OCONEE NUCLEAR SITE

Independent Spent Fuel Storage Installation

10CFR72.212 Evaluation

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I. Purpose

The purpose of this evaluation is to document the reviews required by Title 10 of the Code of Federal Regulations, Part 72, Subpart K, Paragraph 72.212[12] for use of the Standardized NUHOMS-24P dry spent fuel storage system at the Oconee Nuclear Site (Oconee).

II. Background

Duke Energy Corporation, referred to hereafter as "Duke", operates three licensed reactors and one licensed site-specific Independent Spent Fuel Storage Installation (ISFSI) at Oconee. The existing Oconee ISFSI (license no. SNM-2503) utilizes a site-specific version of the NUHOMS-24P dry spent fuel storage system. The ISFSI was constructed with sufficient size to accommodate the licensed maximum of 88 horizontal storage modules (HSMs). To date, 40 site-specific HSMs have been constructed and loaded with spent fuel.

Duke has elected to suspend further construction of the site-specific HSMs in favor of the Standardized NUHOMS-24P system (or, General License system, as it is commonly called) due to its modular design and improved thermal capacity. The General License HSMs are fabricated offsite and installed on new concrete storage pads constructed within the confines of the existing ISFSI.

The Standardized NUHOMS-24P HSM cannot be used under the existing site-specific license because certain limits of the Standardized system exceed the maximum values permitted by the site-specific license (e.g. decay heat load). Rather than seeking an amendment to the site-specific license, Duke will instead, utilize the General License issued to it by the Nuclear Regulatory Commission (NRC) for storage of spent fuel at an ISFSI.

In order to use its General License, Duke must conform to certain conditions set forth by the NRC as stipulated in 10CFR72 Subpart K. This evaluation documents that those conditions are met for storage of spent fuel using the Standardized NUHOMS-24P system at the Oconee ISFSI.

The format of this evaluation is a listing of the specific requirements under 10CFR72 Subpart K, followed by a discussion of the requirement is satisfied.

III. 10CFR72.210- General License Issued

"A general license is hereby issued for the storage of spent fuel in an independent spent fuel storage installation at power reactor sites to persons authorized to possess or operate nuclear power reactors under part 50 of this chapter."

Duke has been authorized by the NRC to operate the three Oconee reactors (License Nos. DPR-38, 47 & 55 for Units 1,2, &3, respectively) under 10CFR Part 50. Thus, Duke has been granted a general license for the storage of spent fuel at an ISFSI at Oconee.

IV. 10CFR72.212(a)(1)- Limitations on Spent Fuel Authorized for Possession

"The general license is limited to that spent fuel which the general licensee is authorized to possess at the site under the specific license for the site."

The Oconee Nuclear Site is authorized under Reactor Licenses DPR-38, 47, and 55 for the possession of Framatome Cogema Fuels (formerly B&W) Mark B fuel assemblies (FA). Each Oconee core contains 177 fuel assemblies. Each FA typically consists of a 15x15 matrix of zircaloy clad/uranium dioxide fuel rods slightly enriched in U-235.

V. 10CFR72.212(a)(2)- Designation of Approved Cask

"This general license is limited to storage of spent fuel in casks approved under the provisions of this part."

The spent fuel storage casks listed in 10CFR72.214 are approved for storage of spent fuel under the conditions specified in their respective Certificate of Compliance (C of C). The standardized cask design that Duke has decided to use at the Oconee Nuclear Site (ONS) Independent Spent Fuel Storage Installation (ISFSI) is the standardized NUHOMS-24P (Certificate Number 1004). The Safety Evaluation Report (SER) and Certificate of Compliance Number 1004 were transmitted by letter to Transnuclear West (f.k.a. VECTRA Technologies, Inc.) on January 18, 1995 to be effective on January 23, 1995. This C of C expires on January 31, 2015.

VI. 10CFR72.212(a)(3)- License Expiration Date

"The general license for the storage of spent fuel in each cask fabricated under a Certificate of Compliance terminates 20 years after the date that the particular cask is first used by the general licensee to store spent fuel, unless the cask's

Certificate of Compliance is renewed, in which case the general license terminates 20 years after the cask's Certificate of Compliance renewal date. In the event that a cask vendor does not apply for a cask model reapproval under 72.240, any cask user or user's representative may apply for a cask design reapproval. If a Certificate of Compliance expires, casks of that design must be removed from service after a storage period not to exceed 20 years."

VII. 10CFR72.212(b)(1)- Notifications Required

"The general licensee shall:"

A. 10CFR72.212(b)(1)(i)

"Notify the Nuclear Regulatory Commission using instructions in 72.4 at least 90 days prior to first storage of spent fuel under this general license. The notice may be in the form of a letter, but must contain the licensee's name, address, reactor license and docket numbers, and the name and means of contacting a person responsible for providing additional information concerning spent fuel under this general license. A copy of the submittal must be sent to the administrator of the appropriate Nuclear Regulatory Commission regional office listed in appendix D to part 20 of this chapter."

Notification of the NRC of the first storage of dry spent fuel in accordance with C of C 1004 is required at least 90 days prior to initial loading of spent fuel into the Dry Shielded Canister (DSC). This notification was completed in accordance with 10CFR72.212(b)(1)(i) and 10CFR72.4 on November 7, 1996.

B. 10CFR72.212(b)(1)(ii)

'Register use of each cask with the Nuclear Regulatory Commission no later than 30 days after using that cask to store spent fuel. This registration may be accomplished by submitting a letter using instructions in 72.4 containing the following information: the licensee's name and address, the licensee's reactor license and docket numbers, the name and title of a person responsible for providing additional information concerning spent fuel storage under this general license, the cask certificate and model numbers, and the cask identification number. A copy of each submittal must be sent to the administrator of the appropriate Nuclear Regulatory Commission regional office listed in appendix D to part 20 of this chapter."

Use of each cask must be registered with the NRC in accordance with 10CFR72.212(b)(1)(ii) no later than 30 days after using the cask to store spent fuel. This requirement is handled by Oconee Regulatory Compliance through a

notification step in site procedure MP/0/A/1500/016, "Independent Spent Fuel Storage Installation Phase III DSC Loading and Storage."

C. 10CFR72.212(b)(1)(iii)

"Fee. Fees for inspections related to spent fuel storage under this general license are those shown in 170.31 of this chapter."

Fees related to spent fuel storage will become applicable with fiscal year 1999 and will be made in accordance with applicable rulemaking.

VIII. 10CFR72.212(b)(2)- Perform Written Evaluations Prior to Use

"Perform written evaluations prior to use, that establish that (i) conditions set forth in the Certificate of Compliance have been met;
(ii) cask storage pads and areas have been designed to adequately support the statis [sic] load of the stored casks; and
(iii) the requirements of 72.104 have been met.
A copy of this record must be retained until spent fuel is no longer stored under the general license issued under section 72.210."

Note that the Oconee Nuclear Site already has a site-specific ISFSI (license number SNM-2503 issued January 29, 1990). The existing Oconee NUHOMS-24P facility is very similar to the new standardized NUHOMS design. Both are horizontal concrete storage designs that utilize the same basic design for loading/transfer equipment and canisters. However, the licensing is different and the General License (GL) system has additional and different requirements. Even so, the loading and transfer processes are similar and Duke has the benefit of experience in having successfully loaded 40 dry storage modules. This section will itemize all C of C requirements and discuss how each is satisfied by either design or administrative controls:

A. 10CFR72.212(b)(2)(i)- Conditions Set Forth In CofC

"...conditions set forth in the Certificate of Compliance have been met;"

CofC 1.1.1- Regulatory Requirements for a General License

The site-specific parameters identified in the SER requiring verification are listed below with the corresponding values from the Oconee Nuclear Site.

1. The temperature of 70 °F as the maximum average yearly temperature with solar incidence. The average daily ambient temperature shall be 100 °F or less.

The average annual temperature for the nearest location to Oconee Nuclear Site (Clemson, SC) over a 68 year period of record is 61.2 degrees F[11]. This is below the limit of 70 ° F. The maximum average daily ambient temperature for a 10 year period of record, 1986 to 1996, of meteorological data at the Oconee site is 87.8 ° F[18]. This is below the limit of 100 ° F.

2. The temperature extremes of 125 degrees F with incident solar radiation and -40 degrees F with no solar incidence for storage of the DSC inside the HSM.

The maximum high temperature recorded in Clemson, SC is 105 ° F and the minimum low temperature is -7 ° F[11]. These temperature extremes are within the limits of 125 ° F and -40 ° F.

3. The horizontal and vertical seismic acceleration levels of 0.25g and 0.17g, respectively.

The maximum horizontal and vertical ground acceleration (MHE) specified for the Oconee site is 0.15g[4]. Therefore the Oconee site accelerations are less than the allowable values of 0.17g vertical and 0.25g horizontal used in the Transnuclear West analysis and are bounded by such[8].

4. The analyzed flood condition of 15 fps water velocity and a height of 50 feet of water (full submergence of the loaded HSM DSC).

The Standardized NUHOMS system is evaluated for a flood height of 50' and a water velocity of 15 fps[8]. The Oconee plant site is at elevation 796' mean sea level (msl) and the ISFSI site is at elevation 825' msl. All of the man-made dikes and dams forming Keowee Reservoir are constructed to an elevation of 815' msl with a full pond elevation of 800' msl. In the Oconee PRA study, a postulated failure of the Jocassee Dam results in a peak flood elevation at Keowee Dam of elevation 813.12', which gives ~1.9' available freeboard. The ISFSI site is well above the nominal plant yard grade at elevation 825'. Therefore, flooding of the ISFSI from external sources is not deemed a credible event.

5. The potential for fire and explosion should be addressed, based on site-specific considerations.

All phases (I, II, & III) of the Oconee ISFSI include HSMs made of concrete and steel, that by design, contain no flammable material and therefore pose no credible fire hazard. A site fire protection review was performed for the Phase III construction and placement process with recommendations incorporated into the

implementation procedure as applicable. The transport vehicles used during HSM loading activities are equipped with portable fire extinguishers. In addition, a portable fire extinguisher is permanently located within the ISFSI enclosed area. Explosion events are already analyzed in the ISFSI UFSAR (Section 8.2.12[2]) for the existing site specific system at Oconee or in specific calculations considered "safeguards information". For the case of an explosive device detonated nearby, the pressures created can be compared with the maximum analyzed tornado wind loadings for the new system which are 3.0 psi, the same as the existing facility. Based on the design requirements given in the NUHOMS CSAR[8] the new standardized HSM design provides equivalent or greater ability to withstand explosion/sabotage as the existing HSMs.

6. The HSM foundation design criteria are not included in the SAR. Therefore, the nominal SAR design or an alternative should be verified for individual sites in accordance with 10CFR72.212(b)(2)(ii). Also, in accordance with 10CFR72.212(b)(3), the foundation design should be evaluated against actual site parameters to determine whether its failure would cause the standardized NUHOMS system to exceed the design basis accident conditions.

Cask Storage pads and areas have been designed to adequately support the static load of stored casks. An equivalent static evaluation, 9-354-030 Duke Oconee NUHOMS ISFSI Phase III Pad Foundation Seismic Analysis[38], was performed by Transnuclear West for the storage pad. The pad is 3 feet thick and physically designed to Duke QA-4 standards. A more detailed evaluation of the cask storage pad is given in Section VII.

7. The potential for lightning damage to any electrical system associated with the standardized NUHOMS system (e.g., thermal performance monitoring) should be addressed, based on site-specific considerations.

C of C section 1.1.1 addresses protection of the thermal performance monitoring system (TPMS), while the SER[14] and CSAR[8] refer to specific site requirements. The existing dry storage system at Oconee is already analyzed for a lightning strike, and has a protection system designed in accordance with NFPA NO. 78-1979 Lightning Protection Code that consists of a grounded hand rail. A similar arrangement will be utilized for the new system. The lightning protection for the thermal performance monitoring system, a non-safety related system, is also protected by the handrails and an electrical circuit breaker on the power supply.

8. Any other site parameters or consideration that could decrease the effectiveness of cask systems important to safety.

A summary of the CSAR review for use at the Oconee site is included in Attachment 3 of this evaluation. The following are more detailed descriptions of specific issues of importance.

Cask Drop - the design basis cask drop is established either in terms of the maximum height to which the cask may be lifted when handled outside the reactor site spent fuel (SF) building or in terms of maximum acceleration that the cask could experience in a drop. The transfer cask trailer is designed to reduce the possibility of a cask drop by the use of the trunion clamps and trailer tie-downs. These make the dropping of a cask externally to the SF building not a credible event. In addition, the trailer is constructed so the cask is maintained at a height less than 80 inches as specified in the NUHOMS CSAR[8]. Finally, the surfaces that the transfer trailer travels from the SF building to the ISFSI location were reviewed and determined to be bounded by the hardness of the 3 foot thick reinforced concrete surface used in the drop analysis.

Transfer Cask Thermal Evaluation - The standardized ISFSI design allows DSCs to contain fuel with up to a 24 kW heat load while the site specific system allowed only a 15.8 kW heat load. To ensure that the existing transfer cask will perform acceptably with the new heat loads a thermal evaluation was conducted by Transnuclear West [13]. (This evaluation determined that the maximum temperature reached by the transfer cask NS-3 shielding material is 246 ° F, which is less than the allowable temperature of 250 ° F.) In addition, the maximum thermal gradient across the cask layers is 52 ° F, while that for the general license cask is 62 ° F, therefore the thermal stresses within the transfer cask are bounded by those reported in the CSAR. The calculated peak temperature of the DSC shell is 441 ° F, which is less than the peak shell temperature for a DSC within the general license transfer cask, 447.7 ° F. The bounded shell temperature means that the fuel cladding temperatures will be bounded by the CSAR values. In addition, the clearance fit between the DSC and transfer cask was checked to ensure the greater heat loads would not result in an interference fit due to thermal expansion. The worst case clearances were determined to be 0.12 inches in diameter and 0.14 inches lengthwise. This ensures the transfer cask cavity is suitably sized for use with the standardized NUHOMS-24P DSC.

Transfer Cask (TC) Trunion Testing - A one time pre-service load test of the trunions is performed for new TC's fabricated under the GL. This is not required for existing TC's. As stated, the Standardized NUHOMS CSAR Section 4.2.3.3[8], "Trunion testing is neither applicable nor required for existing NUHOMS transfer casks previously licensed for site-specific use (e.g., Calvert Cliffs and Oconee plants)." The Oconee TC was fabricated under the site-specific ISFSI license. Trunion testing was not a requirement of the specification or any applicable code or standard and was not performed. If trunion testing were required to be

performed for the Oconee TC extensive disassembly of the cask would be required. Access to the trunion welds for inspection following testing would require machining off the neutron shielding jacket and chipping out the solid neutron shield. Based on the historical performance of the TC and the routine maintenance and inspection performed on the TC, trunion testing is not required[19].

CofC 1.1.2- Operating Procedures

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

Written operating procedures for cask handling, loading, and movement are covered by MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage"[25].

The welding of the DSC is controlled by MP/0/A/1810/019 "Cask - NUHOMS 24-P Dry Storage Canister – Welding."[41]

Removal of DSC's from HSM's and unloading of DSC's is controlled by MP/0/A/1500/017, "ISFSI Phase III DSC Retrieval and Relocation."[26]

Any maintenance procedures for repairs or alterations to the DSC will be generated as needed to correct discrepancies or damage to the DSC.

