INDEX

DESIGN FEATURES

STORAGE POOL

LIMITING CONDITION FOR OPERATION

3.9.11 All missile shields and at least 23 feet of water shall be maintained over the top of irradiated fuel assemblies seated in the storage racks.*

APPLICABILITY Whenever irradiated fuel assemblies are in the storage pool.

ACTION:

a. With all missile shields not installed over the storage pool:

   1) Immediately install all missile shields upon notification of a Tornado Watch, and

   2) Install all missile shields not required to be removed for in-progress handling of fuel assemblies.

b. With the minimum water level requirement not satisfied, suspend all movement of fuel and crane operations with loads in the fuel storage area and restore the water level to within its limit within 4 hours.

c. The provisions of Specification 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.11.1 All missile shields shall be determined to be installed over the storage pool when irradiated fuel assemblies are in the fuel storage pool:

   a) Immediately upon notification of a Tornado Watch, and

   b) Upon completion of handling fuel assemblies.

4.9.11.2 The water level in the storage pool shall be determined to be at least its minimum required depth at least once per 7 days when irradiated fuel assemblies are in the fuel storage pool.

* During the spent fuel pool B rerack modification, all spent fuel maybe stored in pool A and the missile shielding above pool B maybe removed provided the transfer canal gate between the pools is in place.

3/4.9.13 FUEL ASSEMBLY STORAGE

LIMITING CONDITION FOR OPERATION

3.9.13 Fuel assemblies shall be stored in locations in accordance with conditions as specified below:

LOCATION	CONDITION
1. Dry fuel storage racks	New fuel with initial enrichment ≤ 4.5 weight percent U-235
2. Storage Pool A	Fuel with initial enrichment and burnup in accordance with Figure 3.9-1 but ≤ 4.5 weight percent U-235
3. Storage Pool B: Region 1	Fuel with initial enrichment ≤ 4.2 weight percent U-235
4. Storage Pool B: Region 2	Fuel with initial enrichment and burnup in accordance with Figure 3.9-2 but ≤ 4.2 weight percent U-235

APPLICABILITY: Whenever fuel assemblies are in the fuel storage locations.

ACTION:

a. With the requirements of the above specification not satisfied, suspend all other movement of fuel assemblies and crane operations with loads in the fuel storage areas and move the non-complying fuel assemblies to their proper designated locations. In addition, with the requirements of the above specification for storage pools A or B not satisfied, boron concentration of the spent fuel pools shall be verified to be greater than or equal to 1925 ppm at least once per 8 hours.

b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.13.1 Verify the initial enrichment of new fuel assemblies $\leq$ 4.5 weight percent U-235 prior to storage in the dry fuel storage racks.

