain a new or amended information collection requirement subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing requirements were approved by the Office of Management and Budget, Approval Number 3150-0132.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

Regulatory Analysis

On July 18, 1990 (55 FR 29181), the Commission issued an amendment to 10 CFR Part 72. The amendment provided for the storage of spent nuclear fuel in cask systems with designs approved by the NRC under a general license. Any nuclear power reactor licensee can use cask systems with designs approved by the NRC to store spent nuclear fuel if it notifies the NRC in advance, the spent fuel is stored under the conditions specified in the cask's CoC, and the conditions of the general license are met. In that rule, four spent fuel storage casks were approved for use at reactor sites and were listed in 10 CFR 72.214. That rule envisioned that storage casks certified in the future could be routinely added to the listing in 10 CFR 72.214

through the rulemaking process. Procedures and criteria for obtaining NRC approval of new spent fuel storage cask designs were provided in 10 CFR Part 72, Subpart L.

The alternative to this action is to withhold approval of this new design and issue a site-specific license to each utility that proposes to use the casks. This alternative would cost both the NRC and utilities more time and money for each site-specific license. Conducting site-specific reviews would ignore the procedures and criteria currently in place for the addition of new cask designs that can be used under a general license, and would be in conflict with NWPA direction to the Commission to approve technologies for the use of spent fuel storage at the sites of civilian nuclear power reactors without, to the maximum extent practicable, the need for additional site reviews. This alternative also would tend to exclude new vendors from the business market without cause and would arbitrarily limit the choice of cask designs available to power reactor licensees. This final rulemaking will eliminate the above problems and is consistent with previous Commission actions. Further, the rule will have no adverse effect on public health and safety.

The benefit of this rule to nuclear power reactor licensees is to make available a greater choice of spent fuel storage cask designs that can be used under a general license. The new cask vendors with casks to be listed in 10 CFR 72.214 benefit by having to obtain NRC certificates only once for a design that can then be used by more than one power reactor licensee. The NRC also benefits because it will need to certify a cask design only once for use by multiple licensees. Casks approved through rulemaking are to be suitable for use under a range of environmental conditions sufficiently broad to encompass multiple nuclear power plants in the United States without the need for further site-specific approval by NRC. Vendors with cask designs already listed may be adversely impacted because power reactor licensees may choose a newly listed design over an existing one. However, the NRC is required by its regulations and NWPA direction to certify and list approved casks. This rule has no significant identifiable impact or benefit on other Government agencies.

Based on the above discussion of the benefits and impacts of the alternatives, the NRC concludes that the requirements of the final rule are commensurate with the Commission's responsibilities for public health and safety and the common defense and security. No other available alternative is believed to be as satisfactory, and thus, this action is recommended.

Regulatory Flexibility Certification

Under the Regulatory Flexibility Act of 1980 (5 U.S.C. 605(b)), the NRC certifies that this rule will not, if issued, have a significant economic impact on a substantial number of small entities. This final rule affects only the licensing and operation of nuclear power plants, independent spent fuel storage facilities, and TN. The companies that own these plants do not fall within the scope of the definition of "small entities" set forth in the Regulatory Flexibility Act or the Small Business Size Standards set out in regulations issued by the Small Business Administration at 13 CFR Part 121.

Backfit Analysis

The NRC has determined that the backfit rule (10 CFR 50.109 or 10 CFR 72.62) does not apply to this final rule because this amendment does not involve any provisions that would impose backfits as defined. Therefore, a backfit analysis is not required.

Congressional Review Act

Under the Congressional Review Act of 1996, the NRC has determined that this action is not a major rule and has verified this determination with the Office of Information and Regulatory Affairs, Office of Management and Budget.

List of Subjects in 10 CFR Part 72

Administrative practice and procedure, Criminal penalties, Manpower training programs, Nuclear materials, Occupational safety and health, Penalties, Radiation protection, Reporting and recordkeeping requirements, Security measures, Spent fuel, Whistleblowing.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 552 and 553; the NRC is adopting the following amendments to 10 CFR Part 72.