Surveillance procedures for checking the air inlets and outlets and the temperature monitoring, after steady state conditions have been reached, have been incorporated into the daily security procedure SP 522.[39]

Radiation Protection activities associated with DSC loading are controlled by procedure HP/0/B/1000/097, "Radiological Protection Requirements for Independent Spent Fuel Storage Installation Phases III/DSCs 41-60."[24]

After initial insertion of DSC into HSM, the temperature rise must be measured to verify that it reaches an equilibrium below a specified maximum. This measurement will be controlled and documented in procedure PT/0/A/1500/001, "ISFSI Phase III Horizontal Storage Module Temperature Rise Verification".[44]

CofC 1.1.3- Quality Assurance

Duke has an NRC approved 10 CFR Part 50 QA program that is fully described in the Duke Topical Report Quality Assurance Program[30]. Certain components of the existing ISFSI are already designated QA items, i.e. the transfer cask and canisters are considered QA Condition 1, the Phase I & II HSMs are QA-2, etc. While Duke performed actual construction of the initial ISFSI and Phases I & II

HSMs, the Phase III General License modules are purchased as complete units from Transnuclear West. The HSMs are fabricated by Bayshore Concrete Co., Cape Charles, Virginia. Bayshore performs its work in accordance with Transnuclear West's NRC approved 10 CFR Part 72 graded QA program. While the primary QA direction and oversight is provided by Transnuclear West, Duke provides additional QA oversight as required for procurement under its own QA program.

To ensure that the specific QA requirements of the General License conditions are met, Duke and Transnuclear West established Duke QA designations for the components that meet or exceed the TNW requirements[31]. Duke classifications for the major components are as follows: the DSC is QA Condition 1; the HSM is QA Condition 4; and the concrete storage pad is QA Condition 4.

Duke imposed the additional requirement of certified material test reports (CMTRs) for TNW's Category 'B' structural steel components.

CofC 1.1.4- Heavy Loads Requirements

The lifting operations and equipment used to handle the transfer cask for Phase III are identical to those used in Phases I and II. The equipment used is controlled by 10CFR50 and NUREG-0612 requirements. This equipment was designed in accordance with ANSI 14.6-1986. In addition, movement of the transfer cask within the spent fuel pool building with the 100 ton SFP crane is defined as a "Critical Lift" in accordance with Oconee Maintenance Directive 6.3.5, "Control of Cranes/Hoists and Rigging Equipment", additional controls are specified in maintenance directive 6.3.4, "Control of Heavy Loads per NUREG-0612."

CofC 1.1.5- Training Module

Duke conducted initial training for the existing system, and has developed expertise over the course of successfully loading 40 canisters/HSMs. The existing training package[32] has been upgraded to address the differences between the Phase I and II and Phase III HSM designs. The loading and transport sections of the training module remain essentially the same. Changes to the training package are required for the revised loading/alignment/closure procedures associated with the new HSM door design and cask restraints.

CofC 1.1.6- Pre-Operational Testing and Training Exercise

Oconee has successfully completed a pre-operational testing and operation program for the site-specific ISFSI. This test was controlled by the following procedures and technical memos:

TT/1&2/A/0210/01 ISFSI Vacuum Drying System Functional Test, performed 1-25-90[36].

TT/1&2/A/0210/02 ISFSI Dry Run Exercise of DSC Insertion and Withdrawal from HSM, performed 5-21-90 through 5-30-90[45].

TT/1&2/A/0210/03 ISFSI Dry Run Exercise of Cask/DSC operations in the SFP, performed 5-31-90, 6-4-90, 6-5-90, and 6-12-90 through 6-18-90[46].

MP/0/A/1810/019 Cask - NUHOMS 24P Dry Storage Canister - Welding, performed 4-2-90 through 4-11-90.[41]

Memo File No. OS - 230.04 ISFSI Mockup DSC Cutting Demonstration, performed 3-22-90 through 3-28-90.[40]

Since Oconee will continue to use its previously licensed and pre-operationally tested transfer cask and transfer equipment, pre-operational testing for Phase III was limited to a dry run of the HSM loading and unloading procedures in accordance with section 9.2 of the CSAR. The dry runs consists of the following tasks identified in the C of C:

(3.) Testing of TC on transport trailer and transported to ISFSI along a predetermined route and aligned with an HSM

(4.) Testing of transfer trailer alignment and docking equipment. Testing of hydraulic ram to insert a DSC loaded with test weights into an HSM and then retrieve it and the task of emplacing and bolting the HSM access door (not identified in the C of C).

The operations specific to spent fuel pool operations, and cask handling and sealing are not included as they are identical to those previously performed in phase I and II operations.

The dry run for Phase III was successfully completed on March 21, 1997 using procedure TT/O /A/1500/001[35].

CofC 1.1.7- Special Requirements for First System in Place

The first NUHOMS-24P Standardized ISFSI system loaded under the general license was at Toledo Edison's Davis-Besse Nuclear Power Station in Oak Harbor, Ohio. Davis-Besse loaded the first 3 DSC's in January 1996, therefore the heat transfer characteristics of all three HSMs were included in assessment of the heat removal characteristics of the storage system. The results of the heat

load analysis, indicating the highest heat load was 10.87 kw, were transmitted to the NRC by Davis-Besse on January 31, 1996[21].

Oconee will continue its current practice of selecting the oldest fuel consistent with Duke's ALARA program. The decay heat load is calculated as part of the fuel selection procedure, XSFM-002, "Workplace Procedure for Selecting Spent Fuel for General License Independent Spent Fuel Storage Installation[23]." This procedure requires notification of plant personnel that HSM air inlet and outlet temperatures must be submitted to NRC in accordance with 10CFR72.4 in the event that decay heat will exceed previous value.

CofC 1.1.8- Surveillance Requirements Applicability

The surveillance requirements for the specified frequencies given in the CSAR, SER, and C of C are controlled within the applicable procedures.

CofC 1.2.1- Fuel Specification

A new fuel selection procedure has been developed- XSFM-002, "Workplace Procedure for Selecting Spent Fuel for General License Independent Spent Fuel Storage Installation[23]." This procedure is a detailed QA Condition 1 administrative control utilized by the General Office Nuclear Fuels Management Section to verify candidate dry storage fuel assemblies and control components meet all requirements of this specification. The irradiated fuel to be stored in the GL system is basically the same B&W 15 X 15 type placed in the site-specific facility, except the new system allows storage of fuel with shorter cooling times.

Identification of spent fuel assemblies prior to insertion in the DSC is made independently by two individuals as directed by the procedure MP/0/A/1500/16 "ISFSI Phase III DSC Loading and Storage"[25].

CofC 1.2.2- DSC Vacuum Pressure During Drying

The requirement for a vacuum pressure of less than or equal to 3 mm Hg for a time of greater than 30 minutes is controlled in the "Draining and Vacuum Drying of ISFSI Cask/DSC" enclosure of procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage"[25]. This is accomplished by ensuring the canister pressure maintains less than 3mm Hg for at least 30 minutes.

CofC 1.2.3- DSC Helium Backfill Pressure

The requirement for a helium backfill pressure of 2.5 psig for 30 minutes is verified in the "Draining and Vacuum Drying of ISFSI Cask/DSC" enclosure of procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25]

CofC 1.2.4- DSC Helium Leak Rate of Inner Seal Weld

The requirement for the inner cover plate seal weld to have a helium leak rate less than 1.0 x 10^{-4} atm-cm^3/s is verified in the "Draining and Vacuum Drying of ISFSI Cask/DSC" enclosure of procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25]

CofC 1.2.5- DSC Dye Penetrant Test of Closure Welds

The specification requiring all DSC closure welds to have a dye penetrant test in accordance with the ASME Boiler and Pressure Vessel Code is performed in procedure MP/0/A/1810/019 "Cask - NUHOMS 24P Dry Storage Canister - Welding."[41]

CofC 1.2.6- DSC Top End Dose Rates

The specification requiring the DSC top end dose rates to be less than or equal to 200 mrem/hr at the shield plug surface with water in the DSC is verified in procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25] The specification for requiring the DSC top end dose rate to be less than or equal to 400 mrem/hr at the top cover plate surface is verified in procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25]

CofC 1.2.7- HSM Dose Rates

The specification requiring the HSM dose rates to be less than or equal to; a) 400 mrem/hr at 3 feet from the HSM surface, b) 100 mrem/hr on the DSC centerline outside the HSM access door, and c) 20 mrem/hr at the end shield wall exterior is verified in procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25] and procedure HP/0/B/1000/097, "Radiological Protection Requirements for Independent Spent Fuel Storage Installation Phases III/DSCs 41-60"[24]

CofC 1.2.8- HSM Maximum Air Exit Temperature

After initial loading of a DSC into an HSM, the temperature difference between the inlet and outlet vent will be verified to be below a calculated maximum temperature. This calculated maximum temperature is based on decay heat load of DSC and ambient temperature. This requirement is verified by procedure PT/0/A/1500/001, "ISFSI Phase III Horizontal Storage Module Temperature Rise Verification."[44]

CofC 1.2.9- Transfer Cask Alignment with HSM

The requirement for the transfer cask to be aligned with respect to HSM so that the longitudinal centerline of the DSC is within 1/8 inch of its true position is verified in the "Alignment of Cask/DSC and Hydraulic Ram to HSM" enclosure of procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25] and is verified in procedure MP/0/A/1500/017, "ISFSI Phase III DSC Retrieval and Relocation."[26]

CofC 1.2.10- DSC Handling Height Outside the Spent Fuel Pool Building

Ensured by equipment design and restrictions. The maximum deck height of the transfer trailer is 52" + 2.8" pillow block + 55.75" distance to Center Line of cask = 110.55" maximum height. Subtracting cask radius of 43.12" from 110.55" = 67.43" maximum lift height, which is below the 80" limit.

CofC 1.2.11- Transfer Cask Dose Rates

The specification that the cask dose rate will be less than 200 mrem/hr at 3 feet with water in the DSC cavity is verified in procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25] The specification that the dose rate will be less than 500 mrem/hr without water in the DSC cavity is verified in procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage[25]."

CofC 1.2.12- Maximum DSC Removable Surface Contamination

The specification that the DSC outer surface shall have removable surface contamination less than 2,200 dpm/100cm^2 for beta gamma sources and 220 dpm/100cm^2 for alpha sources is verified in procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25]

CofC 1.2.13- TC/DSC Lifting Heights as a Function of Low Temperature and Location

The specification that the ambient temperature be above 0 ° F is identified in Limits and Precautions section of procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage"[25] and procedure MP/0/A/1500/17 "ISFSI Phase III DSC Retrieval and Unloading"[26].

CofC 1.2.14- TC/DSC Transfer Operations at High Ambient Temperatures

The specification that the ambient temperature be below 100 ° F is identified in the Limits and Precautions section of procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage"[25] and in procedure MP/0/A/1500/017 "ISFSI Phase III DSC Retrieval and Relocation"[26].

CofC 1.2.15- Boron Concentration in the DSC Cavity Water (24-P Design Only)

The specification that the boron concentration in SFP and DSC cavity water be greater than 2,000ppm is verified in procedure MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25] and in procedure MP/0/A/1500/017 "ISFSI Phase III DSC Retrieval and Relocation"[26].

CofC 1.2.16- Provision of TC Seismic Restraint Inside the Spent Fuel Pool Building as a Function of Horizontal Acceleration and Loaded Cask Weight

Three locations were evaluated for the 0.40g horizontal acceleration for which seismic restraints are required[47]. Horizontal seismic accelerations for the transfer cask in the decontamination pit and in the cask loading pit of the spent fuel pool are less than 0.40g.

The transfer cask also rests as a "live" load on an intermediate platform in the spent fuel pool for a short time (less than 1 hour) as the yoke extension is engaged/disengaged. This platform is qualified for the vertical load but is not seismically qualified with the transfer cask in place.

It is Duke's position that this specification is not applicable to the transfer cask while it is in this location. The specification refers to the "spent fuel pool building" rather than the spent fuel pool. Further evidence that the spent fuel pool is beyond the applicability of this specification is given in section 3.3.2.2 of the SER, where the NRC discusses the potential for overturn of the transfer cask "in a vertical orientation in the decontamination area during closure of the DSC."

Finally, any consequences of overturn of the transfer cask while on the pool intermediate platform are bounded by the previously analyzed drop of the transfer cask onto stored fuel in the pool.

CofC 1.3.1- Inspection of HSM Air Inlets and Outlets

Security procedure, SP 522[39], performed during daily patrol, verifies that inlet and outlet vents are unobstructed.

CofC 1.3.2- HSM Thermal Performance

Daily thermal performance surveillance and temperature recording are completed by security during daily patrol using security procedure SP 522[39].

B. 10CFR72.212(b)(2)(ii)- Cask Storage Pad Design

"...cask storage pads and areas have been designed to adequately support the statis (sic) load of the stored casks;"

Per the approved CSAR, the ISFSI storage pad is not considered important to safety and is designed, constructed, maintained, and tested as a commercial grade item. The concrete storage pad was designed by Transnuclear West based on a Duke performed shake analysis and input on soil parameters (density, response characteristics, etc.) The storage pad was designed and constructed in accordance with ACI-318 and analyzed for seismic accelerations in both the horizontal and vertical directions. The seismic loads are applied as equivalent static loads. The average dynamic soil spring stiffness and tributary area for each spring utilized in the analysis of the storage pad were obtained from previous Duke calculations, OSC-2499 "ISFSI Shake Analysis"[42] and OSC-2639 "Dry Cask Storage Bearing Pressure Analysis"[43], performed for the site specific ISFSI. The basemat is located within the double fenced boundaries of the existing site specific dry storage facility. The storage pad and associated approach slabs were constructed using concrete with a 28 day compressive strength (fc) of 5000 psi. The reinforcing is ASTM A615 Grade 60 (fy = 60,000 psi). The storage pad is 3' thick by 40.0' wide by 106'-3" long and is separated from the adjacent Phase II structure by a 3" expansion joint. Based on the preceding discussion, it is concluded the storage pad is designed adequately to support the static load of the stored casks. The Transnuclear West analysis is detailed in 9-354-030 Duke Oconee NUHOMS ISFSI Phase III Pad Foundation Seismic Analysis[38].

C. 10CFR72.212(b)(2)(iii)- Requirements of 72.104

"...the requirements of 72.104 have been met."

Requirements of 72.104 "Criteria For Radioactive Materials In Effluents And Direct Radiation From ISFSI Or MRS" are met and documented in the Transnuclear West report, "Duke Oconee ISFSI Phase III 10CFR72.104 and Cask Thermal Evaluation Report"[13]. The annual dose equivalent to any individual who is located beyond the controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any critical organ. This dose equivalent must include contributions from planned releases to the

environment, direct radiation from ISFSI operations, and any other radiation from uranium fuel cycle operations within the region.

The controlled area is defined as the Oconee Nuclear Site Exclusion Area Boundary (EAB). The dose for a maximally exposed individual at this boundary must be below 25 mrem. For a conservative determination the individual is assumed to have a 100% occupation time at the boundary. As the NUHOMS system does not produce any effluents, the dose at the EAB will consist of the direct dose from ISFSI operations and the other uranium fuel cycle operations. Secondly, the dose at the ISFSI restricted area boundary must be below 2 mrem per hour, 10CFR20.1301(a)(2). Lastly, due to the Oconee EAB being traversed by public roads and waterways, the dose within the EAB but external to the Oconee restricted area must be below 100 mrem per year, an occupancy time of 2080 hours (a standard work year) is used as no residences exist within the EAB.[27] This requirement is to comply with 10CFR20.1301(a)(1).

The dose at the site boundary was calculated using existing TLD data[33,34] for the ISFSI current complement of 40 DSCs, the Oconee power generation contribution of 0.1 mrem, and the contribution from the additional 46 GL DSCs using the MCNP monte-carlo transport code. The maximum resulting dose at the Exclusion Area Boundary was calculated to be 0.0268 mrem per year, within the 25 mrem allowable limit. The maximum dose rate at the ISFSI restricted area was determined to be 1.84 mrem per hour, within the 2 mrem per hour allowable limit. Finally the maximum annual dose at the Oconee controlled area boundary was determined to be 54.5 mrem, within the 100 mrem allowable limit.