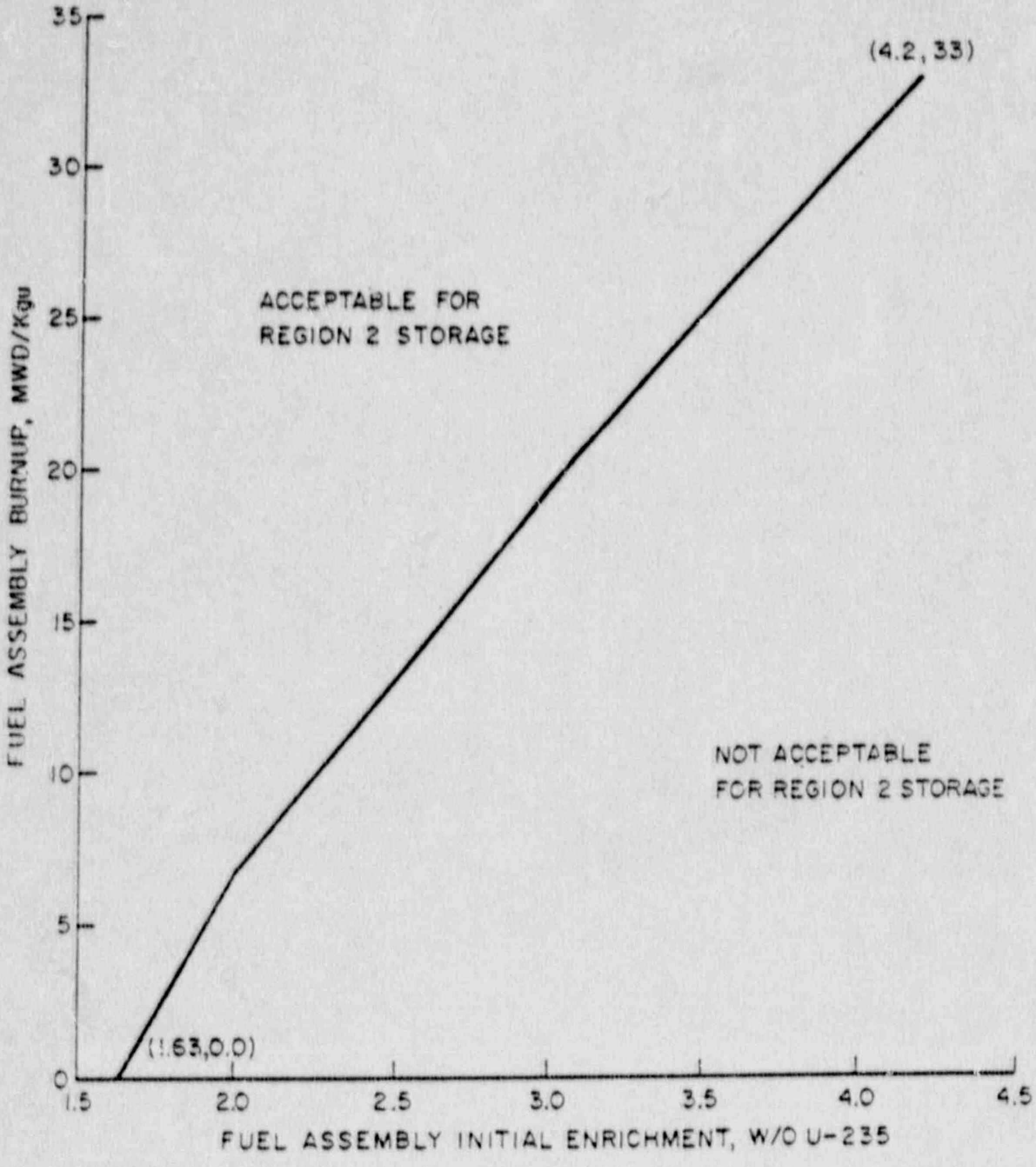
4.9.13.2 Perform an INDEPENDENT VERIFICATION of the initial enrichment and burnup of fuel assemblies in accordance with Figure 3.9-1, prior to storage in the pool A storage racks. A complete record of such analysis shall be kept for the time period that the fuel assembly remains in the pool A storage racks.

4.9.13.3 Verify the initial enrichment of fuel assemblies $\leq$ 4.2 weight percent U-235 prior to storage in Region 1 of pool B storage racks.

4.9.13.4 Perform an INDEPENDENT VERIFICATION of the initial enrichment and burnup of fuel assemblies in accordance with Figure 3.9-2, prior to storage in Region 2 of pool B storage racks. A complete record of such analysis shall be kept for the time period that the fuel assembly remains in the pool B storage racks.

FIGURE 3.9-2

MINIMUM REQUIRED FUEL ASSEMBLY BURNUP AS A FUNCTION OF INITIAL ENRICHMENT TO PERMIT STORAGE IN REGION 2 OF POOL B



5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained.

a. In accordance with the code requirements specified in Section 4.1.2 of the FSAR, with allowance for normal degradation pursuant to applicable Surveillance Requirements.

b. For a pressure of 2500 psig, and

c. For a temperature of 650°F, except for the pressurizer and pressurizer surge line, which is 670°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 12,180 ± 200 cubic feet at a nominal T_{avg} of 525°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY

