

ATTACHMENT 1

VOLUME 15

KEWAUNEE POWER STATION IMPROVED TECHNICAL SPECIFICATIONS CONVERSION

ITS CHAPTER 4.0 DESIGN FEATURES

Revision 0

LIST OF ATTACHMENTS

- 1. ITS 4.0**

**Current Technical Specification (CTS) Markup
and Discussion of Changes (DOCs)**

5.0 DESIGN FEATURES

5.1 SITE

APPLICABILITY

Applies to the location and extent of the reactor site.

OBJECTIVE

To define those aspects of the site which affect the overall safety of the installation.

SPECIFICATION

4.1

The Kewaunee Power Station is located on property owned by Dominion Energy Kewaunee, Inc. at a site on the west shore of Lake Michigan, approximately 30 miles east-southeast of the city of Green Bay, Wisconsin.

The minimum distance from the center line of the reactor containment to the site exclusion radius as defined in 10 CFR 100.3 is 1200 meters.

5.2 CONTAINMENT

APPLICABILITY

Applies to those design features of the Containment System relating to operational and public safety.

OBJECTIVE

To define the significant design features of the Containment System.

SPECIFICATION

a. Containment System

1. The Containment System completely encloses the entire reactor and the Reactor Coolant System and ensures that leakage of activity is limited, filtered and delayed such that off-site doses resulting from the design basis accident are within the guidelines of 10 CFR Part 50.67. The Containment System provides biological shielding for both normal OPERATING conditions and accident situations.
2. The Containment System consists of:
 - A. A free-standing steel reactor containment vessel designed for the peak pressure of the design basis accident.
 - B. A concrete shield building which surrounds the containment vessel, providing a shield building annulus between the two structures.
 - C. A Shield Building Ventilation System that causes leakage from the reactor containment vessel to be delayed and filtered before its release to the environment.
 - D. An Auxiliary Building Special Ventilation System that serves the special ventilation zone and supplements the Shield Building Ventilation System during an accident condition by causing any leakage from the Residual Heat Removal System (RHRS) and certain small amounts of leakage that might be postulated to bypass the Shield Building Ventilation System to be filtered before their release.

LA01

b. Reactor Containment Vessel

1. The reactor containment vessel is designed for the peak internal pressure of the design basis accident plus the loads resulting from an earthquake producing 0.06g horizontally and 0.04g vertically. It is also designed to withstand an external pressure 0.8 psi greater than the internal pressure.
2. Penetrations of the containment vessel for piping, electrical conductors, ducts and access hatches are provided with double barriers against leakage.
3. The automatically actuated containment valves are designed to close upon high containment pressure and on a safety injection signal. The actuation system is designed so that no single component failure will prevent containment isolation, if required.

LA01

c. Shield Building

The shield building is a reinforced concrete structure with a wall thickness of 2.5 feet and a dome thickness of 2 feet. It is designed for the same seismic conditions as the reactor containment vessel and is designed to resist a 3 psi internal pressure due to tornadoes.

LA01

d. Shield Building Ventilation System

In the event of a loss-of-coolant accident, the Shield Building Ventilation System will relieve the initial thermal expansion of air through particulate and charcoal filters and will then cause a vacuum to be produced throughout the shield building annulus. A momentary positive pressure no greater than 0.5 psi will result during the thermal expansion. Once vacuum is achieved, the system causes the air within the annulus to be recirculated through the filters while vacuum is maintained. The filtered mixture of annulus air plus leakage is vented through the Containment System vent by the discharge fan that maintains vacuum at a vent rate determined by in-leakage to the shield building.⁽¹⁾

LA01

e. Auxiliary Building Special Ventilation Zone and Special Ventilation System

A limited amount of containment leakage could potentially escape through certain penetrations in the event of leakage in the isolation valves, as described in the Basis of TS 3.6. The leakage escaping into that portion of the auxiliary building which is designed for medium leakage and controlled access would be processed by the Auxiliary Building Special Ventilation System. When actuated, the system will draw all in-leakage air from this special ventilation zone and exhaust it through particulate and charcoal filters to the auxiliary building vent.⁽²⁾

LA01

⁽¹⁾ USAR Section 5.5

⁽²⁾ USAR Section 9.6

LA01

5.3 REACTOR CORE**APPLICABILITY**

Applies to the reactor core.