These calculations show that the Oconee ISFSI meets the radiological requirements of 10CFR72.104 and 10CFR20.1301. The calculations were performed assuming no further decay or dose rate reduction from the existing 40 Phase I and II HSMs.

IX. 10CFR72.212(b)(3)- Evaluation of Reactor Site Parameters

"Review the Safety Analysis Report (SAR) referenced in the Certificate of Compliance and the related NRC Safety Evaluation Report, prior to use of the general license, to determine whether or not the reactor site parameters, including analyses of earthquake intensity and tornado missiles, are enveloped by the cask design bases considered in these reports. The results of this review must be documented in the evaluation made in paragraph (b)(2) of this section."

A. Earthquake Intensity

The maximum horizontal and vertical ground acceleration (MHE) specified for the Oconee site is 0.15g (Section 2.5.2.8 of Oconee UFSAR[4]). Therefore the Oconee site accelerations are less than the values of 0.17g vertical and 0.25g horizontal used in the Transnuclear West analysis, and are therefore bounded[8].

B. Tornado

Transnuclear West completed a design analysis, NUH-004.0219 "NUHOMS HSM Tornado Missile Impact Analysis"[20], to ensure the tornado missile impact analysis is bounded for the Oconee site. The Oconee site is analyzed for 2 specific tornado missiles (1) a 2000 lbm automobile traveling at 100 mph with 20 square foot contact area and (2) a 12 foot long 8" diameter wooden pole traveling at 250 mph (Oconee UFSAR 3.5.1.3[4]). The first case is bounded by the Standardized NUHOMS-24P CSAR[8] massive missile impact analysis of a 3967 lbm automobile traveling at 126 mph with a frontal area of 20 square feet against the HSM. For the second case, the Transnuclear West analysis is for a 13.5" diameter 35' long 1500 lbm projectile with a velocity of 294 ft/s. This projectile bounds the Oconee wooden pole missile and is documented in the referenced calculation.[20]

The Oconee transfer trailer matches the physical dimensions of the transfer trailer in the CSAR and is therefore bounded by the transfer cask tip-over analysis.

C. Average Ambient Temperature and Temperature Extremes

The maximum average daily ambient temperature is 87.8 ° F based on ten year records at the ONS[18] and the average annual ambient temperature is 61.2 degrees F for the measuring location nearest to Oconee (Clemson, SC). These are below the site specified limits of 100 ° F and 70 ° F, respectively, given in the SER.

Additionally the maximum and minimum temperatures measured in Clemson, SC are 105 ° F and -7 ° F[11]. These site extremes are within the extreme temperature limits of 125 ° F and -40 ° F.

D. Snow and Ice Loadings

The snow and ice loadings for the HSMs (200 pounds per square foot) is conservative for the maximum 100 year snow load for most areas in the continental US. This value conservatively bounds the live snow loads for the Oconee Nuclear Site, the maximum recorded snow fall being only 14.1" per the ISFSI environmental report.

E. Flooding

The Oconee Nuclear Site PRA study calculates the peak flood for the failure of the Jocassee Dam will result in flood elevation of 813.12' above mean sea level (msl) at the Keowee Dam. The man-made dikes and dams forming the Keowee reservoir are at an elevation of 815' msl. The ISFSI site is at an elevation of 825' msl. Therefore flooding of the ISFSI site is not deemed a credible event and is within the specified limits of 50 feet of water and 15 fps water velocity[8].

F. Lightning

The Phase III HSMs are protected from lightning strikes by a grounded handrail similar to the Phase I and II HSMs as discussed in Section VIII.A. of these evaluations.

G. Fire and Explosion

The ISFSI HSM and DSC contain no flammable materials. The concrete and steel materials can withstand any credible fire hazard. While permanent fire suppression equipment is not necessary within the ISFSI boundary, a portable fire extinguisher is permanently staged within the enclosed area. In addition, all transport vehicles used during HSM loading and unloading operations are required to be equipped with portable fire extinguishers.

Internal explosions are not considered credible events as no explosive materials are present in the fission products or cover gasses within the DSC. External explosions have been analyzed for the existing ISFSI.

The analysis assumes that an explosion of 8,500 gallons of gasoline from a tanker truck occurs on nearby highway 183/130. The pressures generated (2.3 psi) for such an event were determined to be bounded by the HSM design loadings for tornados, 2.75 psi for the front wall and 2.48 psi for the roof.[17] .

H. Meteorology

10CFR72.106 requires that "Any individual located on or beyond the nearest boundary of the controlled area shall not receive a dose greater than 5 rem to the whole body or any organ from any design basis accident." The DSC leakage accident described in the NUHOMS CSAR was evaluated by Duke utilizing site-specific meteorology and site-specific fuel characteristics and was determined to be bounded by the analysis performed in the CSAR.[15]

X. 10CFR72.212(b)(4)- Evaluation of Unreviewed Safety Questions

"Prior to use of the general license determine whether activities related to storage of spent fuel under this general license involve any unreviewed facility safety question or change in the facility technical specifications, as provided under 50.59. Results of this determination must be documented in the evaluation made in paragraph (b)(2) of this section."

The use of Phase III General License ISFSI design does not result in an Unreviewed Safety Question (USQ). All operations, systems and equipment, with the exception of the HSMs, are identical to those previously used and analyzed as part of the existing ISFSI. The Phase III HSMs are constructed to the equivalent or more stringent QA requirements specifications as the Phase I and II HSMs and therefore do not create the possibility for new types of malfunctions. The 10CFR50.59 evaluation of USQ evaluation related to the Oconee site is included as Attachment 1. The 10CFR72.48 USQ evaluation related to the existing ISFSI is included as Attachment 2.

XI. 10CFR72.212(b)(5)- Physical Security Effectiveness

"Protect the spent fuel against the design basis threat of radiological sabotage in accordance with the same provisions and requirements as are set forth in the licensee's physical security plan pursuant to 73.55 of this chapter with the following additional conditions and exceptions:

(i) The physical security organization and program for the facility must be modified as necessary to assure that activities conducted under this general license do not decrease the effectiveness of the protection of vital equipment in accordance with 73.55 of this chapter.

(ii) Storage of spent fuel must be within a protected area, in accordance with 73.55 (C) of this chapter, but need not be within a separate vital area. Existing

protected areas may be expanded or new protected areas added for the purpose of storage of spent fuel in accordance with this general license.

(iii) For purposes of this general license, searches required by 73.55(d)(1) of this chapter before admission to a new protected area may be performed by physical pat-down searches of persons in lieu of firearms and explosives detection equipment.

(iv) The observational capability required by 73.55(h)(6) of this chapter as applied to a new protected area may be provided by a guard or watchman on patrol in lieu of closed circuit television.

(v) For the purposed of this general license, the licensee is exempt from 73.55(h)(4)(iii)(A) and 73.55(h)(5) of this chapter."

A separate protected area was established for spent fuel storage when Oconee constructed its original ISFSI under a site-specific license (SNM-2503). The ISFSI was designed to allow for construction of 88 horizontal storage modules, of which 40 have been built and loaded. Subsequent HSMs are the Standardized NUHOMS 24-P design which are procured and operated in accordance with Oconee's 10CFR72 Subpart K General License. These HSMs are placed within the established protected area of the existing ISFSI. A new telephoto lens was installed on an existing closed circuit TV camera to ensure adequate remote surveillance is maintained and no new hiding places were created. Since the new modules are located within the double fenced boundaries of the existing site specific facility which is regularly patrolled by Security and to which access is already controlled, no other security modification of the ISFSI protected area is required.

The physical protection requirements for the ISFSI meet 10CFR73.55 with exception of the vehicle barrier system (VBS), which are not required for ISFSIs[16]. As described in the August 1, 1994 Federal Register Notice pages 38896 and 38897[10], the purpose of the 10CFR73 Part 1 change was to exclude ISFSIs constructed per the provisions of 10CFR72 Part 212 from VBS requirements. The excerpt reads "The NRC did not intend for ISFSIs to be subject to this regulation because of the lower consequences associated with storage of irradiated fuel removed from a power reactor core, particularly since spent fuel stored at ISFSIs must be aged a least one year." The protected area of the ISFSI is enclosed by a physical barrier that meets 10CFR73.2 with isolation zones interior and exterior of the protected area fence with CCTV coverage of the isolation zone. Perimeter intrusion detection is provided with alarm and tamper signals. Also, the ISFSI protected area is illuminated to a level of not less than 0.2 foot-candles. Access is controlled into the ISFSI protected area as outlined in the ISFSI security plan and the security force used for the protection of the ISFSI is the same as the plant. Therefore, the security force is trained, equipped, and qualified in accordance with 10CFR73

Appendix B. During fuel cask transfers to the ISFSI, a continuous security escort is provided from the time the transport vehicle leaves the plant protected area until its arrival inside the ISFSI protected area.

The existing security plan[28] for the ISFSI details security measures for the physical protection against radiological sabotage. The new modules erected in the ISFSI will therefore be protected as outlined in the ISFSI security plan. A review of the ISFSI security plan was performed as a result of the future erection of the additional storage modules. The addition of the new storage modules will not diminish the physical security of the spent fuel. Editorial type changes were made since the ISFSI security plan references specific information such as module types and SAR references of the existing modules. However, these changes will not affect or degrade the physical security of the ISFSI as outlined in the security plan.

XII. 10CFR72.212(b)(6)- Program Effectiveness

"Review the reactor emergency plan, quality assurance program, training program, and radiation protection program to determine if their effectiveness is decreased and, if so, prepare the necessary changes and seek and obtain the necessary approvals."

A. Emergency Plan

The Oconee Emergency plan[29] was reviewed for the existing ISFSI, which is licensed to include up to 88 modules. The new General License System utilizes the same fuel handling/transfer equipment and transport route. The Phase III HSMs are similar in design to the existing modules, occupy the same general site location, and are also passive storage systems. Therefore, there is no direct effect on the site Emergency Plan.

B. QA program

Duke has an NRC approved 10 CFR Part 50 QA program that is fully described in the "Duke Topical Report Quality Assurance Program[30]." Certain components of the existing ISFSI are already designated QA items, i.e. the transfer cask and canisters are considered QA Condition 1, the Phase I & II HSMs are QA-2, etc. While Duke performed actual construction of initial ISFSI and Phases I & II HSMs, the Phase III General License modules are purchased as complete units from Transnuclear West. The HSMs are fabricated by Bayshore Concrete Co., Cape Charles, Virginia. Bayshore performs its work in accordance with the Transnuclear West, NRC approved, 10 CFR Part 72 graded QA program. While

the primary QA direction and oversight is provided by Transnuclear West, Duke provides additional QA oversight as required for procurement under its own QA program. Duke has also imposed the additional requirement of certified material test reports for category 'B' structural steel components. To ensure that the specific QA requirements of the General License conditions are met, Duke and Transnuclear West established Duke QA designations for the ISFSI components that meet or exceed the TNW requirements[31]. Duke classifications for the major components are as follows: the DSC is QA Condition 1; the HSM is QA Condition 4; and the concrete storage pad is QA Condition 4.

C. Training program

Duke conducted initial training for the existing system, and has developed expertise over the course of successfully loading 40 canisters/HSMs. The existing training package was upgraded to address changes and cover items unique to the new General License design. The loading and transport processes remain essentially the same, with major changes only to the loading, alignment, and closure procedures. Since the canister fuel loading process (pool-side activities) remains essentially unchanged, the dry run exercise focused on ensuring that the HSM alignment/loading/closure procedures are adequate and that objective was satisfied. Pre-operational training was completed on March 21, 1997 for the required dry run exercises.

D. RP program

Approved RP procedures are already in place for dry fuel storage operations. Because the General License System imposes additional and different requirements, a new RP procedure[24] was developed. The C of C limits for canister shield plug, cask, HSM dose rates, and contamination limits have been incorporated. The actual loading and transport processes (except for HSM door closure) are largely unaffected by changing to the General License system. Site RP and ALARA procedures and staff oversight continue to be utilized to provide assurance that the requirements of 10CFR20 are met and that no significant increase in occupational exposure results from the design changes.

XIII. 10CFR72.212(b)(7), (8), and (10)- Certificate of Compliance and Cask Documentation Retention

10CFR72.212(b)(7)- *"Maintain a copy of the Certificate of Compliance and documents referenced in the certificate for each cask model used for storage of spent fuel, until use of the cask model is discontinued. The licensee shall comply with the terms and conditions of the certificate."*

10CFR72.212(b)(8)(i)- "*Accurately maintain the record provided by the cask supplier for each cask that shows, in addition to the information provided by the cask vendor, the following:*

(A) The name and address of the cask vendor or lessor:

(B) The listing of spent fuel stored in the cask; and

(C) Any maintenance performed on the cask."

10CFR72.212(b)(8)(ii)- "*This record must include sufficient information to furnish documentary evidence that any testing and maintenance of the cask has been conducted under an NRC-approved quality assurance program."*

10CFR72.212(b)(8)(iii)- "*In the event that a cask is sold, leased, loaned, or otherwise transferred to another registered user, this record must also be transferred to and must be accurately maintained by the new registered user. This record must be maintained by the current cask user during the period that the cask is used for storage of spent fuel and retained by the last user until decommissioning of the cask is complete."*

10CFR72.212(b)(10)- *"Make records and casks available to the Commission for inspection."*

A. Reference Documentation

The appropriate General License documents and other reference documents are controlled and maintained under the DPC document management process. The GL C of C is treated with the same regard as a set of Technical Specifications in that they may not be changed without prior NRC approval. Each ISFSI component (HSMs and DSCs) will be supplied with a documentation package and Certificate of Compliance. This package and C of C will be entered into the Oconee Nuclear Site QA vault and maintained for the life of the facility.

B. Cask Documentation

Cask Vendor - The Standardized NUHOMS-24P dry storage system is designed by Transnuclear West (f.k.a. VECTRA) Fremont, California. The Duke transport cask was built by the ENSA Corporation.

Listing of spent fuel stored in cask - All Special Nuclear Material (SNM) possessed by DPC is closely controlled, inventoried, and reported semi-annually per NRC requirements. The G.O. Nuclear Engineering Group selects the fuel to be stored at the ISFSI per XSFM-002, "Workplace Procedure for Selecting Spent Fuel for General License Independent Spent Fuel Storage Installation"[23]. The

onsite Nuclear Engineering Group approves all fuel assemblies (FAs) for dry storage and ensures all related paperwork (DOE/NRC 741 & 742 forms) is processed and that the Nuclear Materials Accountability System (NMAS) database is updated in a timely manner to reflect the exact location of any reportable quantity of SNM.

Maintenance performed on casks, and documentation of that maintenance and testing are performed under an NRC approved QA program - Periodic maintenance and testing will be performed via approved procedures. Any repairs or modifications to the cask will be performed under the DPC minor modification or NSM processes.

C. Inspection Availability

The records and documentation mentioned in parts A and B of this section are stored in the DPC document control process and are available to the NRC for review upon request. The DSCs, upon receipt and prior to use, and transfer casks are available at Oconee for NRC inspection as are the HSMs and transfer equipment.

XIV. 10CFR72.212(b)(9)- Activities in Accordance with Written Procedures

"Conduct activities related to storage of spent fuel under this general license only in accordance with written procedures."

It is the policy of, and required by Technical Specifications, for Oconee Nuclear Site to utilize approved written procedures in performance of safety related tasks. Oconee already has loading, transport, and storage procedures in place for the existing facility. These procedures have been modified accordingly to facilitate use of the General License Design HSMs. The listing of relevant procedures follows.

