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January 30, 2009

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Subject: Duke Energy Carolinas, LLC
Oconee Nuclear Station
Docket Number 72-4, License No. SNM-2503
License Renewal Application for the Site-Specific Independent Spent Fuel Storage Installation (ISFSI) - Response to Requests for Additional Information
License Amendment Request No. 2007-06

References:

1. License Renewal Application from D. A. Baxter, Vice President, Oconee Nuclear Station, Duke Energy LLC, to the USNRC, "Site-Specific Independent Spent Fuel Storage Installation (ISFSI), License Renewal Application," dated January 30, 2008.
2. Letter from John M. Goshen, Project Manager, Licensing Branch, Division of Spent Fuel Storage and Transportation, Office of Nuclear Material Safety and Safeguards, USNRC, to Mr. Dave Baxter, Vice President, Oconee Nuclear Station, Duke Energy Carolinas, LLC, "Request for Additional Information for Oconee Nuclear Station Independent Spent Fuel Storage Installation License Renewal Application (TAC No. L24184)," dated October 1, 2008.
3. Letter from Gregory F. Suber, Chief Environmental Review Branch, Division of Waste Management and Environmental Protection, Office of Federal and State Materials and Environmental Management Programs, USNRC, to Mr. Dave Baxter, Vice President, Oconee Nuclear Station, Duke Energy Carolinas, LLC, "Request for Additional Information Regarding the Oconee Nuclear Station Independent Spent Fuel Storage Installation License Renewal Application Environmental Report (TAC No. J00817)," dated November 12, 2008.
4. Letter from Dave Baxter, Vice President, Oconee Nuclear Station, to the U. S. Nuclear Regulatory Commission, "Site-Specific Independent Spent Fuel Storage Installation (ISFSI), Extension of Request for Additional Information (RAI) Response Date, " dated October 22, 2008.
5. Letter from Dave Baxter, Vice President, Oconee Nuclear Station, to the U. S. Nuclear Regulatory Commission, "Site-Specific Independent Spent Fuel Storage Installation (ISFSI), Extension of Request for Additional Information (RAI) Response Date, " dated December 5, 2008.

Attachment 3 contains confidential information submitted under 10 CFR 2.390.
Withhold from public disclosure under 10 CFR 2.390.
Upon removal of this attachment, this letter is uncontrolled.

NMSS01

On January 30, 2008, Duke Energy Carolinas, LLC (Duke) submitted a License Renewal Application (LRA) requesting the license renewal for the Site-Specific Independent Spent Fuel Storage Installation (ISFSI) located at the Oconee Nuclear Station (ONS) [Ref. 1]. This application supported a license renewal for an additional 40 year period beyond the January 31, 2010 expiration date for materials license SNM-2503 (Docket No. 72-4). The application included the applicable general, technical, and environmental supporting information required by 10 CFR 72, §72.42(b).

Duke received a Request for Additional Information (RAI) on October 1, 2008 [Ref. 2], and a second RAI on November 12, 2008 [Ref. 3]. By letters dated October 22, 2008, and December 5, 2008, Duke stated that additional time would be needed to respond to the RAIs [Ref. 4, 5]. The enclosed attachments contain Duke's responses to the two RAIs.

If you have any questions in regard to this letter, please contact Stephen C. Newman, Regulatory Compliance Lead Engineer, Oconee Nuclear Station, at (864) 885-4388.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on January 30, 2009.

Very sincerely yours,

Dave Baxter, Vice President
Oconee Nuclear Station

Attachments

(1) Duke Responses to NRC RAI dated October 1, 2008.
(2) Duke Responses to NRC RAI dated November 12, 2008.
(3) Proprietary RAI Response Information
(4) List of Regulatory Commitments

Enclosures

(1) Training and Surveillance Documents.
(2) Transnuclear Affidavit

Attachment 3 contains confidential information submitted under 10 CFR 2.390.
Withhold from public disclosure under 10 CFR 2.390.
Upon removal of this attachment, this letter is uncontrolled.

bc w/attachments/enclosures:

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Attachment 1
Site-Specific ISFSI License Renewal Application
Duke Responses to NRC Request for Additional Information
dated October 1, 2008

On October 1, 2008, Duke received an NRC Request for Additional Information (RAI) on the proposed ISFSI license renewal application submitted on January 30, 2008. The responses to this RAI are included as part of this attachment. A second NRC RAI was received on November 12, 2008, to address the environmental aspects of the proposed change. Responses to this latter RAI are provided in Attachment 2.

Note: The numerical designations of the following RAI items match those given in the NRC RAI.

1-1 Include abbreviations listed in Section 1.4.2 "Intended Function code Definitions" under "Acronyms and Abbreviations" on page i.

This request is for editorial corrections and compliance with 10 CFR Part 72.24 (c) and (d).

2-1 Clarify if any instrumentation was placed for monitoring the operating conditions of the ISFSI's? "Instrumentation" was listed as one of the components in the Scoping Results in Table 2.3-1. Provide inspection/surveillance requirements in a tabular format with frequencies for systems, structures, and components (SSCs) selected in the Aging Management Program (AMP).

This information is needed to determine compliance with 10 CFR 72.11.

3-1 In "DSC [Dry Storage Canister] Support Assembly" it states "stainless steel cover plates are attached to the longitudinal support rails to provide sliding surfaces for the DSC's. The Sliding Surface of the DSC support rails is coated with a dry film lubricant." Placements of those stainless steel cover plates were not identified on the original drawings from the NUTECH NUHOMS -24P Topical Report.

a) Provide copies of as-built drawings that provide fabrication details of the stainless steel cover plates.

b) The difference in thermal expansion between stainless steel and carbon steel is approximately 1.5 times. Provide evaluations how this difference was accommodated without exerting extensive thermal stress and/or distortion at the attachment points.

c) Evaluate possible effects of dry surface condition during the unloading process and why this condition will not lead to accelerated component degradation for the license renewal period.

d) Provide an evaluation regarding the possibility of a galling condition that may cause seizure between the DCS shell and longitudinal support rails during the unloading process.

This information is needed to determine compliance with 10 CFR Part 72.122.

3-2 In section 3.2.2 under "Concrete (and carbon steel rebar)" compressive strength of concrete was listed only. No material and strength of reinforcement-bars were provided. Provide the physical properties of materials of the HSM and reference the applicable documents where that specific information was taken.

This information is needed for completeness of the UFSAR and compliance with 10 CFR Part 72.11.

3-3 The sixth paragraph states that "*With respect to below grade concrete (and reinforcing steel), no aging effects/mechanisms were identified.*" "Structural support (SS)" and "heat transfer (HT)" were selected as intended functions for Concrete Below Grade in Table 3.2-1; therefore, at a minimum, provide reasons for not including exposed surfaces of the Concrete Below Grade within the HSM space in the inspection/monitoring under the Aging Management Activity/Program (AMA/AMP). Refer to RAI A-3 below. Provide justification for not identifying any long term effect of degradation mechanisms; namely: corrosion, fatigue, thermal stresses, irradiation; for the below-grade concrete and reinforcing steel.

This information is needed to determine compliance with 10 CFR Part 72.120.

A-1 Provide an example of Corrective Action Program applications that were issued under each of the following: Work Requests, Program Investigations (PIP) and Engineering Change (EC) that included root-cause determinations, prevention of recurrence reports on components of the ISFSI, and timeliness. The purpose of this RAI is to determine that safety functions (criticality, shielding, confinement, heat transfer and structural integrity) of any part of the SSC of ISFSIs were not compromised at any time of the operations.

This information is needed to determine compliance with 10 CFR Part 72.172.

A-2 Appendix A "Aging Management Programs" discusses surveillance, monitoring, trending and the condition of ISFSI components.

a) Specify the directives, procedures and guidance, including training requirements and logs that are related to surveillance, monitoring and trending and provide examples of each. Include examples of reports providing the current condition of ISFSI's, e.g. comparing the results from the baseline conditions to the inspections of SSC's.

b) Define "baseline inspection." Throughout Section A2.1 the phrase "baseline inspection" was used and has not been defined.

This information is needed to determine compliance with 10 CFR Part 72.120.

A-3 Define *"significant degradation."*

The first sentence in "Summary" of Section A2.1 states *"...has not indicated any **significant degradation** to any..."* Second paragraph in Section A2.3 states *"...to ensure that no **significant degradation** to the ..."* This terminology is used throughout Appendix A.

This information is needed to determine compliance with 10 CFR Part 72.120.

A-4 a) Provide the results of the HSM internal inspection described in Appendix A, Section 2.1, "Site-Specific ISFSI Aging Management Program." Explain how the inspection was performed, and justify the selection process.

b) Also provide an explanation of the 10 year inspection interval, and how previous and future HSM's was/will be selected for internal inspection?

c) Provide a justification for not including DSC shell in the inspection/monitoring and/or Aging Management Activity/Program (AMA/AMP).

d) Describe the specific elements of the inspection/monitoring evaluation of the DSC Support Assembly that was/and will be performed, and provide comparative results of baseline and current conditions as required under AMA/AMP in Table 3.2-1.

This information is needed to determine compliance with 10 CFR Part 72.120.

B-1 Provide the analysis mentioned in Section B2.2.1, "DSC Shell Cracking Due to Fatigue," which demonstrates that fatigue does not need to be considered. Provide copies of references and measurement data cited in your response. Justify the conclusion, including reasons for not including the DSC shell in the inspection /monitoring and/or AMA/AMP

DSC shell structure is subjected (with intended Functions) to dead weight (SS), pressure (PB), temperature (HT) and irradiations (SH), and it was concluded that no "Aging Management Activity/Program (AMA/AMP)" is required as tabulated in Table 3.3-1. Refer to RAI A-3 above.

This information is needed to determine compliance with 10 CFR Part 72.24(d) and 120.

B-2 Provide the referenced fatigue analyses for the transfer cask trunnions, the transfer cask lifting yoke and the transfer cask lift extension. Provide copies of references and measurement data cited in your response.

This information is needed to determine compliance with 10 CFR Part 72.24(d).

B-5 Provide the basis for reducing the number of thermal cycles on the DSC support structure from one cycle per day (365 per year) to 182.5 per year. Provide copies of references and measurement data cited in your response.

This information is needed to determine compliance with 10 CFR Part 72.24(d).

U-1 In Sections 1.3.1.6 "Horizontal Hydraulic Ram" and 4.3.3.5 "Hydraulic Ram" reach lengths were listed as 21.5 feet, and 21 feet respectively. Please state the correct reach length of the hydraulic ram.

This information is needed to determine compliance with 10 CFR Part 72.150.

U-2 Throughout the license renewal application and in the revised ISFSI USFAR non-quantifiable phrases were used - e.g.; "significant," "no significance," "not significant," "small," "slight," slightly," etc. Please identify each one, and if applicable, replace with statements that can provide justifiable and/or measurable values.

This request is for editorial correction and compliance with 10 CFR Part 72.24 (c) and (d).

U-3 The third paragraph in Section 2.4.1.1 *"Site and Facilities" of the ISFSI UFSAR states "Also, the peak flood level to a postulated failure of the upstream Jocassee Dam..."* and second paragraph in Section 2.4.5.1 "Flood Protection Measure for Oconee Station Seismic Class 1 Structures" of the ISFSI UFSAR states *"In the Oconee PRA study, a postulated failure of the upstream Jocassee Dam resulted in the peak flood..."* have contradicting conclusion per the NRC NRR letter to Mr. Dave Baxter, VP, from Mr. Joseph G. Giitter, Director of NRC NRR dated August 15, 2008 (ML081640244). Therefore, the site specific license renewal of the Oconee ISFSI may be contingent upon the resolution of this matter.

NOTE: If an RAI response were to require revising the questioned section of the SAR, please note that change many have to be addressed in the other associated section(s) as well.

RAI Question # 1-1

Include abbreviations listed in Section 1.4.2 "Intended Function code Definitions" under "Acronyms and Abbreviations" on page i.

This request is for editorial corrections and compliance with 10 CFR Part 72.24 (c) and (d).

Response

Abbrieviations from Section 1.4.2 were added to the "Acroynms and Abbreviations" on page i of the license renewal application. The updated "page i" is shown on next page.

ACRONYMS AND ABBREVIATIONS

AMA	Aging Management Activity
AMP	Aging Management Program
AMR	Aging Management Review
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
CC	Provides criticality control of spent fuel
CLB	Current Licensing Basis
CFR	Code of Federal Regulations
cm	centimeter
CNS	Catawba Nuclear Station
DOE	U. S. Department of Energy
DSC	Dry Storage Canister
EPRI	Electric Power Research Institute
ft	Foot/Feet
FOL	Facility Operating License
GWd/MTU	Gigawatt-Days per Metric Tonne Uranium
HBRSEP, Unit No. 2	H. B. Robinson Steam Electric Plant, Unit No. 2 (also referred to as Robinson Nuclear Plant
HSM	Horizontal Storage Module
HT	Provides heat transfer
IFA	Irradiated Fuel Assembly
in	Inch/Inches
ISFSI	Independent Spent Fuel Storage Installation
LBS	Pounds
LRA	License Renewal Application
MeV	Million Electron Volts
MNS	McGuire Nuclear Station
MWd/MTU	Megawatt-Days per Metric Tonne Uranium
N/A	Not Applicable
NFPA	National Fire Protection Association
NMSS	NRC Office Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
NUHOMS®	NUTECH, Inc. Horizontal Modular Storage (system)
OE	Operating Experience
ONS	Oconee Nuclear Station
PB	Directly or indirectly maintains a pressure boundary (confinement)
ppm	parts per million
RCA	Radiation Control Area
RNP	Robinson Nuclear Plant
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SFPO	Spent Fuel Project Office
SH	Provides radiation shielding
SNF	Spent Nuclear Fuel
SSC	System, Structure and Component
SPS	Surry Power Station
SS	Provides structural support and/or functional support of important to safety equipment (structural integrity)
UFSAR	Updated Final Safety Analysis Report

RAI Question # 2-1

Clarify if any instrumentation was placed for monitoring the operating conditions of the ISFSI's? "Instrumentation" was listed as one of the components in the Scoping Results in Table 2.3-1. Provide inspection/surveillance requirements in a tabular format with frequencies for systems, structures, and components (SSCs) selected in the Aging Management Program (AMP).

This information is needed to determine compliance with 10 CFR 72.11.

Response

No instrumentation is required for monitoring the operating conditions of the ISFSI as stated in Section 4.2.4 of the Site-Specific UFSAR (Enclosure 5 of the license renewal application). The instrumentation referred to in Table 2.3-1 is associated with closure and transfer operations (e.g. vacuum drying gages, helium leak test equipment, hydraulic ram pressures, etc.) and verification of temperature rise per Technical Specification 4.2.1 following placement of the DSC into the HSM.

The following Table 2-1 provides the inspection/surveillance requirements and frequencies for the Aging Management Program (AMP).

Table 2-1

SSC	Inspection Requirements	Frequency
ISFSI	Air inlets and outlets for obstructions	Daily
	Radiation levels	Monthly
	Accessible HSM exterior for aging effects	5 years
	Accessible HSM interior for aging effects	10 years
Transfer Cask	Carbon steel subcomponents for aging effects	Annual
Transfer Cask Lifting Yoke	Carbon steel subcomponents for aging effects	Annual
Transfer Cask Lift Extension	Carbon steel subcomponents for aging effects	Annual
Cask Pit Support Stand	Chloride sampling of spent fuel pools	Monthly

RAI Question # 3-1

In "DSC [Dry Storage Canister] Support Assembly" it states "stainless steel cover plates are attached to the longitudinal support rails to provide sliding surfaces for the DSC's. The Sliding Surface of the DSC support rails is coated with a dry film lubricant." Placements of those stainless steel cover plates were not identified on the original drawings from the NUTECH NUHOMS -24P Topical Report.

a) Provide copies of as-built drawings that provide fabrication details of the stainless steel cover plates.
b) The difference in thermal expansion between stainless steel and carbon steel is approximately 1.5 times. Provide evaluations how this difference was accommodated without exerting extensive thermal stress and/or distortion at the attachment points.
c) Evaluate possible effects of dry surface condition during the unloading process and why this condition will not lead to accelerated component degradation for the license renewal period.
d) Provide an evaluation regarding the possibility of a galling condition that may cause seizure between the DCS shell and longitudinal support rails during the unloading process.

This information is needed to determine compliance with 10 CFR Part 72.122.

Response

a) *Provide copies of as-built drawings that provide fabrication details of the stainless steel cover plates.*

The design of the DSC support structure as specified in the NUHOMS®-24P Topical Report called for WT6X115 support rails with a 3/4 inch nickel-plated cover plate. This design was changed for both Phase 1 and Phase 2 of the Oconee Site-Specific ISFSI, as discussed below.

All of the Phase 1 HSMs (i.e. E1 through E10, and W1 through W10) used WT6X105 rails of ASTM A-36 with a 3/4 inch by 6 inch cover plate of ASTM A-240, Type 410S in lieu of the WT6X115 rails. A later change added a 0.120 inch by 3 inch plate of ASTM A-240, Nitronic 60 to the top of the 3/4 inch cover plate to reduce sliding resistance. This later change was made to HSMs E6 through E10, and W6 through W10, only.

All of the Phase 2 HSMs (i.e. E11 through E20, and W11 through W20), used W8X40 rails of ASTM A-36 with a 5/8 inch by 6 inch cover plate of ASTM A-36. A 1/8 inch by 4 inch plate of ASTM A-240, Nitronic 60 was added to the top of the cover plate to provide an appropriate sliding surface.

All of these changes were evaluated to meet the criteria of 10CFR72.48, such that prior NRC approval was not required.

The following Duke drawings contain Proprietary information and are provided in Attachment 3:

- Phase 1: O-39-04-01, Rev 2, "ISFSI Project Units 1-3, Horizontal Storage Modules, Miscellaneous Steel,"

- Phase 2: O-39-14-02, Rev 3, ISFSI Phase 2- Units 1-3, Horizontal Storage Modules, Miscellaneous Steel, Plans, Sections, and Details.

(b) *The difference in thermal expansion between stainless steel and carbon steel is approximately 1.5 times. Provide evaluations how this difference was accommodated without exerting extensive thermal stress and/or distortion at the attachment points.*

The thermal stress analysis of the supporting carbon steel members and the stainless steel cover plate(s) was accomplished by recognizing that at the interface between dissimilar materials, the strains in both materials are equal. By setting these two values, which are made up of different variables, both known and unknown, to be equal, the shear force at the interface can be determined. For the various configurations of support beams and cover plates in Phase I and II, the minimum interaction ratio (allowable weld stress/ actual weld stress) is 1.38. Mechanically induced weld stresses were then added to the thermal stresses. Consequently, the resulting stresses were within code allowables for the materials used.

c) *Evaluate possible effects of dry surface condition during the unloading process and why this condition will not lead to accelerated component degradation for the license renewal period.*

d) *Provide an evaluation regarding the possibility of a galling condition that may cause seizure between the DCS shell and longitudinal support rails during the unloading process.*

[Combined Responses]:

Future retrievability of the DSC was considered and addressed in the original design by the selection of corrosion and wear resistant materials and suitable lubricants. The DSC shell is fabricated from ASME SA-240, Type 304 stainless steel. The sliding surface in the HSMs is either ASTM A-240, Type 410S or ASTM A-240, Nitronic 60.

ASME SA-240, Type 304, which is used for the DSC shell, is an austenitic chromium-nickel stainless steel which provides good resistance to corrosion. Corrosion resistance is provided by the minimum 18% chromium content. It is among the most commonly used alloy in the stainless steel family. It is widely used in the nuclear power industry (e.g. piping, tanks, heat exchangers), and in equipment used for processing food, beverages, and dairy products.

ASTM A-240, Type 410S is used for the sliding surface in some of the Phase 1 HSMs. It is a low carbon martensitic stainless steel of intermediate chromium content (approximately 12%). It is mainly used for its high strength and wear resistance, often at moderately elevated temperatures. The material also exhibits good oxidation resistance and good corrosion resistance in atmospheric conditions. Typical applications are knives, surgical instruments, high strength bolts, spindles, nozzles, shafts, impellers, springs, valves, and compressor and turbine wheels.

ASME SA-240, Nitronic 60 is used for the sliding surface in some of the Phase 1 and all of the Phase 2 HSMs. It is a high strength, austenitic stainless steel alloy designed to resist galling and wear. It also exhibits excellent corrosion resistance in most media and is generally superior to Type 304. It also exhibits excellent oxidation resistance in atmospheric and high temperature conditions. Typical applications are valve stems and seats; bushings; pin and roller bearings; pump wear rings; and construction applications such as bridge pins and parking deck expansion joint wear plates.

The sliding surfaces of the DSC support structure are coated with one of the following three graphite-based solid film lubricants: Everlube 823, Permaslik RN, or Everlube EX 1541. These lubricants are applied to minimize friction during insertion and retrieval of the DSC. The material specifications for the lubricants indicate they are suitable for high and cryogenic temperature applications. The presence of a non-corrosive environment and relatively milder temperature fluctuations ensure that the lubricant does not degrade with age. The effect of radiation on these lubricants is not specified. However, it is expected that it is minimal since these are inorganic and consist entirely of graphite.

The coefficient of friction associated with these lubricants is below 0.05 while the design basis calculations employed a coefficient of friction of 0.25 (Section 8.1.1.4 of the NUHOMS®-24P Topical Report). The hydraulic ram used for the DSC transfer is capable of exerting a force equal to the loaded weight of a DSC and this condition has been evaluated in Section 8.2.2 of the NUHOMS®-24P Topical Report. A coefficient of friction of 1.0 has been used for these "jammed DSC" analyses without relying on the solid film lubricant. The support structure is designed for this loading.

It should be noted that the USNRC has previously evaluated retrievability of the DSC after the service life or license term. With the exception of the ASTM A-240, Type 410S, the materials used for the Oconee Site-Specific DSCs and HSM sliding surfaces are the same as those used for the Standardized NUHOMS® Modular Storage System for Irradiated Nuclear Fuel that was approved by the USNRC for use under the general license provision of 10 CFR 72. In the Federal Register notice of its final rule (Volume 59, December 22, 1994), the USNRC made the following statement regarding retrievability:

"The DSC is enclosed within the HSM and is not exposed to external water. Laboratory experiments have indicated a general corrosion rate of less than 0.00001 inches per year for similar stainless steels. The NRC believes these experiments more accurately bound DSC corrosion than experiences in unrelated industries. For the 50-year design life of the DSC, the expected corrosion would therefore not result in exceeding a corrosion depth of 0.0005 inches. This will not affect the DSC performing its intended safety functions. Because of the low corrosion rates expected for stainless steel, periodic inspections for deterioration of the DSC are not considered necessary. Therefore, inspections are not required. The support rails for the DSC have an extremely hard-alloy steel applied to the sliding surface, are ground to a smooth finish, and are coated with a dry film lubricant to prevent corrosion and to reduce the coefficient of friction. Furthermore, the environment inside the HSM is protected from rain and it is kept dry by the heat load from the DSC. Therefore, it is highly unlikely that corrosion between the stainless steel and the hard

alloy steel surface of the support rail will occur to any significant extent. These conclusions and analyses regarding the very small likelihood of corrosion indicate that there is reasonable assurance that the DSC can be removed from the HSM when required."

The USNRC has more recently reached a similar conclusion with respect to the NUHOMS®-32PT storage system. The following statement is excerpted from the staff's response to public comment three on the NUHOMS®-32PT storage system (Federal Register, Volume 69, January 7, 2004; p. 851): *"...staff concludes that none of the DSC and HSM rail materials are expected to degrade or react with each other. Further, staff concludes that the NUHOMS design considers the effects of environmental conditions and retrievability..."*

RAI Question # 3-2

In section 3.2.2 under "Concrete (and carbon steel rebar)" compressive strength of concrete was listed only. No material and strength of reinforcement-bars were provided. Provide the physical properties of materials of the HSM and reference the applicable documents where that specific information was taken.

This information is needed for completeness of the UFSAR and compliance with 10 CFR Part 72.11.

Response

All concrete reinforcing used in the Oconee Site-Specific ISFSI conforms to ASTM A615, Grade 60.

Beginning on the next page, Table 3-2 provides the complete list of materials used in construction of Phase 1 of the Oconee Site-Specific ISFSI.

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-02-01	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Plans	1	1" dia. Sch 40 PVC drain pipe	Drain Pipe	PVC
O-39-02-01	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Plans	1	1-1/2" dia. Sch 40 PVC conduit	Electrical Conduit	PVC
O-39-02-01	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Plans	1	Caulk between roof vent and roof per Duke Field Sealant Spec No. 7005 (per Note 7)	Caulk	not specified
O-39-02-02	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Concrete below grade (elevation 822' to 825')	Foundation	Concrete (ACI 318-83, Duke Spec. OS-160-5, Mix C2)
O-39-02-02	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Concrete above grade (elevation 825' to 840'+6")	Walls and Roof	Concrete (ACI 318-83, Duke Spec. OS-160-5, Mix C2)
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Mk. VC-1	Precast Roof Vent Cover	Concrete (ACI 318-83, Duke Spec. OS-160-5, Mix C2)
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Mk. VC-2	Precast Roof Vent Cover	Concrete (ACI 318-83, Duke Spec. OS-160-5, Mix C2)
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Precast Slab (6'-0" x 6'-5" x 1'-6")	HSM Inlet Air Plenum	Concrete (ACI 318-83, Duke Spec. OS-160-5, Mix C2)
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Precast Beam (6'-7" x 1'-6" x 2'-0")	HSM Inlet Air Plenum	Concrete (ACI 318-83, Duke Spec. OS-160-5, Mix C2)

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Richmond Rocket Inserts for 1" bolts (in Precast Roof Vent Cover)	Embed	Not specified- assume carbon steel
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Angle 4"x4"x1/4" (Detail A)	HSM Inlet Air Plenum	Not specified- assume carbon steel
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	1/2" wedge anchor (Detail A)	HSM Inlet Air Plenum	Not specified- assume carbon steel
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	Concrete nails (Flashing Detail, B-6)	Fastener	Not specified- assume carbon steel
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	18 gauge galvanized sheet metal flashing	Flashing	Not specified- assume carbon steel
O-39-02-03	ISFSI Project Units 1-3 Horizontal Storage Modules Concrete Sections	1	1/4"x1" plate (see Detail B, coordinate B-8)	HSM Inlet Air Plenum	A36
O-39-03-01	ISFSI Project Units 1-3 Horizontal Storage Modules Reinforcing Plans	1	Rebar and dowels	Reinforcement	ASTM A615, Grade 60 (per Note 1)
O-39-03-03	ISFSI Project Units 1-3 Horizontal Storage Modules Reinforcing Plan & Sections	1	WWF 3x3- W6xW6	Reinforcement	ASTM A615, Grade 60 (per Note 1)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	WT6x105	DSC Support Assembly (Detail B- rail assembly)	ASTM A-36 (per Note 4, O-39-04-02)

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	TS 4x4x1/2x1'-0" long	DSC Support Assembly (see Plan of DSC Support Assembly, coordinate K-2)	A500
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Various support plates	DSC Support Assembly (Detail B- rail assembly)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	3/4"x6" plate	DSC Support Assembly (Detail B- rail assembly)	ASTM A240, Type 410S (per Note 3, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/8"x4" plate	DSC Support Assembly (Detail B- rail assembly)	ASTM A240, Type 410S (per Note 3, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1-1/8" dia bolts	DSC Support Assembly (Detail B- rail assembly)	A325
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	W10x68 or W10x112	DSC Support Assembly (Detail A,D; Section D-D- rail assembly support beam)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1'-2"x3'-10" Embed	DSC Support Assembly (Detail A,D- beam seat for rail assembly support beam)	ASTM A-36 (per Note 4, O-39-04-02)

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Hex nuts	DSC Support Assembly (Detail A- beam seat for rail assembly support beam)	A325 or A194; A36 plate may be substituted for nuts (per Note 1, Detail A,D)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	7/8" dia bolts	DSC Support Assembly (Section B-B- beam seat for rail assembly support beam)	A325
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	3'-4" I.R. Embedded Ring with Nelson Studs	Access Sleeve (Elevation E-E and Detail C)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Door Frame Assembly	HSM Door Frame (Door Frame Detail)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Door Frame Embeds (including 1/2"x7" plate, shims) and Nelson Studs	HSM Door Frame (Section G-G)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HSM Door Assembly	HSM Door (Door Detail, Section H-H, Section J-J)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Neutron Shielding	HSM Door (Section J-J)	Bisco NS-3

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Plate Mk. P-2 with Nelson Studs	Embed (survey monuments for settlement)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Permaslik RN (per Note 3 of Detail B)	DSC Support Assembly (Nitronic plate, Detail B)	Dry film lubricant
O-39-04-01	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Everlube 823 (per Note 22 of O-39-04-02	DSC Support Assembly (3/4"x6"cover plate, Detail B)	Dry film lubricant
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Shim Mk. SP-1	HSM Door Frame	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Plate Mk. P-6	HSM Inlet Air Plenum (see O-39-02-03, coordinate D-9)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	3/8" dia. anchors (FS-3826) for Plate Mk. P-6	HSM Inlet Air Plenum (precast beam)	Not specified- assume carbon steel
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Seismic restraint assembly	Seismic Restraint	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Angle Mk. L-1 with Nelson studs	Precast Roof Vent Cover (see O-39-02-03, coordinate D-1)	ASTM A-36 (per Note 4, O-39-04-02)

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Screen frame for roof vent	Roof Vent Screen	ASTM A-240, Type 304 (per Note 3)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	3/4" No. 18 SS expanded metal	Roof Vent Screen	SS
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/4" dia. wedge anchors for screen frames	Roof Vent Screen	Assume SS
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Screen frame for front vent	Front Vent Screen	ASTM A-240, Type 304 (per Note 3)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	3/4" No. 18 SS expanded metal	Front Vent Screen	SS
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/4" dia. wedge anchors for screen frames	Front Vent Screen	SS
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Angle Mk. L-2 with Nelson studs	Precast Roof Vent Cover (see O-39-02-03, coordinate H-6)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Plate Mk. P-4 with Nelson studs	HSM Inlet Air Plenum (see O-39-02-03, coordinate K-1)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Cask Restraining Attachment	Cask Restraint	ASTM A-36 (per Note 4, O-39-04-02)

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Hex nuts	Cask Restraint	A325 or A194; A36 plate may be substituted for nuts
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Plate Mk. P-3 with Nelson studs	HSM Inlet Air Plenum (see O-39-02-02, coordinate F-3)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Angle Mk. L-5 with Nelson studs and attached field furnished 4x4x1/4 angle	HSM Inlet Air Plenum (see O-39-02-03, coordinates C-11 & D-9)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Plate Mk. P-5 with Nelson studs	HSM Inlet Air Plenum (see O-39-02-03, coordinate I-1)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Plate Mk. P-1 with Nelson studs	HSM Inlet Air Plenum (see O-39-02-03, coordinate B-3)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-02	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	Embedded Angle Mk. L-3 with Nelson studs	HSM Inlet Air Plenum (see O-39-02-03, coordinate B-3)	ASTM A-36 (per Note 4, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-1 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-2 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-3 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-4 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-5 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-6 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-7 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	HS-8 (11 Ga. Plate)	Heat Shield	ASTM A-240, Type 304 (per Note 3, O-39-04-02)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	WW-1254, 1/2" dia. wedge anchors	Heat Shield	Stainless Steel (type not specified)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	3/4" dia.x1" long Sch 40 pipe	Heat Shield	Carbon Steel (type not specified)
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/2"x2-1/2" bar	Mk. L-1, Ladder	A-36

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	5/8" dia. rung	Mk. L-1, Ladder	A-36
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	L 3x3, angle	Ladder attachment	A-36
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/2"x2-1/2" bar	Ladder attachment	A-36
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/2" dia. sleeve anchor	Ladder attachment	Not specified-Assume A-36
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1-1/2" std. pipe	Handrail	A-36
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/2"x2"x1'-0" bar	Handrail attachment	A-36
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/4"x3"x6" bar	Handrail attachment	A-36
O-39-04-04	ISFSI Project Units 1-3 Horizontal Storage Modules Miscellaneous Steel	1	1/2" concrete anchor	Handrail attachment	Not specified-Assume A-36
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Handrail and attachment (see O-39-04-04)	A-36

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Type TA connection and field supplied lugs	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	40	Connector (per DEDB: Thompson Lightning Protection catalog item #78; pressure type cable connector for installation on flat masonry)	Bronze (base)
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13			SS (screw)
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	41	Connector (per DEDB: Thompson Lightning Protection catalog item #706; pressure type tee splicer)	Bronze
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		2/0 lead covered copper cable (includes down conductor per Detail D)	Lead and copper
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		2/0 bare copper cable (ground loop)	Copper

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		2/0 bare copper cable (embedded in concrete)	Copper
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	RJ connectors	for 2/0 bare copper cable to reinforcing bars	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Reinforcing bars	ASTM A615, Grade 60 (per Note 1, dwg O-39-03-01
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	VF connectors	for 2/0 bare copper cable to cask restraint attachment and embedded access sleeve	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Cask restraint attachment	A-36
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Embedded access sleeve	A-36
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		5/8"x10'-0" ground rod	not specified, assume copper

Table 3-2 (Phase 1)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	TA connectors	for 2/0 bare copper cable to ground loop	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	GT connectors	for 2/0 bare copper cable to ground rod	CADWELD

The following table provides the complete list of materials used in construction of Phase 2 of the Oconee Site-Specific ISFSI.