OBJECTIVE

To define those design features which are essential in providing for safe reactor core operations.

SPECIFICATION

4.2.1

a. Fuel Assemblies

The reactor shall contain 121 fuel assemblies. Each assembly shall consist of a matrix of zircaloy or ZIRLO™ clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO₂) as fuel material. Limited substitutions of zirconium alloy, ZIRLO™, or stainless steel filler rods for fuel rods, in accordance with NRC-approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead-test-assemblies that have not completed representative testing may be placed in non-limiting core regions. Lead-test-assemblies shall be of designs approved by the NRC for use in pressurized water reactors and their clad materials shall be the materials approved as part of those designs.

LA02

4.2.2

b. Control Rod Assemblies

The reactor core shall contain 29 control rod assemblies. The control material shall be silver indium cadmium.

5.4 FUEL STORAGE

APPLICABILITY

Applies to the capacity and storage arrays of new and spent fuel.

OBJECTIVE

To define those aspects of fuel storage relating to prevention of criticality in fuel storage areas.

SPECIFICATION

a. Criticality

1. The spent fuel storage racks are designed and shall be maintained with the following:

4.3.1.1.a

a. Fuel assemblies having a maximum enrichment of 56.067/grams Uranium-235 per axial centimeter

4.9776 weight percent

A02

4.3.1.1.b

b. $k_{\text{eff}} < 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties

Add proposed 4.3.1.1.c, 4.3.1.1.d, and 4.3.1.1.e

M01

2. The new fuel storage racks are designed and shall be maintained with:

4.3.1.2.a

a. Fuel assemblies having a maximum enrichment of 56.067/grams Uranium-235 per axial centimeter

4.9776 weight percent

A02

4.3.1.2.b

b. $k_{\text{eff}} < 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties

4.3.1.2.c

c. $k_{\text{eff}} < 0.98$ if moderated by aqueous foam, which includes an allowance for uncertainties

Add proposed 4.3.1.2.d

M02

3. The spent fuel pool is filled with borated water at a concentration to match that used in the reactor REFUELING cavity and REFUELING canal during REFUELING OPERATIONS or whenever there is fuel in the pool.