HP/0/B/1000/097, "Radiological Protection Requirements for Independent Spent Fuel Storage Installation Phases III/DSCs 41-60."[24]

MP/0/A/1500/016, "ISFSI Phase III DSC Loading and Storage."[25]

MP/0/A/1810/019, "Cask - NUHOMS 24-P Dry Storage Canister - Welding."[41]

MP/0/A/1500/017, "ISFSI Phase III DSC Retrieval and Relocation."[26]

IP/0/B/0220/002, "Temperature Monitoring System for Independent Spent Fuel Storage Installation Indication/Thermocouple Instrument Calibration."[48]

PT/0/A/1500/001, "ISFSI Phase III Horizontal Storage Module Temperature Rise Verification." [44]

SP 522, Daily Security Procedure.[39]

XSFM-0002, "Workplace Procedure for Selecting Spent Fuel for General License Independent Spent Fuel Storage Installation."[23]

XV. Conclusion

ONS has successfully demonstrated the feasibility of dry spent nuclear fuel storage with the placement of 40 DSCs into the site specific NUHOMS Phase I and II HSMs. Use of the general license HSM required modifications primarily to existing fuel selection and HSM loading and unloading procedures and the corresponding sections of the training module. The design of the GL and site-specific HSM's account for similar accident scenarios so that the site parameters are bounded by the allowable limits specified by the GL SAR. The review of the Oconee Emergency Plan, Quality Assurance Program, Training Program, and Radiation Protection Program has shown that their effectiveness will not be reduced as a result of the Phase III activities. With the appropriate changes and additions to the existing procedures safe dry storage of spent nuclear fuel will continue. Therefore, the requirements of 10CFR72, Subpart K are satisfied.

XVI. References

1. Final Scope Document for NSM-52959 Parts BS-1, BL-1 Rev 0 dated 7-30-96
2. Oconee Site Specific ISFSI FSAR, sections 1.1, 1.2, 1.3.1.2, 2.1, 3.3, 4.2, 7.3, 7.4, 7.7, 8.0, 10.0, 11.0 Tables A-12, A-16, A-18, 1997 update
3. Oconee ISFSI Materials License SNM-2503 and Technical Specifications, all sections, as amended 11-30-98
4. Oconee Nuclear Site Final Safety Analysis Report, Sections 1.2.2.8, 2.5.2.8,3.0, 9.0, 15.0, 1997 update
5. Oconee Nuclear Site Technical Specifications, Section 3.8, 5.4, as amended 11-30-98
6. DPC Engineering Calculation OSC-6180, "Design Inputs Calculation for NSM-52959"
7. Oconee Nuclear Site Selected Licensee Commitments, sections 16.8, 16.11, as amended 2-29-96
8. Certified Safety Analysis Report (CSAR) for Standardized NUHOMS-24P GL System, Rev 4A, June 1996
9. Certificate of Compliance (C of C) 1004 for NUHOMs Standardized HSM System from NRC to VECTRA dated 1-23-95
10. Federal Register 8-1-94
11. Oconee ISFSI Environmental Report, Table 2.3-6
12. 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Waste"
13. VECTRA Calculation 9-354-120, "Duke Oconee ISFSI Phase III 10CFR72.104 and Cask Thermal Evaluation Report"
14. "Safety Evaluation Report of VECTRA Technologies, Inc. a.k.a Pacific Nuclear Fuel Services, Inc. Safety Analysis Report for the Standardized NUHOMS Horizontal Modular Storage System for Irradiated Nuclear Fuel", issued by the NRC in December 1994
15. DPC Engineering Calculation OSC-2846, Rev 1, "Offsite Dose Consequences For DSC Leakage Accident"
16. Oconee Nuclear Site, Memo to File, dated January 22, 1996, from David A. Nix, Subject: Review of Vehicle Barrier Requirements
17. DPC Engineering Calculation OSC-2942, Rev. 1, "Accident Analysis for the Independent Spent Fuel Storage Installation (ISFSI)"
18. PROFS note from Janet Shivers to Steve Benesole documenting daily average temperatures calculated from Oconee Meteorological data
19. Oconee Nuclear Site, Memo to File, dated September 12, 1996, from Rod Emory, Subject: ISFSI Transfer Cask Trunnion Testing
20. VECTRA Calculation NUH004.0219, "HSM Tornado Missile Impact Analysis"
21. Letter from John P. Stetz, V. P. - Nuclear, Davis-Besse to NRC, dated January 31, 1996, Subject: Registration of Dry Spent Fuel Storage Cask Use and Cask Heat Transfer Characteristics
22. NSD-211 "10CFR 72.48 Evaluations"

23. XSFM-002, "Workplace Procedure for Selecting Spent Fuel for General License Independent Spent Fuel Storage Installation"
24. HP/0/B/1000/097, "Radiological Protection Requirements for Independent Spent Fuel Storage Installation Phases III/DSCs 41-60"
25. MP/0/A/1500/016, "Independent Spent Fuel Storage Installation Phase III DSC Loading and Storage" procedure
26. MP/0/A/1500/017, "ISFSI Phase III DSC Retrieval and Relocation"
27. Oconee Nuclear Site, Memo to File, dated May 15, 1996, from David A. Nix, Subject: Review of "Controlled Area" Requirements"
28. Oconee Site Security Plan
29. Oconee Site Emergency Plan
30. Duke Power Company - Topical Report - Quality Assurance Program
31. Oconee Nuclear Site, Memo to File, dated July 17, 1996, from Gary Walden, Subject: QA Condition of Horizontal Storage Modules
32. ONS Maintenance Training Package, Dry Spent Fuel Storage
33. Oconee Nuclear Site, Memo to File, dated February 9, 1995, from Rick Bowser, Subject: Individual occupancy rate of the area surrounding the ISFSI and requirements for posting dosimetry required areas. File No. OS-754.00
34. Quarterly TLD readings at fence
35. TT/O/A/1500/001, "Independent Spent Fuel Storage Installation Phase III DSC Test Loading and Storage"
36. TT/1&2/A/0210/01, "Independent Spent Fuel Storage Installation Vacuum Drying System Functional Test"
37. Transnuclear West Calculation 9-354-700, "Oconee Phase III ISFSI Cask/HSM Restraints System Structural Analysis"
38. Transnuclear West Calculation 9-354-030, "Oconee NUHOMS ISFSI Phase III Pad Foundation Seismic Analysis"
39. SP522, Security Daily Patrol Procedure
40. Oconee Nuclear Site, Memo to File, dated April 3, 1990, from R. D. Lingle, Subject: ISFSI Project Mockup DSC Cutting Demonstration File No. OS - 230.04
41. MP/0/A/1810/019, "Cask NUHOMS 24P Dry Storage Canister - Welding"
42. DPC Engineering Calculation OSC-2499, "ISFSI Shake Analysis."
43. DPC Engineering Calculation OSC-2639, "Dry Cask Storage Bearing Pressure Analysis"
44. PT/0/A/1500/001, "ISFSI Phase III Horizontal Storage Module Temperature Rise Verification"
45. TT/1&2/A/0210/02, "Independent Spent Fuel Storage Dry Run Exercise of DSC Insertion and Withdrawal from HSM"
46. TT/1&2/A/0210/03, "Independent Spent Fuel Storage Dry Run Exercise of Cask/DSC Operations in the SFP"
47. Oconee Nuclear Site Memo to File dated August 6, 1998 by J.R. McLean, "0.40g Analysis of Loaded Transfer Cask"; File no. OSS-0027B.00-00-0002
48. IP/0/B/0220/002, "Temperature Monitoring System for Independent Spent Fuel Storage Installation Indication/Thermocouple Instrument Calibration"

Reference 18

From: JES780C --PRDC   Date and time   03/20/97 16:00:17
To: SGB7361 --PRDC   Steve G. Benesole
cc: JES780C --PRDC   MCK0829 --PRDC   Marsha C. Kinley
    KFS5020 --PRDC   Kristin F. Sherril JBT1035 --PRDC   Jack Thompson

From: Janet Shivers   JES780C   382-5470   EC07B   ECI-790-70
Subject: OCO Temperatures

Steve,

The following data was obtained from the Oconee Meteorological data for years 1986 - 1996.

Highest daily averages:

07/19/86 - 31.0 deg C ===> 87.8 deg F
07/20/86 - 30.5 deg C ===> 86.9 deg F
07/21/86 - 30.5 deg C ===> 86.9 deg F

Highest hourly temperatues:

07/19/86 17:00 - 37.7 deg C ===> 99.9 deg F
07/21/86 17:00 - 37.3 deg C ===> 99.1 deg F
07/19/86 16:00 - 37.2 deg C ===> 99.0 deg F
07/20/86 17:00 - 37.1 deg C ===> 98.8 deg F
07/21/86 16:00 - 37.1 deg C ===> 98.8 deg F

Please let me know if you need additional information.

Marsha - can you please forward to David Grover. I could not find him on PROFS and I do not have ccMail anymore. Thanks!

Thanks!
Janet

Form 45077B (R3-98) **Duke Power** ATTACHMENT 1 p 1 of 10 **See Attached Documentation**

10 CFR 50.59 USQ EVALUATION (NSD 209.11.1)

(1) STATION(s):	(2) UNITS(s):	(3) TYPE OF ACTIVITY:	
☒ Oconee Nuclear Station	☐ Unit 1	■ Nuclear Station Modification	☐ Operability Evaluation
☐ McGuire Nuclear Station	☐ Unit 2	☐ Minor Modification	☐ Test or Experiment
☐ Catawba Nuclear Station	☐ Unit 3	☐ Procedure	☐ UFSAR Change
☐ ______	■ ISFSI	☐ Other ______	☐ Temporary Modification

(4) DOCUMENT NUMBER, REV. NUMBER, and DESCRIPTION: 10CFR 50.59 EVALUATION for Loading of GENERAL LICENSE ISFSI System At Oconee Nuclear Station

(5) SCREENING FOR INCREASED MANAGEMENT INVOLVEMENT (NSD 209.11.2 & 213)

1. Is the activity being evaluated a procedure, test, experiment, or evolution? If "No," proceed to Part (6). If "Yes,", continue to the next question. ■ Yes ☐ No
2. Does the item involve infrequently performed tests or evolutions that have the potential to significantly degrade the level of nuclear safety? If "Yes," consult with the Superintendent of Operations to determine if additional controls are necessary. ☐ Yes ■ No

Procedure Qualified Reviewer *Rodney K Ensey* Date: *12/21/98*

Superintendent of Operations ______ Date: ______

(6) SAFETY ANALYSIS REPORT DOCUMENT REVIEW (NSD 209.11.3)

1. Will Technical Specification changes be required? * If the answer is "Yes," then the part of the activity requiring a change to the Technical Specifications cannot be performed under the 10CFR 50.59 regulation nor implemented without prior NRC approval. ☐ Yes ■ No
2. TECHNICAL SPECIFICATIONS AND ASSOCIATED BASES CONSULTED: 3.8, 5.4
3. UFSAR SECTIONS CONSULTED: 1.2.2.8, 2.5.2.8, 3.0, 9.1, 15.0
4. OTHER SAR DOCUMENTS CONSULTED: SLC, SER
5. SAR DOCUMENT SECTIONS WHICH NEED REVISION: 15.11.3

(7) SAFETY REVIEW (NSD 209.11.4)

Safety Review performed and documented as required per section 209.11.4 and 209.12?. ■ Yes

(8) EVALUATION OF UNREVIEWED SAFETY QUESTIONS (NSD 209.11.5)

May the proposed activity:

1. Increase the probability of occurrence of an accident previously evaluated in the SAR? ☐ Yes ■ No
2. Increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the SAR? ☐ Yes ■ No
3. Increase the consequences of an accident previously evaluated in the SAR? ☐ Yes ■ No
4. Increase the consequences of a malfunction of equipment important to safety previously evaluated in the SAR? ☐ Yes ■ No
5. Create the possibility for an accident of a different type than any evaluated previously in the SAR? ☐ Yes ■ No
6. Create the possibility for a different type of malfunction of equipment important to safety than any evaluated previously in the SAR? ☐ Yes ■ No

Does the proposed activity:

7. Reduce the margin of safety as defined in the basis for any Technical Specification? ☐ Yes ■ No

*** If the answer to any of the above seven (7) unreviewed safety questions in Part (8) is "Yes," the change cannot be performed under the 10 CFR 50.59 regulation nor implemented without prior NRC approval.**

The Design and Safety Considerations in NSD 209 Table 209-2 have been considered, as appropriate. ■ Yes

(9) DOCUMENTATION (NSD 209.11.6 & 209.12)

Activity Description, Safety Review, Justification of Answers to the 7 USQ Questions in Part 8, Conclusion, Summary for Annual Report, & References attached? ■ Yes

(10) APPROVAL (NSD 209.11.7)

Approver: *Steve Perry* Date: *12/21/98*

Qualified Reviewer: *Rodney K Ensey* Date: *12/21/98*

The Qualified Reviewer is responsible for assuring a copy of the completed evaluation is sent to Site Regulatory Compliance and the Nuclear General Office NSRB

Date Sent *12/21/98*

FOR INFORMATION ONLY - Design and Safety Considerations **

QA condition of SSCs
containment integrity
seismic analysis and mounting
seismic qualification of equipment
environmental qualification
materials compatibility
single failure criteria
separation criteria
equipment accessibility
control room habitability
fire protection and fire loads
release of radioactive gases and liquids
potential for normal effluents to become radioactive
possibility of operator error
design bases, assumptions, and values used in the SAR
missile protection (internal and external)
effects of natural phenomena (flood, wind, lightning)
postulated pipe breaks and new spray zones
potential for internal plant flooding
electrical failure
mechanical failure
control signal failure
plant security
10CFR 50 Appendix R review
overpressure protection
pipe class breaks
heavy loads (NUREG-0612)
fuse and breaker protection and coordination
power system and cable loading
electrical penetration protection
diesel generator loading
diesel generator load sequencing
HVAC air flow restrictions
safety/nonsafety circuit isolation
adequate pneumatic pressure to a device
valve motor torque requirements
fuel movement considerations
mode change considerations
effect on the other unit(s) or train(s)
valve types due to Type C reverse flow testing
human factors considerations (e.g., control room)
Reactivity Management (See NSD 304)
SQUG Review
new surveillance testing requirements
common cause failures (analog-to-digital replacements)
valve pressure locking/thermal binding
instrument grounding due to test equipment
test instrument compatibility
SAR specified testing requirements
procedure step sequence
new sources of debris for the containment sump

** Note: This list is not all inclusive. This information is from NSD 209 Table 209-2 and is provided to aid in the thought process for evaluating an activity for screening or USQ Evaluations. The list does not have to be included in the final documentation of the Evaluation and is not considered as part of the evaluation forms.

Attachment 1

10CFR 50.59 EVALUATION for Loading of GENERAL LICENSE ISFSI System At Oconee Nuclear Station

DESCRIPTION

Nuclear Station Modification (NSM) -52959 provides for installation of Phase III of the Oconee ISFSI to ensure continued capability for dry storage of spent fuel discharged from the plant. The scope of this NSM covers receipt, placement, and alignment of twenty horizontal storage modules (HSMs) of the VECTRA General License "Standardized" NUHOMS 24-P design. Part AS-1 of this NSM performed construction of the concrete basemat on which the new HSMs will reside. Parts BS-1 & BL-1 provide for installation of the first eight modules complete with temperature monitoring equipment. This evaluation addresses loading of these first eight modules. For additional information, see Reference 1.