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	1" dia. Sch 40 PVC drain pipe	Drain Pipe	PVC
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	3" styrofoam expansion joint	Expansion joint between Phase 1 and Phase 2 HSMs	not specified
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	Sealant per Duke Spec 7005	Sealant between precast HSM roof vents	not specified
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	Angle 2x2x1/4x3'-0"	Attachment for precast roof vent	not specified- assume A36
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	1/2"x3-1/8" Nelson studs	Attachment for precast roof vent	not specified- assume carbon steel
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	Angle 2x2x1/4x5'-0"	Attachment for precast roof vent	not specified- assume A36
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	Plate 1/2x2x5'0"	Attachment for precast roof vent	not specified- assume A36
O-39-12-01	ISFSI Phase 2 Horizontal Storage Modules Concrete Plans	1	1/2' SS concrete expansion anchors	Heat shield attachment	Stainless Steel (type not specified)
O-39-12-02	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Concrete below grade (elevation 822' to 825')	Foundation	Concrete (ACI 318-83 except as noted otherwise in Duke Spec. OS-160-5; Mix C1 or C2)
O-39-12-02	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Concrete above grade (elevation 825' to 840'+5-1/2")	Walls and Roof	Concrete (ACI 318-83 except as noted otherwise in Duke

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
					Spec. OS-160-5; Mix C1 or C2)
O-39-12-02	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	1/2' dia. Concrete exp. anchors (WW-1254)	Heat Shield	not specified- assume carbon steel
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Precast concrete slab 1'-6"x6'-6"x6'-7" (Detail C)	HSM Air Plenum	Concrete (ACI 318-83 except as noted otherwise in Duke Spec. OS-160-5; Mix C1 or C2)
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	1" dia. Richmond LCB-1 lifting inserts (Detail C)	HSM Air Plenum	NA
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Precast Vent Block Type 1	HSM Roof Vent (front)	Concrete (ACI 318-83 except as noted otherwise in Duke Spec. OS-160-5; Mix C1 or C2)
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Angle 2x2x1/4x3'-0"	HSM Roof Vent (front)	not specified- assume A36
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	3/8"x6-1/8" Nelson studs	HSM Roof Vent (front)	not specified
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Angle 2x2 (Section E-E)	HSM Roof Vent (front)	not specified- assume A36
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	1/4x2x4'-11" bar (Section E-E)	HSM Roof Vent (front)	not specified- assume A36
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Precast Vent Block Type 2	HSM Roof Vent (rear)	Concrete

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Angle 2x2x1/4x5'-0"	HSM Roof Vent (rear)	not specified- assume A36
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Flashing	HSM Roof Vents	NA
O-39-12-03	ISFSI Phase 2 - Unit 3 Horizontal Storage Modules Concrete Sections	1	Concrete nails	HSM Roof Vents	NA
O-39-13-01	ISFSI Project Phase 2- Units 1-3 Horizontal Storage Modules Reinforcing Plans	1	Rebar and dowels	Reinforcement	ASTM A615, Grade 60 (per Note 1)
O-39-14-01	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Details	1	Mk. P-1 embed with Nelson studs	Settlement Monument	NA
O-39-14-01	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Details	1	Mk. P-2 embed with Nelson studs	Embeds for DSC support structure	Assume ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-01	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Details	1	Mk. P-3 embed with Nelson studs	HSM Air Plenum (precast slab support)	Assume ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-01	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Details	1	Mk. AS-1 embed with Nelson studs	HSM Access Sleeve	Assume ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-01	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Details	1	Mk. DF-1 embed with Nelson studs	HSM Door Frame	Assume ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-02	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Plans, Sections and Details	3	Mk. SF-1 assembly	DSC Support Frame	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-02	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Plans,	3	Mk. SF-1 Nitronic 60 plate (1/8x4x17'-9-3/4")	DSC Support Frame	Nitronic 60

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
	Sections and Details				
O-39-14-02	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Plans, Sections and Details	3	5/8" bolts	DSC Support Frame (connection to Mk. P-2)	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-02	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Plans, Sections and Details	3	DSC Seismic Restraint	HSM Access Sleeve	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-02	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Plans, Sections and Details	3	Rail Stop for W14-assembly	DSC Support Frame	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-02	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Plans, Sections and Details	3	Rail Stop for W14- shims	DSC Support Frame	Stainless Steel (type not specified)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Mk. SR-1 angle	HSM Air Plenum (restraint for precast slab)	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	1" dia. Concrete anchor for Mk SR-1 (WS-100 120)	HSM Air Plenum (precast slab)	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Mk. P-4 embed with Nelson studs	HSM Air Plenum (precast slab)	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Mk. HS-1 (11 gage sheet)	Heat Shield	ASTM 240, Type 304
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Mk. HS-2 (11 gage sheet)	Heat Shield	ASTM 240, Type 304

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Mk. HS-3 (11 gage sheet)	Heat Shield	ASTM 240, Type 304
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Mk. HS-4 (11 gage sheet)	Heat Shield	ASTM 240, Type 304
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	1/2" dia. SS concrete anchor (WW-1254 or equal)	Heat Shield	Stainless Steel (type not specified)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	3/4" #18 SS expanded metal	Plenum Vent Birdscreen	Stainless Steel (type not specified)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	1/8" x 2" SS strip	Plenum Vent Birdscreen	ASTM A666, Type 304
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	1/8" x 2" SS strip	Plenum Vent Birdscreen	ASTM A666, Type 304
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	1/8" x 2" x 2" tabs	Plenum Vent Birdscreen	ASTM A666, Type 304
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Mk. P-5 embed with A36 rods and hex nuts	Cask Restraint	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	1-1/2" STD. pipe	Handrail	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	1/2x4x6" long plate	Handrail (attachment)	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Shims	DSC support structure (rails and beam seats per Notes 9 & 10)	ASTM A-36 (per 0-39-14-03, Note 3)

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-39-14-03	ISFSI Phase 2 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Everlube EX 1541 coating	Nitronic 60 plate	not specified
O-39-14-04	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Door Assembly	HSM Door	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-04	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Door Assembly #17E & #18E	HSM Door	ASTM A-36 (per 0-39-14-03, Note 3)
O-39-14-04	ISFSI Phase 2- Units 1-3 Horizontal Storage Modules Miscellaneous Steel Sections and Details	1	Concrete Fill	HSM Door	3000 psi Type A2 concrete in accordance with Duke specifications OS-160-5 and OS-160-6
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Handrail and attachment (see O-39-04-04)	A-36
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Type TA connection and field supplied lugs	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	40	Connector (per DEDB: Thompson Lightning Protection catalog item #78; pressure type cable connector for installation on flat masonry)	Bronze (base)

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	40	Connector (per DEDB: Thompson Lightning Protection catalog item #78; pressure type cable connector for installation on flat masonry)	SS (screw)
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	41	Connector (per DEDB: Thompson Lightning Protection catalog item #706; pressure type tee splicer)	Bronze
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		2/0 lead covered copper cable (includes down conductor per Detail D)	Lead and copper
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		2/0 bare copper cable (ground loop)	Copper
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		2/0 bare copper cable (embedded in concrete)	Copper
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	RJ connectors	for 2/0 bare copper cable to reinforcing bars	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Reinforcing bars	ASTM A615, Grade 60 (per Note 1, dwg O-39-03-01

Table 3-2 (Phase 2)					
Duke Drawing	**Title**	**Revision**	**Part**	**Subcomponent**	**Material and/or Specification**
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	VF connectors	for 2/0 bare copper cable to cask restraint attachment and embedded access sleeve	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Cask restraint attachment	A-36
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		Embedded access sleeve	A-36
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13		5/8"x10'-0" ground rod	not specified, assume copper
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	TA connectors	for 2/0 bare copper cable to ground loop	CADWELD
O-877-01	Dry Cask Storage Building Grounding, Embedment & Lightning Protection Plan, Sections & Details	13	GT connectors	for 2/0 bare copper cable to ground rod	CADWELD

RAI Question # 3-3

The sixth paragraph states that "*With respect to below grade concrete (and reinforcing steel), no aging effects/mechanisms were identified.*" "Structural support (SS)" and "heat transfer (HT)" were selected as intended functions for Concrete Below Grade in Table 3.2-1; therefore, at a minimum, provide reasons for not including exposed surfaces of the Concrete Below Grade within the HSM space in the inspection/monitoring under the Aging Management Activity/Program (AMA/AMP). Refer to RAI A-3 below. Provide justification for not identifying any long term effect of degradation mechanisms; namely: corrosion, fatigue, thermal stresses, irradiation; for the below-grade concrete and reinforcing steel.

This information is needed to determine compliance with 10 CFR Part 72.120.

Response

Table 3-3 below contains the Oconee site groundwater and lake water chemistry results. No parameters of the Oconee groundwater or lake water chemistry exceed the limits where degradation could occur. The Oconee groundwater and lake water pH ranges are equal to or above the threshold limit of where potential degradation of the concrete may occur. The chloride and sulfate concentration ranges are well below both threshold concentrations. Therefore, the potential for the Concrete Below Grade within the HSM space to degrade due to chemical attack is negligible.

Parameter	Threshold Limit When Degradation Occurs	Oconee Groundwater Chemistry	Oconee Lake Water Chemistry
pH	<5.5	5.5 to 6.0	5.5 to 7
Chlorides	>500 ppm	3.2 to 9.2 ppm	1.3 ppm
Sulfates	>1500 ppm	3.5 to 572 ppm	2.28 ppm

Table 3-3-Oconee Nuclear Station Aggressive Chemical Threshold Limits and ONS Chemistry

The Oconee Specification for Procurement of Concrete specifies a combined chloride concentration ingredient of 250 ppm of the concrete mixture. This chloride concentration can be absorbed by the concrete and not result in structural deterioration and/or corrosion of the embedded steel/rebar. Therefore, loss of material due to corrosion of the embedded steel/rebar is not an applicable aging effect for the concrete structures and components.

The Oconee ISFSI utilizes the NUHOMS®-24P storage system as documented in the ONS ISFSI UFSAR. The NUHOMS®-24P Topical Report for the Nutech HSM system identifies the radiation effects on HSM concrete structure. The accumulated neutron flux over the 50 year service life of the HSM is estimated to be 1.2×10^{14} neutrons/cm^2. The magnitude of this neutron flux has been determined not to affect the compressive strength and modulus of elasticity of the HSM concrete. The gamma energy flux deposited in the HSM concrete is 6.8×10^{10} MeV/cm^2-sec. According to ANSI/ANS-6.4-1977, the temperature rise in concrete due to this level of radiation is negligible. The radiation exposure limits are also addressed in

Section B2.2.2 of Appendix B Time-Limited Aging Analyses of the ONS Independent Spent Fuel Storage Installation Application for Renewed ISFSI Site-Specific License.

The NUHOMS®-24P Topical Report also addresses the adverse effects on reinforced concrete due to sustained elevated temperatures as well as short and long term elevated temperature exposures. Both temperature scenarios were determined not to have an adverse affect on concrete deterioration. The mechanical properties (i.e. reduction in tensile strength, creep, and shrinkage) of the reinforced concrete were also investigated and determined that elevated temperatures would not affect the mechanical properties of the concrete.

RAI Question # A-1

Provide an example of Corrective Action Program applications that were issued under each of the following: Work Requests, Program Investigations (PIP) and Engineering Change (EC) that included root-cause determinations, prevention of recurrence reports on components of the ISFSI, and timeliness. The purpose of this RAI is to determine that safety functions (criticality, shielding, confinement, heat transfer and structural integrity) of any part of the SSC of ISFSIs were not compromised at any time of the operations.

This information is needed to determine compliance with 10 CFR Part 72.172.

Response

Duke's corrective action program is referred to as the "Problem Investigation Process" or "PIP". The purpose of the Problem Investigation Process is to provide a structured approach for:

- The formal reporting of problems, concerns, issues and events by nuclear site and support personnel.
- A formal corrective action program which facilitates the prioritization, evaluation, and correction of conditions adverse to quality.
- The evaluation of potential issues involving safety system operability, NRC reportability and Maintenance Rule functional failure.
- Managing selected internal and external commitments.
- The identification of areas for improvement and optimization.

There are four Action Categories for PIPs. Action Category 1 is used for any "significant condition adverse to quality" and a root cause evaluation is required. Action Category 2 is used for any "condition adverse to quality" and a root cause evaluation may be waived at management discretion if a root cause has been previously performed on the issue or the issue is historical in nature (>2 year old origination). Category 3 and 4 PIPs are not considered to involve safety significance.

A search of the PIP database was performed to identify Action Category 1 and Action Category 2 PIPs. No Category 1 items were found. There were five Category 2 items related to the ISFSI (both Site-Specific and General), but root cause determinations were not required.

It is concluded that there were no events that compromised any of the Intended Functions for the In-Scope SSCs.

RAI Question # A-2

Appendix A "Aging Management Programs" discusses surveillance, monitoring, trending and the condition of ISFSI components.

a) Specify the directives, procedures and guidance, including training requirements and logs that are related to surveillance, monitoring and trending and provide examples of each. Include examples of reports providing the current condition of ISFSI's, e.g. comparing the results from the baseline conditions to the inspections of SSC's.
b) Define "baseline inspection" Throughout Section A2.1 the phrase "baseline inspection" was used and has not been defined.

This information is needed to determine compliance with 10 CFR Part 72.120.

Response

a) *Specify the directives, procedures and guidance, including training requirements and logs that are related to surveillance, monitoring and trending and provide examples of each. Include examples of reports providing the current condition of ISFSI's, e.g. comparing the results from the baseline conditions to the inspections of SSC's.*

   Procedures that implement the Aging Management Program (as described in Appendix A), are included in Table A-2 as given on the following page:

Table A-2			
SSC	**Inspection/Surveillance**	**Procedure No.**	**Title**
ISFSI	Air inlets and outlets for obstructions	PT/0/A/0600/001C	ISFSI Storage Facility Surveillance
	Radiation levels	HP/0/B/1000/054 [Enclosure 5.3, p. 3]	Radiation Protection Routines [Enc. 5.3: Radiation Shift Routine Guide-Thursday Through Sunday (DAY SHIFT)]
	Accessible HSM exterior for aging effects	EDM-410	Inspection Program for Civil Engineering Structures and Components
	Accessible HSM interior for aging effects	EDM-410	Inspection Program for Civil Engineering Structures and Components
Transfer Cask	Carbon steel subcomponents for aging effects	MP/0/A/1700/014	Cask - NUTECH 24P Spent Fuel Transfer - Annual Maintenance
Transfer Cask Lifting Yoke	Carbon steel subcomponents for aging effects	MP/0/A/1700/010A	Cask - Spent Fuel - Lifting Equipment (NUTECH) - Inspection And Load Test
Transfer Cask Lift Extension	Carbon steel subcomponents for aging effects	MP/0/A/1700/010A	Cask - Spent Fuel - Lifting Equipment (NUTECH) - Inspection And Load Test
Cask Pit Support Stand	Chloride sampling of spent fuel pools	System Chemistry Manual [SCM-12, Appendix C, Section 6.4]	System Chemistry Manual [Oconee Primary Chemistry Optimization Plan]

Copies of these procedures and associated training packages/presentations are included in Enclosure 1.

A system health report is developed each quarter for the management of spent fuel. The "Spent Fuel Management System Health Report" includes a report of any current issues relating to the ISFSI. A copy of a recent report is included in Enclosure 1.

b) *Define "baseline inspection." Throughout Section A2.1 the phrase "baseline inspection" was used and has not been defined.*

The referenced baseline inspection was performed in December 2006. The purpose was to inspect and document prior to the renewal period, the condition of the ISFSI subcomponents for which Aging Effects Requiring Management were identified.

Additional information about the baseline inspection is provided in response to A-4.

RAI Question # A-3

Define *"significant degradation."*

The first sentence in "Summary" of Section A2.1 states *"...has not indicated any **significant degradation** to any..."* Second paragraph in Section A2.3 states *"...to ensure that no **significant degradation** to the ..."* This terminology is used throughout Appendix A.

This information is needed to determine compliance with 10 CFR Part 72.120.

Response

It is recognized that some degradation will occur to SSCs during their service life. The use of the term "significant" is to distinguish between low levels of degradation (e.g. surface oxidation, paint discoloration, micro-fissuring of concrete, etc.) and more serious degradation that could lead to loss of function.

Thus, "significant degradation" refers to any Aging Effect Requiring Management of an "In-Scope" SSC that would be of sufficient extent so as to impair the ability of that SSC to perform its Intended Function.

RAI Question # A-4

a) Provide the results of the HSM internal inspection described in Appendix A, Section 2.1, "Site-Specific ISFSI Aging Management Program." Explain how the inspection was performed, and justify the selection process.
b) Also provide an explanation of the 10 year inspection interval, and how previous and future HSM's was/will be selected for internal inspection?
c) Provide a justification for not including DSC shell in the inspection/monitoring and/or Aging Management Activity/Program (AMA/AMP).
d) Describe the specific elements of the inspection/monitoring evaluation of the DSC Support Assembly that was/and will be performed, and provide comparative results of baseline and current conditions as required under AMA/AMP in Table 3.2-1.

This information is needed to determine compliance with 10 CFR Part 72.120.

Response

a) *Provide the results of the HSM internal inspection described in Appendix A, Section 2.1, "Site-Specific ISFSI Aging Management Program." Explain how the inspection was performed, and justify the selection process.*

HSM Inspection Procedure

The baseline inspection was performed using existing station procedures as guidelines.

Engineering Directives Manual EDM-410, "Inspection Program for Civil Engineering Structures and Components" is used as a guide for conducting civil inspections of Structures at all Duke Nuclear Sites. It is credited for the Aging Management Program established for the Oconee Part 50 facility during renewal of its operating licenses under 10 CFR 54.

EDM-410 adopts the guidance provided in NEI-96-03, Industry Guideline for Monitoring Structures, ACI 201.1, Guide for Making a Condition Survey of Concrete in Service, and ACI 349.3, Evaluation of Existing Nuclear Safety-Related Concrete Structures.

For concrete, spalling, cracking, delaminations, honeycombs, water in-leakage, chemical leaching, peeling paint, discoloration, loss of material, or any other change in material property that would be noted by visual inspection are evaluated when discovered. For structural steel, issues to be evaluated include corrosion, peeling paint, beam/column deflection, loose or missing anchors/fasteners, missing or degraded grout under base plates, twisted beams, and cracked welds. For foundations, settlement is the main concern.

Selection of HSMs for Interior Inspections

Three HSMs were selected for interior inspection. E3 was selected because it was the first HSM to be loaded (July 1990). Also, this Phase 1 HSM received the inspection of the concrete above the heat shield that is required by Technical Specification 4.6, HSM Inspection, after 5 years and 10 years service. W8 was selected to ensure one of the early

Phase 1 HSMs on the West side of the ISFSI was inspected. W8 was loaded in November 1991. W15 was selected because it is a Phase 2 HSM. It was loaded in March 1995.

HSM Interior Inspection Method

The interior surfaces and structures of these three HSMs were examined using direct and remote methods.

For the direct method, the door of E3 was removed permitting examination of the door support frame, and the interior steel surface of the doors. [NOTE: in the license renewal application of January 30, 2008 (Reference 1, Enclosure 3, Appendix A, Section A2.1) it was incorrectly stated that three HSMs doors were removed for this examination.] A camera was mounted at the door of HSM E3 before the door was removed permitting visual exams of the rails and seismic restraints and one end of the Dry Storage Canister (DSC).

Remote internal exams were performed for E3, W8, W15 using a 6mm G3 Probe and PTZ 140 mm camera. The probe and camera were inserted into the air outlet vents, intake air plenums, and drain pipes. Through the exhaust vents and intake air plenums, the steel embedment structural support brackets, the stainless steel heat shield (partial), the support structure for the DSC, and several support attachments for the heat shield were examined.

Through the drain pipe, it was determined no blockages existed which would prevent drainage of the HSM.

Results of HSM Interior Inspections

There were no indications of structural degradation or distress which would render the ISFSI incapable of performing its intended function. All inspected items and surfaces were determined to be in good structural condition.

It was not possible to view the entire DSC support structure. However, the ends of support rails, including DSC stops, and the support beams and associated embeds were inspected and no corrosion was observed.

No corrosion was observed on visible portions of the DSC rails or the HSM access ring when the door of E3 was removed.

Coating failure and surface corrosion were found on the attachment welds for the support angle supporting the top of the front inlet plenum in HSMs E3 and W8. Due to the high radiation in this area, direct access to clean and recoat these welds is not feasible. These welds have been identified in Duke's corrective action program (PIP) for enhanced monitoring and/or remediation.

Minor corrosion (no pitting) was noted on the door inner surface for HSM E3. Some debris was noted at the bottom of the HSM E3 door between the door and wall of the structure. The debris appeared to be dirt and may have contained some moisture. To prevent future occurrences, the top of the HSM doors have been sealed.

Provisions were made in the original design for differential thermal expansion between the heat shield and concrete. The heat shield supports were in good condition with no

indications of thermal distress or cracking in the surrounding concrete. The heat shield itself was not visibly deformed and appeared adequately supported.

Otherwise, the Inlet and Outlet Vents and the PVC Drain Pipes were free of obstructions.

No standing water was observed inside the HSMs.

Some shallow honeycomb near heavy embedments and some minor discontinuities from construction due to shifted or improperly set forms were noted.

In several HSMs, the heat shield was found to extend into the pathway of the rear vent path effectively reducing the flow area from 6 inches to about 4.5 inches. All 40 HSMs were visually inspected and none was found to be worse than about a 1.5 inch intrusion into the vent space. An operability evaluation was performed and documented in Duke's corrective action program. It was concluded this condition did not impair the ability of the HSM to provide its heat removal function.

b) *Also provide an explanation of the 10 year inspection interval, and how previous and future HSM's was/will be selected for internal inspection?*

Ten Year Inspection Interval

The ten year inspection frequency was determined for the following reasons:

1. The HSM interior is a Sheltered Environment where there is no direct exposure to weather and the interior is generally dry. With the exception of the inlet plenum, the HSM interior is heated by the stored spent fuel.

   The air inlet plenum will be inspected on a five year frequency because of the baseline inspection finding of coating failure and corrosion found on some support weldments.

2. The HSM exterior will be inspected on a 5 year frequency consistent with the Civil Inspection Program credited by the Oconee reactor Aging Management Program. The HSM exterior is considered a leading indicator of conditions inside the HSM because the exterior is subject to direct weathering.

3. The HSM interior inspections result in increased occupational dose.

   Based on the above reasons and the lack of significant degradation found during the baselines inspections, a less frequent inspection frequency is justified for the HSM interior (except for the air inlet plenum).

Selection of HSMs for Interior Inspection

Selection of the HSMs for the baseline inspection performed in December 2006 is addressed in A-4 a), above.

Future interior inspections will be performed on a "sampling basis (minimum of one HSM)" as stated in Section C3.1.1. The method by which the HSM(s) will be selected for inspection has intentionally not been prescribed at this time. This is based in part on the current absence of any trend or operating experience that would suggest which HSM interiors(s) to inspect next, and also, to allow for operational considerations. The baseline

inspection in December 2006 found the interiors of the three selected HSMs to be in good condition. This was true for both East and West locations, Phase 1 and Phase 2 locations, and for the earliest loaded HSM and a later-loaded HSM. Absent the development of any trend, operating experience, or a finding from the next exterior inspection that would suggest an HSM interior of interest, the determination will be at the discretion of the cognizant personnel responsible for the inspection.

c) *Provide a justification for not including DSC shell in the inspection/monitoring and/or Aging Management Activity/Program (AMA/AMP).*

The DSC shell is not included in the ISFSI Aging Management Program for inspection because no Aging Effects Requiring Management were identified for the applicable material category (stainless steel) and environment (Sheltered).

The following is a summary of affects and mechanisms that were considered:

- Loss of material due to general corrosion, galvanic corrosion, crevice corrosion, pitting corrosion, erosion (including erosion caused by abrasive wear, erosive wear, cavitational wear, and droplet impingement wear), erosion-corrosion, microbiologically influenced corrosion, and selective leaching;
- Fouling due to micro-organisms, silting, and precipitation;
- Cracking due to hydrogen damage, stress corrosion cracking, vibration, and intergranular attack;
- Reduction of fracture toughness due to thermal aging and radiation embrittlement; and
- Distortion due to creep.

None of these Aging Effects Requiring Management was found to be applicable to stainless steel in a Sheltered environment and was categorically excluded, except for galvanic corrosion in circumstances where stainless steel is in contact with carbon steel or cast iron in a wetted and oxygenated environment. Since the DSC shell is maintained in a dry environment and is not in contact with carbon steel or cast iron, galvanic corrosion is not a concern.

Since no Aging Effects Requiring Management were identified for stainless steel in a Sheltered environment, the DSC will continue to serve its Intended Function and need not be included in the ISFSI Aging Management Program[1].

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[1] This determination is consistent with the USNRC's conclusions about the potential for corrosion of the DSC. The USNRC made the following observation in its December 1994 "Safety Evaluation Report of VECTRA Technologies, Inc., Safety Analysis Report for the Standardized NUHOMS Horizontal Modular Storage System for Irradiated Nuclear Fuel", Section 3.2.2.5: "The suitability of stainless steel casks for containment of spent fuel was reported in "Laboratory Experiments Designed to Provide Limits on the Radionuclide Source Term for the Nevade (sic) Nuclear Waste Storage Investigateion's (sic) Project" by V.M. Overby and R.D. McCright. (SAND 85-0380, Reference 71). Stainless steel performs well in oxidizing conditions. Average oxidation rates for stainless steel are: 0.15 micrometer/yr submersed in water at temperatures in the 500C to 100°C; 0.16 micrometer/yr in 100°C saturated steam, and 0.001 to 0.08 micrometers/yr in 150°C unsaturated steam. The oxidation environment of the DSC in the standardized NUHOMS system is expected to be less than the above conditions. It is therefore concluded that even under worst oxidation condition, the

d) *Describe the specific elements of the inspection/monitoring evaluation of the DSC Support Assembly that was/and will be performed, and provide comparative results of baseline and current conditions as required under AMA/AMP in Table 3.2-1.*

The baseline inspection performed in December 2006 established the current condition of the ISFSI, at that time. There have been no additional inspections since that time. The next 5 year external inspection of the ISFSI will occur by December 2011

As discussed in A-4 a), above, it was not possible to view the entire DSC support structure using remote means. However, the ends of support rails, including DSC stops, and the support beams and associated embeds were visible, and no corrosion was observed on these subcomponents. Based on that observation and the sheltered environment, there is no reason to suspect corrosion on the portions of the DSC support structure that could not be observed.

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corrosion depth of the DSC for a 50 year design life is insignificant and will not affect the DSC from performing its intended safety function."

RAI Question # B-1

Provide the analysis mentioned in Section B2.2.1, "DSC Shell Cracking Due to Fatigue," which demonstrates that fatigue does not need to be considered. Provide copies of references and measurement data cited in your response. Justify the conclusion, including reasons for not including the DSC shell in the inspection /monitoring and/or AMA/AMP.

DSC shell structure is subjected (with intended Functions) to dead weight (SS), pressure (PB), temperature (HT) and irradiations (SH), and it was concluded that no "Aging Management Activity/Program (AMA/AMP)" is required as tabulated in Table 3.3-1. Refer to RAI A-3 above.

This information is needed to determine compliance with 10 CFR Part 72.24(d) and 120.

Response

This reponse is Transnuclear Propriety information and is provided in Attachment 3 of this report.

RAI Question # B-2

Provide the referenced fatigue analyses for the transfer cask trunnions, the transfer cask lifting yoke and the transfer cask lift extension. Provide copies of references and measurement data cited in your response.

This information is needed to determine compliance with 10 CFR Part 72.24(d).

Response

This reponse is Transnuclear Propriety information and is provided in Attachment 3 of this report.

RAI Question # B-5

Provide the basis for reducing the number of thermal cycles on the DSC support structure from one cycle per day (365 per year) to 182.5 per year. Provide copies of references and measurement data cited in your response.

This information is needed to determine compliance with 10 CFR Part 72.24(d).

Response

The daily cycle assumed in the original fatigue analysis was a thermal range of 100°F per day which is extremely conservative and not realistic for this climate. It was considered more realistic yet still highly conservative to consider that thermal effects resulting in stress reversal will not occur more than 50% of the days of a year, i.e. 91 days in spring and 91 days in fall are assumed to have a temperature range resulting in stress reversal of the DSC support structure. The support structure is assumed to experience only tension in winter and only compression in summer.

A photocopy of the calculation page is provided on the next page.

CALC: # OSC-2771	REVISION # .....19.....	PAGE: ..29.1..
SUBJECT: ISFSI Misc. Steel Design	PREP. BY: F. Alsabbagh.....	DATE: ...08/05/07 .....
STATION: ONS UNIT# 1, 2, 3	CKD BY: .B. Hester..	DATE: ....08/15/07 .....

PURPOSE / OBJECTIVE:

To support licence renewal application for the Oconee station, thermal fatigue evaluation of the cask support structure need to be re-evalauted for 60 years of operation. Current evaluation consider 50 years (PIP O-07-04085).

The purpose of this calculation is to demonstrate that the cask support structure due to 60 years of operation remain acceptable per Ref. 1.

REFERENCES AND DESIGN INPUT:

1. 1983 ASME Section III. Subsection NF.
2. PIP O-07-04085.

DESIGN METHOD / ANALYTICAL METHOD :

The cask support structure will be evaluated for the revised operation life span of 60 years using the same methodology that was used on page 29 of this calculation. The cask support structure is acceptable if the it meets the fatigue criteria per Ref. 1.

ASSUMPTIONS:

There are no assumptions in this calculation that requires future verification. Conservative assumptions are clearly stated in the body of the calculation.

CALCULATION

Per review of page 29 of this calculation. It was assumed that cask support structure goes through one thermal cycle once every day of the year. This assumption that has been used to calculate the total number of cycle that the structure will experience through its life span is very conservative. Realistically speaking, it is reasonable to consider that one-half of the days per year the subject cask support structure will experience tensile and compressive stresses fluctuation (i.e. stress reversal). Therefore, the total number of fatigue cycles that the cask support structure will experience can be calculated as follows:

days_per_year := 365 Number of days per year

n_years := 60 Revised years of plant operation

$$No_of_cycles := \frac{days_per_year}{2} \cdot n_years$$

No_of_cycles = 10950 < 20,000 O.K.

Therefore, thermal cycling on the cask support structure is not a concern

RAI Question # U-1

In Sections 1.3.1.6 "Horizontal Hydraulic Ram" and 4.3.3.5 "Hydraulic Ram" reach lengths were listed as 21.5 feet, and 21 feet respectively. Please state the correct reach length of the hydraulic ram.

This information is needed to determine compliance with 10 CFR Part 72.150.

Response

The ram stroke is approximately 20.5 feet (6249 mm).

RAI Question # U-2

Throughout the license renewal application and in the revised ISFSI USFAR non-quantifiable phrases were used - e.g.; "significant," "no significance," "not significant," "small," "slight," slightly," etc. Please identify each one, and if applicable, replace with statements that can provide justifiable and/or measurable values.

This request is for editorial correction and compliance with 10 CFR Part 72.24 (c) and (d).

Response

Duke performed a global search on the following qualitative terms in the License Renewal Application (LRA) and ISFSI Updated Final Safety Analysis Report (UFSAR):

1. large,
2. small,
3. slight(ly),
4. significant(ce),
5. moderate(ly),
6. low,
7. minor,
8. many,
9. few
10. little.