See ITS 3.7.14

b. Capacity

4.3.2

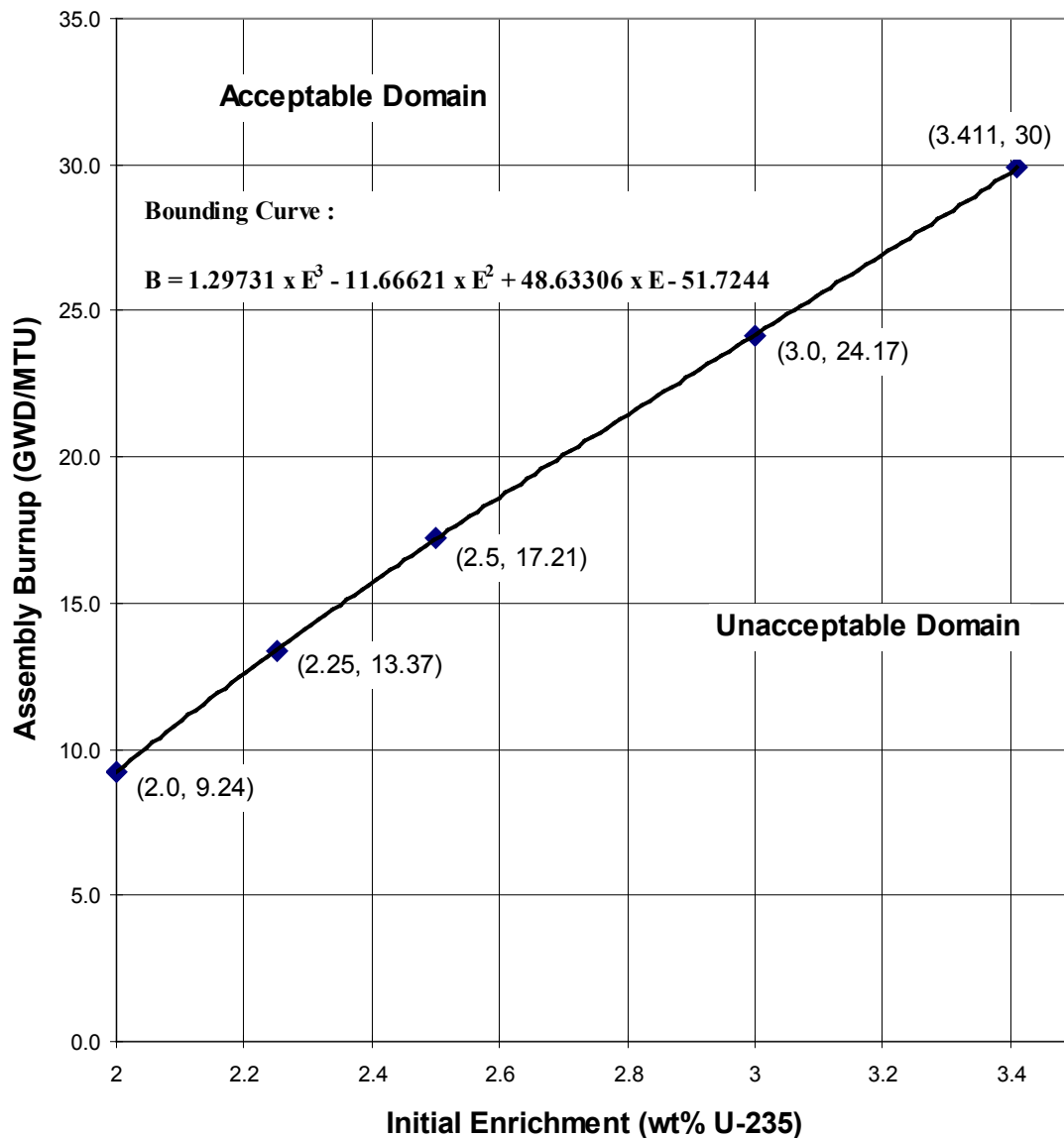
The spent fuel storage pool is designed with a storage capacity of 1205 assemblies and shall be limited to no more than 1205 fuel assemblies.

c. Canal Rack Storage

Fuel assemblies stored in the canal racks shall meet the minimum required fuel assembly burnup as a function of nominal initial enrichment as shown in Figure TS 5.4-1. These assemblies shall also have been discharged prior to or during the 1984 REFUELING outage.

See ITS 3.7.15

FIGURE TS 5.4-1
MINIMUM REQUIRED FUEL ASSEMBLY BURNUP AS A FUNCTION OF
NOMINAL INITIAL ENRICHMENT TO PERMIT STORAGE IN THE TRANSFER CANAL