SAFETY REVIEW

The purpose of the ISFSI is to provide safe reliable onsite dry storage of spent fuel discharged from the Oconee reactors. A site specific license (SNM-2503), issued under Part 72, is in effect for the existing ISFSI facility which is comprised of HSM Phases I & II. Phases I & II represent the first 40 HSMs in locations E1-E20 and W1-W20. Fuel loading of the site specific dry storage facility design concluded with the loading of the last module in Phase II. The next twenty new HSMs (designated Phase III) will be of the VECTRA General License Standardized NUHOMS 24-P design. Part 50 facilities (Oconee) have been granted a General License (GL) for the use of this NRC approved onsite dry storage system via Certificate of Compliance (CofC) 1004 issued on January 23, 1995. The new GL HSMs permit greater fuel storage acceptance/flexibility due to increased heat rejection capacity and also allow for construction in smaller increments. The new GL dry storage system is similar to the site specific system and can utilize the existing fuel handling equipment, dry storage canister (DSC) design, transport/loading equipment, and site location. Although some of the license conditions may differ between the site specific and General License systems, there is no conflict since each system will be treated as a separate entity, both procedurally and in licensing space. [Reference 2, 3, 8, 9, and 19]

As stated before, the new HSMs will reside on a permanent concrete basemat. An equivalent static evaluation was performed for the storage pad to ensure that the potential for damage to the Phase III HSMs, or any undesirable interactions with Phase I & II structures or the plant, during a seismic event is minimal. Although, the new storage pad is considered "not important to safety", it is 3 feet thick and was designed to Duke QA-1

standards. There is also a 3" expansion joint to provide isolation between Phases II and III. The pad was evaluated under Part AS-1 of this NSM. [Reference 1 and 6]

The new "standardized" HSM design is similar to that of the existing structures. Each HSM is a massive concrete and steel modular structure designed to house canistered spent fuel assemblies. Each unit includes a ventilation system, heat shield, and thick steel closure door. The new HSMs have an improved type ventilation arrangement such that cooling air flow enters through a vent located on the lower portion of each side wall, removes heat, and exits through an upper vent in the wall. A 6" wide bird screen separates each unit to ensure unobstructed air flow is maintained. Thus, there are no roof top outlet shield blocks required for this design. A new bolted door closure design is utilized versus the old raise/lower type. The new door design is comprised of concrete encased in steel. The door will be tack welded closed in two places to provide a security tamper seal for Special Nuclear Material control and accountability. [Reference 26]

ISFSI structures, systems, and components (SSCs) important to safety are designed, fabricated, constructed, and tested to quality standards commensurate with the importance of their intended function. Duke Power Company (DPC) has an NRC approved 10 CFR Part 50 QA program. Certain components of the existing site specific dry storage system to be used with the new GL design are already designated QA items, e.g. the transfer cask (TC) and DSCs are QA-1, the Phase I & II HSMs are QA-2, etc. For the Phase III GL design, Duke will utilize its QA-4 designation for the HSMs. The new HSMs will be procured under Duke's QA-1 program and fabricated under VECTRA's NRC approved Part 72 QA program consistent with CofC 1004 Condition 6. Operation, Maintenance, and modification of the HSMs will be performed in accordance with Duke's QA-4 designation which exceeds the QA requirements to which the HSMs are licensed and fabricated. An example of conservatism is the concrete basemat which is designed to QA-1 standards, but designated QA-4, even though it is not considered important to safety. Applicable codes for SSCs are identified on the controlled drawings. Per the approved CSAR, the temperature monitoring system is non-safety related, and therefore non-QA condition. [References 8, 10, and 14]

The new GL HSMs are designed to accommodate normal, accident, and natural phenomena conditions including tornado, earthquake, flood, and lightning without failure. The new HSMs can withstand site analyzed seismic events, tornado generated missiles, and floods. The maximum horizontal and vertical ground acceleration (MHE) specified for the Oconee site is 0.15g. The Oconee site accelerations are less than the values of 0.17g vertical and 0.25g horizontal used in the VECTRA analysis, and are therefore enveloped. For the case of an explosive device detonated nearby, the pressures created can be compared with the maximum analyzed tornado wind loadings for the new system which are 3.0 psi. This is the same as the existing facility. [References 2, 4, 8, 11, and 21]

The closest plant equipment is the intake/CCW pumps at a distance of approximately 400 feet. The additional quantities of steel and concrete added to the site have been evaluated. There are no significant additions of hazardous materials. The new equipment meets all the

material specification requirements. All plant seismic and environmental qualifications will be maintained and pressure boundaries will remain intact. Both environmental and fire protection reviews have been performed. The ability to provide required drainage is not adversely impacted by this construction. The new HSMs contain no readily combustible material, and are largely fire resistant due to their concrete and steel composition. A portable fire extinguisher is already permanently located at the ISFSI site. Lightning protection for the new HSMs is provided in the form of grounded hand rails attached to the structures. The new temperature monitoring system has a surge suppresser to protect against system transients. Based on the above there will be no adverse effect to the surroundings or to any plant or ISFSI accident mitigation functions.[Reference 1 and 2]

ISFSI overall site dose rates will likely increase due to the new HSM design, but will not exceed the siting criteria of 10 CFR 72.104 and 106. The offsite dose (72.104) and dose limits for members of the public (20.1301) have been reviewed and include the contribution from the plant, Phase I & II HSMs, and assume a loading schedule of approximately 5 canisters per year for the 46 GL HSMs filled with design basis fuel. This evaluation concluded that the limits set forth in 10 CFR 72.104 and 10 CFR 20.1301 will not be exceeded. Additionally, the offsite dose due to a leaking DSC was analyzed using site meteorology and source term for compliance with 10 CFR 72.106. This analysis concluded that the limits in 10 CFR 72.106 will not be exceeded for any credible Phase III ISFSI accident. Selected Licensee Commitments 16.11 was reviewed and no changes are required. [Reference 12, 17, 19, 24, and 25]

The new modules will be located within the double fenced boundaries of the existing site specific facility. Security will be maintained via the same methods currently in effect for Phases I & II, which include the boundary fence, motion detectors, routine patrols and camera surveillance. A new telephoto lens was added to an existing security camera to ensure no potential new "hiding places" were created by the new construction. Once loaded, the new system will require daily temperature monitoring and recording, which will be performed during the security patrols. Vehicle Barrier Systems (VBS) are not required for ISFSIs. There is no significant impact on the ISFSI or Site security plans due to the construction and use of Phase III. [Reference 13 and 18]

The same fuel handling systems, vacuum drying, welding equipment, transport cask, hydraulic ram, and basic DSC design will be used for the new system. A hydrogen analyzer will be used to ensure continuous monitoring of the cask vapor space during all welding, cutting, and grinding processes per NRC bulletin 96-04 (potential for adverse chemical, galvanic, or other reactions among the materials of a spent fuel storage or transportation cask). Fuel qualification, administrative controls, and DSC design preclude any criticality concerns. The HSMs provide support for the DSC and radiological shielding, but have no criticality control function. The CofC requirements for fuel qualification and SFP boron concentration ensure that Keff for the Cask/DSC will not exceed 0.95 under all credible normal, off-normal, or accident conditions. While, the new system requires higher SFP boron concentrations for cask loading activities (2000 vs 1810 ppmb), the Oconee pools are routinely maintained at significantly higher concentrations per the Core Operating Limits

Report and approved fuel handling procedures. The CofC and operating procedures require independent verification of SFP boron samples. The procedures used to load/unload the Phase III HSMs are similar to the existing Phase I and II procedures. Therefore, there is no credible reactivity management concern with loading of DSCs in the spent fuel pools, or with loading of DSCs into the Phase III HSMs. [Reference 9, 15, 16, 20, 22, and 23]

With the exception of the "dry storage cask drop accident in the SFP building" evaluated in Chapter 15.11, the Oconee Plant UFSAR only briefly mentions the ISFSI. The cask drop accident is concerned with criticality potential, radiological dose, and physical damage to both the pool and the fuel residing in the SFP racks, and will not change due to loading of Phase III HSMs. The associated plant Technical Specification 3.8 concerning allowable decay time of fuel in the SFP prior to commencing dry storage activities, spent fuel pool ventilation operability, and spent fuel pool boron concentration will not be affected. Technical Specification 5.4 allows for storage of spent fuel in the ISFSI and will not change. All other existing regulatory requirements for dry storage are delineated in the site specific ISFSI license (SNM-2503), FSAR, and SER, and were evaluated under a separate 10 CFR 72.48 evaluation performed for the use of the Phase III HSMs. The existing plant and dry storage systems will continue to perform their design functions after loading of Phase III HSMs. No new credible failure modes or accidents will be introduced as a result of loading Phase III HSMs. [Reference 1 - 9]

USQ EVALUATION

Could the activity:

1) **Increase the probability of occurrence of an accident evaluated in the SAR?**

No. The ISFSI and related dry storage activities do not initiate any accidents analyzed in the Oconee SAR, with the exception of the cask drop in the SFP. The existing fuel handling systems, vacuum drying, welding equipment, transport cask, hydraulic ram, and basic DSC design will be used for the new system. No changes in fuel, or DSC handling were made. Fuel qualification, administrative controls, and DSC design preclude any criticality concerns. Therefore, use of the GL system and new HSM design will not in any way impact the cask drop analysis for inside the fuel building. There is no significant physical effect on any plant SSCs due to the loading and use of the Phase III HSMs. The GL HSMs are designed to accommodate normal, accident, and natural phenomena conditions including tornado, earthquake, flood, explosion, and lightning without failure. There is no increase in the probability of any environmental or weather related events. The maximum horizontal and vertical ground acceleration (MHE) specified for the Oconee site is 0.15g. Thus, the Oconee site accelerations (used in the site specific analysis) are less than the values of 0.17g vertical and 0.25g horizontal used in the VECTRA analysis and are therefore enveloped. Duke will utilize its QA-4

designation for the HSMs. Loading Phase III HSMs will not compromise the ability of any plant or dry storage SSC to perform its design or accident mitigation functions.

2) **Increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the SAR?**

No. The use of Phase III HSMs will have no adverse effect on any plant SSC, or its accident mitigation function, because the seismic, environmental, and security qualifications will be maintained. The cask storage pad has been designed to adequately support the static and dynamic load of stored casks. The new HSMs are passive structures and have no automatic functions. The existing fuel handling, loading, transport, and insertion devices will be utilized for the GL system. No redundant or protective safety features are degraded or deleted. The transfer cask and DSCs will remain QA-1 components, while the new standardized HSMs will be classified as Duke QA Condition 4 structures. The new temperature monitoring system is non-QA and its electrical power supplies are not safety related. No other plant safety related or important to safety SSCs are adversely impacted.

3) **Increase the consequences of an accident previously evaluated in the SAR?**

No. There is no significant change to cask handling activities, therefore cask drop scenarios and consequences are the same. The new HSMs will be designated QA Condition 4, and will be no more likely to fail than the existing arrangement. The environmental, seismic, and security qualifications of the system will be maintained. No Oconee plant parameters, i.e. containment integrity, fuel design, filtration systems, and main steam relief valve setpoints are affected by the loading and use of Phase III HSMs, nor are any existing Phase I or II parameters affected. There are no new radiological release pathways created. As with the existing system, the DSC design provides redundant sealing of the confinement system to prevent release of radionuclides. The DSCs are designed to maintain the inert internal helium atmosphere for heat transfer, and to ensure long term maintenance of fuel clad integrity.

4) **Increase the consequences of a malfunction of equipment important to safety previously evaluated in the SAR?**

No. The integrity of the plant SSCs and HSMs is maintained. There is no effect on plant containment integrity or radiological release pathways. There are no new potential missiles (HSMs are seismically qualified, QA-4 structures) or hazardous materials installed (environmental review performed). The same fuel handling systems, transport cask, and basic DSC design will be used for the new GL system. No important to safety equipment has been degraded. Loading Phase III HSMs will have no effect on any safety related electrical power systems. The plant and ISFSI

will continue to function as designed. Therefore, no new credible failure modes were identified.

5) **Create the possibility for an accident of a different type than any evaluated previously in the SAR?**

No. The integrity of the plant & HSMs is maintained. There is no relaxation of seismic, environmental, or security requirements. Loading Phase III HSMs will have no effect on AC power or electrical separation criteria. There is no increased frequency of operation of any plant systems. The new NRC approved GL system will utilize structures and components very similar to the existing, and in many ways improved, i.e. better heat removal capability, temperature monitoring, etc. Continuous monitoring of the vapor space will be maintained during all welding/cutting operations to preclude ignitable levels of hydrogen. The same fuel handling systems, transport cask, and basic DSC design are used for the new system. The new HSMs are QA-4, and materials used will meet or exceed the acceptance requirements of the existing system. No new credible accidents were identified.

6) **Create the possibility for a different type of malfunction of equipment important to safety than any evaluated previously in the SAR?**

No. No new failure modes were identified. The existing plant fuel handling systems, vacuum drying, welding equipment, transport cask, insertion ram, and basic DSC design will be used with the new GL system. Continuous monitoring of the vapor space will be maintained during all welding/cutting operations to preclude ignitable levels of hydrogen. The new HSMs are QA Condition 4, seismically, and environmentally qualified, and will be no more susceptible to failures than the existing configuration. The ability of any plant or ISFSI SSC to perform its design or accident mitigation function is not adversely impacted. Therefore, use of the new GL HSMs for Phase III will not introduce any new credible malfunctions.

7) **Reduce the margin of safety as defined in the basis to any Technical Specification?**

No. The only associated plant Technical Specification is 3.8 which concerns allowable decay time of fuel in the SFP prior to commencing dry storage activities, and it will not be affected. Loading Phase III HSMs will have no effect on plant or existing ISFSI safety limits, setpoints, or design parameters. There is no adverse impact on the nuclear fuel, fuel cladding, RCS, or containment integrity. Therefore, the margin of safety as defined in the bases of the Technical Specifications will not be reduced.

Attachment 1
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CONCLUSION

Based on the above discussion, no unreviewed safety questions are created by or involved with loading Phase III HSMs. FSAR section 15.11.3 will need to be updated to add the ISFSI General License to the list of references. No changes to the Technical Specifications are required.

SUMMARY FOR 10 CFR 50.59 ANNUAL REPORT

NSM-52959 added the third phase of HSMs to provide for continued dry storage of spent fuel discharged from the Oconee reactors. The scope of this NSM covers receipt, placement, and alignment of twenty horizontal storage modules (HSMs) of the NRC approved VECTRA General License "Standardized" NUHOMS 24-P design. This evaluation addresses loading the first eight Phase III HSM modules. The new GL dry storage system is similar to the Oconee site specific system (License SNM-2503), and can utilize the existing fuel handling equipment, dry storage canisters (DSC) design, transport/loading equipment, and site location. For the Phase III GL design, Duke will utilize its QA-4 designation for the HSMs. Although some of the license conditions may differ between the site specific and General License systems, there is no conflict since each system will be treated as a separate entity, both procedurally and in licensing space. No USQs are involved with loading Phase III HSMs and no Technical Specification changes are required. The plant FSAR section 15.11.3 will need to be revised.