Approximately 300 occurrences of these terms were identified. Each occurrence of the aforementioned terms was screened using the following criteria to ascertain if additional quantitative/descriptive information was needed.

1. Term "Screens-In"

   Meaning: Use of the term requires additional consideration if it is used for one of the following reasons:

   a) The term characterizes an aging effect (e.g. degradation, cracking, fatigue, corrosion, loss of material, change in properties, etc.);
   b) The term provides important information about the operation, function, or other characteristics of an "In-Scope" SSC per Table 2.3-1 of the LRA (e.g. HSMs, DSCs, IFAs, Transfer Cask, Cask Lifting Yoke, Cask Lift Extension, or Cask Support Stand); or
   c) The term is used to describe dose, environmental impact, or other hazard such as combustible material, dust.

   If the term screens-in, one of the following must be performed:

   - Provide quantitative information if it is available;
   - Provide additional description, or
   - Define the meaning of the term (e.g. "insignificant means the ability of the "in-scope" SSC to provide its safety function is not impaired").

2. Term "Screens-out"

   Meaning: Use of the term is considered not material to the LRA for one of the following reasons:

   a) The term is included in the title of reference document;
   b) The term is included in a quote;
   c) The term is explained by adjacent quantitative information [e.g. "small (less than 20 percent)"];
   d) Use of the term is NOT related to any of the following:
      - "In-Scope" SSCs per Table 2.3-1 of the LRA,
      - Aging effect,
      - Dose, environmental impact, or other hazard (e.g. combustible material); or
   e) Use of the term does not provide important information. It is merely descriptive and the meaning of the statement is not changed if the term were deleted. (For example, the word "small" could be deleted from the following statement without altering the meaning "Water in the grapple ring is drained through a small hole.")

Table U-2 provides the results of the screenings performed for the LRA and the ISFSI UFSAR where, as a result of the screening process, additional information was determined to be needed (i.e. usages that "Screened-In").

Table U-2: License Renewal Application				
Page	**Term**	**Text**	**Screen In?**	**Additional Information**
3-6	little (3), low, small	"The rods experienced very little thermal creep during benchmark testing and storage. Little additional creep would be expected because of the low temperature."	Yes (1a)	From EPRI TR-1002882 [Dry Cask Storage Characterization Project - Final Report]), Section 5, little additional thermal creep is characterized as < 0.1%. Given the temperature decrease over the 15 year test period, it is conservative to define "little additional creep" as <0.1%.
		"A small amount of axial migration of hydrogen to cooler sections might have occurred."	Yes (1a)	From Section 4.3 of the EPRI report, it was possible that hydrogen migrated out of areas with a steep temperature gradient. The fact that the EPRI results were not conclusive demonstrates that the condition of the cladding was stable during the storage period.
		"Little or no cladding annealing occurred during either the benchmark testing or long term storage."	Yes (1a)	The EPRI report characterized "little" as follows: From Section 4.4: "Perhaps the strongest argument that little, if any annealing occurred is that the cladding hardness values are relatively uniform from midplane to ~1 m above midplane." From Table D-3-1: the overall average of the Vickers Hardness (DPH) values were as follows: Sample 591C04= 239; Sample 591C12= 236; Sample 591B02= 234.

Table U-2: License Renewal Application				
Page	**Term**	**Text**	**Screen In?**	**Additional Information**
3-7	large, almost none, few	"A review of industry operating experience returned a large number of events related to dry storage."	Yes (1a)	"Large" characterizes 170 events related to dry storage.
		"...almost none were related to aging management."	Yes (1a)	"Almost none" characterizes 4 events related to aging management.
		"Those few are bounded by the aging management review performed for the ONS SSCs."	Yes (1a)	"Few" characterizes 4 events related to aging management.
3-8	small	"The impact of plastic foreign material in a sealed DSC was evaluated and determined to pose no concern because of the small quantity of material and the inert environment."	Yes (1a)	"Small" is defined as <1.5 grams.
A-4	significant	"Ensure that no significant degradation to the horizontal storage modules occurs"	Yes (1a)	Defined as degradation that would impair the intended function(s).

Table U-2: License Renewal Application				
Page	**Term**	**Text**	**Screen In?**	**Additional Information**
A-6	significance, minor	"Corrective actions are taken in a timely manner commensurate with the significance of the defect…"	Yes (1b)	Guidance for "significance" is provided by Duke Nuclear Site Directive 208, "Problem Investigation Process (PIP)".
		"Minor corrosion was noted on some of the exterior carbon steel components, which required touchup painting."	Yes (1a)	The ability of the HSM to provide its safety function was not impaired.
A-7	significant (2)	"Operating experience to date has not indicated any significant degradation to any of the Site-Specific ISFSI components."	Yes (1a)	Defined as degradation that would impair the intended function(s).
		"The purpose of the Transfer Cask Aging Management Program is to ensure that no significant degradation to the ONS Transfer Cask occurs…"	Yes (1a)	Defined as degradation that would impair the intended function(s).
A-9	significance	"Corrective actions are taken in a timely manner in accordance with the significance of the PIP."	Yes (1b)	Guidance for "significance" is provided by Duke Nuclear Site Directive 208, "Problem Investigation Process (PIP)".

Table U-2: License Renewal Application				
Page	**Term**	**Text**	**Screen In?**	**Additional Information**
A-10	significant	"The purpose of the Transfer Cask Lifting Yoke and Lift Extension Aging Management Program is to ensure that no significant degradation to the Transfer Cask Lift Yoke and Lift Extension occurs…"	Yes (1a)	Defined as degradation that would impair the intended function(s).
A-12	significance	"Corrective actions are taken in a timely manner in accordance with the significance of the PIP."	Yes (1b)	Guidance for "significance" is provided by Duke Nuclear Site Directive 208, "Problem Investigation Process (PIP)".
A-14	significant	"The purpose of the Cask Pit Support Stand Aging Management Program is to ensure that no significant degradation occurs…"	Yes (1a)	Defined as degradation that would impair the intended function(s).
A-15	significance	"Corrective actions are taken in a timely manner in accordance with the significance of the PIP."	Yes (1b)	Guidance for "significance" is provided by Duke Nuclear Site Directive 208, "Problem Investigation Process (PIP)".

Table U-2: License Renewal Application				
Page	**Term**	**Text**	**Screen In?**	**Additional Information**
E-50	significant, little	"Maintenance activities that could involve significant radiation exposure of personnel are carefully planned."	Yes (1c)	Defined as exposures that could result in accumulated radiation dose to personnel of 500 mrem or greater.
		"Except during periods of additional module construction, there is no adjacent work area close by, so very little dose is received from fuel in storage."	Yes (1c)	As illustrated in ISFSI UFSAR Figure B-29, "Site Layout and Route," the nearest building is over 200 feet away from the HSMs. The areas immediately surrounding the ISFSI are not posted as "radiation control area" (i.e. dose rates are below 5 mrem/hr).

Table U-2: ISFSI UFSAR				
Page	**Term**	**Text**	**Screen In?**	**Additional Information**
2-2	significant	"...while meeting the criteria for a "no significant hazards" finding."	Yes (1c)	Consistent with 10CFR50, Appendix B terminology.
2-23	slight, little	"It is believed that the removal of the overburden due to construction of the Oconee Site-Specific ISFSI has had little, if any, effect on the water table. If the water table did change, it is believed that it would be a slight drop."	Yes (1c)	These statements were originally based on engineering judgment. They are supported by findings from a geotechnical exploration in Fall 2002 that supported expansion of the General License ISFSI. Two borings were obtained near the locations of the original borings in 1987 for the Site-Specific ISFSI. Relative to the original borings, the 2002 results showed groundwater elevations approximately 2 feet and 4 feet lower for the two locations.
3-2	slightly	"The water level in the DSC is then lowered slightly..."	Yes (1b)	Defined as ~60 gallons of water
3-12	low	"...low enrichment heterogeneous UO2 systems."	Yes (1b)	Defined as < 5 w/% U-235.
4-2	small	"There is a small drainage pipe passing through the HSM front wall..."	Yes (1b)	Defined as 1 inch diameter schedule 40 PVC.
4-5	low	"The transfer trailer is designed to ride as low to the ground as possible..."	Yes (1b)	Defined as ~38.5 inches.
5-1	few	"Lower the HSM front access door back into the door frame to within a few feet of the closed position."	Yes (1b)	The actual position of the door is not critical during this process, so it is not specified in the ISFSI loading procedure. The intent is to reduce dose rates and radiation exposure experienced by workers when the seismic restraint is installed.

Table U-2: ISFSI UFSAR				
Page	**Term**	**Text**	**Screen In?**	**Additional Information**
7-2	low, significant	"Maintenance operations on the transfer cask, transfer trailer and other ancillary equipment are performed in a very low dose environment…"	Yes (1c)	Typically less than 1 mR/hr when fuel movement is not occurring.
		"Maintenance activities that could involve significant radiation exposure of personnel are carefully planned."	Yes (1c)	Defined as exposures that could result in accumulated radiation dose to personnel of 500 mrem or greater
7-3	significant	"This prevents any significant accumulation of potential airborne sources on the canister."	Yes (1c)	In excess of 0.25 DAC [derived air concentration].
7-5	little	"Except during periods of additional module construction, there is no adjacent work area close by, so very little dose is received from fuel in storage."	Yes (1c)	As illustrated in ISFSI UFSAR Figure B-29, "Site Layout and Route," the nearest building is over 200 feet away from the HSMs. The areas immediately surrounding the ISFSI are not posted as "radiation control areas" (i.e. dose rates are below 5 mrem/hr).
8-1	low	"The fourth event is concerned with severe natural phenomena or low probability events."	Yes (1c)	Use of the phrase "low probability events" is consistent with the definition of "design phenomena" given in ANSI/ANS 57.9-1984.

RAI Question # U-3

The third paragraph in Section 2.4.1.1 *"Site and Facilities" of the ISFSI UFSAR states "Also, the peak flood level to a postulated failure of the upstream Jocassee Dam..."* and second paragraph in Section 2.4.5.1 "Flood Protection Measure for Oconee Station Seismic Class 1 Structures" of the ISFSI UFSAR states *"In the Oconee PRA study, a postulated failure of the upstream Jocassee Dam resulted in the peak flood..."* have contradicting conclusion per the NRC NRR letter to Mr. Dave Baxter, VP, from Mr. Joseph G. Giitter, Director of NRC NRR dated August 15, 2008 (ML081640244). Therefore, the site specific license renewal of the Oconee ISFSI may be contingent upon the resolution of this matter.

NOTE: If an RAI response were to require revising the questioned section of the SAR, please note that change many have to be addressed in the other associated section(s) as well.

Response

By letter dated September 26, 2008, Duke responded to the referenced NRC letter dated August 15, 2008. As noted in the response letter, Duke believes that the sudden and complete failure of the Jocassee dam is not credible and the resulting inundation levels not possible. However, as demonstrated in the Jocassee Hydro Project Dam Failure Inundation Study, Federal Energy Regulatory Commission (FERC) Project No. 2503, dated December 10, 1992, inundation levels, considering an improbable failure of the Jocassee dam, could reach elevation 808'-6" (Sunny Day failure case) and 812'-10" (Probable Maximum Flood failure case) respectively at the Oconee site. These worst case flood levels will not reach the ISFSI yard elevation of 825'-0".

Duke continues to work with the NRC to determine the most credible failure scenarios and resulting flood levels regarding the Jocassee Hydro Project. However resolution of this work should have no bearing on the 10 CFR Part 72 ISFSI installation license renewal application since, as demonstrated, even in the worst case scenario the flood inundation will not reach the level of the ISFSI yard. As such, Duke does not consider this application contingent on the resolution of the flooding of the site following a postulated Jocassee dam failure issue.

Attachment 2
Site-Specific ISFSI License Renewal Application
Duke Responses to NRC Request for Additional Information
dated November 12, 2008

Note: The numerical designations of the following RAI items match those given in the original NRC RAI submittal.

1. As part of the ISFSI license renewal application, ONS included a survey conducted in 1998 to identify Threatened and Endangered Species in the vicinity of ONS. Based on this survey, ONS identified "Echinacea Laevigata" (federally threatened species) as being present in the general area of ONS but outside the one mile radius on ONS.

   a) Justify the use of 1998 data for determining Threatened and Endangered Species.

   b) Explain the steps taken to verify that Threatened and Endangered Species identified by Fish and Wildlife Service in 2008 are located in the area or impacted by ISFSI operations. The Fish and Wildlife Service consultation letter can be found in ADAMS under reference number ML081850455.

   c) Given that Threatened and Endangered Species identified by Fish and Wildlife Service (in 2008) are missing from the 1998 survey conducted by ONS, describe the steps that will be taken to ensure protection of all Threatened and Endangered Species during reasonable foreseeable action (up to and including expansion of additional ISFSI)?

2. In accordance with the design of Horizontal Storage Module (HSM) described in ONS's UFSAR, air inlet and outlet ventilation screens are available for cooling through natural circulation. Describe how ONS ensures Threatened and Endangered Species (such as birds), are precluded from nesting in the air inlet/outlet ventilation screens.

RAI Question # 1

As part of the ISFSI license renewal application, ONS included a survey conducted in 1998 to identify Threatened and Endangered Species in the vicinity of ONS. Based on this survey, ONS identified "Echinacea Laevigata" (federally threatened species) as being present in the general area of ONS but outside the one mile radius on ONS.

a) Justify the use of 1998 data for determining Threatened and Endangered Species.

b) Explain the steps taken to verify that Threatened and Endangered Species identified by Fish and Wildlife Service in 2008 are located in the area or impacted by ISFSI operations. The Fish and Wildlife Service consultation letter can be found in ADAMS under reference number ML081850455.

c) Given that Threatened and Endangered Species identified by Fish and Wildlife Service (in 2008) are missing from the 1998 survey conducted by ONS, describe the steps that will be taken to ensure protection of all Threatened and Endangered Species during reasonable foreseeable action (up to and including expansion of additional ISFSI)?

Response

a) Justify the use of 1998 data for determining Threatened and Endangered Species.

The 1998 survey of the Oconee Nuclear Site by Dr. L. L. Gaddy was the basis for determining the presence of Rare, Threatened and Endangered Species (RTE species) for the Oconee Nuclear Station (ONS) operating license renewal. This was a comprehensive study of the one mile radius exclusion zone surrounding ONS. Information concerning the potential presence of RTE species in the vicinity of the ONS was provided to Duke by the U. S. Fish and Wildlife Service (USFWS) and the South Carolina Department of Natural Resources.

Duke issued a letter dated August 30, 2006 requesting a review and concurrence with our assessment that no RTE species would be impacted by the ISFSI license renewal. Duke received a letter dated September 27, 2006 from the USFWS concurring with our assessment. The concurrence by the USFWS is the basis for using the 1998 study.

b) Explain the steps taken to verify that Threatened and Endangered Species identified by Fish and Wildlife Service in 2008 are located in the area or impacted by ISFSI operations. The Fish and Wildlife Service consultation letter can be found in ADAMS under reference number ML081850455.

Duke contracted Dr. L. L. Gaddy of terra incognita to perform a survey of the area in the immediate vicinity of the ONS ISFSI for the presence of federally listed Rare, Threatened, Endangered or Species of Concern or habitat favorable for their existence (Gaddy, 2008). Dr. Gaddy concluded that, with the exception of the American Kestral, there is no potential for any species listed in the USFWS's 2008 letter to inhabit or regularly use the ISFSI site or proposed expansion area. The December 2008 survey completed by Dr. Gaddy is given on the next page following this response.

c) *Given that Threatened and Endangered Species identified by Fish and Wildlife Service (in 2008) are missing from the 1998 survey conducted by ONS, describe the steps that will be taken to ensure protection of all Threatened and Endangered Species during reasonable foreseeable action (up to and including expansion of additional ISFSI)?*

There are no planned expansions outside of the current footprint of the existing Site-Specific ISFSI. If the Site-Specific ISFSI is expanded, Duke will perform a survey of the affected area for any federally listed RTE and Species of Concern prior to the start of ground disturbing activities. This action has been captured as a regulatory commitment in Attachment 4.

Federally-listed Endangered, Threatened, Candidate, and Special Concern Species Potentially-Occurring at the Proposed Expansion Site of the Oconee Nuclear Station Independent Spent Fuel Storage Installation (ISFSI), Oconee County, South Carolina

Introduction and Study Area

The purpose of this report is to document the potential occurrence of any federally-noteworthy (listed as endangered, threatened, candidate, or special concern by the U. S. Fish and Wildlife Service) species of plants or animals at the proposed expansion site of the Oconee Nuclear Station Independent Spent Fuel Storage Installation (ISFSI) in Oconee County, South Carolina. Oconee Nuclear Station is located on the Keowee River and Lake Keowee in Oconee County in the Piedmont of South Carolina.

The study area for the proposed ISFSI expansion site is just west of the existing ISFSI near the intake structure at Oconee Nuclear Station. The expansion site consists of a non-forested east-facing slope of disturbed soil, possibly fill. A field examination of the soils at the site on 15 December 2008 revealed that they were predominantly disturbed sandy loams with scattered clay deposits. The soil texture here did not appear to be that of a naturally-occurring Piedmont soil.

The vegetation at the site is dominated by early successional, disturbed site species including sericea (or Chinese lespedeza, an exotic plant), frost aster, and loblolly pine seedlings. A small area on the extreme western portion of the expansion site has a scattered canopy of 25 to 35 year-old loblolly and shortleaf pine and a disturbed understory dominated by blackberry. Below, a list of plant species present at the site on 15 December 2008 is given.

(Species emboldened are dominant or locally common)

Carya sp. (hickory)
Chimaphila maculata (spotted wintergreen, pipsissewa)
Diospyros virginiana (persimmon)
***Eupatorium capillifolium* (dog fennel)**
Heterotheca subaxillaris (camphorweed)
Hypericum hypericoides (St. Andrews Cross)
***Lepedeza cuneata* (sericea, Chinese lespedeza)**
Lepedeza sp. (lepedeza)
Lolium pretense (fescue)
***Lonicera japonica* (Japanese honeysuckle)**
Morella cerifera (wax myrtle)
Oenothera sp. (evening primrose)
Paspalum sp. (paspalum grass)
Pinus echinata (shortleaf pine)
***Pinus taeda* (loblolly pine)**
Plantago sp. (plantain)
Prunus serotina (black cherry)
Quercus nigra (water oak)
Quercus stellata (post oak)
Rhus glabra (smooth sumac)
***Rubus sp.* (blackberry)**
Solidago odora (fragrant goldenrod)
***Symphyotrichum pilosum (=Aster pilosus)* (frost aster, oldfield white aster)**
Trifolium sp. (clover)

Potentially-Occurring Federally-listed Endangered, Threatened, Candidate, and Special Concern Species

Table 1 is based on a list transmitted in a 23 June 2008 letter from the Charleston office of the U. S. Fish and Wildlife Service (U. S. Department of the Interior) to the Nuclear Regulatory Commission (NRC). Most of the plant and animal species listed in Table 1 are natural forest-dwelling species and, therefore, have little or no possibility of occurring at the proposed expansion site. A few plant species in Table 1—smooth coneflower (*Echinacea laevigata*), Georgia aster (*Symphyotrichum georgianum*), and sun-facing coneflower (*Rudbeckia heliopsidis*) do occur on Piedmont roadsides and in open, non-forested habitats similar to the proposed expansion site. These species, however, generally prefer nutrient-rich clay soils (in the case of smooth coneflower and Georgia aster) or less disturbed sites (in the case of sun-facing coneflower) and have little or no

chance of occurring at the proposed site. The Appalachian Bewick's Wren (*Thryomanes bewickii altus*) and the Golden-winged Warbler (*Vermivora chrysoptera*) are both known from openings and brushy areas in the extreme northern portion of South Carolina, but both are birds of the high elevation Blue Ridge sites (the proposed expansion site is at approximately 925 feet above m.s.l.).

The only species in Table 1 for which there is habitat at the proposed site is the American Kestrel (*Falco sparverius*). The Kestrel is a bird of open fields and wood edges. It forages in fields and meadows and nests in hollow trees along such openings. It could be present at the site as a forager, but no trees of appropriate size exist along the margins of these openings for its nesting. Furthermore, there is an abundance of the non-forested open habitat in the area. It is therefore concluded that the use of this slope will not impact local populations of the American Kestrel.

In conclusion, with the exception of the American Kestrel, there is little or no chance that any of the species listed in Table 1 occur and/or regularly use the proposed ISFSI site. There is a chance that the American Kestrel may forage at the proposed site, but disturbance of the proposed site should not impact local or regional populations of this bird.

Table 1. Federally-listed Endangered, Threatened, Candidate, and Species of Concern

Potentially Present at the Proposed Expansion Site of the

Oconee Nuclear Station's Independent Spent Fuel Storage Installation (ISFSI),

Oconee County, South Carolina.**Scientific Name**	**Common Name**	**Status**[2]	**Preferred Habitat**	**Habitat Present at the Site?**	**Potential Impact of Project on Species**
Vascular Plants					
Aster avitus (see Eurybia avita)					
Aster georgianus (see Symphyotrichum)					
Carex amplisquama (see C. communis var. amplisquama)					
Carex communis var. amplisquama	Fort Mountain sedge	FSC	Dry, open woodlands in mountains (Weakley, 2008)	No	None
Carex manhartii	Manhart's sedge	FSC	Cove forests and montane oak-hickory forests (Weakley, 2008)	No	None
Carex radfordii	Radford's sedge	FSC	Rocky, calcareous mountain woods (Gaddy, 1995)	No	None

Chelone cuthbertii	Cuthbert's turtlehead	FSC	Bogs, sphagnous swamps, seeps in mountains, rarely Piedmont (Weakley, 2008)	No	None
Echinacea laevigata	Smooth coneflower	FE	Open woodlands, fields, and roadsides on soils rich in calcium and magnesium (Gaddy, 1991)	No	None
Eurybia avita	Alexander's rock aster	FC	In shallow soils on granite flatrocks where moist from seasonal seepage (Weakley, 2008)	No	None
Hexastylis naniflora	Dwarf-flowered heartleaf	FT	Ravines, coves, and springheads on Pacolet and Madison soils (Gaddy, 1981)	No	None
Hymenophyllum tunbrigense	Tunbridge fern	FSC	Known only from seepage cliff in Eastatoe Gorge (Weakley, 2008)	No	None
Isotria medeoloides	Small whorled pogonia	FT	Moists forests in the mountains…usually with *Pinus strobus* (Weakley, 2008)	No	None
Juglans cinerea	Butternut; white walnut	FSC	Moist, nutrient-rich forests (usually in the mountains in SC) (Weakley, 2008)	No	None
Lotus purshianus var. helleri (see *L. unifoliolatus* var. *helleri*)					

Lotus unifoliolatus var. helleri (=Acmispon helleri)	Prairie birdsfoot-trefoil	FSC	Originally found in prairie-type habitats, now generally man-made openings on clayey soils (Weakley, 2008)	No	None
Lysimachia fraseri	Fraser's loosestrife	FSC	Forest edges and roadbanks (Weakley, 2008)	No	None
Monotropsis odorata	Pygmy-pipes; sweet pinesap	FSC	Ericaceous woods (Weakley, 2008)	No	None
Packera millefolium	Yarrow-leaved ragwort; divided-leaf groundsel	FSC	Granitic domes, cliffs, and rocky woodlands (Weakley, 2008)	No	None
Rudbeckia heliopsidis	Sun-facing coneflower	FSC	Roadsides (in SC) (Weakley, 2008)	No	None
Sarracenia rubra ssp. jonesii (=S. jonesii)	Mountain sweet pitcherplant	FE	Bogs, cataract seeps (Weakley, 2008)	No	None
Senecio millefolium (see Packera millefolium)					
Shortia galacifolia	Oconee bells	FSC	Moist slopes and creekbanks in escarpment gorges (Weakley, 2008)	No	None

Smilax biltmoreana	Biltmore carrion-flower	FSC	Open dry and moist forests in mountains (Weakley, 2008)	No	None
Solidago simulans	Granite dome goldenrod	FSC	Soil mats in seepages on granite domes (Weakley, 2008)	No	None
Symphyotrichum georgianum	Georgia aster	FC	Woodland borders, roadbanks, power line rights-of-way over clayey soils (Weakley, 2008)	No	None
Trillium persistens	Persistent trillium	FE	Acidic forests with hemlocks and heaths (Weakley, 2008)	No	None
Waldsteinia lobata (=Geum lobatum)	Lobed barren strawberry	FSC	Forests, streambanks (Weakley, 2008)	No	None
Non-vascular Plants					
Porella japonica ssp. appalachiana	liverwort	FSC	Mountain gorges	No	None
Mammals					
Corynorhinus rafinesquii	Rafinesque's big-eared bat	FSC	Hollow trees and dilapidated buildings near water (Webster et al., 1985)	No	None

Neotoma floridana haematoreia	Southern Appalachian woodrat	FSC	Rocky areas in mountain deciduous forests (Webster et al., 1985)	No	None
Birds					
Dendroica cerulea	Cerulean Warbler	FSC	Canopy in deciduous mountain coves and along rivers and streams (Peterson, 1980)	No	None
Dendroica virens	Black-throated Green Warbler	FSC	Hemlock-*Rhododendron* mountain ravines (Sprunt and Chamberlain, 1970)	No	None
Falco sparverius	American kestrel	FSC	Open country, wood edges, farmland, nests in dead trees (Peterson, 1980)	Yes	None
Limnothlypis swainsonii	Swainson's Warbler	FSC	Hemlock-*Rhododendron* thickets in mountains (Peterson, 1980)	No	None
Loxia curvirostra	Red Crosbill	FSC	Hemlock forests in southern Appalachian mountains (Peterson, 1980)	No	None
Thryomanes bewickii altus	Appalachian Bewick's Wren	FSC	Thickets, underbrush in mountains (Peterson, 1980)	No	None
Vermivora chrysoptera	Golden-winged Warbler	FSC	Open woods, brushy clearings, undergrowth in mountains (Peterson, 1980)	No	None

Reptiles					
Clemmys muhlenbergii	Bog turtle	FT S/A	Sphagnum bogs, swamps, slow-moving, clear meadow streams (Conant, 1975)	No	None
Amphibians					
Aneides aeneus	Green salamander	FSC	Narrow, damp (not wet) crevices in rock faces in mountains (Conant, 1975)	No	None
Cryptobranchus alleganiensis	Hellbender	FSC	Recorded only from the Chattooga River in SC (Conant, 1975)	No	None
Mollusks					
Alasmidonta varicosa	Brook floater	FSC	Chattooga River drainage in mountains of SC (SCDNR, 2008)	No	None
Other Invertebrates					
Macromia margarita	Margaret's river cruiser dragonfly; mountain river cruiser	FSC	Mountain rivers (www.discoverlife.org)	No	None

Polycentropus carlsoni	Carlson's polycen-tropus caddisfly	FSC	Whitewater rivers and streams (Hoffman and Morse, 1990)	No	None

[1]-**FE**-federally-listed (by Fish and Wildlife Service) as endangered; **FT**-federally-listed as threatened; **FC**-federal candidate for listing; **FSC**-federal species of concern (species rare or of limited distribution but not officially listed and, therefore, not legally protected); **S/A**-federally-protected due to similarity of appearance to listed species.

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RAI Question # 2

In accordance with the design of Horizontal Storage Module (HSM) described in ONS's UFSAR, air inlet and outlet ventilation screens are available for cooling through natural circulation. Describe how ONS ensures Threatened and Endangered Species (such as birds), are precluded from nesting in the air inlet/outlet ventilation screens.

Response

Duke currently performs daily surveillances using procedure PT/0/A/0600/001C, "ISFSI Storage Facility Surveillance." The purpose of the surveillance is to identify material and debris that may block the Horizontal Storage Module (HSM) inlet and outlet ventilation screens and restrict air flow between the HSM modules.

Based on feedback from NRC Environmental Staff that toured the facility on October 21, 2008, the following note will be added to the procedure (this action has been captured as a regulatory commitment in Attachment 4):

The presence of nesting material (e.g. sticks, leaves, paper, insulation, trash, etc.) on or within the HSM structure should be reported to Environmental Health and Safety during the next dayshift.

Environmental Health and Safety staff will initiate a response to remove the materials and determine the potential impacts to Threatened and Endangered Species as a result of the materials presence. If it is determined that Threatened or Endangered Species are present, notifications to the appropriate agencies will be made (e.g. U. S. Fish and Wildlife Service) and the appropriate actions taken.

Enclosure 1
Site-Specific ISFSI License Renewal Application
Training and Surveillance Documents

Index of Items

No.	Inspection/Surveillance	Procedure No.	Title
1	Air inlets and outlets for obstructions	PT/0/A/0600/001C	ISFSI Storage Facility Surveillance
2	Radiation levels	HP/0/B/1000/054 [Enc. 5.3, pg. 3 only]	Radiation Protection Routines [Enc. 5.3: Radiation Shift Routine Guide- Thursday Through Sunday (DAY SHIFT)]
3	Accessible HSM exterior for aging effects	EDM-410	Inspection Program for Civil Engineering Structures and Components
4	Accessible HSM interior for aging effects	EDM-410	Inspection Program for Civil Engineering Structures and Components
5	Carbon steel subcomponents for aging effects	MP/0/A/1700/014	Cask - NUTECH 24P Spent Fuel Transfer - Annual Maintenance
6	Carbon steel subcomponents for aging effects	MP/0/A/1700/010A	Cask - Spent Fuel - Lifting Equipment (NUTECH) - Inspection And Load Test
6	Carbon steel subcomponents for aging effects	MP/0/A/1700/010A	Cask - Spent Fuel - Lifting Equipment (NUTECH) - Inspection And Load Test
7	Chloride sampling of spent fuel pools	System Chemistry Manual [SCM-12, Appendix C, Section 6.4, pg. 23 only]	System Chemistry Manual [Oconee Primary Chemistry Optimization Plan]

No.	Training Documents
1	Spent Fuel Management System Health Report for 20083Q
2	"Ion Chromatography – DX3000 IC"
3	Independent Spent Fuel Storage Installation (ISFSI) – Training Package
4	"Monitoring the ISFSI – A Trip to the Edge of the Protected Area," Powerpoint Training Package.
5	"Preventive Maintenance of Spent Fuel Shipping Cask – Training and Qualification Guide."
6	"Inspect and perform quarterly and annual inspections of Nutech 24P 100-ton Spent Fuel Cask Lifting Equipment – Training and Qualification Guide."

Duke Energy Oconee Nuclear Station **ISFSI Storage Facility Surveillance** **Continuous Use**	Procedure No. **PT/0/A/0600/001 C** Revision No. **002** Electronic Reference No. **OP0098CU**

PERFORMANCE

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ISFSI Storage Facility Surveillance

1. Purpose

1.1 To verify Horizontal Storage Module (HSM) air inlet and outlet ventilation screens free from blockage.

1.2 To verify no material accumulated between modules to block air flow.

1.3 To verify HSM roof slab temperatures within ISFSI Technical Specification limits.

2. References

2.1 ISFSI Technical Specifications 1.3.1 and 1.3.2

2.2 PT/1/A/0600/001 Periodic Instrument Surveillance

3. Time Required

1 Hour (One Operator) - As Needed (24 Hour Frequency When AutoTour Unavailable)

4. Prerequisite Tests

None

5. Test Equipment Required

None

6. Limits and Precautions

If entry to roof area required, radiation area postings must be observed for entry requirements.

7. Required Unit Status

None

8. Prerequisite System Conditions

None

9. Test Method

Visual inspections are performed on Horizontal Storage Modules and roof slab temperatures are verified to ensure ISFSI Technical Specification limit of 80°F temperature rise over a 24 hour period is met. These surveillances are required on a 24 hour frequency and in order to meet this frequency this procedure is performed between the hours of 1900 and 0100.

These surveillances are documented in PT/1/A/0600/001 (Periodic Instrument Surveillance).

These surveillances are normally performed per the SSF and Outside Rounds. When the roof slab temperatures are obtained in the handheld computers, the data is transferred from AutoTour to the PI Program. Previous days roof slab temperatures which are used in this procedure are obtained from the PI Program.

Normally, this procedure is performed only when AutoTour is out of service.