See ITS 3.7.15

MINIMUM FREQUENCIES FOR EQUIPMENT TESTS

EQUIPMENT TESTS ⁽¹⁾	TEST	FREQUENCY
1. Control Rods	Rod drop times of all full length rods Partial movement of all rods not fully inserted in the core	Each REFUELING outage Quarterly when at or above HOT STANDBY
1a. Reactor Trip Breakers	Independent test ⁽²⁾ shunt and undervoltage trip attachments	Monthly
1b. Reactor Coolant Pump Breakers-Open-Reactor Trip	OPERABILITY	Each REFUELING outage
1c. Manual Reactor Trip	Open trip reactor ⁽³⁾ trip and bypass breaker	Each REFUELING outage
2. Deleted		
3. Deleted		
4. Containment Isolation Trip	OPERABILITY	Each REFUELING outage
5. Refueling System Interlocks	OPERABILITY	Prior to fuel movement each REFUELING outage
6. Deleted		
7. Deleted		
8. RCS Leak Detection	OPERABILITY	Weekly ⁽⁴⁾
9. Diesel Fuel Supply	Fuel Inventory ⁽⁵⁾	Weekly
10. Deleted		
11. Fuel Assemblies	Visual Inspection	Each REFUELING outage
12. Guard Pipes	Visual Inspection	Each REFUELING outage
13. Pressurizer PORVs	OPERABILITY	Each REFUELING cycle
14. Pressurizer PORV Block Valves	OPERABILITY	Quarterly ⁽⁶⁾
15. Pressurizer Heaters	OPERABILITY ⁽⁷⁾	Each REFUELING cycle
16. Containment Purge and Vent Isolation Valves	OPERABILITY ⁽⁸⁾	Each REFUELING cycle

⁽¹⁾ Following maintenance on equipment that could affect the operation of the equipment, tests should be performed to verify OPERABILITY.

⁽²⁾ Verify OPERABILITY of the bypass breaker undervoltage trip attachment prior to placing breaker into service.

⁽³⁾ Using the Control Room push-buttons, independently test the reactor trip breakers shunt trip and undervoltage trip attachments. The test shall also verify the undervoltage trip attachment on the reactor trip bypass breakers.

⁽⁴⁾ When reactor is at power or in HOT SHUTDOWN condition.

⁽⁵⁾ Inventory of fuel required in all plant modes.

⁽⁶⁾ Not required when valve is administratively closed.

⁽⁷⁾ Test will verify OPERABILITY of heaters and availability of an emergency power supply.

⁽⁸⁾ This test shall demonstrate that the valve(s) close in ≤ 5 seconds.

**DISCUSSION OF CHANGES
ITS 4.0, DESIGN FEATURES**

ADMINISTRATIVE CHANGES

- A01 In the conversion of the Kewaunee Power Station (KPS) Current Technical Specifications (CTS) to the plant specific Improved Technical Specifications (ITS), certain changes (wording preferences, editorial changes, reformatting, revised numbering, etc.) are made to obtain consistency with NUREG-1431, Rev. 3.0, "Standard Technical Specifications-Westinghouse Plants" (ISTS).

These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the CTS.

- A02 CTS 5.4.a.1.a and 5.4.a.2.a states that the spent fuel storage racks and the new fuel storage racks, respectively, are designed and shall be maintained with the fuel assemblies having a maximum enrichment of 56.067 grams Uranium-235 per axial centimeter. ITS 4.3.1.1.a and 4.3.1.2.a states that the spent fuel storage racks and the new fuel storage racks, respectively, are designed and shall be maintained with the fuel assemblies having a maximum U-235 enrichment of 4.9776 weight percent. This changes the CTS by specifying the weight percent of the U-235 enrichment instead of the actual weight per axial centimeter.

The purpose of CTS 5.4.a.1.a and 5.4.a.2.a is to specify the maximum amount of uranium for a fuel assembly per axial centimeter. Based on Westinghouse letter BD-03-193, Rev. 0, dated December 11, 2003, 56.067 grams of U-235 per axial centimeter corresponds to 4.9776 weight percent of U-235. Therefore, the ITS percent weight is the same as the CTS actual weight. This change is acceptable and is designated as administrative because it does not result in a technical change to the CTS.

MORE RESTRICTIVE CHANGES

- M01 ITS 4.3.1.1.c requires that spent fuel storage racks in the Fuel Transfer Canal Pool are designed and maintained to have a nominal 8.3 inch rack cell lattice spacing between fuel assemblies in order to prevent criticality of the spent fuel assemblies. ITS 4.3.1.1.d requires that spent fuel storage racks in the North and South Pools Combined are designed and maintained to have a minimum 10 inch center to center distance between fuel assemblies in order to prevent criticality of the spent fuel assemblies. ITS 4.3.1.1.e provides the requirements for loading spent fuel assemblies in accordance with ITS LCO 3.7.15. The CTS does not contain this information. This changes the CTS by adding specific requirements for the design and maintenance of the spent fuel storage racks.