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

a. A K_{eff} less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance for uncertainties. This is based on new fuel with a maximum initial enrichment of 4.5 weight percent U-235 in dry fuel storage racks, on fuel with combinations of initial enrichment and discharge burnup as shown in Figure 3.9-1 in storage pool A, and on fuel with a maximum initial enrichment of 4.2 weight percent in Region 1 of storage pool B, and on fuel with combinations of initial enrichment and discharge burnup as shown in Figure 3.9-2 in Region 2 of storage pool B;

b. A nominal 10.5 inch center-to-center distance between fuel assemblies placed in the high density storage racks in pool A; and

c. A nominal 21.125 inch center-to-center distance between fuel assemblies placed in the dry fuel storage racks; and

d. A nominal 10.6 inch center-to-center distance between fuel assemblies placed in Region 1 of spent fuel pool B; and a nominal 9.17 inch center-to-center distance between fuel assemblies placed in Region 2 of spent fuel pool B.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 138 feet 4 inches.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1357 fuel assemblies and 6 failed fuel containers.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limit of Table 5.7-1.

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TSIP SUBMITTAL

3.6 PLANT SYSTEMS

3.6.16 Fuel Assembly Storage

LCO 3.6.16 Fuel assemblies shall be stored with:

a. New fuel of initial enrichment ≤ 4.5 weight percent U-235 in dry fuel storage racks,

b. Fuel of initial enrichment and burnup in accordance with Figure 3.6.16-1 and initial enrichment ≤ 4.5 weight percent U-235 in fuel storage pool A, and

c. Fuel of initial enrichment ≤ 4.2 weight percent U-235 in Region 1 of fuel storage pool B.

d. Fuel of initial enrichment and burnup in accordance with Figure 3.6.16-2 and inital enrichment ≤ 4.2 weight percent U-235 in Region 2 of fuel storage pool B.

APPLICABILITY: When fuel assemblies are in fuel storage locations.

---------------------------NOTE---------------------------
Provisions of LCO 3.0.3 are not applicable.

ACTIONS

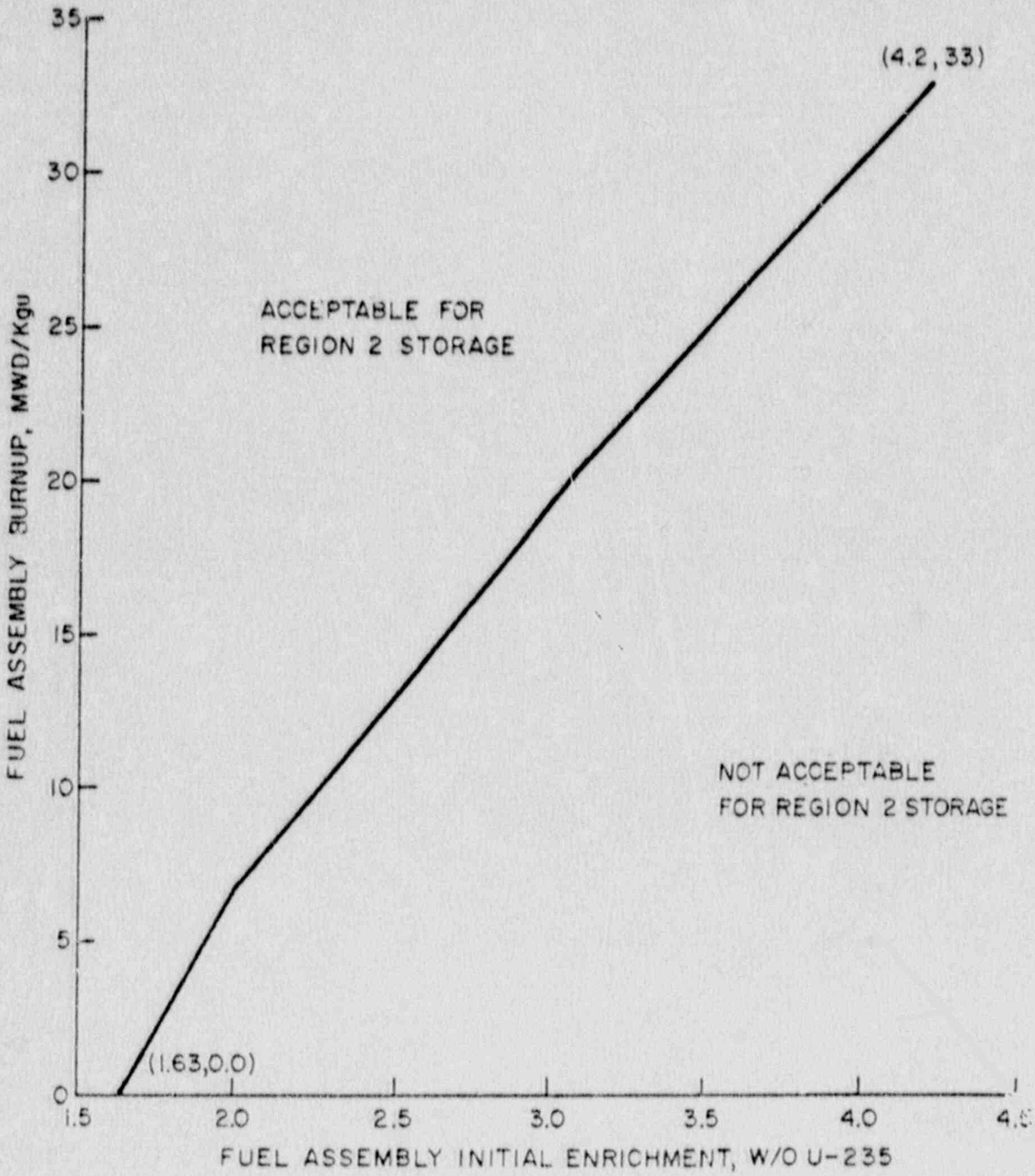
CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more fuel assemblies not stored as specified.	-----------NOTE---------- Suspension of movement of loads in accordance with Required Actions A.1 or A.2 shall not preclude completion of movement of a component to a safe, conservative position. -------------------------	
	A.1 Suspend movement of other fuel assemblies in the fuel storage area. AND	15 minutes
	(continued)	