REFERENCES

1. Final Scope Document for NSM-52959 Parts AS-1, BS-1, BL-1 Rev 0 dated 7-30-96
2. Oconee Site Specific ISFSI FSAR, sections 1.1, 1.2, 1.3.1.2, 2.1, 3.3, 4.2, 7.3, 7.4, 7.7, 8.0, 10.0, 11.0 Tables A-12, A-16, A-18, December 31, 1997 update
3. Oconee ISFSI Materials License SNM-2503 and Technical Specifications, all sections, as amended January 5, 1994
4. Oconee Nuclear Station Final Safety Analysis Report, Sections 1.2.2.8, 2.5.2.8, 3.0, 9.0, 15.0, December 31, 1997 update
5. Oconee Nuclear Station Technical Specifications, Section 3.8, 5.4, as amended September 24, 1998
6. DPC Engineering Calculation OSC-6180, "Civil Design Inputs Calculation for NSM-52959"
7. Oconee Nuclear Station Selected Licensee Commitments, sections 16.11, as amended October 13, 1998
8. Certified Safety Analysis Report (CSAR) for NUHOMs Standardized HSM System, Rev 4A, June 28, 1996
9. Certificate of Compliance 1004 for NUHOMs Standardized HSM System from NRC to VECTRA dated January 23, 1995

10. Memo concerning QA Condition of Horizontal Storage Modules from Gary Walden dated July 17, 1996
11. VECTRA calculation NUH004.0219, "NUHOMS HSM Tornado Missile Impact Analysis"
12. DPC Engineering Calculation OSC-2846, Rev 1, "Offsite dose Consequences for DSC Leakage Accident"
13. Memorandum to File by D.A. Nix (Compliance) "Subject: Review of Vehicle Barrier Requirements" dated 1-22-96
14. NSD-307, Quality Standards Manual
15. MP/0/A/1500/016, "Independent Spent Fuel Storage Installation Phase III DSC Loading and Storage Procedure"
16. Oconee Core Operating Limits Report
17. VECTRA Calculation 9-354-120, "Duke Oconee ISFSI Phase III 10CFR72.104 and Cask Thermal Evaluation"
18. Electronic mail and subsequent personal Communication between Lee Shehan Mod Eng - Elec) and Ed Price (MSE) on 12-11-95 verifying installation of new security camera telephoto lens is complete
19. 10CFR Part 72 "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste"
20. XSFM-002, "Workplace Procedure for Selecting Spent Fuel for General License Independent Spent Fuel Storage Installation", Revision 0
21. DPC Engineering Calculation OSC-2942, "Accident Analysis for the Independent Spent Fuel Storage Installation (ISFSI), Revision 1
22. NRC Bulletin 96-04: Chemical, Galvanic, or Other Reactions in Spent Fuel Storage and Transport Casks, July 5, 1996
23. Letter from W. R. McCollum to the U.S. Nuclear Regulatory Commission titled Bulletin 96-04, "Chemical, Galvanic, or Other Reactions in Spent Fuel Storage and Transport Casks" Request for Additional Information.
24. 10CFR72.104 Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS
25. 10CFR72.106 Controlled area of an ISFSI or MRS
26. DPC drawing OM-179.--0038 001

ATTACHMENT 2
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Duke Power Company
10CFR 72.48 EVALUATION
Oconee Nuclear Station ISFSI

(1) Evaluation for: 10 CFR 72.48 Evaluation for Initial Loading of VECTRA General License NUHOMS-24P Dry Storage System at the Oconee ISFSI

(2) SAR sections consulted: 1.2, 1.3, 3.2, 3.3, 4.3, 4.5, 7.6, 7.7, 8.2

(3) License conditions and Technical Specifications consulted: ISFSI Technical Specifications Table of Contents, 5.6, Appendix C

Will license condition or technical specification changes be required? *☐ Yes ■ No

License conditions or technical specifications affected: None

Station Regulatory Compliance personnel contacted: None

(4) OCCUPATIONAL RADIOLOGICAL EXPOSURE EVALUATION

Will the evaluation item increase individual occupational exposure significantly? *☐ Yes ■ No

Will the evaluation item increase cumulative occupational exposure significantly? *☐ Yes ■ No

(5) ENVIRONMENTAL IMPACT EVALUATION

Will the evaluation item increase offsite radiological exposure significantly? *☐ Yes ■ No

Will the evaluation item increase non-radiological environmental impacts significantly? *☐ Yes ■ No

(6) USQ EVALUATION

Could the activity:

Increase the probability of an accident evaluated in the ISFSI SAR? *☐ Yes ■ No

Increase the consequences of an accident evaluated in the ISFSI SAR? *☐ Yes ■ No

Create the possibility for an accident of a different type than any evaluated in the ISFSI SAR? *☐ Yes ■ No

Increase the probability of a malfunction of equipment important to safety evaluated in the ISFSI SAR? *☐ Yes ■ No

Increase the consequences of a malfunction of equipment important to safety evaluated in the ISFSI SAR? *☐ Yes ■ No

Create the possibility for a malfunction of a different type than any evaluated in the ISFSI SAR? *☐ Yes ■ No

Reduce the margin of safety as defined in the basis for any ISFSI Technical Specification? *☐ Yes ■ No

(7) PROVIDE AN ATTACHMENT TO SUBSTANTIATE ALL YES AND NO ANSWERS - SEE NSD-211 FOR GUIDANCE

*** If the answer to any question is "Yes", STOP! The activity CANNOT be performed under 10 CFR 72.48. Contact Regulatory Compliance for assistance.**

(8) APPROVAL

Preparer: [signature] Date: 12/28/98

Qualified Reviewer: [signature] Date: 12/30/98

For Oconee the QR is responsible for sending a copy of the completed evaluation to Site Regulatory Compliance and the General Office NSRB Staff (Mailcode-EC05N). Date Sent: 12/30/98

Attachment 2

10 CFR 72.48 Evaluation for Initial Loading of VECTRA General License NUHOMS-24P Dry Storage System at the Oconee ISFSI

I. GENERAL LICENSE SYSTEM

NSM-52959 involves installation of the next 20 horizontal storage modules (HSMs) to provide for continued dry storage of spent fuel discharged from the Oconee reactors. A site specific license (SNM-2503), issued under 10 CFR Part 72, is in place for the existing Independent Spent Fuel Storage Installation (ISFSI). The existing ISFSI facility will now be referred to as the "site specific system" which includes Phases I and II HSMs. The new HSMs (designated Phase III) will be of the VECTRA Standardized NUHOMS-24P design and will be referred to as the "General License" (GL) system. Nuclear plants licensed under 10 CFR Part 50 (Oconee) have been issued a General License to use NRC approved onsite storage systems via a Certificate of Compliance (CofC). The new GL HSMs will permit greater fuel storage acceptance/flexibility due to their increased heat rejection capacity and modular design. The new HSMs will utilize the same basic dry storage canister (DSC) and existing transport/loading equipment. The use of the GL System ISFSI design will be governed by the requirements of the associated CofC, Certified Safety Analysis Report (CSAR), and SER. The use of the existing site specific system will continue to be controlled by the requirements of the associated SNM-2503 License, Technical Specifications, FSAR, and SER. Part AS-1 of this NSM performed construction of the concrete basemat on which the new HSMs will reside. Parts BS-1 and BL-1 provided for installation of the first eight modules complete with temperature monitoring equipment. This evaluation addresses loading of these first eight modules. For additional information see Reference 1.
[References 1-8, 15]

II. LICENSE CONDITIONS

The operating controls, limits, and license conditions that are given in the ISFSI Materials License SNM-2503 dated January 29, 1990 and the approved Technical Specifications (TS) will remain in effect for any and all activities associated with the ISFSI Phase I and II system, structures, and components. These activities include, but are not limited to, any future loading, unloading, modification, or procedure changes affecting the site specific system. All activities associated with the new GL system will be governed by the license conditions established in the GL CofC 1004. Although some of the license conditions may differ between the site specific and GL systems, there is no conflict since each system will continue to be treated as a separate entity. Both dry storage systems will have separate controlling procedures. The two distinct dry storage systems will simply employ the same

fuel handling, welding, and transport equipment, basic DSC design, and will reside on the same site location.
[References 1, 2, 3, 7, 8]

Section 5.0 of the ISFSI Technical Specifications addresses the site, HSM, and storage pad design features for the existing system. The addition of the new GL design HSMs and pads will not physically affect any of the existing Phase I or II structures. The two compatible dry storage systems will simply occupy the same general location. Seismic isolation will be maintained.
[References 1, 3]

ISFSI overall site dose rates will likely increase due to the new HSM design, but will not exceed the siting criteria of 10 CFR 72.104 and 106. HSM and transfer cask dose rates associated with the GL system may exceed the operating controls and limits of Table 2.2-2 of the Oconee ISFSI SER. However, these SER operating and control limits do not as a whole represent "License Conditions" but reflect upper bound limits of design basis calculated results. The purpose of these limits is to alert personnel to potential gross failures, shielding inadequacies, misloaded fuel, etc. associated with the existing site specific system. Equivalent restrictions are also placed on the GL system. However, the GL design is clearly expected to have higher dose rates due to its ability to safely store fuel with considerably less cooling time (5 versus 10 years). The GL dose rate limits are clearly specified in the approved CofC 1004. The shielding analyses for the GL system indicate that there may be increases in the relatively low dose rates seen at the existing HSM, DSC, and TC surfaces. Although the HSM design is different, comparisons between the two systems can be drawn by examining expected dose rates at equivalent locations from the associated SAR shielding analyses [Reference 7, Table 7.3-2, and Reference 2, Table A-18]. The following examples assume 5 year decayed fuel for the GL system and 10 year decayed fuel with the site specific system and were taken from the respective SARs.

	Location	Site Specific	Gen License
(1)	HSM wall or roof total dose rate in mrem/hr	7	48.6
(2)	Center of HSM door	45	50.4
(3)	Center line top shield plug	15	79.8
(4)	Transfer Cask surface - radial	200	591.8

An increase of the above magnitude, without any other discernible abnormalities, would not be indicative of any gross failures. The only operating controls and limits that are considered as license conditions for the existing system are those given in the ISFSI Materials License SNM-2503 and approved Technical Specifications. ISFSI TS Table 2-1 requirements are that the dose rate at the surface of the horizontal storage module be ≤ 200

mrem/hr. The surface dose rates of the active Phase I and II HSMs are based on radiation emanating from associated stored DSCs, and will not be significantly affected by the installation of the GL system. The allowable surface dose rates for the new system are covered in the CofC 1004. Loading of the GL system HSM modules will not adversely affect any site specific ISFSI T.S. or licensing conditions. Additionally, the effect of the new HSMs upon offsite exposures was evaluated for compliance with 10 CFR Parts 72.104 and 106. The 72.104 evaluation includes the contribution from the Phase I and II HSMs and assumes up to 46 GL HSMs filled with design basis fuel. This evaluation concluded that the dose would be within the limits set forth in 72.104. The off site dose due to a leaking canister was also analyzed for the Oconee site environmental and fuel characteristics and was found to be within the limits of 72.106.
[References 1, 2, 3, 6, 7, 8, 11, 22]

Routine temperature monitoring equipment for the HSM concrete is not required for the existing site specific system. The installation of thermocouples and a temperature display device for the new HSMs per the electrical portion of this mod, will not adversely affect any License condition.
[Reference 1]

III. UNREVIEWED SAFETY QUESTIONS

ISFSI structures, systems, and components (SSCs) important to safety are designed, fabricated, constructed, and tested to quality standards commensurate with the importance of their intended function. Duke Power Company (DPC) has an NRC approved 10 CFR Part 50 QA program. Certain components of the existing site specific dry storage system to be used with the new GL design are already designated QA items, for example the transfer cask (TC) and DSCs are QA-1, the Phase I and II HSMs are QA-2. For the Phase III GL design, Duke will utilize its QA-4 designation for the HSMs. The new HSMs will be procured under Duke's QA-1 program and fabricated under VECTRA's NRC approved Part 72 QA program consistent with CofC 1004 Condition 6. Operation, Maintenance, and modification of the HSMs will be performed in accordance with Duke's QA-4 designation which exceeds the QA requirements to which the HSMs are licensed and fabricated. An example of conservatism is the concrete basemat which is designed to QA-1 standards, but designated QA-4, even though it is not considered important to safety. Applicable codes for SSCs are identified on the controlled drawings. Per the approved CSAR, the temperature monitoring system is non-safety related, and therefore non-QA condition.
[References 2, 7, 8, 9, 18, 19]

The same fuel handling systems, vacuum drying, welding equipment, transport cask, hydraulic ram, and basic DSC design will be used for the new system. A hydrogen analyzer will be used to ensure continuous monitoring of the cask vapor space during all welding, cutting, and grinding processes per NRC bulletin 96-04 (potential for adverse chemical, galvanic, or other reactions among the materials of a spent fuel storage or transportation

cask). Fuel qualification, administrative controls, and DSC design preclude any criticality concerns. The HSMs provide support for the DSC and radiological shielding, but have no criticality control function. The CofC 1004 requirements for fuel qualification and SFP boron concentration ensure that Keff for the Cask/DSC will not exceed 0.95 under all credible normal, off-normal, or accident conditions. While, the new system requires higher SFP boron concentrations for cask loading activities (2000 vs 1810 ppmb), the Oconee pools are routinely maintained at significantly higher concentrations per the Core Operating Limits Report and approved fuel handling procedures. The CofC 1004 and operating procedures require independent verification of SFP boron samples. The procedures used to load/unload the Phase III HSMs are similar to the existing Phase I and II procedures. Therefore, there is no credible reactivity management concern with loading of DSCs in the spent fuel pools, or with loading of DSCs into the Phase III HSMs.
[References 2, 3, 7, 8, 20, 21]

The new GL HSMs are designed to accommodate normal, accident, and natural phenomena conditions including tornado, earthquake, flood, and lightning without failure. The new HSMs can withstand site analyzed seismic events, tornado generated missiles, and floods. The maximum horizontal and vertical ground acceleration (MHE) specified for the Oconee site is 0.15g. The Oconee site accelerations are less than the values of 0.17g vertical and 0.25g horizontal used in the VECTRA analysis, and are therefore enveloped. For the case of an explosive device detonated nearby, the pressures created can be compared with the maximum analyzed tornado wind loading for the new system which is 3.0 psi. This is the same as the existing facility and therefore will have no impact on the Phase I and II HSMs. All phases (I, II, and III) of the Oconee ISFSI include HSMs made of concrete and steel, that by design, contain no flammable material and therefore pose no credible fire hazard. [References 2, 4, 7, 10, 25]

The GL HSM temperature monitoring system and instrumentation used in the loading process are not required to be classified as important to safety. The purpose of the monitoring system is to provide temperature readings to guard against slow degradation of the concrete structure. A failure of the monitoring system will not result in a release of radioactive materials and will have no impact on the existing site specific system. [References 1, 7, 17]

The DSC design provides redundant sealing of the confinement system to prevent release of radionuclides. The DSCs are designed to maintain the inert internal helium atmosphere for heat transfer, and to ensure long term maintenance of fuel clad integrity. The fuel cladding is protected from overheating while in storage by the passive heat removal system. The HSM vents are monitored daily to ensure no obstructions. The GL standardized NUHOMS design provides for fuel clad temperatures below 384°C during normal conditions and below 570°C for short term accident conditions. The Oconee transport cask was licensed for use with the site-specific ISFSI. The site specific ISFSI was designed to accommodate fuel that was cooled a minimum of 10 years. The existing Oconee transport cask will be used in the GL facility, which is licensed to accommodate hotter 5-year

decayed fuel. The use of this cask was evaluated and was found to be acceptable and bounded by the evaluation in the CSAR.
[References 7, 22]

Site specific analyses of both offsite dose and direct radiation are required to be performed and addressed by 10 CFR 72.212. The system has been shown analytically to meet both 72.104 (direct radiation) and 72.106 (accident dose) requirements. The "Controlled Area" is defined as the area immediately surrounding the ISFSI for which the Licensee exercises authority over its use and within which the ISFSI operations are performed. The minimum required distance to the controlled area per 10 CFR 72.106 is 100 meters (328 ft). The minimum distance to the Oconee owner controlled area site fence from the ISFSI is ~ 644 ft. The Licensee also defines an exclusion area boundary (EAB) which is essentially a one mile radius around the Unit 2 reactor that encompasses the ISFSI. Access to this area can be controlled by the Licensee during an emergency or accident condition. The closest plant and existing ISFSI accident offsite dose rate calculations are based on the EAB radius and site specific dispersion factors, therefore the GL DSC leakage accident assumes the same distance and dispersion factors, as well. Site-specific analysis of normal and accident dose show that the GL ISFSI is within the limits of 10CFR 72.104 and 106.
[References 7, 11, 13, 14, 22]

The new modules will be located within the double fenced boundaries of the existing site specific facility which is regularly patrolled by Security and to which access is already controlled. A new telephoto lens has been installed on an existing camera to ensure adequate remote surveillance is maintained. Vehicle Barrier Systems (VBS) are not required for ISFSIs.
[References 7, 12, 23]

Could the activity:

1) Increase the probability of an accident evaluated in ISFSI SAR?