10. Data Required

HSM Roof Slab Temperature (°F)

11. Acceptance Criteria

11.1 ALL HSM air inlet and outlet ventilation screens free from blockage.

11.2 ALL HSM roof slab temperatures are < 250°F and have < 80°F temperature rise from the previous reading.

12. Procedure

12.1 Between the hours of 1900 - 0100:

12.1.1 Perform the following:

_____ • Verify <u>all</u> HSM air inlet and outlet ventilation screens free from blockage.

_____ • Verify <u>all</u> HSM air inlet and outlet vertical ventilation screens have no material accumulation between modules to block air flow.

_____ • Verify <u>all</u> HSM air inlet and outlet ventilation screens **<u>NOT</u>** damaged.

_____ • Record current roof slab temperatures for modules on Enclosure 13.1.

NOTE:	Previous days roof slab temperatures may be obtained from previous days SSF and Outside Rounds printout.

12.1.2 On Enclosure 13.1, perform the following:

_____ A. Obtain and record previous days roof slab temperature for each module.

_____ B. Subtract "Previous Temperature" from "Current Temperature" for each module and record as "Δ Temperature"

12.1.3 Perform the following:

_____ • Verify acceptance criteria met.

_____ • **IF** acceptance criteria **NOT** met, immediately notify SRO.

_____ 12.1.4 Notify Unit 1 Control Room of the following:

☐ HSM surveillance complete.

☐ Update surveillance in PT/1/A/0600/001 (Periodic Instrument Surveillance).

NOTE:	AutoTour must be updated with current temperatures so the next shift has the correct previous temperatures to calculate temperature rise.

12.2 **WHEN** AutoTour returns to service, update AutoTour program using current roof slab temperatures recorded on Enclosure 13.1 as follows:

_____ 12.2.1 Record roof slab temperatures points in handheld as a partial round.

_____ 12.2.2 Download the partial round into AutoTour.

13. Enclosures

13.1 HSM Temperature Rise Calculation

Enclosure 13.1

HSM Temperature Rise Calculation

Date/Time Data Taken: _____/_____

North Horizontal Storage Modules Roof Slab Temperatures (Panel TBDCS-1)				
Switch Position	**Module Number**	**Current Temperature (°F)**	**Previous Temperature (°F)**	**Δ Temperature (°F)**
1	E-21			
2	E-22			
3	E-23			
4	E-24			
5	E-25			
6	E-26			
7	E-27			
8	E-28			
9	E-29			
10	E-30			
11	W-21			
12	W-22			
13	W-23			
14	W-24			
15	W-25			
16	W-26			
17	W-27			
18	W-28			
19	W-29			
20	W-30			

South Horizontal Storage Modules Roof Slab Temperatures (Panel TBDCS-4)				
Switch Position	Module Number	Current Temperature (°F)	Previous Temperature (°F)	Δ Temperature (°F)
1	E-31			
2	E-32			
3	E-33			
4	E-34			
5	E-35			
6	E-36			
7	E-37			
8	E-38			
9	E-39			
10	E-40			
11	E-41			
12	E-42			
13	W-31			
14	W-32			
15	W-33			
16	W-34			
17	W-35			
18	W-36			
19	W-37			
20	W-38			
21	W-39			
22	W-40			
23	W-41			
24	W-42			

NOTE: Only whole numbers are recorded. Decimals are rounded to nearest whole number.

North West Horizontal Storage Modules Roof Slab Temperatures (Panel TBDCS-5)				
Switch Position	**Module Number**	**Current Temperature (°F)**	**Previous Temperature (°F)**	**Δ Temperature (°F)**
1	E-43			
2	E-44			
3	E-45			
4	E-46			
5	E-47			
6	E-48			
7	E-49			
8	E-50			
9	E-51			
10	E-52			
11	E-53			
12	E-54			
13	E-55			
14	E-56			
15	W-43			
16	W-44			
17	W-45			
18	W-46			
19	W-47			
20	W-48			
21	W-49			
22	W-50			
23	W-51			
24	W-52			
25	W-53			
26	W-54			
27	W-55			
28	W-56			

Duke Energy Oconee Nuclear Station **Radiation Protection Routines** **Reference Use**	Procedure No. **HP/0/B/1000/054** Revision No. **040** Electronic Reference No. **OX002S4Q**

PERFORMANCE

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THURSDAY - SUNDAY (DAY SHIFT)

From: 0700 to 1900

Elevation	Survey Location	Type Survey	Frequency	Initial
796'	Unit 1 BWST	I, M	(1)	
796'	Unit 2 BWST	I, M	(1)	
796'	Unit 3 BWST	I, M	(1)	
796'	Contaminated Oil Storage Area and Associated Liner RCZ Outside South End Auxiliary Building	I, M	(1)	
844'	Rm 619, Spent Fuel Pool Area and Corridor to Contaminated Change Room	M	(1)	
796'	Locker Room and Restroom at Badge Racks	M	(1)	
796'	Corridor from Badge Racks to Supply Window	M	(1)	
796'	I & E Shop Area and Equipment Storage at Badge Rack Area	M	(1)	
	Full Face Respiratory Monthly Inspection per HP/0/B/1010/002 and Document on SCBA Units, Spare Cylinders, And Respirators Monthly Or Initial Inspection And Inventory		(1)	

NOTE: If gamma radiation levels are ≥ 2 mrem/hr at designated RP Survey Points, a neutron survey and a Boundary Survey are required. {PIP 01-04230}

	ISFSI Dry Cask Storage Facility Survey at Designated RP Survey Points on Plan View	I	(2)	

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ENGINEERING DIRECTIVES MANUAL

EDM - 410 : Inspection Program for Civil Engineering Structures and Components

REVISION NUMBER	ISSUE DATE
0	06/13/96
1	06/16/97
2	09/16/97
3	03/17/98
4	12/01/98
5	03/31/99
6	01/15/01
7	06/15/01
8	02/27/02
9	04/30/03
10	03/12/04
11	10/12/05
12	05/23/07

CATAWBA	MCGUIRE	OCONEE
Approved By/Date	Approved By/Date	Approved By/Date
J. R. Ferguson/04/27/07	J. J. Nolin/04/27/07	S. D. Capps/04/27/07
Effective Date:	Effective Date:	Effective Date:
May 23, 2007	May 23, 2007	May 23, 2007

Issued By: Thomas C. Geer

Vice President, Nuclear Engineering, Nuclear General Office

DOCUMENT REVISION DESCRIPTION

REVISION NO.	PAGES or SECTIONS REVISED AND DESCRIPTION
0	Initial Issue
1	Revised definition of structure condition classifications.
2	Revised information in Tables 410-1, 410-2, 410-4 and 410-5.
3	Defined program administrator in 410.4.1 and clarified responsibilities of evaluator in 410.4.7. 410.4.5 was revised to clarify the definition of "acceptable" structures.
4	Add structures to Table 410-1 for Oconee Nuclear Station per PIP's #98-2850 and #98-3409.
	Deleted Item #6 and modified Item #7 in Table 410-4 for McGuire Nuclear Station.
5	Added EWST to Table 410-1 for Oconee Nuclear Station.
	Added clarification on units for McGuire and Catawba Nuclear Stations' list of structures.
	Added inspections to Table 410-3.
	Revised Technical Specifications and SLC references in Tables 410-4 and 410-5.
6	Added note to Section 410.2 that the inspection is credited with managing aging at Oconee for the extended period of operation.
	Added clarification of concrete examination guidelines in Section 410.4.4 .
	Added inspection of external surfaces of mechanical components for Oconee only in Section 410.4.4.
	Added recommendation to include reports from related inspections, where appropriate, in Section 410.5.
	Added Keowee Penstock Inspection to Table 410-3 and provided references to UFSAR Chapter 18 for Keowee Powerhouse Inspection, Dams and Dikes, and Transmission Tower Inspections.
7	Added Nuclear Service Water Conduit Manholes to the list in Table 410-2 for Catawba only.
8	Added structures within scope of Oconee license renewal in section 410.2 and in Table 410-1.
9	Added statement in Section 410.2 that inspection is credited with managing aging of external surfaces of mechanical components.
	Added references to license renewal documents in Section 410.3.
	Added examination guidelines for flood seals in Section 410.4.4.
	Deleted structural from text throughout Section 410.4.5 so that component is applicable to both structural and mechanical.
	Added statement for unacceptable mechanical components in Section 410.4.6.
	Added statement that mechanical component inspection results should be evaluated by a registered professional engineer to Section 410.4.7.
	Identified the structures at McGuire and Catawba that are within license renewal scope in Table 410-2.
	Identified inspections which are credited for license renewal in Table 410-4 and added description of Flood Barrier Inspection.
	Identified inspections which are credited for license renewal in Table 410-5 and added description of Underwater Inspection.

REVISION NO.	PAGES or SECTIONS REVISED AND DESCRIPTION
10	Added statement (paragraph 6) in section 410.4.4 to clarify expectations and programmatic linkage to the maintenance rule and license renewal program in resolution of PIP G-03-00235, CA#2.
11	Revised Tables 410-2, 410-4, and 410-5 to correctly flag the structures for scope of McGuire and Catawba license renewal and to delete structures that are not in scope of Maintenance Rule. Removed reference to DE&S from Table 410-3. This revision covers resolution of PIP M-04-05092, CA#15.
12	Revised Sections 410.1, 410.2, 410.3 and Tables 410-1 & 410-3 to include the Oconee Independent Spent Fuel Storage Installation (ISFSI).

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410. INSPECTION PROGRAM FOR CIVIL ENGINEERING STRUCTURES AND COMPONENTS

410.1 PURPOSE

The purpose of this directive is to provide a program for monitoring and assessing civil engineering structures and components and their condition in order to provide assurance that they are capable of performing their intended functions.

This program is applicable in meeting the regulatory requirements of 10 CFR Part 50.65, *Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants* (hereinafter referred to as the Maintenance Rule), 10 CFR Part 54, *The License Renewal Rule*, and the "Preliminary Guidance for License Renewal for Site-Specific Independent Spent Fuel Storage Installations (ISFSIs)". In addition, the guidance presented in this program may be beneficial in non-regulatory applications for maximizing the useful life of structures.

This program meets the intent of EDM 201, "Engineering Support Program," for civil engineering structures and structural components.

This directive supersedes the "Manual of Inspection of Civil Works and Structures at Fossil and Nuclear Generating Stations" (File Nos.: SSS-0502, SSS-0503) for nuclear generating stations.

410.2 SCOPE

The scope of the inspection program for civil engineering structures and components will be determined by the civil group which performs the inspection. At a minimum, the scope of this program should include:

1. nuclear safety-related structures which enclose, support, or protect nuclear safety-related systems and components and
2. non-safety related structures whose failure may prevent a nuclear safety-related system or component from fulfilling its intended function.

This program may be used to fulfill the requirements of the Maintenance Rule, the License Renewal Rule, and the Preliminary Guidance for ISFSI License Renewal. If this program is used to comply with a regulation, the scope shall also include any additional structures and components as defined by the regulation.

This directive is applicable to the structures and structural components identified in Tables 410-1 and 410-2. The list of structures and components within the scope of this inspection program is determined on a site specific basis; therefore, the tables may include more structures and components than those identified within either the Maintenance Rule or License Renewal Rule.

Portions of this inspection are credited with managing the aging of steel and concrete components for the extended period of operation. The structures within the scope of license renewal are identified in Tables 410-1 and 410-2. This inspection is also credited with managing the aging of external surfaces of mechanical components for the extended period of operation.

410.3 REFERENCES

This directive was established using the guidance provided in the following references:

1. NEI 96-03, *Industry Guideline for Monitoring Structures.*
2. NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule.*
3. 10 CFR Part 50.65, The Maintenance Rule.

4. 10 CFR Part 54, The License Renewal Rule.
5. NUREG-1522, *Assessment of Inservice Conditions of Nuclear Safety-Related Nuclear Plant Structures*, U. S. Nuclear Regulatory Commission, dated June, 1995.
6. NUREG-1526, *Lessons Learned from Early Implementation of the Maintenance Rule at Nine Nuclear Power Plants*, U. S. Nuclear Regulatory Commission, dated June, 1995.
7. NUMARC 93-01, *Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.*
8. ACI 201.1, *Guide for Making a Condition Survey of Concrete in Service.*
9. ACI 201.2, *Guide to Durable Concrete.*
10. ACI 349.3, *Evaluation of Existing Nuclear Safety-Related Concrete Structures.*
11. NRC Regulatory Guide 1.127, *Inspection of Water-Control Structures Associated with Nuclear Power Plants.*
12. AISC, *Manual of Steel Construction.*
13. EDM 210, "Engineering Responsibilities for the Maintenance Rule".
14. EDM 201, "Engineering Support Program".
15. MNS UFSAR Table 18-1
16. CNS UFSAR Table 18-1.
17. ONS UFSAR Chapter 18, Sections 18.3.6, 18.3.8, 18.3.13, 18.3.16 and 18.3.24.
18. MCS-1274.00-00-0016, " McGuire License Renewal Commitments".
19. CNS-1274.00-00-0016, " Catawba License Renewal Commitments".
20. OSS-0274.00-00-0016, " Oconee License Renewal Commitments".
21. Preliminary Guidance for License Renewal for Site-Specific Independent Spent Fuel Storage Installations (ISFSIs), dated March 2001.

410.4 PROGRAM FOR MONITORING CIVIL ENGINEERING STRUCTURES AND COMPONENTS

410.4.1 RESPONSIBILITIES

The civil engineering organization at the nuclear plant site is responsible for coordinating, implementing, inspecting and generating the necessary documents to monitor the condition of the structures and components.

The civil section supervisor is responsible for providing or obtaining the technical resources necessary to perform the examination.

The program administrator is a designated individual in the plant civil engineering group.

410.4.2 IDENTIFICATION OF STRUCTURES

The structures included in the inspection program for civil structures and components are identified in Tables 410-1 and 410-2.

410.4.3 PREREQUISITES

1. All prior inspection reports should be reviewed to assure adequacy of inspections and to note any previously reported problems.
2. Drawings and other pertinent documents as deemed appropriate by the inspection team should be reviewed prior to the inspection.
3. An inspection route should be defined to keep from unnecessary backtracking.
4. Necessary equipment should be identified and obtained. This may include cameras, tape measure, flashlight, etc.
5. Radiation Work Permits shall be obtained as required.
6. Underwater divers shall be available as required.
7. System tag out shall be verified where applicable.

410.4.4 EXAMINATION GUIDELINES

1. Each structure shall be inspected from the interior and exterior where accessible.
2. For each structure included in the examination, structural members, components and systems, along with architectural details shall be visually inspected for early signs of degradation or existing structural problems.
3. The following should be examined during the evaluation of each structure:
   - Concrete
     -spalling, cracking, delaminations, honeycombs, water in-leakage, chemical leaching, peeling paint, discoloration, loss of material, or any other change in material property that would be noted by visual inspection
   - Masonry Walls
     -cracks in joints, unsealed penetrations, missing or broken blocks, or separation from supports
   - Structural Steel
     -corrosion, peeling paint, beam/column deflection, loose or missing anchors/fasteners, missing or degraded grout under base plates, twisted beams, and cracked welds
   - Equipment Foundations
     -settlement, cracked concrete
   - Equipment Supports
     -cracked concrete, loose connections, corroded steel
   - Cable Tray Supports
     -Loose connections, corrosion, distortion, and excessive deflection
   - Roof Systems
     -structural integrity, deteriorated penetrations (i.e., drains, vents, etc.), signs of water infiltration, cracks, ponding and flashing degradation
   - Seismic Gaps
     -gaps or loss of joint filler material
   - Siding
     -structural integrity and visible damage
   - Windows/Doors
     -missing panes, cracks, deteriorated glazing, broken or cracked frames, missing or damaged hardware, and seal integrity

- Trenches
  -cracks, mis-alignment or damage of covers (may spot check trenches by removing covers and inspecting walls and bottoms for cracks)
- Earthen Structures/Dams
  -erosion, settlement, slope stability, seepage, drainage systems, integrity of rip-rap, and environmental conditions
- Flood Seals

  - cracking and change in material property that would be noted by visual inspection
- External Surfaces of Mechanical Components–loss of material due to corrosion

4. The inspection team should be aware that certain structures and components may be exposed to environments which make them more susceptible to degradation. Examples include, but are not limited to:

- Chemical attack - Sumps and chemical use areas
- Excessive humidity - Tendon galleries
- Freeze/thaw - Trench covers
- Excessive heat - Pipe penetrations
- Abrasion - High traffic areas
- Settlement - Expansion joints.

5. Inaccessible Structures and Structural Components

Some structures (or portions of structures) may be inaccessible because of radiological considerations, obstructions, or other reasons. Site specific characteristics, industry experience data, and/or testing history of such structures under similar conditions (mainly environmental conditions) may be inspected and evaluated in lieu of actual inspection of the inaccessible areas. It is recommended that inaccessible areas not inspected be identified in the first structural inspection report along with justifications or alternate evaluations used instead of actual inspections. Whenever normally inaccessible areas are made accessible by excavation or by other means, an inspection should be performed and documented as part of the structural monitoring program.

6. Equipment Supports

It is not an expectation of this directive, nor is it a requirement of the Maintenance Rule or License Renewal, that inaccessible equipment supports and/or anchors inside floor mounted equipment or electrical cabinets be inspected. If there is some visible indication of potential problems (e.g. ponding water, prior flooding, visible exterior corrosion), then further evaluations should be made on a case-by-case basis that may warrant additional inspections.

410.4.5 ACCEPTANCE CRITERIA

Acceptance criteria for the condition of a structure or component should be based on examination and assessment by a qualified engineer using the preceding criteria along with codes and standards referenced in 410.3 and other applicable standards.

The condition of the structures and components shall be classified as follows:

- **Acceptable** - Acceptable structures or components are those which are capable of performing their intended function, including the protection or support of nuclear safety-related systems or components. Acceptable structures or components are free of deficiencies which could lead to possible failure prior to the next regularly scheduled inspection, or may contain minor deficiencies resulting from normal operation or anticipated service conditions which, if not corrected by routine or preventive maintenance, will not lead to possible failure of the structure or component prior to the next regularly scheduled inspection.

When determining whether a condition is a minor deficiency as noted above, the inspector shall consider the root cause, rate of degradation, and distribution of the degradation throughout the structure or component.

Other monitoring programs required by other codes and standards shall be considered. If the structure or component is found acceptable under other codes and standards, it should also be considered acceptable for Maintenance Rule performance criteria monitoring.

Any structure or component considered acceptable will be placed in A(2).

- **Unacceptable -** Unacceptable structures or components are those which are damaged or degraded such that they are not capable of performing their intended function, including the protection or support of nuclear safety-related systems or components. If degradation is to the extent and was allowed to continue uncorrected until the next normally scheduled inspection such that the structure or component may not meet its design basis, it is also unacceptable.

  Any structure or component considered unacceptable will be placed in A(1).

410.4.6 PROBLEM IDENTIFICATION AND RESOLUTION

Acceptable structures and components with minor deficiencies which would not lead to possible failure if not corrected prior to the next scheduled examination may be corrected using Work Management System (WMS) or the Problem Investigation Program (PIP) or monitored in subsequent inspections.

Structures and components which are unacceptable shall be addressed with the Problem Investigation Program (PIP). Guidance given under the PIP program NSD 208 shall be followed for any problems that meet reportability requirements under that program. Generally, anything that results in any functional failure or poses a future threat to the required function of the structure or systems within the structure shall be addressed under the PIP program.

Some degradation could be found acceptable without corrective action if an analysis or evaluation has been performed. Follow-up inspections would need to verify that previously documented conditions have not deteriorated, possibly invalidating the analysis or evaluation.

Maintenance preventable functional failures shall be identified per the Maintenance Rule as addressed in EDM 210.9.3.

For mechanical components which are determined to be unacceptable, the PIP corrective action should be assigned to the appropriate system or component engineer.

410.4.7 INSPECTION TEAM AND EVALUATOR QUALIFICATIONS

Inspections should be performed by a team of at least two people. Inspectors should be civil/structural engineering graduates (4-year) having at least 4 years experience in evaluation of inservice structures. In addition, one of the inspectors shall be a registered Professional Engineer. Where applicable, the responsible engineer for the structures (primary contact) and his/her back-up (secondary contact) should be included in the inspection team.

The inspection results should be evaluated by a registered professional engineer having at least 4 years experience in evaluation of inservice structures. This person may participate as a member of the inspection team. Results of inspection of external surfaces of mechanical components should be evaluated by a registered professional engineer.

410.4.8 INSPECTION FREQUENCY

The inspection shall be performed on a nominal 5 year interval with consideration for refueling outages in establishing the exact schedule. The interval may be increased to a nominal 10 year frequency with appropriate justification based on the structure, environment and related inspections. While efforts will be made to perform all inspections and issue the report in the same calendar year, the inspections may be completed in phases as necessary

due to the accessibility of structures. More frequent inspections may be performed following unusual events such as flooding or seismic activity.

410.5 DOCUMENTATION

The examination shall be documented in a report by the personnel performing the examination. A report outline is provided in Appendix A for use as a guide in preparing the inspection report.

The report should include the following:

- Results of the examination including a summary of the structures' overall condition.
- Description and location of any identified degradation.
- Copies of data sheets, pictures, video tapes and other relevant information. Photographs and videos should be clear and if appropriate, taken from several perspectives and distances from the subject. Pictures and videos should be properly annotated to document the location (e.g., by reference to column, etc.) and size (e.g., by including a scale in the picture) if there could be a question as to size.
- Assessment of the degradation.
- Recommendations for additional investigations, corrective actions, or future surveillance where appropriate. Recommendations requiring attention will be noted and resolved through the WMS or PIP process.
- Information from the previous report relative to conditions which have been identified as acceptable with minor deficiencies or unacceptable. The report should also provide confirmation that corrective actions, if specified, were implemented and effective.
- Conclusions on the ability of the structure to perform its intended function.
- Signatures of the persons performing the inspection and preparing the report.
- Where appropriate, include the report or a summary of the findings of related civil inspections that are used to conform with the Maintenance Rule civil inspection. As an example, the findings and corrective actions associated with the Keowee Penstock Inspection, FERC Five-Year Inspection, Duke Power Five-Year Underwater Inspection of Hydroelectric Dams and Appurtenances, and the 230 kV Keowee Transmission Line Inspection should be included in the documentation. These may be added as appendices or included in the body of the report.

410.6 TRENDING

Trending shall be performed in accordance with 10 CFR 50.65, the Maintenance Rule. Guidance for trending per the Maintenance Rule is provided in EDM 210.10.

410.7 RELATED CIVIL INSPECTION PROGRAMS

Other related civil inspection programs may exist and should be used to supplement this inspection program. This program is not intended to replace related civil inspection programs or Technical Specification Programs; however, existing programs should be reviewed and revised as necessary to meet the requirements of this program. Related civil inspection programs are identified in Tables 410-3 through 410-5.

The Station Surveillance Program also supplements the civil inspection program. Civil structures and components are monitored by observations of operation and maintenance personnel during their normal rounds and duties. Civil structure and component problems identified during routine surveillance should be identified and resolved through the PIP process.

410.8 RECORDS

Inspection reports for structures which protect or support nuclear safety related systems or components shall be considered Appendix B Quality Assurance Records. All inspection reports shall be maintained for the life of the plant in file OS-46, MC-1462.00, and CN-1462.00 for Oconee, McGuire, and Catawba respectively. A copy of the report should be sent to site management.

410.9 CHANGES TO THE INSPECTION PROGRAM FOR CIVIL ENGINEERING STRUCTURES AND COMPONENTS

Any changes to the inspection program for civil structures and components shall be reviewed and approved by the appropriate group coordinating the civil inspection program.

Table 410-1 Oconee Nuclear Station - Structures Subject to the Structural Inspection Program

1. Reactor Buildings Unit 1*, 2*, 3 *
2. Unit Vents 1*, 2*, 3 *
3. Auxiliary Building Unit 1*, 2*, 3 *
4. Turbine Building Unit 1*, 2*, 3 *
5. CCW Intake Structure *
6. CCW Discharge Structure
7. CCW Intake Piping Internal Coatings Inspection*
8. CCW Discharge Piping Internal Coatings Inspection*
9. Underwater Weir
10. Cable Trenches *
11. 100kV Structure (CT5)
12. 230kV Relay House *
13. 230kV Switchyard Structure *
14. 525kV Switchyard
15. 6900V Switchgear Enclosure (unit 3 only)
16. Unit 1-2 Switchgear Enclosure (Blockhouse) *
17. Unit 3 Switchgear Enclosure (Blockhouse) *
18. Standby Shutdown Facility *
19. Radwaste Facility
20. Water Treatment Room
21. Machine Shop *
22. Plant Grounds
23. 525kV Relay House
24. Service Building
25. ESV Building *
26. Intake Canal Dike Trench *
27. Trench from ESV Building to RWF Trench *
28. Auxiliary Boiler Fuel Oil Storage Facility
29. Elevated Water Storage Tank (exterior) *
30. Keowee Powerhouse and Service Building *
31. Independent Spent Fuel Storage Installation **

* Structures are within scope of license renewal. In addition, the intake Canal Dikes, Keowee River Dam, and Little River Dam and Dikes are within scope of license renewal and inspected in accordance with Table 410-3.

** All phases of ISFSI subject to inspection. Phases 1 and 2 are within scope of ISFSI license renewal. Internal inspections of Phase 1 and Phase 2 are to be conducted on a sampling bases at 10 year intervals. External inspection shall include the air inlet plenums.

Table 410-2 McGuire and Catawba Nuclear Station - Structures Subject to the Structural Inspection Program

1. Auxiliary Building *
2. D/G Building, U1* & U2 *
3. Doghouse Building, U1* & U2 *
4. Reactor Building, U1* & U2 *
   a) Interior Concrete, Foundation Slab, Interior Structures
   b) Service Level 1 Coatings
   c) NSSS Steel Supports
   d) S/G Supports
5. Service Building *
6. Spent Fuel Pool Building, U1* & U2 *
   a) New Storage Vault
   b) Fuel Pool (insofar as possible by looking from above)
7. Safe Shutdown Facility Building *
8. Turbine Building, U1* & U2 *
   a) Exterior Shell, Supports, Substructure & Superstructure
9. RC
   a) Intake* & Discharge Structure (MNS only)
   b) Discharge Canal, Dike, & Riprap (MNS only)
   c) Cooling Towers (CNS only)
10. Low Level Intake Pump Structure (MNS only)
11. Yard Drainage * *
12. 230kV Switch Station & Steel Foundations and Walls, U1* & U2 *
13. 525kV Switch Station & Steel Foundations and Walls (MNS only) *
14. Relay House *
15. Step Up & Auxiliary Transformers Foundations and Walls, U1* & U2 *
16. Nuclear Service Water Discharge to Standby Nuclear Service Water Pond *
17. Standby Nuclear Service Water Pond Intake Structure *
18. Refueling Water Storage Tank (RWST) U1* & U2 *
   a) Foundation and Missile Shield Wall*
   b) Trenches to Aux. building (inspect only from top with covers in place) *
19. Reactor Makeup Water Storage Tank Foundation, U1 * * * & U2 * * *
20. Control Room to Switchyard Cable Trenches (inspect only from top with covers in place) *
21. Station Vent (including plenum), U1* & U2 *
22. Trench covers on QA-1 trenches (inspect only from top with covers in place) *
23. Building, Containment Chilled Water (CNS ONLY)
24. Low Pressure Service Water Intake Structure (CNS ONLY) *
25. Low Pressure Service Water Discharge Structure including canal, dike, and riprap (CNS Only)
26. Nuclear Service Water Pump Structure (CNS only) *
27. Electrical Cable Trenches (inspect only from top with covers in place)
28. Nuclear Service Water Conduit Manholes (CNS ONLY) *
29. CA Tanks: Support, Tie Rods And Concrete Foundation (MNS ONLY)
30. Standby Nuclear Water Pond Outlet (CNS ONLY)*
31. Upper Head Injection Building (CNS ONLY)*

* Structures are within scope of license renewal. In addition, the MNS and CNS SNSW Pond Dam are within scope of license renewal and inspected in accordance with Table 410-4 and 410-5, respectively.
* * Only Yard Drainage at Catawba is within the scope of license renewal.
*** Only the Reactor Makeup Water Storage Tank Foundation at McGuire is within the scope of license renewal.

Table 410-3 Oconee Nuclear Station - Related Civil Inspections

~~**Independent Spent Fuel Storage Installation (ISFSI)**~~
~~The ISFI has its own inspection program as specified in ISFSI Tech Spec. Appendix A-11.~~

Chemical Treatment Ponds #1, 2, and 3
The chemical treatment ponds are inspected on an annual basis to meet SPCC and insurance commitments.

Tendon Surveillance Program *
The reactor building concrete prestressed containment is inspected and monitored per Section 3.6.1 of the Improved Tech Specs. Inspections may also be performed in accordance with the ASME Code, Section XI.

Reactor Building Integrated Leak Rate Test (ILRT) *
Interior and exterior containment structure inspections are performed as prescribed per Section 3.6.1 of the Improved Tech Specs and Appendix J. Inspections may also be performed in accordance with the ASME Code, Section XI.

ISI *
Inservice inspections of Class 1, 2, and 3 piping and supports are performed as prescribed per Duke Power's Inservice Inspection Program.

Crane Inspection Program *
Duke Power has a program for the periodic inspection of cranes.

Keowee Powerhouse Inspection *
The powerhouse and related structures are periodically inspected by Duke Power and FERC. The Duke Power Five-Year Underwater Inspection of Hydroelectric Dams and Appurtenances is described in UFSAR Chapter 18, Section 18.3.6.

Keowee Penstock Inspection *
The Keowee Penstock is periodically inspected by Duke Power's Hydro Generation Department. The Keowee Penstock Inspection is described in UFSAR Chapter 18, Section 18.3.16.

Dams and Dikes *
Dams and dikes are periodically inspected by Duke Power and FERC, where applicable. The FERC Five Year Inspection is described in UFSAR Chapter 18, Section 18.3.8.

EWST Inspection *
The elevated water storage tank is drained and inspected once every 5 years per MP/O/B/1800/121.

Transmission Tower Inspections *
The transmission towers supporting the overhead power path between Keowee and Oconee are periodically inspected by Duke Power's Power Delivery Group. The 230kV Keowee Transmission Line Inspection is described in UFSAR Chapter 18, Section 18.3.24.

Containment Sump Screen Inspection
The containment sump screen is routinely inspected in accordance with Oconee maintenance procedure MP/O/A/1800/105.

SSF Diesel Fuel Oil Storage Tank Inspection *

The SSF Diesel Fuel Oil Storage Tank is inspected on a 10 year frequency per MP/O/A/5050/39.

BWST Internal Coating Inspection *

The BWST internal coatings are inspected every 3rd refueling outage per standing station model work orders 91045766, 91044255, and 91040739 for units 1 through 3 respectively.

* Inspections are credited for License Renewal.

Table 410-4 McGuire Nuclear Station - Related Civil Inspections

1. **Reactor Building Concrete Shell Wall and Penetrations ***
   Inspected every 40 months per ITS SR 3.6.16.3 Integrated Leakage Rate Test and procedure PT/1/A/4200/44 and PT/2/A/4200/44. Inspections may also be performed in accordance with the ASME Code, Section XI.

2. **Reactor Building Divider Barrier Seal ***
   Inspected every 18 months per ITS SR 3.6.14.5 and procedure PT/0/A/4200/05.

3. **Reactor Building Steel Containment Vessel Liner including Equipment Hatch and Penetrations. ***
   Inspected every 40 months per ITS SR 3.6.1.1 Integrated Leakage Rate Test and procedure PT/1/A/4200/44 and PT/2/A/4200/44. Inspections may also be performed in accordance with the ASME Code, Section XI.

4. **Reactor Building Lower Containment Recirculation Sump and Screen Assembly**
   Inspected each outage per procedures PT/1/A/4700/56 & PT/2/A/4700 /55.

5. **Groundwater Drainage for QA1 Structure**
   Groundwater monitors verify water levels per SLC 16.9.8
   This verifies underdrain system is working properly.

6. **Standby Nuclear Service Water Pond Dam and WWCB Dikes ***
   Annual Civil inspections performed by per ITS SR 3.7.8.3 and procedure PT/0/A/4400/04. A 5-year independent consultant inspection is performed every 5 years per North Carolina Utilities Commission, Docket No. E-100, Sub.23. Reports are filed in MC-1124.02, MC-1124.05, and MC-1114.01.

7. **Steam Generator Snubbers**
   One of eight tested and inspected each outage per SLC 16.9.15

8. **Cranes and Lifting Devices ***
   Covered Under the Duke Power Lifting Program.