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.16.1	Verify initial enrichment of new fuel assemblies ≤ 4.5 weight percent U 235.	Prior to storage in dry fuel storage racks.
SR 3.6.16.2	Verify initial enrichment and burnup of fuel assemblies is in accordance with Figure 3.6.16-1.	Prior to storage in fuel storage pool A.
SR 3.6.16.3	Verify initial enrichment of fuel assemblies ≤ 4.2 weight percent U-235.	Prior to storage in Region 1 of fuel storage pool B.
SR 3.6.16.4	Verify initial enrichment and burnup of fuel assemblies is in accordance with Figure 3.6.16-2.	Prior to storage in Region 2 of fuel storage pool B.

Figure 3.6.16-2 (Page 1 of 1)

Minimum Required Fuel Assembly Burnup as a Function of Initial Enrichment to Permit Storage in Region 2 of Pool B



3.6 PLANT SYSTEMS

3.6.17 Fuel Storage Pool Missile Shields

LCO 3.6.17 Missile shields shall be installed over the fuel storage pool.

---NOTE---
Missile shields may be removed as necessary for handling of fuel assemblies in the area.

APPLICABILITY: When irradiated fuel assemblies are in the fuel storage pool.

---NOTE---
Provisions of LCO 3.0.3 are not applicable.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more missile shields not installed over the fuel storage pool due to reasons other than handling of fuel assemblies in the area.	A.1 Initiate action to re-install missile shields over the fuel storage pool. AND A.2 Continue action as required by A.1 above.	15 minutes Until reinstallation of missile shields is complete.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more missile shields not installed over the fuel storage pool with a Tornado Watch or Warning in effect for the plant site.	B.1 -----------NOTE--------- Suspension of movement of fuel assemblies shall not preclude completion of movement of a component to a safe, conservative position. ------------------------	
	Suspend any movement of fuel assemblies in fuel storage area.	15 minutes
	AND	
	B.2 Initiate action to reinstall all missile shields over the fuel storage pool.	15 minutes
	AND	
	B.3 Continue action as required by B.2 above.	Until reinstallation of missile shields is complete.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.17.1	Verify missile shields installed over the fuel storage pool.	Within 15 minutes of notification of a Tornado Watch or Warning in effect for the plant site. AND Upon completion of handling fuel assemblies in the area.