The purpose of ITS 4.3.1.1.c and 4.3.1.1.d is to prevent criticality in the Fuel Transfer Canal spent fuel pool and the North and South Pools Combined spent fuel pool. USAR Section 9.5.1.1 describes KPS General Design Criterion (GDC) 66, Prevention of Fuel Storage Criticality, which states, in part, that criticality in the new and spent fuel storage pools shall be prevented by physical systems or processes. Such means, as geometrically safe configurations shall be emphasized over procedural controls. The establishment of minimum spacing design requirements for the spent fuel storage racks assists in meeting the

**DISCUSSION OF CHANGES
ITS 4.0, DESIGN FEATURES**

requirements of GDC 66 and provides assurance that no incident could occur that would result in a hazard to public health and safety. This change is acceptable because it provides appropriate limits for the spent fuel storage racks. The purpose of ISTS 4.3.1.1.e is to provide requirements for loading spent fuel assemblies in accordance with ISTS Figure 3.7.15-1 into the appropriate spent fuel pool. License Amendment 150 allows KPS to store only those spent fuel assemblies prior to or from the 1984 refueling outage in the Canal Pool storage racks. The design of the Canal Pool is fixed and the storage of spent fuel assemblies is restricted by the licensing requirements of License Amendment 150. Therefore, ITS 4.3.1.1.e has been revised to state that the spent fuel assemblies in both the North and South Pools and the Canal Pool shall be in accordance with LCO 3.7.15. LCO 3.7.15 is more applicable for placement of the requirements of the spent fuel assemblies in the spent fuel pools at KPS than ITS 4.0. This change is designated more restrictive because requirements have been added to the ITS that do not exist in the CTS.

- M02 ITS 4.3.1.2.d requires that new fuel storage racks are designed and maintained to have a nominal 21 inch center to center distance between fuel assemblies in order to prevent criticality of the spent fuel assemblies. The CTS does not contain this information. This changes the CTS by adding specific requirements for the design and maintenance of the new fuel storage racks.

The purpose of ITS 4.3.1.2.d is to prevent criticality in the new fuel storage pool. USAR Section 9.5.1.1 describes KPS GDC 66, Prevention of Fuel Storage Criticality, which states, in part, that criticality in the new fuel storage pit and the spent fuel storage pools shall be prevented by physical systems or processes. Such means, as geometrically safe configurations shall be emphasized over procedural controls. The establishment of minimum spacing design requirements for the new fuel storage racks assists in meeting the requirements of GDC 66 and provides assurance that no incident could occur that would result in a hazard to public health and safety. Furthermore, USAR Table 9.5-1 states that the center to center spacing of assemblies is 21 inches for the new fuel storage pit. This change is acceptable because it provides appropriate limits for the new fuel storage racks. This change is designated more restrictive because requirements have been added to the ITS that do not exist in the CTS.

RELOCATED SPECIFICATIONS

None

REMOVED DETAIL CHANGES

- LA01 *(Type 1 – Removing Details of System Design and System Description, Including Design Limits)* CTS 5.2 describes the various design features of the containment. The ITS does not contain this information. This changes the CTS by moving the description of the containment to the USAR.

The removal of these details, which are related to system design, from the Technical Specifications, is acceptable because this type of information is not

**DISCUSSION OF CHANGES
ITS 4.0, DESIGN FEATURES**

necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains requirements on containment OPERABILITY in ITS 3.6.1. Also, this change is acceptable because the information will be adequately controlled in the USAR. Any changes to the USAR are made under 10 CFR 50.59, which ensures changes are properly evaluated. This change is designated as a less restrictive removal of detail change because information relating to system design is being removed from the Technical Specifications.