9. **Lake Norman Dike Located North of Plant**
   Periodic inspections performed under the Hydro Group Inspection Program.

10. **Class A,B, and C Piping and Supports ***
    Duke Power Inservice Inspection Program.

11. **RC Lines***
    Model work orders 90057284 (Unit 1) and 90057283 (Unit 2) inspect inside coatings of underground pipe every 5 years.

12. **SNSW Pond Intake and Discharge Structures, Low Level Intake on Cowens Ford Dam, RC Intake and Discharge Structures, Bridge to Training/Technology Center * ***
    Model work order 95065949 will inspect underwater portion of these structures.

13. **Flood Barrier Inspection ***

    The flood barriers are periodically inspected using model work orders 93045301 for Unit 1 and 93045299 for Unit 2. The flood barrier inspection is referenced in UFSAR Table 18-1.

* Inspections are credited for license renewal.

* * The Underwater Inspection is credited for license renewal for the SNSW Pond Intake and Discharge Structures only.

Table 410-5 Catawba Nuclear Station - Related Civil Inspections

1. **Reactor Building Concrete Shell Wall and Penetrations ***
   Inspected three times in ten years per ITS SR 3.6.16.3 Integrated Leakage Rate Test. Inspections were performed previously with procedure PT/1/A/4200/01A and PT/2/A/4200/01A and currently performed under PT/1,2/A/4200/078. Inspections may also be performed in accordance with the ASME Code, Section XI.

2. **Reactor Building Divider Barrier Seal ***
   Inspected every 18 months per ITS SR 3.6.14.5 and procedure PT/0/A/4200/43.

3. **Reactor Building Steel Containment Vessel Liner including Equipment Hatch and Penetrations ***
   Inspected three times in ten years per ITS SR 3.6.1.1 Integrated Leakage Rate Test and procedure PT/1/A/4200/01A and PT/2/A/4200/01A. Inspections may also be performed in accordance with the ASME Code, Section XI.

4. **Groundwater Drainage for QA1 Structure**
   Groundwater monitors verify water levels per SLC 16.7-8. This verifies underdrain system is working properly.

5. **Penetration Fire Stops ***
   Combined QA 1 & 3 penetrations (NRC committed penetrations) are being inspected every 18 months per procedure PT/0/A/4200/48.

6. **Standby Nuclear Service Water Pond Dam ***
   Annual Civil inspections performed and a report generated. An annual inspection is also made by operations per ITS SR 3.7.9.3 and procedure PT/0/A/4400/04.

7. **Steam Generator Snubbers**
   One of eight tested and inspected each outage per SLC 16.9-13.

8. **Cranes and Lifting Devices ***
   Covered Under the Duke Power Lifting Program.

9. **Class A,B, and C Piping and Supports ***
   Duke Power Inservice Inspection Program.

10. **RC Lines***
    Model work orders 91005512 (Unit 1) and 91005512 01 (Unit 2) inspect inside coatings of underground pipe every outage.

11. **Underwater Inspection ***

    The underwater inspections are performed using model work orders 91010400, 97081463, 97081465, and 97087692. The Underwater Inspection is identified in UFSAR Table 18-1.

* Inspections are credited for license renewal.

410. GENERAL GUIDELINES FOR STRUCTURAL INSPECTION REPORT

I. Introduction

A. Structure

B. Areas Inspected

C. Inspected By

D. Date(s) Inspected

E. General Observations/information/conclusions/summary

II. Condition of Items from Previous Inspection

A. List of items from previous inspection report with updates per current inspection.

B. Items being monitored.

III. Report of Field Inspection

A. Narrative of each finding

B. Photographs and other pertinent information

IV. Recommendations

A. Further investigation/analysis/studies

B. PIP's

C. Repair/maintenance

Duke Energy Oconee Nuclear Station **Cask - NUTECH 24P Spent Fuel Transfer - Annual Maintenance** **Continuous Use**	Procedure No. **MP/0/A/1700/014** Revision No. **005** Electronic Reference No. **OX002UJR**

PERFORMANCE

* * * * * * * * * * UNCONTROLLED FOR PRINT * * * * * * * * * *

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Cask - NUTECH 24P Spent Fuel Transfer - Annual Maintenance

1. Purpose

Provide guidelines for annual inspection and preventative maintenance of NUTECH 24P Spent Fuel Transfer Cask.

2. References

2.1 Source Documents

2.1.1 OM 120-0068, System Instruction Manual for NUHOMS 24P Independent Spent Fuel Storage Installation

2.1.2 OM 120-0041, NUHOMS 24P Onsite Transfer Cask - Main Assembly

2.2 References That May Be Needed To Perform Procedure

None

2.3 Commitment Items

None

3. Personnel Requirements

3.1 Procedure Users: (Additional users should be documented on Log Sheet.)

Initials	Printed Name	Initials	Printed Name

4. Safety Considerations

4.1 Equipment Clearance and Isolation

4.1.1 Personnel performing this procedure should, to the best of their ability, verify safe condition of equipment on which maintenance is to be performed and verify safe positions of valves, breakers, etc.

4.2 Radiation Protection Considerations

Technicians understand and implement Radiation Protection considerations and ALARA methods.

4.3 Special Safety Considerations

None

5. Unit Status

_____ 5.1 Procedure shall be performed in any status.

6. Prerequisites

_____ 6.1 Verify clearance to begin work has been obtained and documented on the Work Order.

6.2 Contact RP for coverage; RWP # _____.

Person Contacted _____ Date _____

_____ 6.3 Review Section 4.

7. Repair Parts

7.1 Substitutions for parts listed may be made with Accountable Engineer's approval. Document substitutions and approvals on Enclosure 13.1, Log Sheet.

8. Special Tools

8.1 7/8" deep well socket

8.2 Heise Air Pressure Test Rig

8.3 Precision Tools

Type	Used For Step No.	Serial No.	Cal. Due Date

9. Acceptance Requirements

_____ 9.1 Annual inspection will be completed per guidelines of this procedure.

_____ 9.2 All four neutron shield safety relief valves will be tested and set to specified values.

_____ 9.3 Visual inspection will be performed on the upper and lower trunnions bearing surfaces and attachment welds.

_____ 9.4 Top cover and ram access cover bolting will be cleaned and visually inspected for damage.

_____ 9.5 All discrepancies found during performance of this procedure will be corrected OR evaluated as acceptable for continued operation.

10. Interference Items

None

11. Procedure

NOTE:	Refer to Enclosure 13.3, Cask Component Orientation.

11.1 Visual Inspection

_____ 11.1.1 Inspect entire cask exterior for scratches and gouges and document any findings on Enclosure 13.1.

_____ 11.1.2 IF scratches and gouges are found, initiate corrective Work Request to polish out any scratches and gouges which could cause decon problems.

_____ 11.1.3 Perform the following to ram access cover area:

A. Unbolt and remove ram access cover and O-ring.

B. Inspect access cover O-ring groove for nicks or other damage. Repair as necessary.

C. Inspect seating surfaces on cover and cask for cracks or other visual indications of damage. Repair as necessary.

D. Clean access cover bolts.

E. Inspect access cover bolts for damage or defects. Document findings on Enclosure 13.1.

_____ 11.1.4 Inspect top cover plate and bolting as follows:

A. Clean top cover plate bolts and washers.

B. Inspect bolts and washers for damage or defects. Document findings on Enclosure 13.1.

C. Visually inspect all helicoil insert threads for damage and document any findings on Enclosure 13.1.

D. IF helicoil insert threads are damaged, initiate corrective Work Request to replace any damaged helicoil inserts.

E. Inspect top cover plate for visual indications of damage or corrosion and document any findings on Enclosure 13.1.

F. IF top cover plate is damaged or corroded, initiate corrective Work Request to repair any cover plate damage.

11.2 Neutron Shield Safety Relief Valve Maintenance.

NOTE:	1. Sign off steps are located on Enclosure 13.2, Component Signoff Sheet.
	2. Refer to Enclosure 13.3 for valve locations.
	3. Use Heise Air Pressure Rig

11.2.1 Remove relief valve from cask and tag as to location removed from.

11.2.2 Remove deflector cap and save for reuse.

11.2.3 Perform the following to valve:

A. Using degreaser, clean valve.

B. Inspect valve body and threads for damage.

C. Repair or replace damaged parts as necessary.

D. Indicate inspection results on Enclosure 13.2.

11.2.4 Attach valve to be tested to pressure test assembly.

11.2.5 While applying pressure to valve, perform the following:

A. Verify relief valve relieves as follows:

1. 45 to 50 psig for top valves (Valves # 1 and 2)

2. 15 to 20 psig for bottom valves (Valves # 3 and 4)

B. Record AS FOUND relief setting on Enclosure 13.2.

C. Circle result on Enclosure 13.2 for top and bottom valves.

11.2.6 IF valve set relief pressure requires adjusting, set to required value as follows:

A. Insert 5/16 inch hex wrench into locking screw located in outlet of valve.

B. Turn locking screw counterclockwise until flats on locking screw match up with flats on adjusting screw.

C. Insert hex wrench through locking screw into adjusting screw to set relief pressure.

D. IF valve lifts below required pressure, turn both screws in (clockwise) to increase pressure.

E. IF valve lifts above required pressure, turn both screws out (counterclockwise) to reduce pressure.

F. Once valve is adjusted, pull hex wrench out of adjusting screw and turn locking screw clockwise to lock adjusting screw in position.

G. Retest valve to ensure it lifts at required pressure or readjust as necessary. Independent verification is required on Enclosure 13.2.

H. Remove valve from test assembly and set aside.

11.2.7 Repeat steps 11.2.1 through 11.2.6 for remaining safety relief valves.

11.2.8 Wrap Teflon tape around relief valve threads and install tightly into cask.

11.2.9 Install deflector caps on valves.

11.3 Visual Examination

_____ 11.3.1 Clean upper and lower trunnion bearing surfaces and welds.

_____ 11.3.2 Perform visual inspection of cask trunnion bearing surfaces and welds for damage. Record location and extent of any damage on Enclosure 13.1.

12. Restoration

12.1 Initially identify AND independently verify component has been returned to service.

Initial Identification _____ Date _____

Independent Verification _____ Date _____

_____ 12.2 Verify discrepancies found during performance of this procedure are corrected OR Accountable Engineer has evaluated as acceptable for continued operation.

Accountable Engineer _____ Date _____

_____ 12.3 Ensure work area has been cleaned and all tools have been properly stored.

13. Enclosures

13.1 Log Sheet

13.2 Component Sign Off Sheet

13.3 Cask Component Orientation

NOTE: Additional copies may be made as necessary.

Date	Step No.	Remarks	Initials

Enclosure 13.2

Component Sign Off Sheet

Page 1 of 2

Neutron Shield Relief Valve #1 Left Valve Facing Open End of Cask

_____ 11.2.3 Satisfactory / Repaired / Replaced (circle one)

_____ IV _____ 11.2.5 AS FOUND Setting _____ psig

Pass / Fail (circle one)

_____ 11.2.6 Adjusted? Yes No (circle one)

Replaced? Yes No (circle one)

Final Setting _____ psig

Verified By _____

_____ 11.2.8

_____ 11.2.9

Neutron Shield Relief Valve #2 Right Valve Facing Open End of Cask

_____ 11.2.3 Satisfactory / Repaired / Replaced (circle one)

_____ IV _____ 11.2.5 AS FOUND Setting _____ psig

Pass / Fail (circle one)

_____ 11.2.6 Adjusted? Yes No (circle one)

Replaced? Yes No (circle one)

Final Setting _____ psig

Verified By _____

_____ 11.2.8

_____ 11.2.9

Enclosure 13.2

Component Sign Off Sheet

Page 2 of 2

Neutron Shield Relief Valve #3 Left Valve Facing Ram Opening

_____ 11.2.3 Satisfactory / Repaired / Replaced (circle one)

_____ IV _____ 11.2.5 AS FOUND Setting _____ psig

Pass / Fail (circle one)

_____ 11.2.6 Adjusted? Yes No (circle one)

Replaced? Yes No (circle one)

Final Setting _____ psig

Verified By _____

_____ 11.2.8

_____ 11.2.9

Neutron Shield Relief Valve #4 Right Valve Facing Ram Opening

_____ 11.2.3 Satisfactory / Repaired / Replaced (circle one)

_____ IV _____ 11.2.5 AS FOUND Setting _____ psig

Pass / Fail (circle one)

_____ 11.2.6 Adjusted? Yes No (circle one)

Replaced? Yes No (circle one)

Final Setting _____ psig

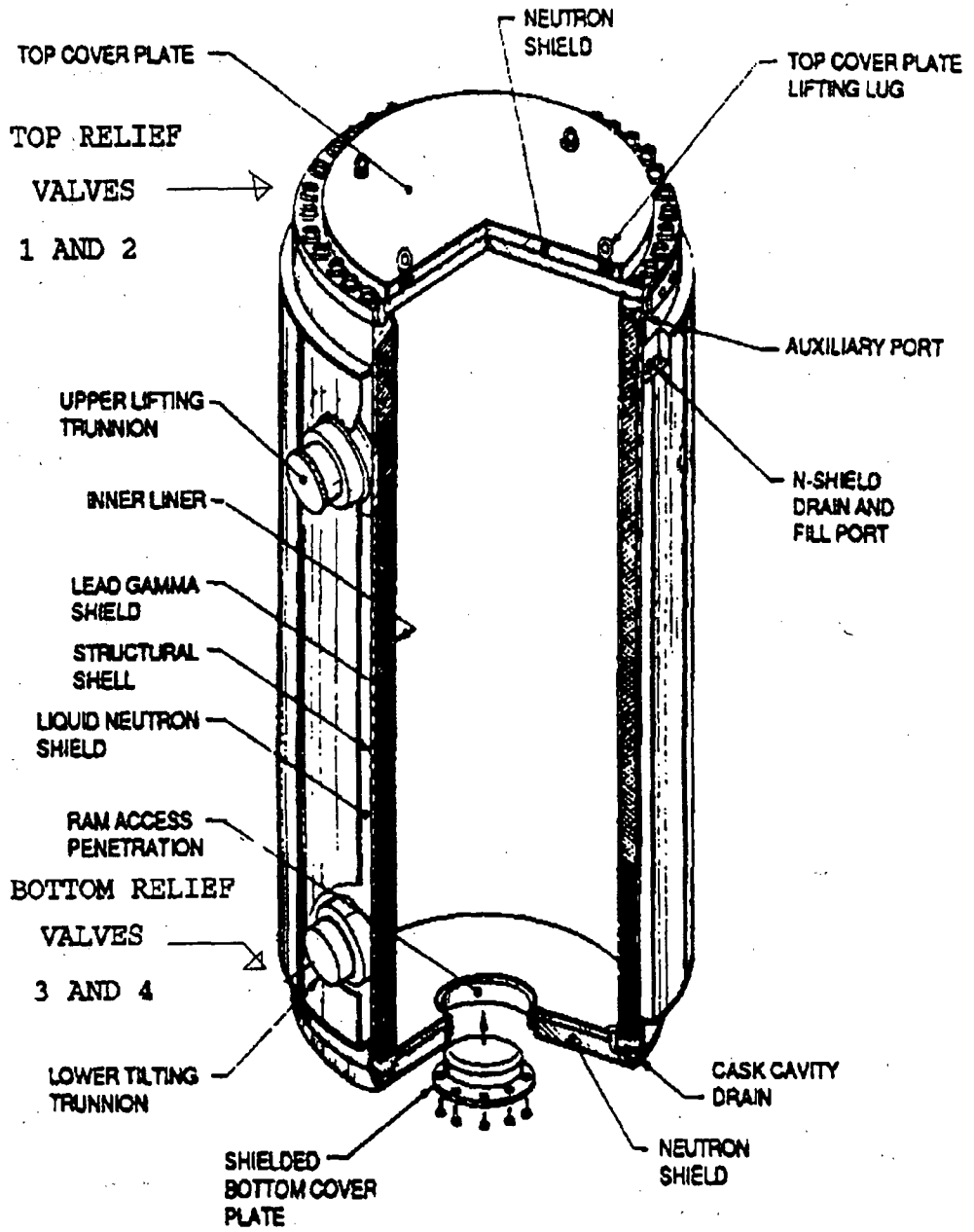
Verified By _____

_____ 11.2.8

_____ 11.2.9

Enclosure 13.3

Cask Component Orientation



Duke Energy Oconee Nuclear Station **Cask - Spent Fuel - Lifting Equipment (NUTECH) - Inspection And Load Test** **Continuous Use**	Procedure No. **MP/0/A/1700/010 A** Revision No. **008** Electronic Reference No. **OX002UJQ**

PERFORMANCE

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Cask - Spent Fuel - Lifting Equipment (NUTECH) - Inspection And Load Test

1. Purpose

To provide instructions for annual inspection of NUTECH Spent Fuel Cask lifting equipment.

- Inspection may be performed by 150% load test, followed by visual inspection of critical areas for defects, and all areas for permanent deformation.
- Alternately, inspection may be performed by non-destructive testing of major load bearing welds and critical areas, along with dimensional testing and visual examination.
- Cask lifting yoke is tested to ANSI N 14.6., Section 6.3.1(1). Section 7 does **NOT** apply as the yoke does **NOT** handle critical loads as defined in ANSI N14.6.

2. References

2.1 Source Documents

2.1.1 ANSI N14.6 - 1986, Special Lift Devices For Nuclear Materials

2.1.2 ANSI/B30.20 - 2003, Below The Hook Lifting Devices

2.1.3 Maintenance Directive 6.3.5, Control Of Slings And Lifting Devices

2.1.4 OM 120 - 044, Technical Specifications For 100 Ton Capacity Lifting Yoke And Extensions

2.1.5 OM 120 - 057, Cask Lifting Yoke Assembly

2.1.6 OM 120 - 058, Cask Lifting Yoke Extension

2.1.7 NUREG 612, Guideline 4

2.1.8 OSC 07636, Calculation (NUREG 612)

3. Personnel Requirements

3.1 Refer to Work Order.

3.2 Procedure Users: (additional users should be documented on Log Sheet)

Initials	Printed Name	Initials	Printed Name

4. Safety Considerations

4.1 Equipment Clearance and Isolation

Personnel performing this procedure should, to the best of their ability, verify safe condition of equipment on which maintenance is to be performed.

4.2 Radiation Protection Considerations

Technicians understand AND implement Radiation Protection considerations and ALARA methods.

4.3 Special Safety Considerations

- Use main hook for handling tower and a second (mobile) crane when upending/downending.
- Tower is pinned to base (4 pins) when **NOT** attached to overhead crane. Crane does **NOT** have to be unhooked once starting tower erection.
- With tower pinned to base, tower can take horizontal load of 500 pounds when installing extension. Use care when bringing extension in and out of tower top. Clearance is ± 1 1/2 inches.
- Use man lift to access tower top.
- Heavy Loads, watch for pinch points.

5. Unit Status

None

6. Prerequisites

_____ 6.1 Review procedure and NA Sections **NOT** to be performed.

_____ 6.2 Hydraulic system jacks need a functional verification performed on test block. Pretest hydraulic system to full stroke and pressure above 5000 psi.

6.3 Contact RP for coverage; RWP # _____.

_____ _____
Person Notified Date

_____ 6.4 Review Section 4.

_____ 6.5 **IF** NDE is required, contact QA prior to starting job.

_____ _____
Person Notified Date

_____ 6.6 **IF** NDE is required, review Section 11.2, then contact QA Tech. Support for NDE procedures to be used.

_____ _____
Person Notified Date

NDE Procedures 1. Base Material _____ or _____

2. Hooks _____

_____ 6.7 **IF** NDE is required, have the Planning Department initiate a Work Order to have all exposed carbon steel surfaces (except pins, inside surface of pin hole and lower slot) coated in accordance with Duke Power Coating Specification 306; 8.5-10.0 mils thick; DP#71.

7. Repair Parts

CAUTION:
- Materials shall be compatible with system per Power Chemistry Materials Guide.
- Substitutions for "or equivalent" shall be approved by Maintenance Tech Support/Engineering.

7.1 N-5000 or equivalent

8. Special Tools

8.1 Precision Tools

- Torque wrench capable of 500 ft-lbs.
- 4 - Hydraulic gauges calibrated to 10,000 # minimum

Type	Used At Step #	Serial #	Cal. Due Date

8.2 Hand Tools

1-7/16 inch combination wrench
1-5/8 inch combination wrench
3/4 inch ratchet
1-7/16 inch socket
1-5/8 inch socket
25 foot tape
"J" leg lifting device
2 inch x 3 foot choker
2 inch x 6 foot choker
6 inch hydraulic jack
Medium allen pack
Tap and die for top plate adapter

8.3 Tools For Load Test

8.3.1 30 Foot load test tower/w:

- Load test base
- Shim plate - 4 stacks on base (12 inch total)

8.3.2 Other

- 4 - 100 ton rams Simplex RLS-1002 or Enerpac RCS-1002 with 2.25 inches extension maximum or equivalent hydraulic jacks, (chart in Section 11.2, is for 19.63/19.64 square inch effective piston area)
- 4 - hydraulic hand pumps to fit rams above
- 1 1/4 inch 12 ton shackle
- 4- 3/4 inch shackles
- 2- 6 foot plus 12 ton minimum endless slings
- 3 inch wide shim stock 0.001, 0.002, 0.003 inch thickness as available
- Tin snips
- SS wire
- Duct tape
- Wrap materials for contaminated areas (herculite etc.)
- Misc. shim for outrigger base (wood or metal)

9. Acceptance Requirements

_____ 9.1 NUTECH lifting equipment listed on Enclosure 13.4, presently in service OR being returned to service, shall be inspected/tested per guidelines of this procedure.

_____ 9.2 All lifting equipment components will pass dimensional checks, and NDE or 150% load test.

_____ 9.3 All carbon steel components shall be properly coated prior to return to service.

_____ 9.4 All lifting equipment components inspected will be labeled with serial number prior to return to service.

_____ 9.5 Lift adaptor shall be labeled with load rating prior to return to service. (Rating is 100 tons)

_____ 9.6 All discrepancies noted shall be corrected or otherwise resolved prior to returning equipment to service. Corrective action or resolution shall be recorded on Enclosure 13.1, Log Sheet.

10. Interference Items

NA

11. Procedure

CAUTION: Each component should be labeled prior to disassembly to ensure proper reassembly.

NOTE: Applicable enclosures shall be filled out for each component of lifting device. Areas of particular interest are indicated on respective enclosure.

11.1 Visual Inspection And Dimensional Verification For NUTECH Cask Lifting Equipment

NOTE: Refer to Enclosures 13.2 and 13.3.

_____ 11.1.1 Inspect for obvious visual deformation of assembled structures.

_____ 11.1.2 Inspect complete structure for obvious visual damage, such as:

- Broken members
- Bent members
- Cracked members
- Loose members
- Missing members.

_____ 11.1.3 Visually inspect equipment surfaces for evidence of damage from the following:

- Heat
- Chemicals
- Corrosion.

_____ 11.1.4 Inspect adaptor pins for the following:

- Obvious visible cracks
- Corrosion
- Deformation
- Galling.

_____ 11.1.5 Support lifting sleeve on extension adaptor and remove clevis pin connecting jack leadscrew to lifting sleeve.

_____ 11.1.6 Visually inspect clevis pin for damage and replace with new pin if bent or damaged. Install clevis pin.

_____ 11.1.7 Visually inspect and exercise screw actuator for the following:

- Corrosion
- Bent lead screw
- Worn threads
- Other mechanical defects.

_____ 11.1.8 **IF** screw actuator is corroded or damaged, contact Maint Tech Support/Accountable Engineer for evaluation and instructions. Record instructions on "Log Sheet", Enclosure 13.1.

_____ 11.1.9 **IF** 150% load testing is to be performed, verify it is completed prior to continuing.

_____ 11.1.10 Inspect for obvious visual deformation of assembled structures.

_____ 11.1.11 Inspect complete structure for obvious visual damage, such as:

- Broken members
- Bent members
- Cracked members
- Loose members
- Missing members.

_____ 11.1.12 Visually inspect equipment surfaces for evidence of damage from the following:

- Heat
- Chemicals
- Corrosion.

_____ 11.1.13 Inspect adaptor pins for the following:

- Obvious visible cracks
- Corrosion
- Deformation
- Galling.

_____ 11.1.14 Support lifting sleeve on extension adaptor and remove clevis pin connecting jack leadscrew to lifting sleeve.

_____ 11.1.15 Visually inspect clevis pin for damage and replace with new pin if bent or damaged. Install clevis pin.

_____ 11.1.16 Verify twist of hook points from plane of unbent shank is less than 10 degrees. **IF** either hook is bent more than 10 degrees, notify Responsible Supervisor.

_____ 11.1.17 Measure AND record dimensions as indicated on appropriate enclosures.

_____ 11.1.18 Verify dimensions in step 11.1.17 do **NOT** exceed maximum dimensions stated on enclosures.

WARNING: Lifting equipment parts are extremely heavy. Use extra care when handling.

11.2 Disassembly and NDE For NUTECH Cask Lifting Equipment

CAUTION: Prior to any disassembly, EACH component should be labeled to ensure proper reassembly.

NOTE:
1. **IF** annual testing requirement is to be met per 150% load test, Steps 11.2.1 through 11.3.5 may be marked NA.
2. Refer to Enclosures 13.2 and 13.3.

_____ Right _____ Left 11.2.1 Disassemble yoke by loosening the stainless steel hook tie bolts on one side of the yoke, then loosen spacer bolts on inside of spreader. Spread yoke halves apart, approximately 1 inch, then remove either right or left hook.

_____ Right _____ Left 11.2.2 Have QC perform NDE as indicated below using NDE method indicated on Enclosures 13.2 and 13.3 and procedures listed in Step 6.6:

- NDE of lifting pins (one for each end of adaptor) is required ONLY on shaft of pin.
- NDE of yoke lifting hooks is required on load bearing portion of hooks where hooks contact lifting beams and load area as indicated on appropriate enclosures.
- NDE of load-bearing areas on hook shall be inspected and accepted in accordance with the ANSI/ASME B30.10 standard for crane hooks.

Document results on appropriate enclosures (NDE acceptance per ASME Section III, Div. 1 Subsection NF for all items except Hooks).

_____ Right _____ Left 11.2.3 Replace hook, referencing any match marking or labeling done in Step 11.2.1. Reference Note 10 on Enclosure 13.4 for orientation.

11.3 Reassembly of NUTECH Cask Lifting Equipment

_____ 11.3.1 Verify EACH component is stamped with a serial number and no serial numbers are duplicated. **IF** necessary, contact Maint Tech Support/Accountable Engineer for resolution.

_____ 11.3.2 Notify planning that lifting equipment is ready for painting.

_____ 11.3.3 Verify painting has been completed.

11.3.4 Visually inspect yoke beam bolting material for the following and replace as necessary.

- Cleanliness
- Damage
- Defects.

_____ _____
QC Inspector Date

NOTE: **IF NOT** replaced, reuse original nuts, bolts and flatwashers.

_____ 11.3.5 Lifting device reassembly:

A. Install hook tie bolts and flatwashers.

B. Apply Loc-Tite to nuts and install nuts on hook tie bolts.

C. Apply Loctite to spacer bolts, then loosely install.

D. **IF** yoke was completely disassembled, torque hook tie bolts to initial value of 50 ft-lbs

E. Use a crisscross pattern to torque spacer bolts to 500 ft-lbs.

F. Verify fitup of yoke to lifting trunnions on cask prior to final torquing of tie bolts.

G. Use a crisscross pattern to torque hook tie nuts to 500 ft-lbs.

H. Have QC verify torque process.

_____ _____
QC Inspector Date

11.4 Functional Test of Yoke

11.4.1 Verify fit up of yoke to lifting trunnions on cask.

11.4.2 **IF** hook engagement needs to be adjusted, perform necessary parts of Steps 11.2.1 and 11.3.5.

CAUTION: Protect tower equipment with stainless steel shim or other suitable methods to prevent contamination of equipment.

NOTE: Variation of sequence can be made under direction of Fuel Handling Supervisor.

11.5 Equipment Staging For Load Test

11.5.1 Tap bolt holes and run die on bolts in top lift adapter.

11.5.2 Stage/hang lift adaptor in Fuel Receiving Area (FRA).

11.5.3 Stage yoke in stand in FRA, West of pit overhang.

_____ 11.5.4 Stage hydraulic system:

A. Install calibrated 10,000 # gauges on hydraulic systems.

B. Verify jacks are Simplex RLS 1002 or Enerpac RCS 1002.

C. Pretest each hydraulic system to full stroke and pressure above 5000 psi.

11.5.5 Line 6 inch hole in lift plate with thinnest stainless shim stock available, to prevent contamination between pin, extension, and sides.

WARNING: Top bolts, 4 - 1 inch A307 or A325 bolts shall be wrench tight before lifting tower, each time.

NOTE:
- Tower with top plate weighs 5200 pounds.
- Base weighs 4800 pounds.

11.5.6 Stage tower base in FRA West of the yoke stand with the base opening facing the yoke stand to allow tower assembly to slip in to stand base.

NOTE: Shims are to prevent rocking and hold tower vertical.

11.5.7 With wood or metal under 6 inch tube steel outriggers, level base to $\pm$ 1/8 inch.

11.5.8 Wrap 8 inch pins in base with stainless steel shim stock to prevent contamination.

11.5.9 Stage tower in FRA:

A. Wrap tower top plate lugs as necessary to prevent contamination from yoke hooks.

B. Move upper end of tower with lift plate installed and bolted down, into FRA.

C. Pin tower gate opening into OPEN position.

D. Rig upper end of tower to 100 ton crane and upend, using second crane at bottom end to control load.

E. De-rig from second crane.

11.5.10 Place tower on base, pin, and secure pins.

11.5.11 Unbolt lift plate and CLOSE gate.

11.5.12 Raise lift plate and rig to yoke lift adaptor.

11.5.13 While lifting for storage hanger, visually verify that yoke lift adapter is **NOT** under load. **IF** loaded, stop lift and use drill motor to unload jack screw from extension piece.

WARNING: Pinch Point, tight clearances.

11.5.14 Place lift adaptor into tower using lift plate alignment arrows.

11.5.15 Bolt lift plate down wrench tight.

11.5.16 Unpin tower and pick up tower from base.

11.5.17 Ensuring jack screw lifting eye in extension is **NOT** under load, attach yoke to lift adaptor.

11.5.18 Align tower with yoke hook opening towards base and tower legs towards leg openings on base.

11.5.19 Move tower horizontally into position.

11.5.20 Slowly raise tower to engage yoke with 8 inch pins in base.

NOTE: Jack height (5.56 inches) + shims (approximately 3 inches) + jack stroke (max 2.25 inches) = maximum 10.8 inches.

11.5.21 Install 7 inch square shim plates, then jacks (4) under tower legs (at least one shim shall be under jack).

11.5.22 Pressurize jacks to evenly remove play, maintaining tension on crane hook.

11.5.23 **IF** base is raised, lower crane and re-shim base as necessary.

11.6 Yoke Load Test

NOTE:
1. Test load of 160 tons is based on 150% of yoke rated capacity (100 tons) plus weight of yoke (6550 pounds), lift adaptor (2600 pounds), and tower (5200 pounds).
2. Chart is for Simplex RLS 1002 or Enerpac RCS 1002 jacks with 5 inch bore and 19.63/19.64 square inch piston area.

11.6.1 Evenly pump hydraulic jacks (4) to test pressure, 4100 psi + 100 psi - 0.

Tons	Gauge Pressure psi
10	1020
20	2038
30	3057
35	3566
40	4076
41	4176

_____ 11.6.2 Verify all 4 jacks are at test pressure of 4100 psi + 100 psi - 0 (160 - 164 tons).

11.6.3 Measure extended stroke of each jack.

Jack # 1 _____ Jack # 2 _____ Jack # 3 _____ Jack # 4 _____

NOTE: Any stroke less than 2.00 inches is acceptable.

_____ 11.6.4 **IF** extended stroke is more than 2.00 inches on any jack, release pressure on all jacks and add shims as appropriate to shorten stroke to less than 2.00 inches on affected jack(s).

11.6.5 **IF** necessary, evenly pump hydraulic jacks (4) to test pressure, 4100 psi + 100 psi - 0, per Step 11.6.1.

11.6.6 Maintain pressure on jacks by additional pumping in case of leak down to maintain pressure for at least 10 minutes or duration of inspection of yoke.

Test Pressure _____ Time Started _____

NOTE:
1. Each lifting device shall be visually inspected in all accessible areas.
2. Inaccessible areas are to be inspected after disassembly from test fixture.