3.6 PLANT SYSTEMS

3.6.18 Fuel Storage Pool Water Level

LCO 3.6.18 The fuel storage pool water level shall be $\geq$ 23 feet over the top of irradiated fuel assemblies seated in the storage racks.

APPLICABILITY: When irradiated fuel assemblies are in the fuel storage pool.

---------------------------NOTE---------------------------
Provisions of LCO 3.0.3 are not applicable.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Fuel storage pool water level < 23 feet over the top of irradiated fuel assemblies seated in the storage racks.	A.1 ----------NOTE---------- Suspension of movement of loads shall not preclude completion of movement of a component to a safe conservative position. ------------------------	
	Suspend movement of fuel assemblies in the fuel storage area.	15 minutes
	AND	
	A.2 ----------NOTE---------- Suspension of movement of loads shall not preclude completion of movement of a component to a safe conservative position. ------------------------	
	Suspend crane operations with loads in the fuel storage area.	15 minutes
	AND	
	(continued)	

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	A.3 Initiate action to restore the fuel storage pool water level. AND A.4 Continue actions to restore the fuel storage pool water level to $\geq$ 23 feet over the top of irradiated fuel assemblies seated in the storage racks.	15 minutes Until the fuel storage pool water level is restored.

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.6.18.1	Verify fuel storage pool water level is $\geq$ 23 feet over the top of irradiated fuel assemblies seated in the storage racks.	7 days

B 3.6 PLANT SYSTEMS

B 3.6.16 Fuel Assembly Storage

BASES

BACKGROUND

This document describes the Bases for Fuel Assembly Storage (LCO 3.6.16) which imposes storage requirements upon irradiated and unirradiated fuel whenever fuel assemblies are in the fuel storage area. The storage areas, which are part of the fuel handling system, governed by this specification are:

a. Dry fuel storage racks,
b. Fuel storage pool "A", and
c. Fuel storage pool "B". (Regions 1 and 2)

In general, the function of the storage racks is to support and protect new and spent fuel from the time it is placed in the storage area until it is shipped offsite.

Spent fuel is stored underwater in either fuel storage pool A or B. Fuel pool A has the capability to store failed fuel in containers. Spent fuel pool A features high density poison storage racks with a 10 1/2 inch center-to-center distance capable of storing 542 assemblies. Fuel pool A is capable of storing fuel with enrichments up to 4.5 weight percent U-235 (Ref. 1) without exceeding the criticality criteria of Reference 3. Spent fuel pool B is divided into two regions. Region 1 (174 locations) consists of high density poison storage racks with a 10.60 inch center-to-center distance. Region 2 (641 locations) also consists of high density storage racks with a 9.17 inch center-to-center distance. Fuel pool B is capable of storing fuel with enrichments up to 4.2 weight percent U-235 (Ref. 9) without exceeding the criticality criteria of Reference 3. Both of the spent fuel pools are constructed of reinforced concrete and lined with stainless steel plate. They are located in the fuel handling area of the auxiliary building (Ref. 2).

New fuel is stored dry for a temporary period in the unloading area and then transferred to wet storage within the auxiliary building. The dry fuel storage vault is a 6x11 array of storage locations with a 21 1/8 inch center to center spacing. Two rows (12 locations) are physically blocked to ensure the reactivity limits of Reference 3 are not exceeded for fuel enrichments of up to 4.5 weight percent U-235 (Ref. 8).

(continued)

4.4.2 Volume

The total water and steam volume of the reactor coolant system is ≥ 11,980 cubic feet and ≤ 12,380 cubic feet at a nominal Tavg of 525 degrees F.