PART 72--LICENSING REQUIREMENTS FOR THE INDEPENDENT STORAGE OF SPENT NUCLEAR FUEL, HIGH-LEVEL RADIOACTIVE WASTE, AND REACTOR-RELATED GREATER THAN CLASS C WASTE

1. The authority citation for Part 72 continues to read as follows:

Authority: Secs. 51, 53, 57, 62, 63, 65, 69, 81, 161, 182, 183, 184, 186, 187, 189, 68 Stat. 929, 930, 932, 933, 934, 935, 948, 953, 954, 955, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2071, 2073, 2077, 2092, 2093, 2095, 2099, 2111, 2201, 2232, 2233, 2234, 2236, 2237, 2238, 2282); sec. 274, Pub. L. 86-373, 73 Stat. 688, as amended (42 U.S.C. 2021);

sec. 201, as amended, 202, 206, 88 Stat. 1242, as amended, 1244, 1246 (42 U.S.C. 5841, 5842, 5846); Pub. L. 95-601, sec. 10, 92 Stat. 2951 as amended by Pub. L. 102-486, sec. 7902, 106 Stat. 3123 (42 U.S.C. 5851); sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332); secs. 131, 132, 133, 135, 137, 141, Pub. L. 97-425, 96 Stat. 2229, 2230, 2232, 2241, sec. 148, Pub. L. 100-203, 101 Stat. 1330-235 (42 U.S.C. 10151, 10152, 10153, 10155, 10157, 10161, 10168); sec. 1704, 112 Stat. 2750 (44 U.S.C. 3504 note); sec. 651(e), Pub. L. 109-58, 119 Stat. 806-10 (42 U.S.C. 2014, 2021, 2021b, 2111).

Section 72.44(g) also issued under secs. 142(b) and 148©, (d), Pub. L. 100-203, 101 Stat. 1330-232, 1330-236 (42 U.S.C. 10162(b), 10168©, (d)). Section 72.46 also issued under sec. 189, 68 Stat. 955 (42 U.S.C. 2239); sec. 134, Pub. L. 97-425, 96 Stat. 2230 (42 U.S.C. 10154). Section 72.96(d) also issued under sec. 145(g), Pub. L. 100-203, 101 Stat. 1330-235 (42 U.S.C. 10165(g)). Subpart J also issued under secs. 2(2), 2(15), 2(19), 117(a), 141(h), Pub. L. 97-425, 96 Stat. 2202, 2203, 2204, 2222, 2224 (42 U.S.C. 10101, 10137(a), 10161(h)). Subparts K and L are also issued under sec. 133, 98 Stat. 2230 (42 U.S.C. 10153) and sec. 218(a), 96 Stat. 2252 (42 U.S.C. 10198).

2. In § 72.214, Certificate of Compliance 1030 is added to read as follows:

§ 72.214 List of approved spent fuel storage casks.

* * * * *

Certificate Number: 1030.

Initial Certificate Effective Date: (**insert effective date of final rule**).

SAR Submitted by: Transnuclear, Inc.

SAR Title: Final Safety Analysis Report for the NUHOMS® HD Horizontal Modular Storage System for Irradiated Nuclear Fuel.

Docket Number: 72-1030.

Certificate Expiration Date: [**insert date 20 years after final rule effective date**].

Model Number: NUHOMS® HD-32PTH.

* * * * *

Dated at Rockville, Maryland, this______________ day of_______ , 2006.

For the Nuclear Regulatory Commission.

____

Luis A. Reyes,
Executive Director for Operations.

SAR Title: Final Safety Analysis Report for the NUHOMS® HD Horizontal Modular Storage System for Irradiated Nuclear Fuel.

Docket Number: 72-1030.

Certificate Expiration Date: [**insert date 20 years after final rule effective date**].

Model Number: NUHOMS® HD-32PTH.

*   *   *   *   *

Dated at Rockville, Maryland, this______________ day of_______ , 2006.

For the Nuclear Regulatory Commission.

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Luis A. Reyes,
Executive Director for Operations.

ML
***See previous concurrence.**

OFFICE:	**DILR/FSME**		**SFST**		**DILR/FSME**		**OGC**	
NAME:	**J McCausland**		**D Huang***		**M Delligatti**		**STreby**	
DATE:	**10 /23 /06**		**10 / 17 /06**		**10 / 23 / 06**		**/ /06**	

OFFICE:	**ADM**		**RGB/IMNS**		**DEDMRS**		**EDO**	
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DATE:	**/ /06**		**/ /06**		**/ /06**		**/ /06**	