11.7 Visual Inspection of Yoke and Lift Adaptor

NOTE: Refer to Enclosures 13.2 and 13.3.

_____ 11.7.1 Inspect for obvious visual deformation of assembled structures.

_____ 11.7.2 Inspect complete structure for obvious visual damage, such as:

- Broken members
- Bent members
- Cracked members
- Loose members.
- Corrosion
- Deformation
- Galling

11.7.3 Verify yoke is square with extension and base in fixture.

_____ 11.7.4 Visually inspect entire device, weld areas, pins, arms, under load for distortion or damage. Record any indications on Enclosure 13.1.

11.7.5 End of test under load. Test shall be greater than 10 minutes. Record time stopped and calculate total time.

Time Stopped _____ Total Time _____

11.7.6 Release pressure from hydraulic system.

11.7.7 **IF** any indications were recorded on Enclosure 13.1, contact Maint Tech Support/Engineering for evaluation.

_____ _____
Person Contacted Date

11.8 Disassembly Of Test Equipment

11.8.1 Remove shims and jacks.

11.8.2 Lower tower to disengage yoke hooks and move horizontally out of base.

11.8.3 Place yoke on stand.

11.8.4 Place tower on base, pin, and secure pins.

11.8.5 Use manlift to access and unbolt lift plate.

11.8.6 Retract lift adaptor extension.

11.8.7 Raise lift plate and place yoke lift adaptor on storage hanger.

11.8.8 Place lift plate on tower.

11.8.9 Bolt plate down hand tight.

11.8.10 Unpin tower and remove from base.

11.8.11 Use second crane to down end tower.

11.8.12 Decon test tower and base with shim plates attached (approximately 12 inches) and prepare for storage.

11.8.13 Remove load testing equipment and store.

12. Restoration

12.1 Verify lift adaptor is labeled with 100 ton load rating.

_____ 12.2 Verify all discrepancies noted have been corrected or otherwise resolved prior to returning equipment to service. Corrective action or resolution will be recorded on Enclosure 13.1, Log Sheet.

_____ 12.3 Return all lifting devices to proper storage area as designated by Fuel Handling Supervisor.

_____ 12.4 Ensure work area has been cleaned and all tools have been properly stored.

13. Enclosures

13.1 Log Sheet

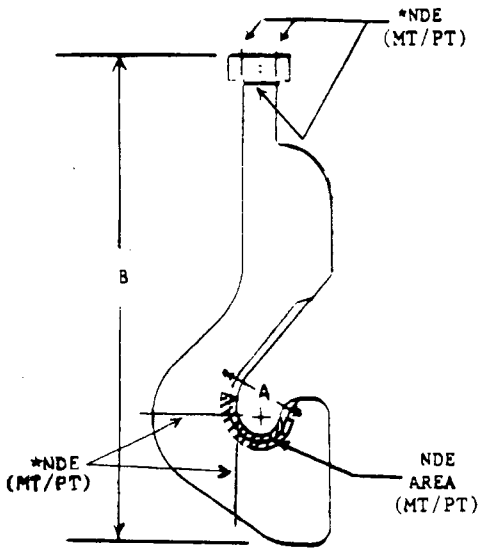
13.2 NUTECH Yoke Data Sheet

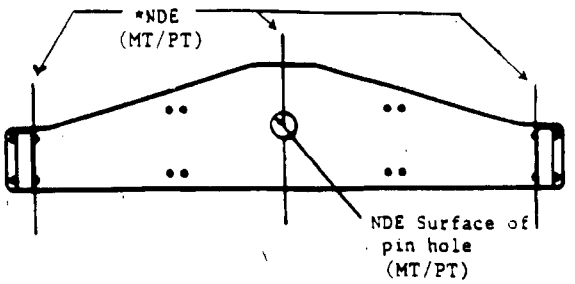
13.3 NUTECH Yoke Extension Data Sheet

13.4 Station Inventory Of Yokes And Adaptors

NOTE: Additional copies may be made as necessary.

DATE	STEP #	REMARKS	INITIALS





Complete Assembly S/N Y-3 | Yoke Hooks S/N Y3-L , Y3-R | Yoke Beams S/N Y3-F , Y3-B

NOTE: * NDE to be performed on a 6 inch area (3 inches on either side of line)

1. Record The Following Dimensions S/N Y3-L A_____ B_____
   S/N Y3-R A_____ B_____

2. The following are the Reference and Maximum Dimensions.
   Reference Dimensions A 16 inch B 8 ft, 10 1/8 inch
   Maximum Dimensions A 16 1/4 inch B 8 ft, 10 1/4 inch

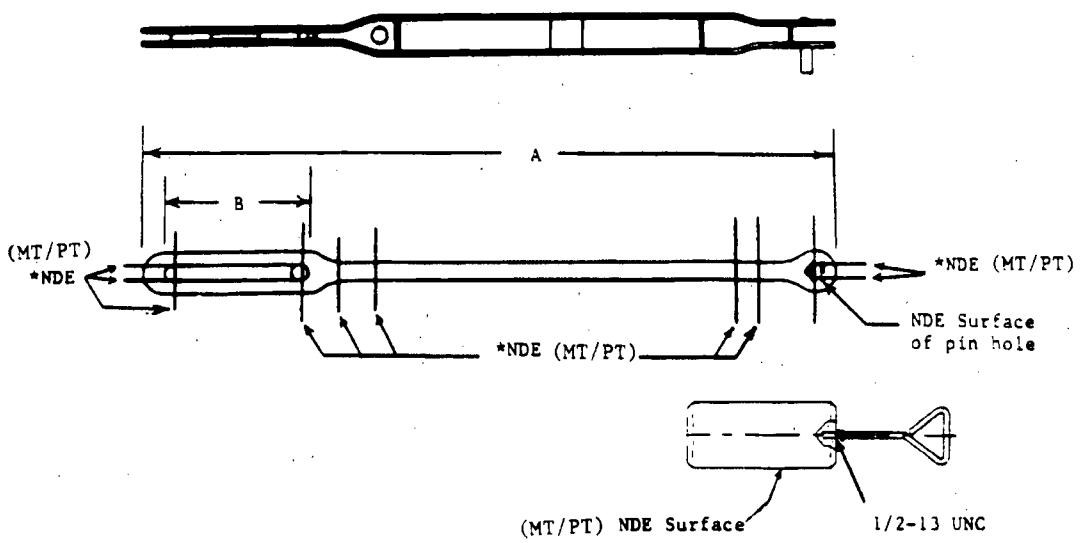
*** NOTE:** See Step 6.6 for applicable NDE procedures to use.

3.

Item	* NDE Procedure / Rev. #	Acc.	Rej.	QA Insp.	Date
Y3-L					
Y3-R					
Y3-F					
Y3-B					

Enclosure 13.3

NUTECH Yoke Extension Data Sheet



Yoke Extension
S/N L-4

Pin Assemblies
S/N P-3 , P-4

NOTE: * NDE to be performed on a 6 inch area (3 inches on either side of line)

1. Record The Following Dimensions A_____ B_____
2. The following are the Reference and Maximum Dimensions.

   Reference Dimensions A 21 ft, 11 inches B 4 ft, 6 inches

   Maximum Dimensions A 21 ft, 11 1/8 inches B 4 ft, 6 1/8 inches

* **NOTE:** See Step 6.6 for applicable NDE procedures to use.

3.

Item	* NDE Procedure / Rev. #	Acc.	Rej.	QA Insp.	Date
L-4					
P-3					
P-4					

40 TONS NAC CASK LIFTING ADAPTORS	SERIAL NUMBER	NOTES
Pin	P-2	(1)
Long Adaptor with Hook	LA-1	(2)
Short Adaptor with Hook	SA-1	(3)
25 TON NAC CASK LIFTING ADAPTORS		
Pin	P-1	(1) (8)
Long Adaptor with Hook	LA-2	(4) (8)
Short Adaptor with Hook	SA-2	(5) (8)
100 TON NUTECH LIFT ADAPTOR		
Upper Pin	P-4	
Lower Pin	P-3	
Adaptor	L-4	
LIFTING YOKES		
NAC Yoke	Y-1	(6) (9)
NAC Yoke	Y-2	(6) (9)
NUTECH Yoke	Y-3	(10)
MISCELLANEOUS		
TN Lift Adaptor	L-3	(7)

NOTE:

1. Used with both long and short adaptor.
2. Bolted construction, includes lift rods A-1 and A-2, couplings C-1 and C-2, and hook H-4.
3. Bolted construction, includes hook H-3.
4. Welded construction, includes lift rods B-1 and B-2, and hook H-2.
5. Welded construction, includes hook H-1.
6. May be used with either set of NAC lifting adaptors.
7. No longer used, was purchased instead of leased as it was built to Oconee unique configuration.
8. Stored at Warehouse 7 (bldg. 8055) (contaminated).
9. One stored at Warehouse 7 (bldg. 8055), other on cask trailer. Both contaminated.
10. Y-3 yoke assembly consists of four major components, left and right hooks and front and back spreader beams. Components are designated Y3-L, Y3-R, Y3-F and Y3-B. Eye of the hooks are to the front of the yoke, the left hook is on the left when facing the yoke from the rear.

Duke Energy Nuclear Generation **SYSTEM CHEMISTRY MANUAL - OCONEE PRIMARY CHEMISTRY OPTIMIZATION PLAN (DOCUMENT INITIAL ISSUE)**	Procedure No. **SCM-12 APPENDIX C** Revision No. **008** Electronic Reference No. **NG0008NX**

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CURRENT

Duke Power SM

A Duke Energy Company

System Chemistry Manual

SCM-12 Appendix C, "Oconee Primary Chemistry Optimization Plan"

REVISION NUMBER	ISSUE DATE
0	March 14, 2000
1	June 26, 2000
2	December 20, 2000
3	December 19, 2001
4	June 20, 2002
5	February 24, 2004
6	June 21, 2006
7	March 31,2008
8	July 21, 2008

Approved By/Date

D. P. Rochester / 6/30/2008
NGO Chemistry Manager

S. K. Gibby / 7/18/2008
CM&TH Engineering Supervisor

G. M. Barker / 6/26/2008
Oconee Chemistry Manager

R.M. Glover / 6 /26/2008
Oconee Station Manager

Effective Date: October 20, 2008

Verify Hardcopies against NEDL immediately prior to each use.

6.3 Borated Water Storage Tank

Parameter	Frequency	Limit
Boron, ppm	1/ 7 days(1)	(1)
Chloride, ppb	1/m	≤150
Fluoride, ppb	1/m	≤150
Sulfate, ppb	1/m	≤150
Silica, ppb	1/qtr(2)	(3)
Turbidity	1/m	(3)
Gamma Isotopic	1/m	(3)
Aluminum, ppb	(4)	(3)
Calcium, ppb	(4)	(3)
Magnesium, ppb	(4)	(3)

Notes:

1. Frequency and limit based on Technical Specification SR 3.5.4.3 and COLR.
2. EPRI Primary Guidelines suggest monthly analysis of the Refueling Water Storage Tank for silica; however, the weekly recirculation of the BWST keeps with the Spent Fuel Purification system keeps these two water sources interconnected.
3. No limit is specified. Data collected for identification of impurity ingress and/or diagnosis of potential clarity problems.
4. Sampled once prior to the refueling outage.

6.4 Spent Fuel Pool

Parameter	Frequency	Limit
Boron, ppm	1/ 7 days(1)	(1)
Chloride, ppb (5)	1/m	≤150
Fluoride, ppb	1/m	≤150
Sulfate, ppb	1/m	≤150
Silica, ppb	1/m	(2)
Gamma Isotopic	1/wk	(3)
Turbidity	1/m	(4)
Aluminum, ppb	(6)	(2)
Calcium, ppb	(6)	(2
Magnesium, ppb	(6)	(2)

Notes:

1. Frequency and limit based on Technical Specification SR 3.7.12.1 and COLR.
2. No limit is specified. Data collected for identification of impurity ingress.
3. No limit is specified. Data collected for monitoring fuel cladding status and demineralizer performance.
4. No limit is specified. Data collected for diagnosis of potential clarity problems.
5. The Chemistry Control Program is part of an aging management program credited for Oconee ISFSI license renewal, as described in the license renewal specification OSS-0121-00-00-0011. When making changes to the SFP chemistry, refer to ISFSI site specific USFAR Section 9.7.
6. Sampled once prior to the refueling outage.

SPENT FUEL MANAGEMENT SYSTEM HEALTH REPORT
Report Time Period: 2008Q3
System Engineer: Steve Perrero
Approved By: Carl Fago

UNIT	OVERALL RATING
Shared	G
1	Y
2	Y
3	R

M/R #	Maintenance Rule Function Description	Risk Cat. (A, B or C)	Unit Rating S	1	2	3
SFM.1	Provide structurally sound and geometrical array to maintain adequate margin to critical conditions for storage of fuel assemblies (includes SFP racks, and ISFSI dry storage canisters).	B	G	G	G	G
SFM.2	Maintains safe and reliable handling of fuel during transfer from the spent fuel pool to the ISFSI such that fuel integrity is maintained (includes ISFSI dry storage canisters, ISFSI transfer cask, ISFSI cask trailer, ISFSI horizontal storage modules).	B	G	G	G	G
SFM.3	Provide adequate cooling to the dry storage canister to maintain adequate margin to HSM concrete temperature limit (does not exceed 350 degrees for more than 24 hours).	B	G	G	G	G
SFM.4	Maintain core offload capability in the spent fuel pools.	B	G	Y	Y	R

Overall Health Summary

THIS IS AN ACTION PLAN UPDATE ONLY. THE BODY OF THIS HEALTH REPORT HAS NOT BEEN UPDATED FOR THIS TIME PERIOD. THIS HEALTH REPORT WAS LAST UPDATED 2008Q2 .

The Spent Fuel Management (SFM) System includes both the components utilized for storage of spent fuel assemblies and management issues associated with the use of these components. The components include the Unit 1&2 Spent Fuel Pool racks, the Unit 3 Spent Fuel Pool racks, and the Independent Spent Fuel Storage Installation (ISFSI). Note that the ISFSI is designated as "Shared" in the associated Unit Rating.

The Unit 1&2 spent fuel pool (SFP) rating is currently yellow. The Unit 3 SFP rating is red. These ratings are based on the available Prudent Operating Reserve (POR). POR takes into account the number of empty cells required in the SFP for all activities (full core offload, new fuel, fuel work, diving radius for upender work). As of 7/1/08 the U1&2 SFP has 356 empty cells and the U3 SFP has 293 empty cells. The required POR is 321 empty cells. With a POR maintained of 321 cells the SFPs will still only be considered yellow since this is the minimum space required to perform a delay free outage. It is desired to have both of the SFPs with 417 empty cells or greater to provide margin to that number. For this reason the SFPs will not be considered Green until 417 empty cells is achieved.

ISFSI Phase VI planning has begun and 201 funding has been approved. Under the current loading schedule Phase V will be full in 2010.

The Action Plan associated with DSC loading schedule has been reviewed with Gary Ruppe for their buy-in and concurrence of the action and its due date.

Common Parameters and Inputs	Unit Rating S	1	2	3	Justification
System Reliability · Lost Generation · MRFFs · Reduced Reliability · Critical Equipment Reliability · Unplanned TS Action Statement Entries (where applicable)	G	G	G	G	There has been no lost generation associated with this system. However, if the planned loading schedule cannot be attained, there could be a loss of critical path time during offload and reload evolutions. There are no maintenance rule functions, therefore there are no MRFFs.
MR Status · A1/A2 Status	G	G	G	G	There is no MR status for this system since it has been scoped out.

· MPFFs · RMPFFs · Unavailability (MRHSS, INPO and NRC PI) · Plant Level Events					
Functional Material Condition · Walkdown Results · Corrective WR/WOs · PM/PdM/PT Results and Feedback	G	G	G	G	For the ISFSI, functional material condition is coded Green. There are no observable indications of degradation of the concrete bunkers. There are no problems with the temperature monitoring system. There are currently no issues with the fuel racks in either of the spent fuel pools.
Design Basis & Configuration Health · OBD/NCI · Temp Mods Open · Reduced Design or Operating Margin	G	G	G	G	The Unit 1&2 and Unit 3 spent fuel pools currently operable. There are no Temporary Modifications open with respect to the spent fuel pool racks or the ISFSI. There are no OBD/NCI conditions for the spent fuel pool racks or the ISFSI. There are no reduced design margins with respect to the spent fuel pool racks or the ISFSI.
Health Group PIP Status · Open Root Cause Evaluations · Open Problem Evaluations for Category 3 · Open Corrective Actions	G	G	G	G	There is no PIP backlog with respect to ISFSI and spent fuel. PIP 06-4569 relating to disposition of primary sources loaded into dry storage. In September 2007 the final disposition of where all of the source rods currently are was made. The last remaining action with regards to ISFSI is to "submit an LAR for the current site-specific ISFSI license to clarify the components that can be stored in spent fuel assemblies at the ONS ISFSI." GO SFM to develop the Technical Basis and ONS Reg Compliance to suubmit LAR.
Additional Issues - OE - Assessments / Audits / Inspections / Benchmarking - Field Observations	G	G	G	G	There are currently no additional issues related to the SFPs and the ISFSI. An application to renew the ISFSI license was submitted to the USNRC January 30, 2008.

Specific Parameters and Inputs	Unit Rating				Justification
	S	1	2	3	
Prudent Operating Reserve Spent Fuel Pool Inventory, Available empty rack locations		Y	Y	R	Prudent Operating Reserve (POR) is defined as the empty storage reserve in the spent fuel pool required to unload a reactor core and store one feed batch of new fuel (accounting for checkerboard storage requirements.) 24 rack locations are also required for fuel work that may be necessary. The POR is currently set at 177+2*60+24 = 321. The Unit 1&2 spent fuel pool rating is yellow. The Unit 3 spent fuel pool rating is red. As of 07/01/08 the U1&2 SFP has 356 empty cells and the U3 SFP has 293 empty cells. Green: 417 available rack locations Yellow: 321 available rack locations Red: < 321 available rack locations
ISFSI Support The reliability of the equipment used to transfer fuel from the spent fuel pool to the ISFSI. This includes the spent fuel bridge, 100 Ton Crane, Vacuum Drying System, Hydrogen Analyzer, Transfer Cask, Transfer Trailer, and HSMs.	G	G	G	G	There are currently no issues in this area.
HSM Roof Slab Temperature	G				Review of HSM roof slab temperatures show none greater than 160

HSM Roof Slab Temperature Acceptable (Does not exceed 350 Degrees for more than 24 hrs)					degrees. Green - Temperature <= 200 Yellow - Temperature > 200 Red - Temperature > 300

Long Range Plan

ISFSI Phase VI planning has begun and 201 funding has been approved. This is necessary to ensure timely construction of the next phase of the ISFSI.

License amendments and/or DSCs capable of loading Mk-B11 and HTP fuel assemblies into the ISFSI are being considered in the ten year fleet ISFSI plan being developed by GO/SFM group.

ACTION PLAN
(for red or yellow major component)

MAJOR PROBLEMS	RESOLUTIONS
A) Spent Fuel Pools do not have the desired available empty rack locations.	A) Aggressive dry storage loading schedule to gain desired empty rack locations as quickly as possible. The following represents the desired load schedule prior to the O3EOC24 outage: Load #102, U3 pool, Model WO 01460678, 04/25/09 Load #103, U3 pool, Model WO 01460678, 04/25/09 Load #104, U3 pool, Model WO 01460678, 04/25/09 The following represents the desired load schedule prior to the O1EOC24 outage: Load #105, U3 pool, Model WO 01460678, 10/09/09 Load #106, U1&2 pool, Model WO 01460678, 10/09/09 Load #107, U1&2 pool, Model WO 01460678, 10/09/09 Load #108, U1&2 pool, Model WO 01460678, 10/09/09 Load #109, U1&2 pool, Model WO 01460678, 10/09/09 Load #110, U3 pool, Model WO 01460678, 10/09/09

ACTION/PRIORITY	TRACKED BY	RESPONSIBLE INDIVIDUAL	SCHEDULE
A1) DSC Loads prior to O3EOC24 outage	Load #, Model WO# 102, 01460678 103, 01460678 104, 01460678	Gary Ruppe	04/25/09
A2) DSC Loads prior to O1EOC24 Outage	Load #, Model WO# 105, 01460678 106, 01460678 107, 01460678 108, 01460678 109, 01460678 110, 01460678	Gary Ruppe	10/09/09
Monitoring Period	Integrated Project Plan	Steve Perrero	A program has been set up to monitor this system to ensure adequate SFP space is available to support all future outages without impact to critical path.

BARRIERS/MANAGEMENT SUPPORT NEEDED	

Status: Approved

Duke Energy Oconee Nuclear Station **ION CHROMATOGRAPHY - DX3000 IC**	Procedure No. **ONCHEM3490** Revision No. **000A** Electronic Reference No. **OAP000DX**

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ISSUED

ON-CHEM-3490

ETQS Training and Qualification Guide

TITLE: ION CHROMATOGRAPHY - DX3000 IC

DESCRIPTION/INITIAL CONDITIONS/CONSEQUENCES:

Analyzes and interprets the data of a water sample for anions or cations using the Dionex ICS-3000.

Improper analysis or inaccurate results may lead to missed SLC surveillances, out of guideline hours, and/or induced corrosion of an operating system

TASK EVALUATION METHOD: Perform (P)

PREREQUISITES: NONE

1. KNOWLEDGE ELEMENTS:

1.1 State the basic principle(s) of the analysis.

STANDARD 1.1:

The Dionex carries the sample(s) through a chromatographic process:

- Loading: sample is pumped into a loop
- Injection: load/inject valve switches position and the sample is carried by the eluent into the system.
- Separation: ions elute from the columns at different times based on their affinity to the resin.
- Suppression: ionic constituents of the eluent are removed to reduce background conductivity.
- Detection: the conductivity of the analytes is measured as they pass through the conductivity cell.
- Quantification: conductivity is directly proportional to the concentration of each Analyte.

1.2 State any special precautions and/or hazards associated with analysis.

STANDARD 1.2:

- Special precautions must be taken to prevent contamination from handling radioactive samples
- When using the six-way sample valve ensure the valve is set at the correct position for the sample(s) to be run.
- When saving a new batch it is important to check the "raw data" in the pop-up window in order to carry over the curve data.
- Both the Cation and Anion channels are left in idle when not in use to maintain instrument stability.

1.3 State the interferences associated with the analysis.

STANDARD 1.3:

State why the following are interferences:

Adjacent and/or carbonate peaks - Sample contaminants may interfere with peaks of interest.

Column wear - will change retention times and cause peak tailing.

1.4 State the chemicals used for this analysis and the purpose of each.

STANDARD 1.4:

- Eluent: carries sample through chromatographic process, beginning with the load/inject step and ending with the detection step
- Boric Acid: Used as eluent dilution water to matrix match sample boron matrix
- Sodium Borate: used to regenerate ATC
- Helium Gas: used to pressurize Sodium Borate container to push solution through ATC.

1.5 State the Tech Specs or other regulatory requirements associated with the analysis.

STANDARD 1.5:

Chloride and fluoride, due to corrosion concerns.

1.6 Explain the communication requirements for the results of this analysis.

STANDARD 1.6:
There is no communication requirement for the results of this analysis unless the results are out of specification. If the results are out of specification, Chemistry Staff/Management and Operations will be notified

1.7 Explain where the results of this analysis are documented.

STANDARD 1.7:
Results are documented on Chemdesk, data sheets, and any procedures that require results to be documented.

1.8 State the task specifics to the operation of this task as applicable (calculations, maintenance, troubleshooting).

STANDARD 1.8:
Maintenance and troubleshooting should be carried out as outlined in LM/O/P944 Enclosure 6.5 and the Dionex ICS 3000 Chromatography System Operators Manual.

2. SKILL ELEMENTS:

2.1 Identify the major components of the instrument and the purpose of each.

STANDARD 2.1:

Oven Compartment - Contains Conductivity cell, Self-Regenerating Suppressor (SRS), injection valves, columns and sample loops. Controls column and cell temperature. Also has indicating lights for status of SRS, Conductivity Cell, and injection valves, along with alarm indication.

Gradient Pump Compartment: Contains Cation and Anion Gradient pumps. Location for ATC on anion channel. Contains control to prime pumps, seal rinse, and indicating lights for pump status, along with alarm indication. Accesses pump controls for priming eluent manifold and pumps.

Eluent Generator: Generates high purity eluents at method specified concentrations using reagent grade water and a MSA cartridge on the cation channel and a prepared boron solution and KOH cartridge on the anion channel. Concentration of the eluent for gradients is changed through the method.

Sample Pump and 6 way valve: pumps sample into loop.

2.2 Demonstrate the ability to perform the instrument standardization.

STANDARD 2.2:

Performs Lab Method per LM/O/P944, Enclosure 6.2.

2.3 If different from the instrument standardization operation, demonstrate the ability to perform a QC standard check.

STANDARD 2.3:

Performs Lab Method per LM/O/P944, Enclosure 6.3.

2.4 If different from the instrument standardization operation, demonstrate the ability to analyze a sample.

STANDARD 2.4:
Performs Lab Method per LM/O/P944, Enclosure 6.3.

2.5 For In-Line Instrument as applicable:

STANDARD 2.5:
N/A

2.6 Demonstrate the ability to perform the following task specific elements (maintenance, troubleshooting). Example: rebuilding a sample valve, replacing tubing, using software, etc.

STANDARD 2.6:

1. Demonstrate Optimization to include:

   Magnifying a peak

   Adjusting start/stop markers

   Identify or renaming peak

   Adjusting the baseline on a peak

2. Demonstrate priming of the eluent pump, Enclosure 6.5 Step 1.2 of LM/O/P944.
3. Demonstrate priming of the sample pump, Enclosure 6.5 Step 1.3 of LM/O/P944.
4. Demonstrate regeneration of ATC, Enclosure 6.5 Step 1.5 of LM/O/P944.

OPERATING EXPERIENCE:

1. **Waste discharge lines must be checked for proper routing and drainage. Waste discharge lines have become disconnected in past events causing electrical shorts and contamination problems.**

2. **System tubing must be changed on a periodic basis. Aged or contaminated tubing can become coated with ions that serve as a ion exchanger, affecting analytical results and creating bias.**

3. **New guard and analytical columns may have impurities and components associated with manufacturing and storage. New columns need to be rinsed for at least 12 hours before placing in service.**

4. **Column wear and aging tend to reduce retention times and merge adjacent peaks. Past events have revealed problems in quantifying peaks because of a lack of baseline resolution in the fluoride, acetate, formate, and chloride region of the chromatogram. In this circumstance, the user must evaluate the merit of changing columns in response.**

5. **PIP M-94-619 Reactor coolant was sampled for Chloride and Fluoride analysis on 5-13-94. The sample was analyzed and results obtained. Data was documented and entered into the Chemistry data plot system. On 5-18-94 the trend plots of the data were reviewed. It was noted that there was a problem with that days data. The raw data was then looked at and it was determined that due to an instrument problem the sample did not get injected into the analysis stream. This made the results generated by the analysis nonrepresentative of the REACTOR COOLANT sample that was to be analyzed. This resulted in a missed tech. spec surveillance. Lesson learned is the importance to validate all data and use a questioning attitude if something does not look right.**

PROCEDURE(S):

LM/O/P944

REFERENCE(S):

PIP M-94-619

Dionex Application Note 166, "Application of Eluent Generation for Trace Anion Analysis f Borated Waters."

LM/O/P914

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

TRAINING PACKAGE

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Prepared:	Tommy A. Loflin	**Date:**	11-07-07
Reviewed:	Steven Perrero	**Date:**	11-16-07
Operations Review:	Sandra Loskoski	**Date:**	11-07-07
Training Approval:	John R. Steely	**Date:**	11-28-07

PROGRAM: Operations Training

MODULE: Periodic Training Requalification

TOPIC: Independent Spent Fuel Storage Installation (ISFSI)

LESSON: IFSFI Monitoring

OVERVIEW:

This training package addresses the requirements for and process of monitoring Horizontal Storage Modules for spent fuel.

PREREQUISITE:

Licensed RO or SRO

REFERENCES:

1. ONS ISFSI Material License SNM-2503 Technical Specifications
2. Certificate of Compliance for Dry Spent Fuel Storage Casks (Certificate Number 1004 Rev. 0)
3. PT/1/A/0600/001 (Periodic Instrument Surveillance) Enclosure 13.6
4. PIP 05-7553

AIDS:

None

OBJECTIVES APPLICABILITY PAGE

TIME		1.0			1.0	1.0	TIME						
Objective	ISS	NLRQ	LPRO	LPSO	RORQ	SORQ	Objective	ISS	NLRQ	LPRO	LPSO	RORQ	SORQ
T1		X			X	X	R21						
T2							R22						
T3							R23						
T4							R24						
T5							R25						
R1		X			X	X	R26						
R2		X			X	X	R27						
R3		X			X	X	R28						
R4		X			X	X	R29						
R5							R30						
R6							R31						
R7							R32						
R8							R33						
R9							R34						
R10							R35						
R11							R36						
R12							R37						
R13							R38						
R14							R39						
R15							R40						
R16							R41						
R17							R42						
R18							R43						
R19							R44						
R20							R45						

OBJECTIVES

TERMINAL OBJECTIVE

At the completion of this training the student will be knowledgeable of the reasons for and the process of monitoring the ISFSI. (T1)

ENABLING OBJECTIVES

1. Explain the reason for monitoring the ISFSI. (R01)
2. Discuss the parameters that must be monitored. (R02)
   - 2.1 Limits for roof slab temperature
   - 2.2 Limits for temperature increase in 24 hours
   - 2.3 Frequency of readings
   - 2.4 Requirements when limits are exceeded
3. Identify the location of the instrumentation used to obtain the temperature readings. (R03)
4. Describe the correct procedure for taking the temperature readings. (R04)

SRO ENABLING OBJECTIVE

5. Explain the reason for the surveillance and identify the documents that require the surveillance to be performed. (R05)

1. INTRODUCTION

1.1 **(OBJ. R1)** Security has recently requested that Operations resume surveillance at the ISFSI.

1.2 **(OBJ. R2)** The parameters that will be monitored are as follows:

A. The Horizontal Storage Module (HSM) roof slab temperatures

B. The inlet and outlet ventilation screens checked for debris

C. Check for material that could block air flow between the modules

2. PRESENTATION

2.1 **(OBJ. R5)** ISFSI Tech Spec and Certificate of Compliance

A. The first 20 HSMs are covered by Oconee Nuclear Station ISFSI Material License SNM-2503 Technical Specification and Certificate of Compliance.

B. The rest are covered by a similar Spec and C of C that is held by Trans Nuclear.

1. Trans Nuclear handles the Spec with the NRC and we adhere to the requirements.

C. A copy of the Spec is in the OSM's office.

D. The basis for the surveillance requirements is to keep the concrete temperature bellow 350°F. Above this temperature the concrete begins to dry out and its strength and durability become uncertain.

E. Operations requirement to report temperature at the limit of 250°F is far enough below the TS of 350°F that it gives Reactor Engineering time to assess the situation.

1. Worse case they may be forced to unload the HSM.

F. The 80°F temperature rise would indicate a module that could be fast approaching the 250°F.

G. The surveillance is required daily and is to be performed on night shift.

1. The specified frequency for each Surveillance Requirement is met if the surveillance is performed within 1.25 times the interval specified in the frequency as measured from the previous performance.

a) 30 hours from last round max.

2.2 PT/600/01 is being changed to delete the notification from security and change the surveillance from day shift to night shift.

2.3 **(OBJ. R1)** The surveillance monitoring for the ISFSI is required by Site Specific Technical Specification 4.1 and is outlined in ISFSI General License Tech Spec.

2.4 **(OBJ. R2)** The HSM shall be inspected to verify that the air inlets and outlets are free from obstructions.

A. Normal visual inspection frequency

1. Daily

B. Accident visual inspection frequency

1. Within 24 hours after an accident

2.5 **(OBJ. R2)** Verify a temperature measurement of the thermal performance, for each HSM on a daily basis.

A. The temperature measurement could be any parameter that would indicate off-normal thermal conditions.

1. We use a direct measurement of the HSM roof slab temperature.

2.6 **(OBJ. R2)** Procedural requirements:

A. The roof slab temperatures on modules that contain spent fuel should be less than 250°F.

B. The temperature increase must be <80°F over a twenty-four hour period.

C. The surveillance will be performed once daily (Night Shift) with the resultant findings being reported to Unit 1's Control Room.