4.5 FUEL STORAGE

4.5.1 Criticality

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

a. A K_{eff} less than or equal to 0.95 when flooded with unborated water, which includes a conservative allowance of greater that 1% Δ K/K for uncertainties. This is based on new fuel with a maximum enrichment of 4.5 weight percent U-235 in dry fuel storage racks, on fuel with combinations of initial enrichment and discharge burnup as shown in Figure 3.6.16-1 in storage pool A, and on fuel with a maximum enrichment of 4.2 weight percent in Region 1 of storage pool B and on fuel with combinations of initial enrichment and discharge burnup as shown in Figure 3.6.16-2 in Region 2 of storage pool B;

b. A nominal 10.5 inch center-to-center distance between fuel assemblies placed in the high density storage racks in pool A; and

c. A nominal 21.125 inch center-to-center distance between fuel assemblies placed in the dry fuel storage racks; and

d. A nominal 10.6 inch center-to-center distance between fuel assemblies placed in Region 1 of spent fuel pool B; and a nominal 9.17 inch center-to-center distance between fuel assemblies placed in Regin 2 of spent fuel pool B.

4.5.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 138 feet 4 inches.

4.5.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1357 fuel assemblies and 6 failed fuel containers.

BASES (continued)

APPLICABLE SAFETY ANALYSIS

The function of the spent fuel storage racks are to support and protect spent fuel assemblies from the time they are placed in the pool until they are shipped offsite. The dry storage rack houses new fuel assemblies until being transferred to wet storage. Spent fuel is stored underwater in either spent fuel pool A or B. Spent fuel pool A utilizes high density storage racks using B4C poison to maintain a safe subcritical configuration. Spent fuel pool B is divided into two storage regions. Region 1 consist of high density fuel assembly spacing obtained by utilizing a neutron absorbing material. Region 2 consists of closer high density fuel assembly spacing and also utilizes a neutron absorbing material and is designed to take credit for burnup. The fuel assembly storage LCO was derived from the need to establish limiting conditions on fuel storage to assure sufficient safety margin exists to prevent inadvertent criticality and to minimize offsite doses resulting from a design basis accident. The design basis accident of concern for the fuel assembly storage system is a fuel handling accident (FHA) outside containment. The spent fuel assemblies are stored entirely underwater in a configuration that has been shown to result in a reactivity of less than 0.95 under worse case conditions (Ref. 1, 2, 9). Under these storage conditions, a mechanical damage type of accident (as opposed to an inadvertent criticality) is considered the maximum potential source of activity release during fuel handling operations. The activity released from this type of accident is assumed to arise from the fission product inventory retained by irradiated fuel. The amount of fission products present in the fuel assembly is a function of fuel enrichment, reactor power level, and operating time (burnup). The spent fuel assembly enrichment requirements in this LCO are required to ensure inadvertent criticality does not occur in the spent fuel pool.

The accident analysis for an FHA assumes end of life conditions for the fuel. Therefore, the requirements of this LCO related to new fuel storage, are not initial conditions of an FHA. However, the LCO requirements for new fuel are necessary to prevent an inadvertent criticality and to ensure the enrichment limits of spent fuel are not exceeded. For these reasons, the new fuel storage requirements have been retained in the LCO.

(continued)

BASES

APPLICABLE SAFETY ANALYSIS (continued)	Inadvertent criticality within the fuel storage area or a design basis fuel handling accident could result in offsite radiation doses exceeding 10CFR100.11 limits. The limits specified in 10CFR100.11 are given in terms of total radiation dose received by a member of the general public who remains at the exclusion area boundary for two hours following onset of the accidental fission product release. The limits established in 10CFR100 are a whole body dose of 25 Rem, and/or a 300 Rem dose to the thyroid from iodine exposure (Ref. 5). The fuel assembly storage Technical Specification satisfies Selection Criterion 2 of the NRC Interim Policy Statement (Ref. 6). Fuel enrichment limits are initial conditions for a fuel handling accident as analyzed in Chapter 14 of the FSAR.
LCOs	Limits on the maximum allowable fuel enrichment were established to ensure the fission product activity contained in the spent fuel remains within the assumptions of the FHA and to assure the criticality safety of the spent fuel pools and the new-fuel storage vault. The LCO identifies the maximum fuel enrichment allowed for fuel assembly storage. A maximum enrichment for new fuel being stored in the dry fuel storage racks of less than or equal to 4.5 weight percent U-235 has been established. This enrichment limit assures that an inadvertent criticality does not occur. A fuel enrichment limit of 4.5 weight percent is also consistent with the assumptions made in the safety analysis. Limits on initial fuel enrichment and burnup for spent fuel stored in pool A have been established. Two limits are defined: 1. Initial fuel enrichment must be less than or equal to 4.5 weight percent U-235, and 2. For spent fuel with initial enrichment less than or equal to 4.5 weight percent and greater than or equal to 3.5 weight percent, fuel burnup must be within the limits specified in Figure 3.6.16-1. (Figure 3.6.16-1 presents required fuel assembly burnup as a function of initial enrichment.)