- LA02 *(Type 1 – Removing Details of System Design and System Description, Including Design Limits)* CTS 5.3.a contains details of fuel assembly design, such as the design of lead-test-assemblies and their clad materials. The ITS does not contain these details. This changes the CTS by moving the details about the lead-test-assemblies and their cladding material to the USAR.

The removal of these details, which are related to system design, from the Technical Specifications, is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protection of public health and safety. The ITS still retains requirements on the fuel assembly design, as applicable. This change is acceptable because the removed information will be adequately controlled in the USAR. Any changes to the USAR are made under 10 CFR 50.59, which ensures changes are properly evaluated. This change is designated as a less restrictive removal of detail change because information relating to system design is being removed from the Technical Specifications.

LESS RESTRICTIVE CHANGES

- L01 *(Category 5 – Deletion of Surveillance Requirement)* CTS Table TS 4.1-3 Equipment Test 11 requires a visual inspection test of the fuel assemblies each REFUELING outage. In addition, footnote (1) to Table TS 4.1-3 requires that following maintenance on equipment that could affect the operation of the equipment, tests should be performed to verify OPERABILITY. ITS 4.0 does not contain these requirements. This changes the CTS by eliminating a Surveillance Requirement and a subsequent post-maintenance Surveillance Requirement.

The purpose of CTS Table TS 4.1-3 Equipment Test 11 is to provide assurance that fuel assemblies in the spent fuel pool storage racks have incurred no physical damage as a result of refueling operations. This change is acceptable since the requirements to ensure the integrity of the fuel assemblies stored in the spent fuel pool are maintained in the ITS. Thus, appropriate equipment continues to be tested in a manner and frequency necessary to give confidence that the integrity of the fuel assemblies is maintained. The elimination of the Surveillance Requirement also eliminates the subsequent post-maintenance Surveillance Requirement as discussed in footnote (1) of CTS Table TS 4.1-3 and, as a result, there will be no need for post-maintenance testing. Therefore, this change is designated less restrictive because a Surveillance which is required in the CTS will not be performed in the ITS.

**Improved Standard Technical Specifications (ISTS) Markup
and Justification for Deviations (JFDs)**

All changes are (1) unless otherwise noted

4.0 DESIGN FEATURES

4.1 Site Location

5.1 [Text description of site location.] ← INSERT 1

4.2 Reactor Core

5.3.a 4.2.1 Fuel Assemblies

The reactor shall contain [157] fuel assemblies. Each assembly shall consist of a matrix of [Zircalloy or ZIRLO] fuel rods with an initial composition of natural or slightly enriched uranium dioxide (UO2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions.

5.3.b 4.2.2 Control Rod Assemblies

The reactor core shall contain [48] control rod assemblies. The control material shall be [silver indium cadmium, boron carbide, or hafnium metal] as approved by the NRC.

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

- 5.4.a.1.a a. Fuel assemblies having a maximum U-235 enrichment of [4.5] weight percent.
- 5.4.a.1.b b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in [Section 9.1] of the [FSAR].
- DOC M01 c. A nominal [9.15] inch center to center distance between fuel assemblies placed in [the high density fuel storage racks].
- DOC M01 d. A nominal [10.95] inch center to center distance between fuel assemblies placed in [low density fuel storage racks].

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2 3
2
3 2
3

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INSERT 1

- 5.1 The Kewaunee Power Station is located on property owned by Dominion Energy Kewaunee Inc. at a site on the west shore of Lake Michigan, approximately 30 miles east-southeast of the city of Green Bay, Wisconsin.
- 5.1 The minimum distance from the center line of the reactor containment to the site exclusion radius as defined in 10 CFR 100.3 is 1200 meters.

All changes are (1) unless otherwise noted

4.0 DESIGN FEATURES

4.3 Fuel Storage (continued)

Spent fuel assemblies stored in the north and south pools and the canal pool in accordance with LCO 3.7.15, "Spent Fuel Pool Storage."