No. There is no significant physical effect on Phase I or II structures due to installation of the Phase III HSMs. Due to design changes, the new HSMs will not be susceptible to the loss of air outlet shielding accident. The tornado wind loading is the same (3psi), however, there are no external shield blocks to be impacted by the tornado missile. The new HSMs are designed to accommodate normal, accident, and natural phenomena conditions including tornado, earthquake, flood, and lightning without failure. The flooding and explosion accidents are not impacted. Although different in design, both systems have inlet and outlet air vents which are required to be checked for obstructions on a daily basis. The existing dry storage system at Oconee is already analyzed for a lightning strike, and has a protection system designed in accordance with NFPA NO. 78-1979 Lightning Protection Code that consists of a grounded hand rail. A similar arrangement will be utilized for the Phase III system, including the new temperature monitoring system. The maximum horizontal and vertical ground acceleration (MHE) specified

for the Oconee site is 0.15g. Therefore the Oconee site accelerations (used in the site specific analysis) are less than the values of 0.17g vertical and 0.25g horizontal used in the VECTRA analysis and are therefore bounded. The new HSMs can utilize the same basic DSC design. The existing transport cask/loading equipment will be retained, and there is no effect on the cask drop or jamming accidents for Phase I and II. There is no increase in the probability of any environmental accidents (tornado, earthquake, flood, lightning strike, etc.). Therefore, loading of the GL system HSMs will not compromise the ability of the existing dry storage system to perform its containment, heat removal, or accident mitigation functions.

2) **Increase the consequences of an accident evaluated in the ISFSI SAR?**

No. The use of the GL standardized HSMs to contain DSCs on the same site location as the existing site specific HSMs will in no way affect the likelihood or consequences of radiological release from the already in service Phase I or II HSMs. Even so, an evaluation has been performed to address DSC leakage with 5-year aged fuel, and the results are well within the accepted limits for offsite dose. As with the existing system, the DSC design provides redundant sealing of the confinement system to prevent release of radionuclides. The DSCs are designed to maintain the inert internal helium atmosphere for heat transfer, and to ensure long term maintenance of fuel clad integrity. There are no new radiological release pathways created. The HSMs provide support for the DSC and radiological shielding, but have no criticality control function. The new HSMs will be QA-4 structures. The consequences of specific events applicable to each design are fully addressed in the GL Standardized NUHOMS-24P CSAR and the accident assumptions remain unchanged.

3) **Create the possibility for an accident of a different type than any evaluated in the ISFSI SAR?**

No. The new system will utilize structures and components very similar to the existing, and in many ways improved, for example better heat removal capability, temperature monitoring, etc. The same fuel handling systems, transport cask, and basic DSC design are used for the new system. The new HSMs are QA-4, and materials used will meet or exceed the acceptance requirements of the existing system. The GL HSMs will not interact with the existing HSMs during a seismic event. Installation of the new HSMs does not increase the likelihood of any environmental accidents. Therefore, no new credible ISFSI accidents or failures are postulated as a result of these changes.

4) **Increase the probability of a malfunction of equipment important to safety evaluated in the ISFSI SAR?**

No. The original design basis margins of safety for DSC transfer operations and associated equipment for the site specific system will be satisfied. The same

loading and transport devices will be utilized for Phase III. No redundant or protective safety features are degraded or deleted. The transfer cask and DSCs will remain QA-1. The GL HSMs will be classified Duke QA Condition 4. A non-safety temperature monitoring system will be included for the new HSMs. Routine temperature monitoring is not required for the existing site specific structures. Cask Storage pads and areas have been designed to adequately support the static and dynamic load of stored casks. The existing Phase I and II HSMs are completely passive during the storage mode and the only functionality important to safety is the maintenance of the physical integrity of the HSMs and DSCs. Since all previously evaluated accidents are still valid, and no new credible ones are introduced, and since the two systems cannot interact with one another, structural integrity is not compromised.

5) **Increase the consequences of a malfunction of equipment important to safety evaluated in the ISFSI SAR?**

No. The consequences of malfunctions associated with the site specific system remain bounded by the FSAR evaluations which are unchanged by the loading of the GL system HSMs. The new HSMs are QA-4 structures that will have no adverse impact on the existing ISFSI SSCs. The same fuel handling systems, transport cask, and basic DSC design will be used for the new GL system. No important to safety equipment has been degraded. Both dry storage systems will have separate controlling procedures.

6) **Create the possibility for a malfunction of a different type than any evaluated in the ISFSI SAR?**

No. The existing fuel handling systems, vacuum drying, welding equipment, transport cask, and basic DSC design will be used with the new GL system. The new HSMs are passive structures, as are the existing. The new HSMs are designed to accommodate normal, accident, and natural phenomena conditions including tornado, earthquake, flood, and lightning without failure. The new HSMs are made of concrete and steel, and by design contain no flammable or explosive materials. No credible new failure modes are postulated. Any failures associated with Phase III would not adversely affect Phase I and II.

7) **Reduce the margin of safety as defined in the bases for any ISFSI technical specification?**

No. The changes outlined above are for loading of a new NRC approved General License dry storage system on the existing ISFSI site. The new HSMs are QA-4 structures, and the materials used will meet or exceed the acceptance requirements of the existing system. Although some of the license conditions may differ between the site specific and GL systems, there is no conflict since each system will continue

to be treated as a separate entity. Both dry storage systems will have separate controlling procedures. The two distinct dry storage systems will simply employ the same fuel handling, welding, and transport equipment, basic DSC design, and will reside on the same site location. Loading of the HSMs will not adversely affect any plant or ISFSI safety limits, setpoints, design parameters, or Technical Specifications. Loading the HSMs will in no way degraded the margins of safety associated with the fission product barriers.

IV. OCCUPATIONAL EXPOSURE

A proposed increase in occupational exposure may be deemed significant if 1) the limits on individual exposure derived from 10CFR20 may be exceeded, or 2) the total occupational exposure anticipated from all ISFSI related activities exceeds the NRC acceptance criteria. The NRC acceptance criterion is interpreted to be less than 10% of the total occupational dose commitment for the Oconee Nuclear Site. Previous evaluations considered a total occupational exposure of up to 100 person-rem per year (< 10% of 1075 person-rem for Oconee site reported in Reference 8.42 of Reference 16) to be allowable without prior NRC approval. Improved ALARA practices have since reduced the site total occupational exposure significantly. More recent evaluations have conservatively considered a lesser site dose (< 10% of 476 person-rem per year for Oconee site per Reference 8.143 of Reference 16) or up to 40 person-rem per year total occupational exposure to be acceptable for dry storage operations.

Loading of the first eight HSMs of the NRC approved General License design will not significantly affect the occupational dose rates associated with the existing site specific system. No modifications are being made to the Phase I or II structures. The site specific HSMs will all be loaded and secured prior to loading of Phase III. A comprehensive 10 CFR 72.212 evaluation (which includes verification of 10 CFR 72.104 and 106 requirements) has been performed. This evaluation addresses the dose consequences associated with operations of the GL system.
[References 1, 24]

The vendor (VECTRA) has provided projected dose rates and associated information that indicate the total dose rates (gamma plus neutron) will be higher with the new system. See details in Section II of this evaluation. Increasing these dose rates may increase welder exposure at the top of the cask and overall doses during transport and loading, but not such that there is a significant increase in the potential for an individual worker to receive an exposure in excess of 10 CFR 20 limits. Site Radiation Protection procedures, ALARA practices, pre-job briefings, and RP coverage are utilized to provide assurance that the requirements of 10 CFR 20 are met. The fuel handling, transport, and storage processes remain essentially the same. While both the new and existing systems require daily surveillance, there is no routine occupancy of the ISFSI. While any radiation dose is undesirable, the potential increases remain well within the allowable limits for total

occupational exposure. No significant increase in occupational exposure will result from loading of the first eight GL HSMs.
[References 1, 2, 7]

V. ENVIRONMENTAL IMPACTS

Loading of the first eight GL HSMs at the Oconee ISFSI will not have any significant environmental impact on the existing structures. As long as the T.S. Table 2-1 operating limit of ≤ 200 mrem/hr for the existing HSMs is satisfied, the limit on offsite exposures from the ISFSI will not be exceeded. Typical dose rates are much less than 200 mrem/hr. Loading of the new HSMs will not significantly impact the surface dose rates of the existing loaded modules. A comprehensive 10 CFR 72.212 evaluation which includes verification of 10 CFR 72.104 (Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS) and 72.106 (Controlled area of an ISFSI or MRS) requirements has been performed. The same fuel handling systems, transport cask, and basic DSC design are retained and used. The DSC design provides redundant sealing of the confinement system to prevent release of radionuclides. The DSCs are designed to maintain the inert internal helium atmosphere for heat transfer, and to ensure long term maintenance of fuel clad integrity. The thick concrete QA-4 HSMs will provide the final shield between the canister and the environment with long term direct and skyshine radiation being the only significant contributor to offsite dose. There are no effluents from the canisters or HSMs.

VI. CONCLUSIONS

Loading of the first eight General License HSMs does not involve any safety concerns or USQs. Although some of the license conditions may differ between the site specific and General License systems, there is no conflict since each system will continue to be treated as a separate entity, both procedurally and in licensing space. No ISFSI Technical Specification changes are required. No ISFSI UFSAR changes are required.

The CSAR for the standardized NUHOMS system has been reviewed as required by 10 CFR 72.212 and is acceptable for use at Oconee with no changes required. Both the new GL CSAR and the CofC will be entered into the Document Management System as controlled documents. These documents will be applicable only to the ISFSI Phase III system. Like the site specific FSAR, the Oconee GL CSAR will be updated annually to reflect changes and modifications. To avoid confusion, the existing "site specific" or Phase I and II ISFSI FSAR and TS will remain entirely separate.

VII. SUMMARY FOR 10CFR72.48 ANNUAL REPORT

This 72.48 was written to evaluate the impact of loading the first eight standardized NUHOMS-24P General License (GL) design horizontal storage modules (HSMs). The new GL HSMs permit greater fuel storage acceptance/flexibility due to increased heat rejection capacity and modular design. The new HSMs utilize the same basic dry storage canister (DSC) design and transport/loading equipment as the existing site specific system (Phases I and II). The two distinct dry storage systems will employ the same fuel handling, welding, and transport equipment, DSC design, and will reside on the same site location.

The use of the NRC approved GL System ISFSI design will be governed by the requirements of the associated CofC 1004, CSAR, and SER. Although some of the license conditions may differ between the existing site specific and the new GL systems, there is no conflict since each system will continue to be treated as a separate entity, both procedurally and in licensing space. Both dry storage systems will have separate controlling procedures. Loading of the new HSMs does not increase the probability or consequences of any accidents already evaluated in the ISFSI SAR, nor are any new accident scenarios or failure modes for equipment important to safety created. No margins of any safety limits are reduced as a result of loading the GL System HSMs. No safety concerns or USQs are involved. No ISFSI Technical Specification changes are required. No ISFSI UFSAR changes are required. The are no significant increases in occupational exposure or environmental impacts.

VIII. REFERENCES

1. Final Scope Document for NSM-52959 Parts BS-1, BL-1 Rev 0 dated 7-30-96
2. Oconee Site Specific ISFSI FSAR, sections 1.2, 1.3, 3.2, 3.3, 4.3, 4.5, 7.6, 7.7, 8.2 12-31-1997 update
3. Oconee ISFSI Materials License SNM-2503 and Technical Specifications, all sections, as amended 1-5-94
4. Oconee Nuclear Station Final Safety Analysis Report, Sections 1.2.2.8, 3.0, 9.0, 15.0, 1997 update
5. Oconee Nuclear Station Technical Specifications, Section 3.8, 5.4, as amended 9-24-98
6. Oconee Nuclear Station Selected Licensee Commitments, section 16.11, as amended 10-13-98
7. Certified Safety Analysis Report (CSAR) for Standardized NUHOMS-24P GL System, Rev 4A, June 1996
8. Certificate of Compliance 1004 for NUHOMs Standardized HSM System from NRC to VECTRA dated 1-23-95
9. Memo concerning QA Condition of Horizontal Storage Modules from Gary Walden dated July 17, 1996.
10. VECTRA calculation NUH004.0219 " NUHOMS HSM Tornado Missile Impact Analysis"

11. DPC Engineering Calculation OSC-2846, Rev 1, "Offsite dose Consequences for DSC Leakage Accident"
12. Memorandum to File by D.A. Nix (Compliance) "Subject: Review of Vehicle Barrier requirements" dated 1-22-96
13. Memorandum to File by D.A. Nix (Compliance) "Subject: Review of Controlled Area Requirements" dated 5-15-96
14. Electronic mail from JR McLean communicating fence distances.
15. NRC SER for Oconee Site Specific ISFSI dated 10/89
16. Duke Engineering Calculation OSC-3485, Rev 15, "Modifications to the Oconee ISFSI", 10/3/95
17. Memorandum to File by D.A. Nix "Subject: Review of temperature monitoring requirements.
18. OSC-6558 "Electrical Design Inputs for NSM-52959 BL-1"
19. NSD-307, Quality Standards Manual
20. MP/0/A/1500/16, "Independent Spent Fuel Storage Installation Phase III DSC Loading and Storage Procedure"
21. Oconee Core Operating Limits Report
22. VECTRA Calculation 9-354.0120 "Duke Oconee ISFSI Phase III 10CFR72.104 and Cask Thermal Evaluation Report".
23. Electronic mail and subsequent personal Communication between Lee Shehan (Mod Eng - Elec) and Ed Price (MSE) on 12-11-95 verifying installation of new security camera telephoto lens is complete.
24. 10 CFR 72.212
25. DPC Engineering Calculation OSC-2942, "Accident Analysis for the Independent Spent Fuel Storage Installation (ISFSI), Revision 1

Attachment 3
1 of 10

Duke Power Company
Oconee Nuclear Station
System Engineering
P.O. Box 1439
Seneca, SC 29679

(803)885-3000
(803)885-3411 FAX

DUKE POWER

November 15, 1995

VECTRA Technologies, Inc.
6203 Ignacio Avenue
San Jose, CA 95119

Attention: Mr. Moses Taylor, Project Manager

Subject: Oconee Nuclear Site
NSM-52959 - Dry Storage Project Phase III
Licensing Document Reviews
File No. OS-230.04

Reference: Conference call of 11-16-95 and Action Items List

Moses,

Per our previous discussion, I am submitting the results of the Duke licensing document reviews. Attached find our specific comments on the General License CSAR, SER, and CofC. It is our understanding that VECTRA will apprise the other users of the requested changes, gain their concurrence, and incorporate the applicable items in the next CSAR update. In the interim, VECTRA will identify and provide the necessary 72.48 evaluations for any of these issues that require resolution prior to our beginning fabrication/construction activities such that the proposed construction schedule is not impacted.