1. An MG is required to access the ISFSI, so ensure that you are logged onto the EDC System and read the posted plan view prior to entering the area

2.7 **(OBJ. R2)** For any HSM with an upper slab reading >250°F or one that experiences >80° temperature increase perform the following:

A. Notify Unit 1 Control Room

B. Ensure a work order is written

C. Notify Reactor Engineering

2.8 **(OBJ. R3)** Instrumentation for monitoring twenty of the temperatures (HSM 21 through 30) is located in the small panel, labeled TBDCS-1 Temperature Indication.

2.9 **(OBJ. R4)** Once the panel is opened, the HSM Roof Thermocouple Identification Chart can be found on the inside of the door.

A. Each HSM will have two temperature readings (east and west).

B. The selector switch and digital temperature indicator are inside the panel.

1. Selector switch, OSF SS 0001, has twenty positions.
2. Each position is required to be checked to ensure that the module roof slab temperature is less than 250°F, with less than an 80°F temperature rise in a twenty-four hour period.
3. Temperature is read on digital temperature indicator OSF P0001.
4. If the temperature is fluctuating, record the highest temperature.

5. This location measures HSMs 21 through 30.

2.10 **(OBJ. R3/R4)** The instrumentation for monitoring HSM 31 through 42 is located in the small panel located on the south end of the old HSMs.

A. It is labeled TBDCS-4, HSM Roof Thermocouple.

B. Selector switch, OSF SS 0002, has twenty-four positions and its operation is identical to the one on the north end.

1. Each position is required to be checked to ensure that the module roof slab temperature is less than 250°F, with less than an 80°F temperature rise in a twenty-four hour period.

2. Temperature is read on the digital temperature indicator OSF P0002.

2.11 **(OBJ. R3/R4)** Instrumentation for monitoring the 14 HSMs on the right side is located in the small panel located on the north end of the newer HSMs.

A. It is labeled TBDCS-5

B. Selector switch, OSF SS 0003, has thirty positions and its operation is identical to the others.

1. Six HSMs currently have fuel (HSMs 47 through 52) and are the only ones that must be monitored at this time.

2. Switch positions 5 through 10 (east readings) and 19 through 24 (west readings) are currently being read.

3. Temperature is read on digital temperature indicator OSF P0003.

2.12 **(OBJ. R02)** The older HSMs have screens below the modules' access covers as well as screens on the roof.

2.13 The oldest HSMs 1 through 20 have no temperature indication.

2.14 The newer HSMs have vertical screens that cover the separation between the HSMs.

A. The screens are on both sides of the HSMs and on top.

B. The actual ventilation inlets and outlets are at the top and bottom of the sides of the HSMs.

C. The screens should be visually inspected to ensure that the air inlets and outlets are not blocked and that nothing has accumulated between the modules that could block air flow.

D. Do not loiter over screened gaps

2.15 Red buckets, which can be seen on the roof, cover thermocouples that are used by fuel handling for monitoring inlet and outlet temperatures for the first week after loading an HSM.

2.16 Remember to close the gate to the facility.

A. PIP O-05-7553 discusses an instance where the NRC resident found the gate open and reported the incident to RP.

B. A clear view of the radiological postings for the area is compromised when the gate is left open. The postings are on the gate.

3. SUMMARY

3.1 Tech Specs requires monitoring of the ISFSI and Security has requested that Operations perform that monitoring.

3.2 The HSMs will be checked once per day.

3.3 Monitoring will consist of:

A. Roof slab temperatures

1. HSM roof slab temperature must be <250°F.
2. Individual HSM temperature increase must be <80°F over a 24 hour period.

B. Air inlets and outlets must be free from obstructions.

C. There are three panels that house temperature instrumentation.

1. Two on the older HSMs; one on each end
2. One on the north end of the newer HSMs.

D. HSMs 1 through 20 have no temperature indication.

COMMITMENT LOG

Commitment #	Summary of Change	Commitment (PIP #, SOER, Tracking #, etc.)
1		
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26		

LESSON PLAN/EXERCISE GUIDE CHANGE/REVISION DOCUMENTATION SHEET

TITLE: ISFSI Monitoring

ID:

DATE	CHANGE REVISON #	DESCRIPTION OF CHANGE/REVISION & SECTION(S) AFFECTED	INITIALS
11-07-07	00	NEW	TAL

Monitoring the ISFSI

A Trip to the Edge of the Protected Area

OBJECTIVES

- Explain the reason for monitoring the ISFSI.
- Discuss the parameters that must be monitored.
  - Limits for roof slab temperature
  - Limits for temperature increase in 24 hours
  - Frequency of readings
  - Requirements when limits are exceeded
- Identify the location of the instrumentation used to obtain the temperature readings.
- Describe the correct procedure for taking the temperature readings.
- SROs explain the reason for the surveillance and identify the documents that require the surveillance to be performed. _

Monitoring the ISFSI

- Security has recently requested that Operations resume surveillance at the ISFSI. The parameters that will be monitored are as follows:
  - The Horizontal Storage Module (HSM) roof slab temperatures
  - The inlet and outlet ventilation screens checked for debris
  - Check for material that could block air flow between the modules_

Monitoring the ISFSI

- The surveillance monitoring for the ISFSI is required by ISFSI Technical Specification 4.1and is outlined in ISFSI Certificate of Compliance 1.3.1 and 1.3.2:
  - The HSM shall be inspected to verify that the air inlets and outlets are free from obstructions.
  - Normal visual inspection frequency
    - Daily
  - Accident visual inspection frequency
    - Within 24 hours after an accident
  - Verify a temperature measurement of the thermal performance, for each HSM on a daily basis.
    - The temperature measurement could be any parameter that would indicate off-normal thermal conditions.
      - We use a direct measurement of the HSM roof slab temperature._

ISFSI Tech Spec and Certificate of Compliance (C of C)

- The first 20 HSMs are covered by Oconee Nuclear Station ISFSI Material License SNM-2503 Technical Specification and Certificate of Compliance.
- The rest are covered by a similar Spec and C of C that is held by Trans Nuclear.
  - Trans Nuclear handles the Spec with the NRC and we adhere to the requirements.
- Copies of the Site Specific Spec and the General license C of C are in the OSM's office._

ISFSI Tech Spec and Certificate of Compliance (C of C)

- The basis for the surveillance requirements is to keep the concrete temperature below 350°F.
  - Above this temperature the concrete begins to dry out and its strength and durability become uncertain.
- Operations requirement to report temperature at the limit of 250°F is far enough below the TS of 350°F that it gives Reactor Engineering time to assess the situation.
  - Worse case they may be forced to unload the HSM.
- The 80°F temperature rise would indicate a module that could be fast approaching the 250°F._

ISFSI Tech Spec and Certificate of Compliance (C of C)

- The surveillance is required daily and is to be performed on night shift.
  - The specified frequency for each Surveillance Requirement is met if the surveillance is performed within 1.25 times the interval specified in the frequency as measured from the previous performance.
    - 30 hours from last round max. _

PT/600/01

- PT/600/01 is being changed to delete the notification from security and change the surveillance from day shift to night shift._

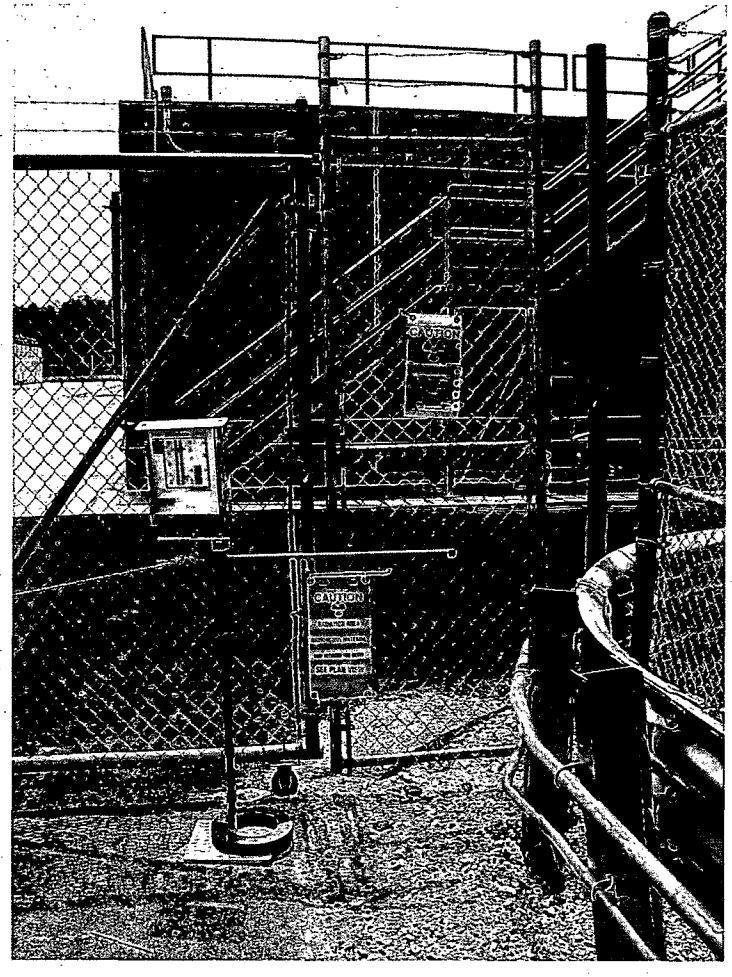
Monitoring the ISFSI

- Procedural requirements:
  - The roof slab temperatures on modules that contain spent fuel should be less than 250°F.
  - The temperature increase must be <80°F over a twenty-four hour period.
- The surveillance will be performed once daily (Night Shift) with the resultant findings being reported to Unit 1's Control Room.
- An MG is required to access the ISFSI, so ensure that you are logged onto the EDC System and read the posted plan view prior to entering the area _

Monitoring the ISFSI

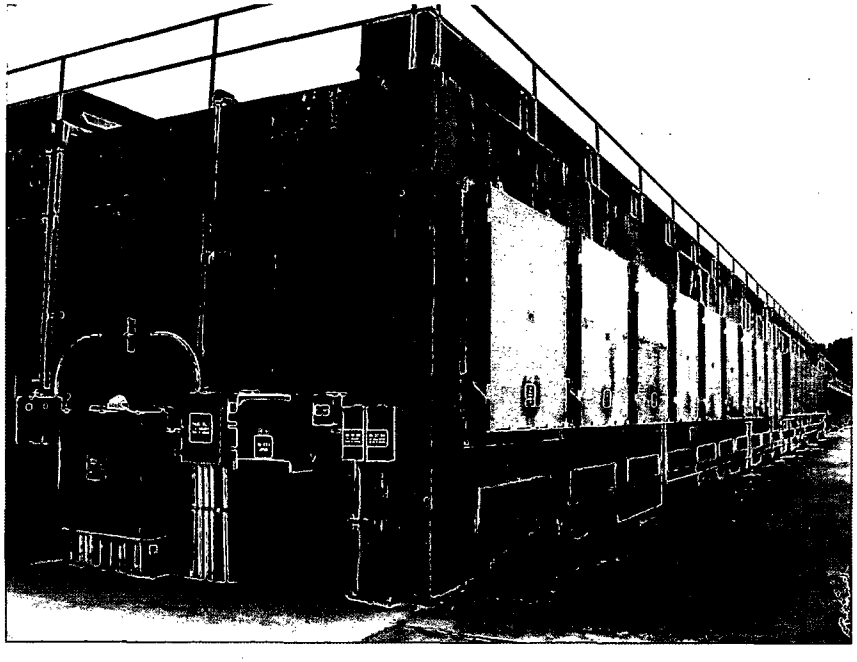
- For any HSM with a upper slab reading >250°F or one that experiences >80° temperature increase perform the following:
  - Notify Unit 1 Control Room
  - Ensure a work order is written
  - Notify Reactor Engineering_

Monitoring the ISFSI



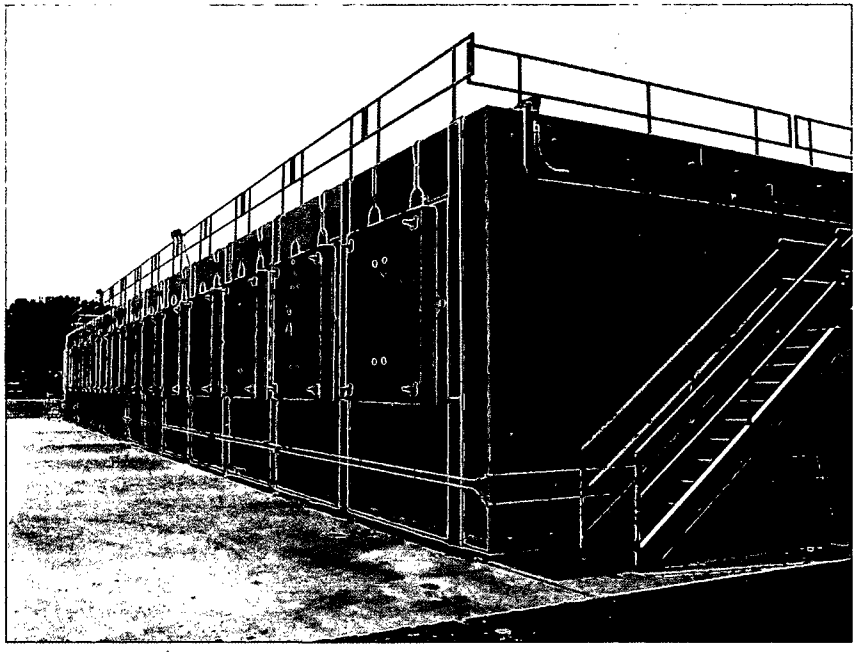
- This is the entry gate on the north side of the ISFSI.
- Note the radiological postings for the area.
- PIP O-05-7553 discusses an instance where the NRC resident found the gate open and reported the incident to RP.
- A clear view of the radiological postings for the area is compromised when the gate is left open. _

Monitoring the ISFSI



- Upon entering the gate, this is the view to your left, looking south along the (older) HSMs._

Monitoring the ISFSI

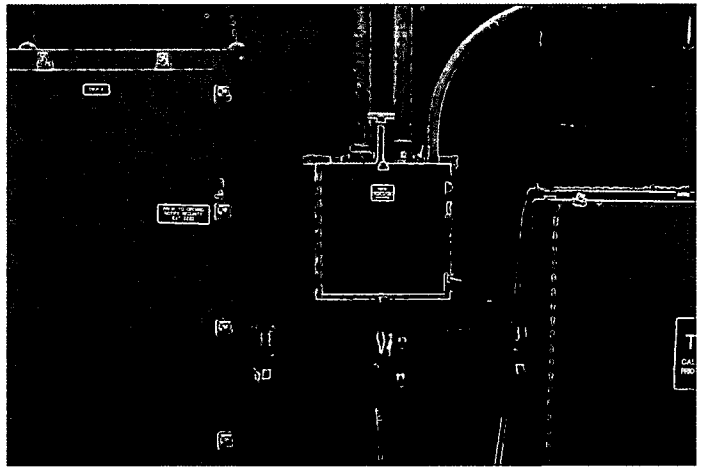


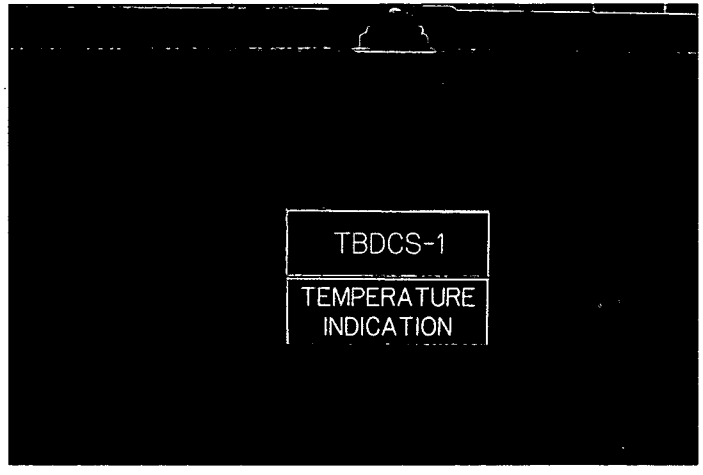
- These are the newer HSMs located to your right.

Monitoring the ISFSI

- You will also see these panels to your left, located on the north end of the HSMs.

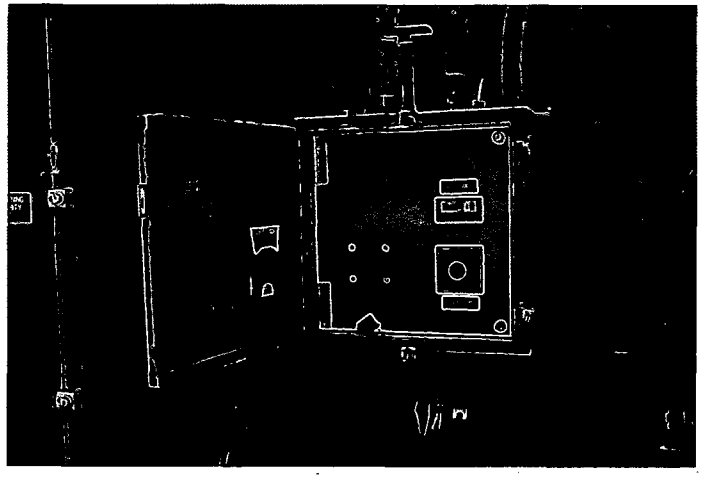
Monitoring the ISFSI

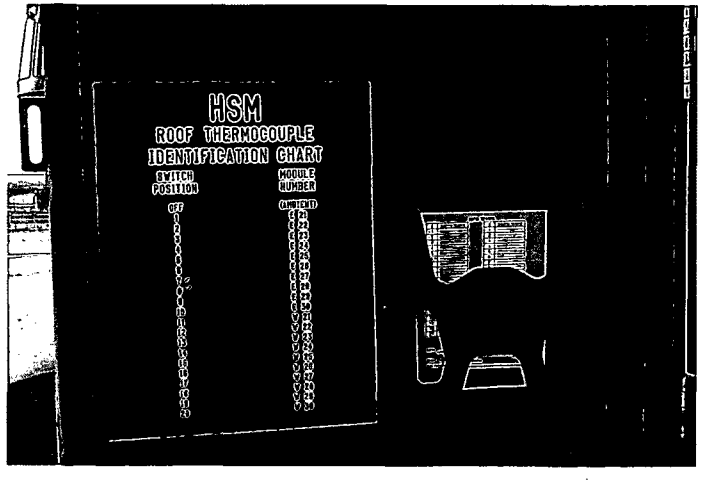




- Instrumentation for monitoring twenty of the temperatures (HSM 21 through 30) is located in the small panel, labeled TBDCS-1 Temperature Indication.

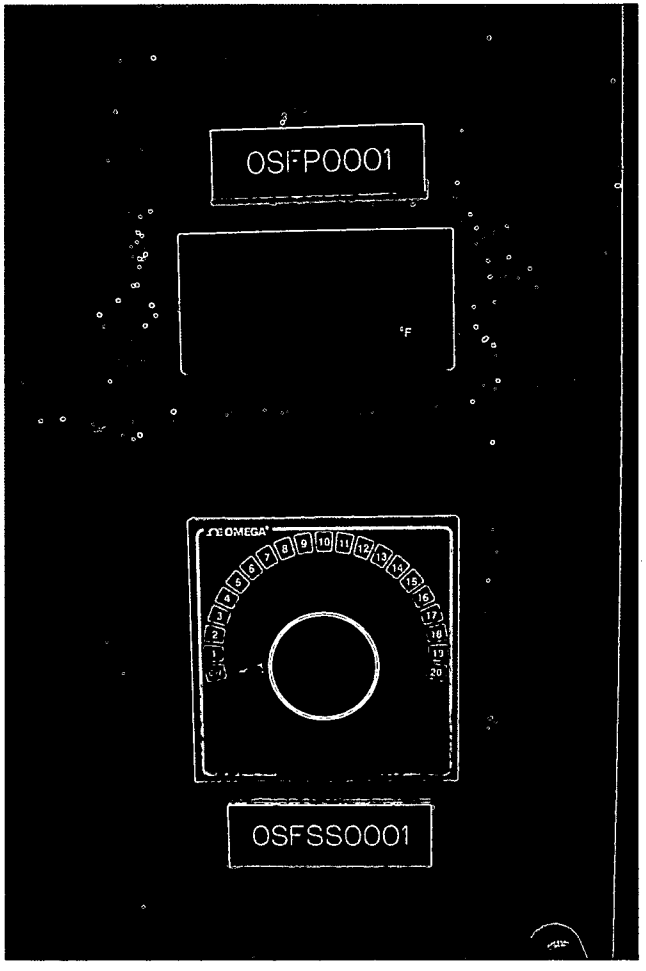
Monitoring the ISFSI





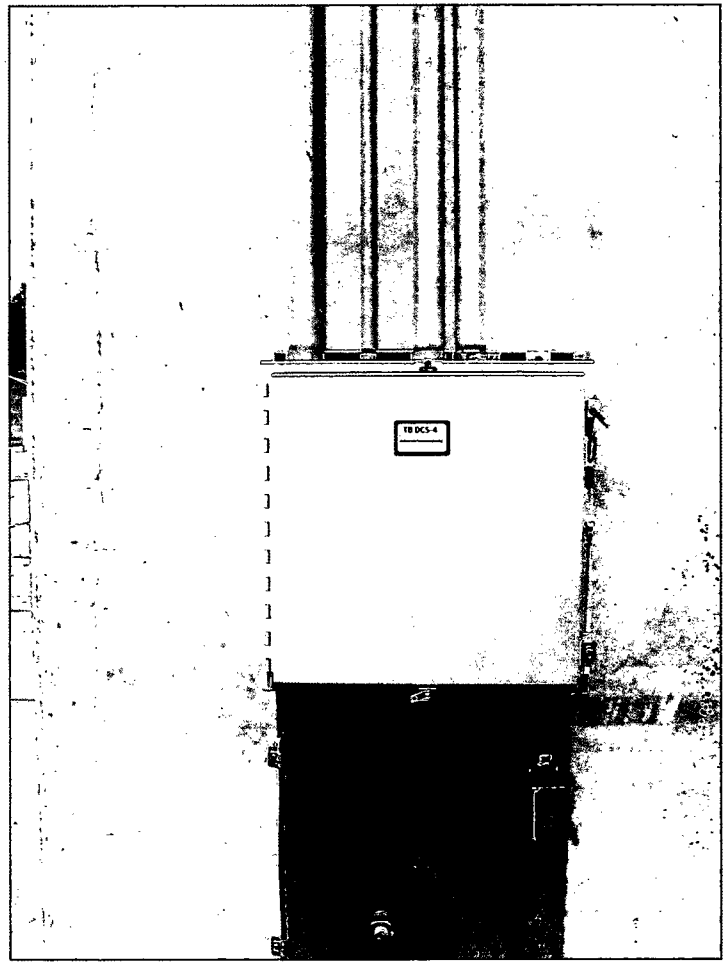
- Once the panel is opened, the HSM Roof Thermocouple Identification Chart can be found on the inside of the door.
- Each HSM will have two temperature readings (east and west).
- The selector switch and digital temperature indicator are inside the panel._

Monitoring the ISFSI



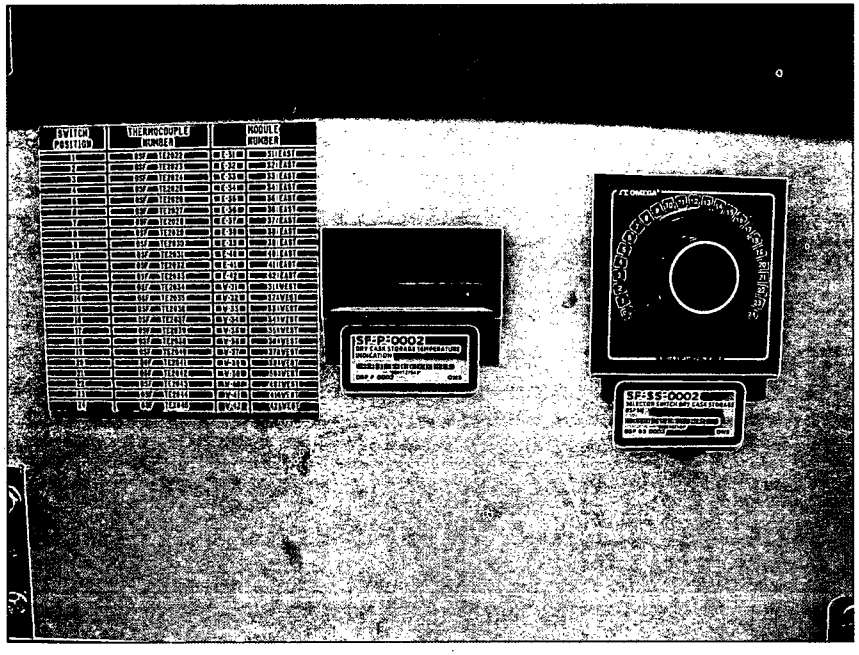
- Selector switch, OSF SS 0001, has twenty positions.
- Each position is required to be checked to ensure that the module roof slab temperature is less than 250°F, with less than an 80°F temperature rise in a twenty-four hour period.
- Temperature is read on digital temperature indicator OSF P0001.
- If the temperature is fluctuating, record the highest temperature.
- This location measures HSMs 21 through 30._

Monitoring the ISFSI



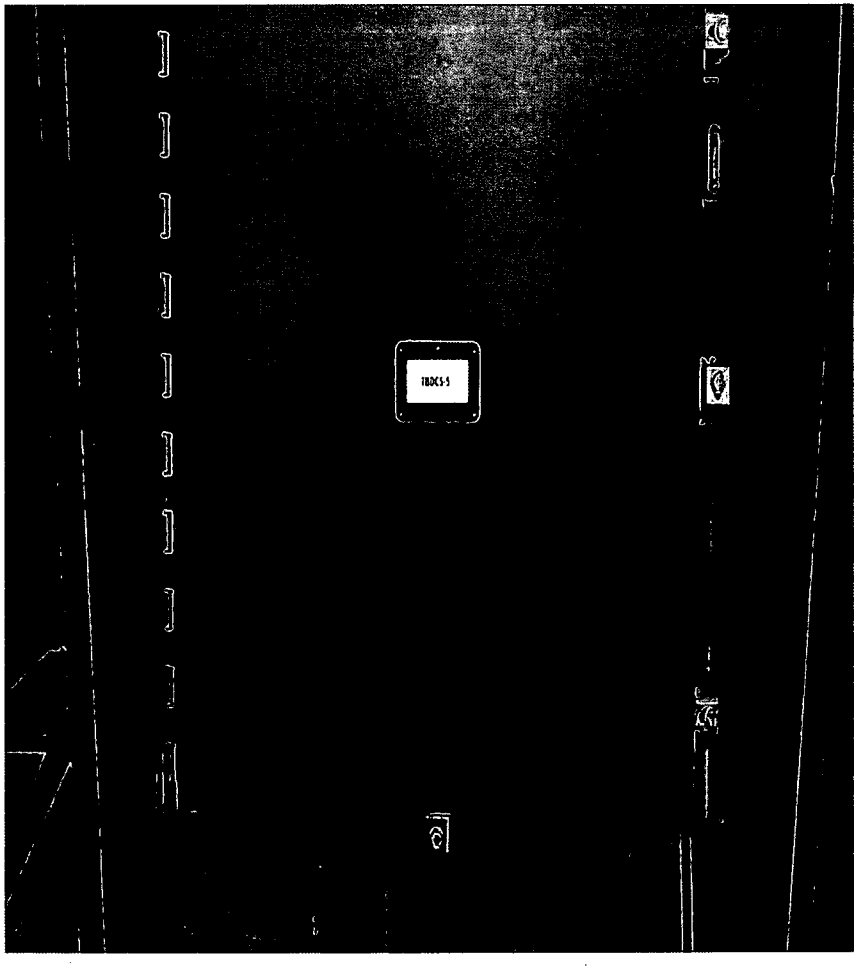
- The instrumentation for monitoring HSM 31 through 42 is located in the small panel located on the south end of the HSMs.
- It is labeled TBDCS-4, HSM Roof Thermocouple._

Monitoring the ISFSI



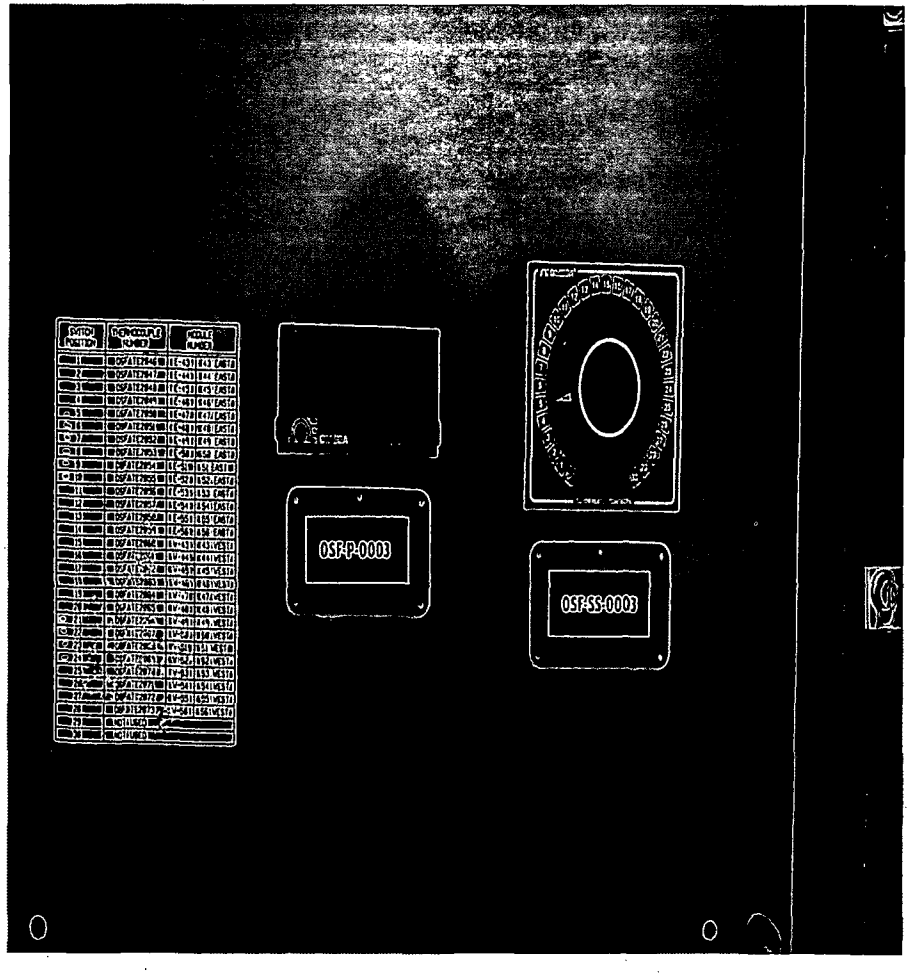
- Selector switch, OSF SS 0002, has twenty-four positions and its operation is identical to the one on the north end.
- Each position is required to be checked to ensure that the module roof slab temperature is less than 250°F, with less than an 80°F temperature rise in a twenty-four hour period.
- Temperature is read on the digital temperature indicator O SF P0002._

Monitoring the ISFSI



- Instrumentation for monitoring the 14 HSMs on the right side is located in the small panel located on the north end of the newer HSMs.
- It is labeled TBDCS-5

Monitoring the ISFSI

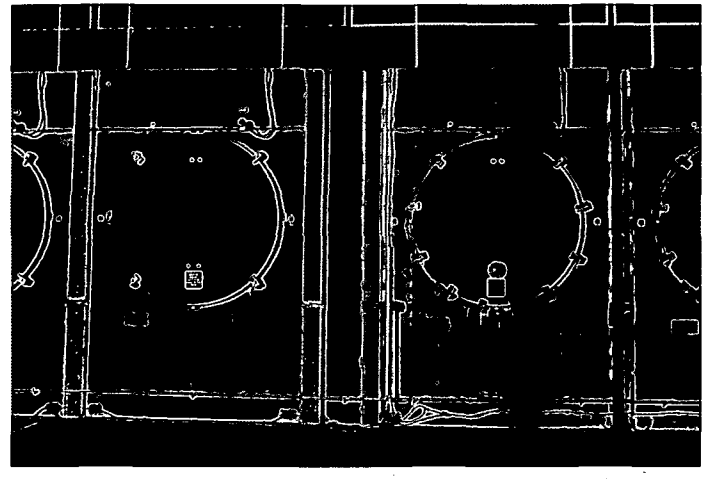


- Selector switch, OSF SS 0003, has thirty positions and its operation is identical to the others.
- Six HSMs currently have fuel (HSMs 47 through 52) and are the only ones that must be monitored at this time.
- Switch positions 5 through 10 (east readings) and 19 through 24 (west readings) are currently being read.
- Temperature is read on digital temperature indicator OSF P 0003._