DOC M01

e. New or partially spent fuel assemblies with a discharge burnup in the "acceptable range" of Figure [3.7.17-1] may be allowed unrestricted storage in [either] fuel storage rack(s), and]

4

f. New or partially spent fuel assemblies with a discharge burnup in the "unacceptable range" of Figure [3.7.17-1] will be stored in compliance with the NRC approved [specific document containing the analytical methods, title, date, or specific configuration or figure].]

4

4.3.1.2 The new fuel storage racks are designed and shall be maintained with:

5.4.a.2.a

a. Fuel assemblies having a maximum U-235 enrichment of [4.5] weight percent

3

4.9776 ;

5.4.a.2.b

b. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in [Section 9.1] of the [FSAR]

2

U ;

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5.4.a.2.c

c. $k_{eff} \leq 0.98$ if moderated by aqueous foam, which includes an allowance for uncertainties as described in [Section 9.1] of the [FSAR], and

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DOC M02

d. A nominal [10.95] inch center to center distance between fuel assemblies placed in the storage racks.

21

4.3.2 Drainage The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation [23 ft].

5

5.4.b

4.3.3 Capacity

6

2

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than [1737] fuel assemblies. [1205]

**JUSTIFICATION FOR DEVIATIONS
ITS 4.0, DESIGN FEATURES**

1. The ISTS contains bracketed information and/or values that are generic to all Westinghouse vintage plants. The brackets are removed and the proper plant specific information/value is provided. This is acceptable since the generic specific information/value is revised to reflect the current plant design.
2. Changes are made (additions, deletions, and/or changes) to the ISTS which reflect the plant specific nomenclature, number, reference, system description, analysis, or licensing basis description.
3. The punctuation corrections have been made consistent with the Writer's Guide for the Improved Standard Technical Specifications, TSTF-GG-05-01, Section 5.1.3.
4. The spent fuel pool configuration at Kewaunee Power Station (KPS) consists of North and South Pools and a Canal Pool. Spent fuel assemblies of varying enrichment may be stored in the North and South Pools. However, with the creation of the Canal Pool, limitations on the enrichment of the spent fuel that could be stored in the Canal Pool were imposed via License Amendment 150 dated January 23, 2001 (ADAMS accession No. ML010240051). License Amendment 150 states that only assemblies which have been discharged prior to or during the 1984 refueling outage are permitted to be stored in the Canal Pool. License Amendment 150 also utilized the concept of burnup reactivity equivalencing for the storage of the spent fuel in the Canal Pool. This concept is based on the reactivity decrease associated with fuel depletion and has been previously found acceptable by the NRC for use in PWR fuel storage analysis. A series of reactivity calculations is performed to generate a set of enrichment versus burnup ordered pairs which yield an equivalent k-eff of less than 0.95 (approximately 0.945) for fuel stored in the storage racks. The requirements of ISTS 4.3.1.1.e and 4.3.1.1.f, which address the applicable discharge burnup limitations, are addressed in LCO 3.7.15, "Spent Fuel Pool Storage," for the KPS ITS.
5. ISTS 4.3.2 states the spent fuel pool is designed and shall be maintained to prevent inadvertent draining of the pool. The information in Item 6 of Kewaunee Power Station (KPS) Updated Safety Analysis Report (USAR) Table 9.5-2, "Design Conformance with Safety Guide 13," reflects that no drains have been provided for the spent fuel storage pool. In addition, the USAR states that since the pump suction connections extend no more than two feet below normal water level, there is also no possibility of inadvertently draining pool water below that level. As an additional measure to ensure against inadvertent draining of the spent fuel pool by a siphon effect, each spent fuel pool cooling return line contains a check valve to prevent reverse flow. Therefore, the information in ISTS 4.3.2 has been deleted as it is considered not applicable to the design of KPS.
6. ISTS 4.3.2 has been deleted as discussed in Justification For Deviations (JFD) 5. As a result, Section 4.3.3 has been appropriately renumbered.

Specific No Significant Hazards Considerations (NSHCs)

**DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS
ITS 4.0, DESIGN FEATURES**

There are no specific NSHC discussions for this Specification.