If you have any questions please contact me @ (803) 885-4388 or Gary Walden @ (704) 382-6778

Sincerely,

E. D. Price Jr.
Design Engineer

attachments

cc: G. R. Walden
T. A. Saville
E. C. Greagan
W. D. Adams

Section	Comment
TOC	pg VI, 4.3.9. "Maintenance" is mis-spelled. pg VIII, 8.2.6. Should be "lightning" vs lighting
1.3.2.1	Include verbage that OS-187 TC is acceptable for use with standardized system. Ensure no wording is added anywhere in CSAR to require trunnion testing for OS-187 (i.e. put Duke in a backfit position).
3.1.2	Recognize that temperature monitoring and surveillance of bird screen and inlet/outlet vents is required.
3.2/3.3	Address acceptabilty of adding simple lightning protection equipment to HSM structures, i.e. grounded handrails, ladders, etc.
3.2.1	Address 250 mph wooden pole tornado missile.
3.3.3.2	Note thermal monitoring is req'd by CofC.
3.3.4.1.1(B)	2nd paragraph, last sentence. incorrect grammar
3.3.5.1	Address tack welding of (2) closure bolts as an acceptable security tamper seal.
3.3.6	Need to address fire, explosion and sabotage (hand held device) protection.
3.4	Describe strongback device and address use.
3.4.2	see 3.3 comment
4.3.2.1	Address use of both long and short DSCs (both drwgs should be in App E) and include acceptability of storing control components.
4.7.3.1(D)	4th paragraph, 5th sentence. Remove entire sentence as statement is incorrect. Drainage is to SFP. 2nd sentence - add "or spent fuel pool."
Figure 4.7-1	Add pathway on drwgs to show drainage routed to SFP.
5.1.1.3	Add steps to cover strongback installation and removal.
Table 8.1-3	Applicable to OS-187?
Table 8.1-4	Mention strongback device.
8.2	Need to address fire, explosion and sabotage (hand held device) accident. May want to include Duke existing analysis of fuel tanker explosion; also include any existing analyses for explosion of xport equipment gas tanks.

Section	Comment
8.2.3.2(D)	Does transfer cask overturn analysis bound Duke trailer?
8.2.5.1	Duke has addressed drop of fully loaded cask into SFP. Consider whether cask drop in fuel receiving bay is credible and, if so, the consequences.
8.2.6	Since Duke has performed fairly extensive analyses of lightning strike events, consider adding these.
8.2.8.3	Why no thyroid dose included? Oconee site specific ISFSI FSAR lists 200 mr to thyroid for canister leakage accident and Part 72.106 refers to whole body OR critical organ.
9.2	Add verbage to cover exceptions to required pre-op testing for utilities (Duke) which have already been using the site specific NUHOMS system. Since cask and canisters are the same there is no need to repeat the poolside activities only the HSM loading and closure process.
11.2	Add following statement "If utility elects to perform construction, and has an NRC approved QA program that is equivalent to or exceeds vendor program, then the utility QA program is considered an acceptable substitute."
Appendix E	Include drwgs of both long and short DSCs.
Appendix F	response to NRC question 10, pg 3, 2nd paragraph, 1st sentence. typo - word should be "bounding" not hounding.
	ques 6, pg 3 of 5, last paragraph, final sentence - improper wording.
All	Drawings and diagrams should be labelled "typical" where possible to preclude site specific problems.

DPC CofC REVIEW and COMMENT

Section	Comment
Condition 7	Need documentation from VECTRA and concurrence by JVB.
1.1.7	Need input from VECTRA and ONS Reg Compliance (DAN) concurrence.
1.1.8	Note that maximum allowed time between required surveillances is 1.25 times the interval specified as measured from the previous performance. This requirement may be more stringent than typical Duke "grace periods".
1.2.9	RKE needs guidance from VECTRA on procedure change.
1.2.12	Very difficult to meet 2200 dpm limit per TLC.
1.2.13	Does Charpy V notch testing issue have any impact here?

Attachment 3
5 of 20

PROCEDURE CHANGES

Note: The following procedures were identified as requiring changes per the referenced CofC sections:

Affected Procedure(s)	CofC Section(s)
MP (Maint)	1.1.2, 1.2.9, 1.2.10, 1.2.15, 1.2.16
XSFM-001 "GO Fuel Selection"	1.2.1
HP (Rad Prot)	1.2.6, 1.2.7, 1.2.11, 1.2.12
**CP (Chem)	1.2.15
Security	1.3.1

** may require change

Note: The following procedures were identified as requiring changes per the referenced CSAR sections:

Affected Procedure(s)	CSAR Section(s)
MP	4.5, 4.7, 5.1.1.4 (5), 5.1.1.5 (1,2,10,19, & 20), 5.1.1.7(2), 5.1.1.8 (2,3,12, & 15)
XSFM-001	13.1.1
HP	3.3.7.1.3, 7.0

DPC SER REVIEW and COMMENT

Section	Comment
1.3.3	Reference is made only to the use of "steel" shield plugs. Should include both lead and steel design. At the bottom of pg 1-6, reference is made to dryfilm lubricants applied to the DSC. The film has been eliminated.
1.3.4	This section refers to the 2 piece neutron shield plug which covers the transfer cask ram access port during transport of the cask to the ISFSI. Installation of this assembly should be optional.
1.3.5	In the 4th paragraph reference is made to a lifting pin connecting the crane hook to the lifting yoke. At Oconee, a lift extension is used to place the transfer cask/DSC into the pool. Use of the lift extension should be addressed in the CSAR.
2.4	On pg 2-3, the following statement appears: "...user must evaluate the foundation in accordance with 10CFR 72.212 (b)(2) and (b)(3) to ensure that in an unlikely event, no gross failures would occur that would occur that would cause the DSC to jam during transfer operation..." Seismic events, tornado missiles, etc. are currently evaluated in the CSAR, but not coincident with transfer operations. This scenario should be included in the CSAR, or a statement should be included to indicate why this scenario need not be included.
2.4.1	Numerous references are made throughout the SER, that while the loads are acceptable, the DSC should be considered a live load rather than a dead load. VECTRA may wish to correct this in a future SAR update.
2.4.2	NRC identifies 3 exceptions to the SAR evaluation of offnormal events-jammed should be offnormal load combination (not accident); DSC support assembly should have criteria for offnormal temperature rise; minimum service temperatures apply to both loaded DSC and the transfer cask with loaded DSC. VECTRA may wish to correct these items in a future update.
2.5	This section discusses criteria for fire and explosions identifying the trailer as a source (fuel tank) and stating that "the user should perform written evaluations to ensure that temperatures, accelerations, missile impacts, and other loads cannot be exceeded by credible fires and explosions..." In fact, fuel tanks from additional sources are involved with loading the DSC into the HSM - the transport tractor, ram trailer tractor, mobile crane. VECTRA should include in the CSAR an evaluation of all sources for fire/explosion which are routinely involved in transport and storage of the DSC, as well as any offsite explosion sources which have been evaluated.

DPC SER REVIEW and COMMENT

Section	Comment
3.0	This section discusses a number of issues evaluated for the transfer cask such as brittle fracture considerations, load combinations, normal/offnormal/ accident conditions for the transfer cask. It also states some temperature restrictions for cask handling due to material choices and material testing techniques. Is the Oconee site-specific transfer cask bounded by these analyses? If not, the temperature restrictions in this section, as well as in the CofC, may not be valid. The CSAR should be clear about the use of the site-specific cask at Oconee, how it differs from the reference design, and evaluate any safety issues associated with the use of the Oconee cask. Two particular items for the Oconee cask are the 250 mph tornado propelled utility pole and the potential for overturning the cask during transport.

June 22, 1995

OCONEE NUCLEAR SITE
INTRASITE LETTER

TO:	J.R. McLean	R.K. Emory	W.D. Adams	W. T. McClure
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	J.R. Brown	G.R. Walden	T.M. McQuarrie	

SUBJECT: Certificate of Compliance (CofC) and Safety Analysis Report (SAR) Reviews for ISFSI Phase III (NSM-52959) File No. 230.04

Attached is a list of sections from the subject documents that need to be reviewed by the listed individuals prior to construction and implementation of ISFSI Phase III. I have included copies of the appropriate sections of the SAR for your convenience. The CofC was distributed at an earlier meeting.

We are making this effort to ensure we identify and resolve any differences between the new and existing dry storage systems, and to ensure that no new requirements are overlooked.

Please complete this review on or before August 15, 1995, and return the acknowledgment below to me at ON03MS. If you find any potential problems or have comments, please include a mark up of the applicable sections. As always, if you need additional document copies, information, etc., contact me at extension 4388 or EDP0934.

E. D. Price Jr.
Lead Engineer
ONS Mechanical Nuclear Systems Engineering

attachments

cc E.C. Greagan
T.A. Saville

I have reviewed the listed SAR and/or CofC documents and:

(1) have no comments ☐
OR
(2) comments attached ☐

Signed ______________________ Date ______________

General License SAR Review Assignments

Section	Description	Responsible Person
1	Intro and General Description	EDP
2	Site Characteristics	JRM/JWC
3.0	Principal Design Criteria	N/A
3.1	Purpose of Installation	EDP
3.1.1	Material to be Stored	GRW
3.1.2	General Operating Functions	LLH/RKE
3.2	Structural and Mechanical Safety Criteria	JRM
3.3	Safety Protection System	EDP
3.3.1	General	EDP
3.3.2	Protection by Multiple Confinement Barriers and Systems	GRW
3.3.3	Protection by Equipment and Instrumentation Selection	GRW
3.3.4	Nuclear Criticality Safety	EDP
3.3.5	Radiological Safety	TLC
3.3.6	Fire and Explosion Protection	JVB/WCC
3.3.7	Materials Handling and Storage	GRW
3.3.8	Industrial and Chemical Safety	SAFETY
3.4	Classification of Structures, Components, and Systems	JRM
3.5	Decommissioning	GRW
3.6	References	N/A
4.0	Installation Design	N/A
4.1	Summary Description	EDP
4.2	Storage Structures	JRM
4.3	Auxiliary Systems	EDP
4.4	Decontamination System	TLC
4.5	Transfer Cask Repair and Maintenance	RKE/LLH
4.6	Cathodic Protection	JRM
4.7	Fuel Handling Operation Systems	RKE/LLH
4.8	References	N/A
5.0	Operation Systems	N/A
5.1	Operation Description	LLH/RKE
5.2	Fuel Handling Systems	RKE/LLH
5.3	Other Operating Systems	RKE/LLH
5.4	Operation Support System	RKE/LLH
5.5	Control Room and/or Control Areas	EDP
5.6	Analytical Sampling	EDP
5.7	References	N/A
6	Waste Confinement and Management	TLC
7	Radiation Protection	TLC
8	Analysis of Design Events	EDP/JRM OTHERS
9.0	Conduct of Operations	N/A
9.1	Organizational Structure	EDP
9.2	Pre-operational Testing and Operation	RKE/LLH/CMD
9.3	Training Program	TWY
9.4	Normal Operations	LLH
9.5	Emergency Planning	EP
9.6	Decommissioning Plan	EDP
10	Operating Controls and Limits	*Exempted by CofC*
11	Quality Assurance	TM/WDA
Appendix A	Details of Shielding Models	EDP
Appendix B	Details of Heat Transfer	EDP
Appendix C	Supporting Structural Analyses	JRM
Appendix D	Review of Concrete Behavior Under Elevated Temperature	JRM
Appendix E	Drawings	JRM
Appendix F	NRC Criticality Question Resolutions (Topical Report)	EDP

Attachment 3
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CofC Review Responsibilities

	[illegible] 72-1004 Section	Description	Applicable Documents	Notes	Responsible Person(s)
1	Condition 6	QA for Fabrication Activities	Duke/Vendor Appendix B Plans		TM/GRW
2	Condition 7	Notification of Fabrication Schedules	n/a		GRW
3	Condition 8	10 CFR Part 50 License Required	Part 50 Licenses		EDP/DAN
4	Condition 9	Changes, tests, experiments	NRC letter for 72.48 applicability; NSD for 72.48		EDP
5	First paragraph page 4	Records of changes, safety evaluations	NSD-211, vendor program	Coordinate w/VECTRA	EDP/GRW/DAN
6	Second paragraph page 4	Annual report on changes	NPM		EDP/DAN
	CofC Attachment A ("Tech Specs")				
7	1.1.1 Item 1	Average ambient temperature	ISFSI Environmental Report		JWC
8	1.1.1 Item 2	Ambient temperature max/min	ISFSI Environmental Report		JWC
9	1.1.1 Item 3	Seismic accelerations	ISFSI SAR/site FSAR		JRM
10	1.1.1 Item 4	Site flood conditions	ISFSI SAR/site FSAR		JRM
11	1.1.1 Item 5	Site fire/explosion conditions	ISFSI SAR/site FSAR		JVB/WCC
12	1.1.1 Item 6	Foundation design conditions	VECTRA foundation analysis		JRM
13	1.1.1 Item 7	Potential for lightning damage	Design calc (?)		JVB/WCC
14	1.1.1 Item 8	Other site conditions	ISFSI SAR/site FSAR		EDP
15	1.1.2	Operating procedures	Handling, loading, transfer, surveillance , maint. procedures	Address DSC re-opening	RKE/LLH
16	1.1.3	Quality Assurance	QA Topical Report, FSAR Chapter 17(?)		TM/EDP
17	1.1.4	Heavy loads- NUREG 0612	ISFSI transfer cask drop analysis	50.59 evaluation req'd	CMD/JRM
18	1.1.5	Training	Training modules		TWY
19	1.1.6	Pre-operation testing	1990 dry run procedures, new dry runs for alignment/insertion		EDP
20	1.1.7	Thermal performance report	VECTRA analysis/Toledo report	Coordinate w/VECTRA	EDP/GRW
21	1.1.8	Surveillance frequency	All surveillance procedures		All
22	1.2.1	Fuel specification	G.O. fuel selection procedure		GRW
23	1.2.2	Vacuum drying pressure	MNT procedure		LLH
24	1.2.3	Helium backfill pressure	MNT procedure		LLH
25	1.2.4	Helium leak rate	QA procedure, ref. in MNT procedure		TM/LLH
26	1.2.5	Closure weld dye penetrant	QA procedure, ref. in MNT procedure		TM/LLH
27	1.2.6	DSC top end dose rates	RP procedure, ref. in MNT procedure	New specification	TLC/LLH
28	1.2.7	HSM dose rates	RP procedure, ref. in MNT procedure		TLC/LLH
29	1.2.8	HSM air temperature rise	MNT procedure, surveillance procedure	Daily measurements	JVB/WTM
30	1.2.9	Transfer cask alignment	MNT procedure		RKE/LLH
31	1.2.10	DSC outside handling height	System specification, ref. in MNT procedure(L&P)		RKE/LLH
32	1.2.11	Transfer cask dose rates	RP procedure, ref. in MNT procedure	New specification	TLC/LLH
33	1.2.12	DSC surface contamination	RP procedure, ref. in MNT procedure	2,200 dpm/100 sq cm	TLC/LLH
3[illegible]	[illegible]13	Low temperature/lift height	MNT procedure	New specification	LLH
[illegible]	[illegible]	High temperature/transfer operations	MNT procedure	New specification	LLH
[illegible]	[illegible]	Boron concentration	CHM procedure/MNT procedure	2000 ppm	MMG/LLH
[illegible]	[illegible]16	Transfer cask seismic restraint	ISFSI SAR/site FSAR	n/a for < 0.4g	JRM/RKE
38	1.3.1	HSM vent debris inspection	Surveillance procedure		WTM/EDP
39	1.3.2	HSM thermal performance	Surveillance procedure/VECTRA analysis	Daily temp. measurements	JVB/WTM
	DAN	Dave Nix	JRM John McLean		
	WDA	Billy Adams	JRB Rodney Brown		
	MMG	Mike Garrison	TM Trip McClure		
	CMD	Cliff Davis	ECG Colin Greagan		
	EDP	Ed Price			
	GRW	Gary Walden			
	JVB	John Boehme			
	JWC	John Crane			
	LLH	Sonny Howell			
	RKE	Rod Emory			
	TLC	Ted Cherry			
	TWY	Terry Young			
	WCC	Wayne Carter			
	WTM	Tom McQuarrie			

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