Monitoring the ISFSI

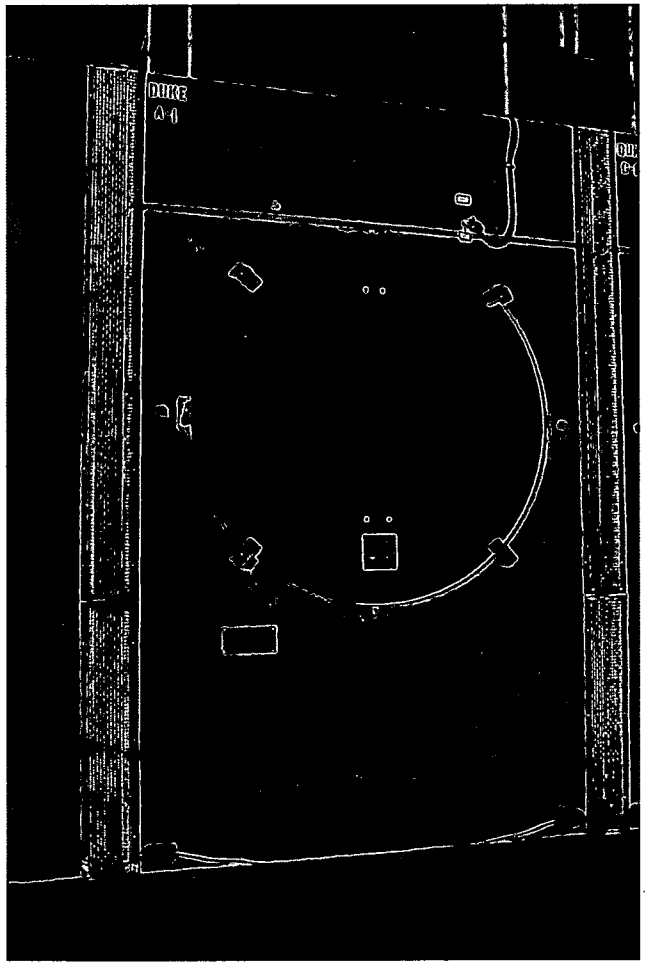
- These are the ventilation screens that are required to be inspected.
- The older HSMs have screens below the modules' access covers as well as screens on the roof. This is the view on the west side of the older HSMs.
- The oldest HSMs 1 through 20 have no temperature indication._

Monitoring the ISFSI



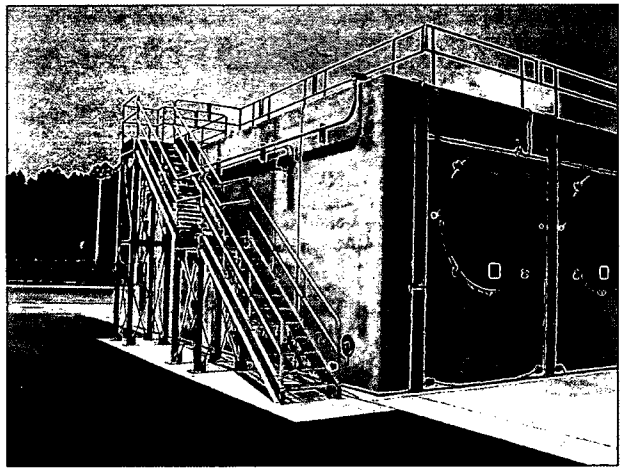
- This is the view of the vertical screens between the newer modules.
- These screens are on the east and west sides of the HSMs._

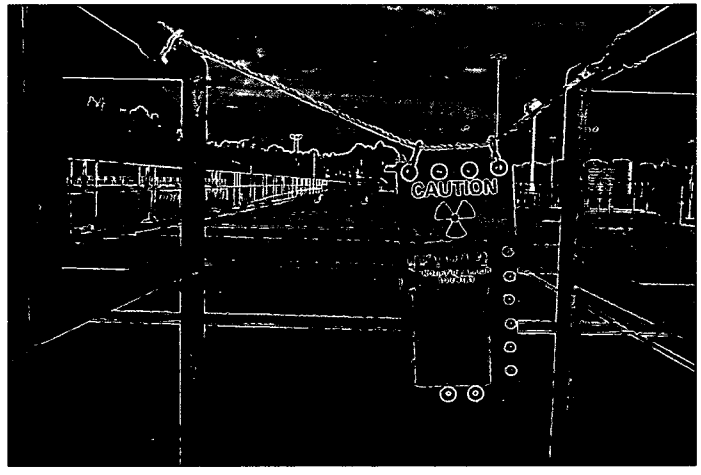
Monitoring the ISFSI



- Another view of the vertical screens on the newer HSMs.
- The screens should be visually inspected to ensure that the air inlets and outlets are not blocked and that nothing has accumulated between the modules that could block air flow._

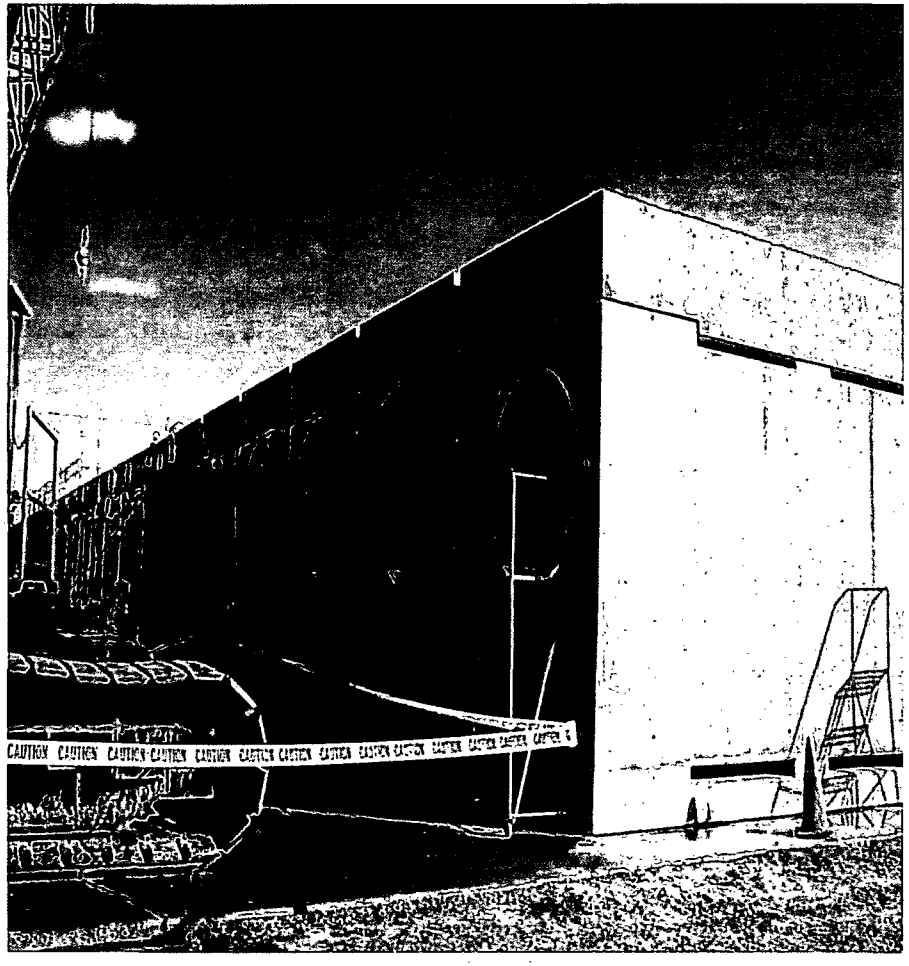
Monitoring the ISFSI





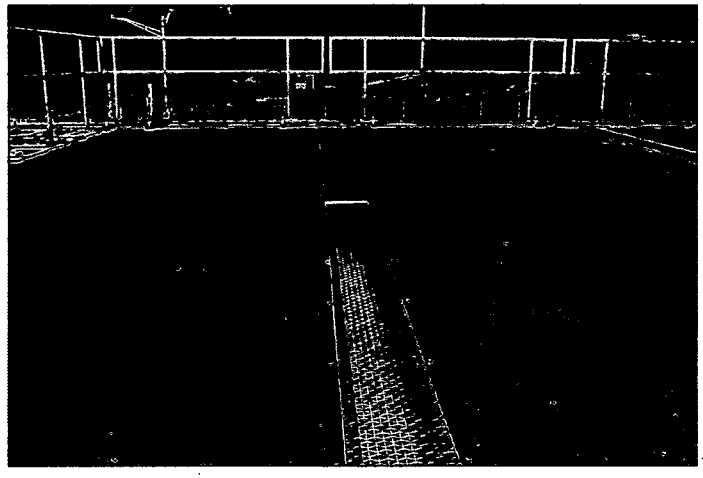
- The picture on the left is the stairwell located on the southern end of the HSMs for roof access and the picture on the right is the entrance to the roof from the stairwell.
- There is also a ladder on the northern end of the HSMs for roof access. _

Monitoring the ISFSI



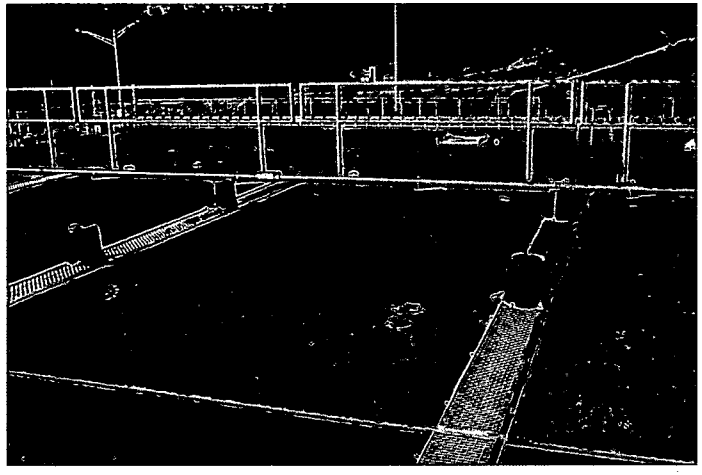
- HSMs under construction.
- The slots at the bottom and top of the module are the ventilation inlets and outlets.
- The screens between the HSMs keep birds and debris from collecting between HSMs._

Monitoring the ISFSI



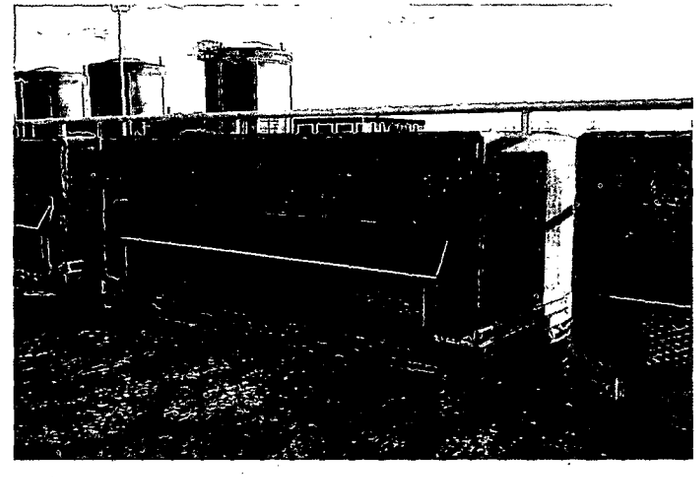
- This is one of the ventilation screens on the roof of the HSMs.
- There is one screen between each of the newer HSMs on the roof.
- Do not loiter over screened gaps._

Monitoring the ISFSI



- Another view of the roof ventilation screens.
- The red buckets are covering thermocouples that are used by fuel handling for monitoring inlet and outlet temperatures for the first week after loading an HSM._

Monitoring the ISFSI



- These ventilation screens are located on the roof, on the northern end, above the older HSMs._

SUMMARY

- Tech Specs requires monitoring of the ISFSI and Security has requested that Operations perform that monitoring.
- The HSMs will be checked once per shift
- Monitoring will consist of:
  - Roof slab temperatures
    - HSM roof slab temperature must be <250°F.
    - Individual HSM temperature increase must be <80°F over a 24 hour period.
  - Air inlets and outlets must be free from obstructions.
- There are three panels that house temperature instrumentation.
  - Two on the older HSMs; one on each end
  - One on the north end of the newer HSMs.
- HSMs 1 through 20 have no temperature indication._

APPROVAL:_____

SME APPROVAL:_____

TASK MM-OT-6301
ETQS
TRAINING AND QUALIFICATION GUIDE

TITLE: Preventive Maintenance of Spent Fuel Shipping Cask

DESCRIPTION: Perform preventive maintenance of Spent Fuel Shipping Cask to meet acceptance criteria established by Maintenance Procedures and/or Manufacturers' Literature.

The qualification parameters are: None

ACCEPTABLE QUALIFICATION METHOD: P

PREREQUISITES: MM-OT-0722 Operate A Lasco or Equivalent (Uni-Test) Type Test Bench

TRAINING/QUALIFICATION ELEMENTS:

S/U 1. Visually Inspect Cask.

A. Explain the criteria for the visual inspection of Spent Fuel Cask components.

S/U 2. Based on inspection results, repair component parts as necessary and/or discuss repairs required.

S/U 3. Perform preventive maintenance on the Spent Fuel Shipping Cask using sequence identified by Maintenance Procedures and/or Manufacturers' Literature.

A. Discuss the process for removal and installation of a Helicoil.

B. Discuss the process for removal, testing and installation of the Neutron Shield Safety Relief Valve.

S/U 4. Clean and Inspect all disassembled components as necessary.

TASK MM-OT-6301
ETQS
TRAINING AND QUALIFICATION GUIDE

REFERENCES:

ASSOCIATED PROCEDURES:
NOTE: Asterisk item denotes qualifiable procedure.

MP/0/A/1700/09 *
MP/0/A/1700/014 *

OPERATING EXPERIENCE ITEMS:

TASK MM-OT-6301
TRAINER/QUALIFIER GUIDE

The following provides guidance for the Trainer/Qualifier to ensure the training and qualification is conducted with consistency and in accordance with established and approved standards. It will provide some guidance on the key areas of emphasis embedded within each element.

All lettered information can be directly tied to an element's individual enabling objective on the T&Q Guide. Asterisked items include information that should be emphasized/evaluated throughout the performance of that element.

The qualifier may question the technician during task performance; assuring that questioning neither assists nor hinders technician performance of the task.

The following are general items that should be stressed/evaluated during all maintenance activities:

* Proper use of tools and equipment
* Bagging all small parts
* Tagging all parts
* Cleanliness of work area
* Adherence to all safety/FME rules
* Match marking component parts
* Obtaining QC sign-offs as applicable
* Proper care, handling, and storage of component parts

ELEMENT 1: VISUALLY INSPECT CASK

* Have R.P. Technician monitor radiation levels.

A. Explain the criteria for the visual inspection of Spent Fuel Cask components.

1. Inspect cask lid for nicks and/or gouges, o-ring grooves and seating surfaces for cracks, wear or damage.

2. Inspect all bolting for cracking/galding or other indications of damage.

ELEMENT 2: BASED ON INSPECTION RESULTS, REPAIR COMPONENT PARTS AS NECESSARY AND/OR DISCUSS REPAIRS REQUIRED.

- Polish out any nicks or grooves found.

- Replace all o-rings.

- Repair or replace any damaged bolts.

TASK MM-OT-6301
TRAINER/QUALIFIER GUIDE

ELEMENT 3: PERFORM PREVENTIVE MAINTENANCE ON THE SPENT FUEL SHIPPING CASK USING SEQUENCE IDENTIFIED BY MAINTENANCE PROCEDURES AND/OR MANUFACTURER'S LITERATURE.

A. Discuss the process for removal and installation of a Helicoil.

- Cut a notch in top coil.
- Using Helicoil removal tool, remove Helicoil.
- Using special Helicoil tap, re-tap threaded hole.
- Using Helicoil insertion tool, install Helicoil.
- Top of coil shall be 1/4 to 1/2 turn below top surface.
- Using long nose pliers, remove tang from Helicoil.

* Treat underside of lid, inside surfaces of cask and any bolts or inserts as contaminated
* Be careful not to damage threads in tapped hole.
* Verify that a bolt can be threaded into the new insert.

B. Discuss the process for removal, testing and installation of the Neutron Shield Safety Relief Valve.

- Remove deflector cap and save for reuse.
- Remove relief valve and tag as to location removed from.
- Clean valve, inspect valve body and threads for damage, repair/replace as necessary.
- Test valve per the appropriate procedure. Adjust as necessary.
- Repeat this process for remaining valves.
- Install thread sealant on relief valve threads and install into cask.
- Install deflector caps on valves.

TASK MM-OT-6301
TRAINER/QUALIFIER GUIDE

ELEMENT 4: CLEAN AND INSPECT ALL DISASSEMBLED COMPONENTS AS NECESSARY.

- Clean upper and lower trunnion bearing surfaces and welds.
- Visually inspect cask trunnion bearing surfaces and welds for damage. Document results in appropriate procedure.

APPROVAL:_____

SME APPROVAL:_____

MM-OT-6103
ETQS
TRAINING AND QUALIFICATION GUIDE

TITLE: Inspect and perform quarterly and annual inspections of Nutech 24P 100-ton Spent Fuel Cask Lifting Equipment

DESCRIPTION: Inspect Spent Fuel Cask lifting equipment to meet acceptance criteria established by Maintenance procedures and/or manufacturer's literature. Perform annual load-test (150% capacity) of the cask lifting equipment per procedure. Perform quarterly visual inspection on cask yoke and lift adaptor.

The qualification parameters are: All appropriate station Safety, FME, RP, and Lifting/Rigging guidelines shall be used during rigging/lifting aspects of the tasks for inspection and load-testing of the NUTECH 100-ton Spent Fuel Cask Lifting Equipment.

ACCEPTABLE QUALIFICATION METHOD: P

PREREQUISITES:

CO-LIFT-1201	Rigger Lifting Process
CO-LIFT-1203	Operation of a Pendant Crane
MM-OT-6107	Inspection of Lifting Equipment

TRAINING/QUALIFICATION ELEMENTS:

S/U 1. Discuss applicable procedural Safety Considerations associated with the following cask lifting equipment inspection/load-test procedures.

A. MP/0/A/1700/010A

B. MP/0/A/1700/010B

C. MP/0/A/1700/014

S/U 2. Identify and discuss the purpose of the following:

A. Transfer Cask Lifting Yoke

B. Long-Lift Adaptor

C. Load Test Tower

D. Load Test Base

S/U 3. Perform quarterly visual inspection of NUTECH 100-ton spent fuel cask lifting equipment per MP/0/A/1710/014.

S/U 4. Perform Annual Load Test (150% capacity) and inspection of NUTECH 100-ton spent fuel cask lifting equipment per MP/0/A/1700/010B, using Load-Test Tower, Base, and hydraulic jacks.

S/U 5. Perform visual inspection and dimensional verification for Nutech cask lifting equipment per MP/0/A/1700/010A

A. Disassemble Nutech Lifting Yoke

B. Contact QA to perform NDE for cask lifting equipment

C. Reassemble Nutech cask lifting equipment.

REFERENCES:

NOTE: Asterisk item denotes qualifiable procedure.

1. ASSOCIATED PROCEDURES:

MP/0/A/1700/010A	Cask-Spent Fuel-Lifting Equipment (NUTECH)-Inspection
MP/0/A/1700/010B	Cask-Spent Fuel-Lifting Equipment (NUTECH) - Load Test
MP/0/A/1700/014	Spent Fuel Cask-Yokes and Lift Adaptors - Visual Inspection (Quarterly inspection)

MM-OT-6103
TRAINER/QUALIFIER GUIDE

The following provides guidance for the Trainer/Qualifier to ensure the training and qualification is conducted with consistency and in accordance with established and approved standards. It will provide some guidance on the key areas of emphasis embedded within each element.

All lettered information can be directly tied to an element's individual enabling objective on the T&Q Guide. Asterisked items include information that should be emphasized/evaluated throughout the performance of that element.

The qualifier may question the technician during task performance; assuring that questioning neither assists nor hinders technician performance of the task.

The following are general items that should be stressed/evaluated during all maintenance activities:

* Proper use of tools and equipment
* Bagging all small parts
* Tagging all parts
* Cleanliness of work area
* Adherence to all safety/FME rules
* Match marking component parts
* Obtaining QC sign-offs as applicable
* Proper care, handling, and storage of component parts

ELEMENT 1: DISCUSS APPLICABLE PROCEDURAL SAFETY CONSIDERATIONS ASSOCIATED WITH THE FOLLOWING CASK LIFTING EQUIPMENT INSPECTION/LOAD-TEST PROCEDURES:

A. MP/0/A/1700/010A

B. MP/0/A/1700/010B

C. MP/0/A/1700/014

Procure a copy of the above procedures and discuss the Safety Considerations section in each.

MM-OT-6103
TRAINER/QUALIFIER GUIDE

ELEMENT 2. IDENTIFY AND DISCUSS THE PURPOSE OF THE FOLLOWING:

A. Transfer Cask Lifting Yoke

Lifting device that adapts the SFP Transfer Cask to the 100-ton crane hook to allow the crane to be used for transport of the cask within the SFP and Fuel Receiving Bay Areas.

Normally stored on stand in the Fuel Receiving Bay.

B. Long-Lift Adaptor

Lifting device that is attached between the 100-ton crane hook and the Cask Lifting Yoke to allow transfer of the cask to/from the Cask Platform and the SFP Depression area.

Normally stored in overhead of Fuel Receiving Bay area, hanging from a specifically-designed support hook.

C. Load Test Tower

Upper section of the Cask Yoke Load-Test Fixture.

30' tall (5200 lb) steel-framed tower used to allow support for long-lift adaptor when attaching the adaptor to the cask lifting yoke for annual load-test.

The Load Test Tower is used in conjunction with the Load Test Base and is secured to the base with support pins.

Normally stored in the ISFSI Warehouse (Old Motor Pool)

D. Load Test Base

Lower adjoining section of the Cask Yoke Load-Test Fixture.

Base weighs 4800 lbs and is used during the load-test to support the Cask Yoke. Base is then attached to the Tower, which is used to align/support the yoke's long-lift adaptor.

Normally stored in the ISFSI Warehouse (Old Motor Pool)

MM-OT-6103
TRAINER/QUALIFIER GUIDE

ELEMENT 3. PERFORM QUARTERLY VISUAL INSPECTION OF NUTECH 100-TON SPENT FUEL CASK LIFTING EQUIPMENT PER MP/0/A/1710/014.

NOTE: Refer to appropriate procedure enclosures for parts identification sheets during inspection.

* Visually inspect for structural members that are broken, bent, loose, missing, or cracked.

* Inspect for indications of loose or missing fasteners, rivets, bolts, and welds.

* Inspect for evidence of damage from heat, chemicals, or corrosion.

* Inspect for evidence of mechanical deformation of structure and all load-bearing pins, bolts, and threads.

* Inspect all bearing seals to verify no free grease or lubricant is present.

* Verify no evidence of faulty repair or improper component substitution.

* Verify all latching mechanisms operate properly.

* Document all discrepancies on procedure Log Sheet and initiate WR for necessary repairs.

* Verify all equipment and tools are properly stored and notify supervisor of all results.

ELEMENT 4. PERFORM ANNUAL LOAD-TEST (150% CAPACITY) AND INSPECTION OF NUTECH 100-TON SPENT FUEL CASK LIFTING EQUIPMENT PER MP/0/A/1700/010B, USING LOAD-TEST TOWER, BASE, AND HYDRAULIC JACKS.

* Stage the following in the desired Fuel Receiving Bay as directed per procedure:

  a. Cask Yoke

  b. Long-Lift Adaptor

  c. Hydraulic Jack system to be used for load-test

  d. Load Test Tower and Load Test Base

MM-OT-6103
TRAINER/QUALIFIER GUIDE

* Level the Load Test Base per procedural guidelines.

* Place Load Test Tower onto base and secure with pins.

* Place long-lift adaptor into tower per procedure.

* Unpin Tower and pick up from base, then attach yoke to long-lift adaptor.

* Align tower with yoke hook opening towards base, then position tower to engage yoke with 8" pins in base.

* Install shim plates and jacks under tower legs per procedure, and then pressurize jacks to evenly remove play.

* Perform Yoke Load Test per procedural guidelines.

  a. Evenly pump hydraulic jacks to test pressure at 4100 psi + 100 psi - 0.

  b. Verify all 4 jacks are at required test pressure.

  c. Measure extended stroke of each jack and record.

     If extended stroke on any jack is more than 2.00 inches, release pressure on all jacks and add shims as needed to shorten stroke to less than 2.00 inches on affected jacks.

  d. Maintain required pressure on jacks for duration of load-test.

* Perform Visual Inspection of Yoke and Long-Lift Adaptor

  a. Inspect for deformation of structures and obvious visual damage.

  b. Verify yoke is square with extension and base in test fixture.

  c. Visually inspect entire device, weld areas, pins, arms, **under load** for damage and record any discrepancies from normal. **UNDER LOAD test shall be greater than 10 minutes, per procedure.**

  d. Release pressure from hydraulic system.

* Disassemble Test Equipment

NOTE: Visual inspection per MP/0/A/1700/010A may be performed during disassembly of test equipment.

a. Remove shims and jacks

b. Lower tower to disengage yoke hooks and move out of test base.

c. Place yoke on support stand.

d. Place tower on base; pin and secure pins.

e. Retract long-lift adaptor extension per procedure and then place lift-adaptor on storage hanger in fuel bay.

f. Place lift plate on tower and bolt down.

g. Unpin tower and remove from base.

* Decon Test Tower and Base and prepare for storage

* Remove Load-Testing equipment and store as required.

ELEMENT 5. PERFORM VISUAL INSPECTION AND DIMENSIONAL VERIFICATION OF NUTECH 100-TON SPENT FUEL CASK LIFTNG EQUIPMENT PER MP/0/A/1700/010A.

NOTE: Each lifting device shall be subjected annually to visual examination, dimensional verification, and non-destructive testing of major load-carrying welds and critical areas.

NOTE: Pin locks should engage sufficiently to prevent removal of pin.

* Inspect for obvious visual deformation of assembled structures.

* Inspect for structural members that are broken, bent, loose, missing, or cracked.

* Inspect for evidence of damage from heat, chemicals, or corrosion.

* Inspect for loose fasteners, defective welds, and rust.

* Inspect clevis pin on extension adaptor; if pin is bent or damaged, replace with new pin.

* Visually inspect and exercise screw actuator for corrosion, bent lead screw, worn threads, or any mechanical defects.

* All welds to be free from obvious cracks. Removal of paint not required for this visual inspection.

* Measure J-leg tram marks and inspect to verify throat opening is within maximum dimensions.

A. DISASSEMBLE NUTECH LIFTING YOKE

CAUTION: **Each component should be labeled and match-marked prior to disassembly to ensure proper reassembly.**

Care to be taken when removing J-legs on yoke; parts are heavy and pinch-points exist.

* Visually inspect bolting material on yoke for any damage or defects replace as necessary.

* Disassemble yoke by loosening the stainless steel hook tie-bolts on one side of the yoke, and then loosen spacer bolts on inside of spreader. Spread yoke halves apart, and then remove either right or left hook.

B. CONTACT QA TO PERFORM NDE FOR CASK LIFTING EQUIPMENT

After yoke is disassembled, contact QC to perform NDE as directed per appropriate enclosures in procedure.

NOTE: For NDE inspection, paint may need to be removed from load-bearing areas of the hooks.

* NDE of lifting pins

* NDE of yoke and yoke extension is required on load-bearing portion of pin eye plus one inch of exterior of eye.

* NDE of load bearing area inside J-legs shall be done in accordance with standard NDE for crane hooks.

MM-OT-6103
TRAINER/QUALIFIER GUIDE

C. REASSEMBLE NUTECH CASK LIFTING EQUIPMENT

NOTE: Before reassembly, any paint removed or nicks or scratches on yoke and yoke extension will be painted back in accordance with Duke Power Coating Spec 306; 8.5 - 10.0 mils thick; DP #71.

NOTE: Watch for pinch-points during reassembly.

* Reassemble lifting devices utilizing labeling and match marks during disassembly.

* Visually inspect yoke beam bolting material and replace as necessary.

* Replace four SS bolts and apply Loc-tite to nuts and torque to 500 ft/lbs. Each J-leg, QA to verify.

* Verify all labeling is correct (serial numbers, weights, and rating).

* Return yoke and yoke extension to proper storage location.

Enclosure 2
Transnuclear Affidavit

AFFIDAVIT PURSUANT
TO 10 CFR 2.390

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

I, Jayant Bondre, depose and say that I am a Vice President of Transnuclear, Inc., duly authorized to execute this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.390 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought is listed below:

1. The section titled "DSC Fatigue Evaluation" from Pages 10 and 11 of Areva Technical Report 53918-0101, "ISFSI Time-Limited Aging Analysis Report," Revision 0, May 25, 2007,

2. Transnuclear, Inc. calculation NUH002.0470, "Fatigue Analysis of Transfer Cask Trunnion and Transfer Cask Lifting Yoke System," Revision 0.

These documents have been appropriately designated as proprietary.

I have personal knowledge of the criteria and procedures utilized by Transnuclear, Inc. in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1) The information sought to be withheld from public disclosure involves the structural analysis of a spent fuel storage dry shielded canister regarding cracking due to fatigue, and a calculation associated with the fatigue analysis of certain components of a spent fuel storage transfer cask, which are owned and have been held in confidence by Transnuclear, Inc.

2) The information is of a type customarily held in confidence by Transnuclear, Inc. and not customarily disclosed to the public. Transnuclear, Inc. has a rational basis for determining the types of information customarily held in confidence by it.

3) The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.390 with the understanding that it is to be received in confidence by the Commission.

4) The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

5) Public disclosure of the information is likely to cause substantial harm to the competitive position of Transnuclear, Inc. because:

   a) A similar product is manufactured and sold by competitors of Transnuclear, Inc.

b) Development of this information by Transnuclear, Inc. required expenditure of considerable resources. To the best of my knowledge and belief, a competitor would have to undergo similar expense in generating equivalent information.

c) In order to acquire such information, a competitor would also require considerable time and inconvenience related to the development of a design and analysis of a dry spent fuel storage system.

d) The information required significant effort and expense to obtain the licensing approvals necessary for application of the information. Avoidance of this expense would decrease a competitor's cost in applying the information and marketing the product to which the information is applicable.

e) The information consists of descriptions of the design and analysis of dry spent fuel storage systems, the application of which provide a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Transnuclear, Inc., take marketing or other actions to improve their product's position or impair the position of Transnuclear, Inc.'s product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

f) In pricing Transnuclear, Inc.'s products and services, significant research, development, engineering, analytical, licensing, quality assurance and other costs and expenses must be included. The ability of Transnuclear, Inc.'s competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

Further the deponent sayeth not.

Jayant Bondre
Vice President, Transnuclear, Inc.

Subscribed and sworn to me before this 19th day of January, 2009.

Notary Public

My Commission Expires 10 / 14 / 2012

ATTACHMENT 4

LIST OF REGULATORY COMMITMENTS

The following commitment table identifies those actions committed to by Duke Energy Carolinas, LLC (Duke) in this submittal. Other actions discussed in the submittal represent intended or planned actions by Duke. They are described to the Nuclear Regulatory Commission (NRC) for the NRC's information and are not regulatory commitments.

	Commitment	Completion Date
1	The ISFSI inspection procedure will be revised to add a periodic surveillance to check for the presence of nesting materials on or in the HSM structure.	Prior to implementation of renewed license period.
2	There are no planned expansions outside of the current footprint of the existing Site-Specific ISFSI. If the Site-Specific ISFSI is expanded, Duke will perform a survey of the affected area for any federally listed RTE and Species of Concern.	Prior to the start of ground disturbing activities.