(continued)

BASES

LCOs (continued)

Fuel enrichment limits are based on avoiding inadvertent criticality in the spent fuel pool. The CR-3 spent fuel storage system was initially designed to a maximum enrichment of 3.5 weight percent. Enrichments of up to 4.5 weight percent are permissible for storage in spent fuel pool A as long as the fuel burnup is sufficient to limit the worst case reactivity in the storage pool to less than 0.95. Fuel burnup reduces the reactivity of the fuel due to the accumulation of fission product poisons. Reference 1 documents that the required burnup varies linearly as a function of enrichment with 7000 megawatt days per metric ton uranium (Mwd/mtU) required for fuel with 4.5 weight percent enrichment and 0 burnup required for 3.5 weight percent enriched fuel.

Fuel stored in Region 1 of Fuel Pool B is limited to less than or equal to 4.2 weight percent enrichment. This enrichment limit assures against an inadvertent criticality accident occurring in Pool B (Ref. 9).

Limits on initial fuel enrichment and burnup for spent fuel stored in Region 2 of Pool B have been established. The two limits are defined as follows:

1. Initial fuel enrichment must be less than or equal to 4.2 weight percent U-235, and

2. For spent fuel with initial enrichment less than or equal to 4.2 weight percent and greater than or equal to 1.63 weight percent, fuel burnup must be within the limits specified in Figure 3.6.16-2. (Figure 3.6.16-2 presents required fuel assembly burnup as a function of initial enrichment and is based on a constant rack reactivity for that region and not on a constant fuel assembly reactivity.)

Spent fuel storage, in the Region 2 spent fuel storage racks, is achievable by means of the concept of reactivity equivalencing. The concept of reactivity equivalencing is predicated upon the reactivity decrease associated with fuel depletion. A series of reactivity calculations are performed to generate a set of enrichment-fuel assembly discharge burnup ordered pairs which all yield the equivalent k_{eff} when the fuel is stored in the Region 2 racks.

(continued)

BASES (continued)

APPLICABILITY	In general, limiting fuel enrichment of stored fuel prevents inadvertent criticality in the storage pools along with minimizing the effects of a fuel handling accident. Inadvertent criticality or an FHA outside containment is dependent on whether fuel is stored in the pools and is completely independent of plant MODE. Therefore, this LCO is applicable whenever fuel assemblies are in fuel storage locations. A Note related to the APPLICABILITY of this LCO states that the provisions of LCO 3.0.3 are not applicable. Since the design basis accident of concern in this specification is an FHA, and since the possibility or consequences of an FHA are independent of plant MODE, there is no reason to shutdown the plant if the LCO or Required Actions cannot be met.
ACTIONS	To protect against the possibility of an FHA with initial conditions outside those assumed in the design basis, inadvertent criticality, or degradation of the fuel storage configurations, Required Actions are provided which suspend fuel handling operations when the LCO requirements are not met. A.1 If one or more fuel assemblies are not stored as specified by the LCO, the movement of other fuel assemblies in the fuel storage area must be suspended. This Required Action ensures that further misplacement of fuel assemblies will not occur. The Completion Time of 15 minutes is sufficient to safely bring fuel handling operations to a halt and is based on engineering judgment. A note states that suspension of movements of loads as required by this Required Action shall not preclude completion of movement of a component to a safe, conservative position. This allows movement of the load to a position which minimizes load drop considerations. A.2 Upon identification of improper fuel storage, Required Action

(continued)

BASES

ACTIONS

A.2 (Cont'd)

A.2 directs the suspension of crane operations, with loads other than the affected fuel assemblies, in the fuel storage area. This prevents unnecessary fuel movement or other crane operations which may lead to further degradation of the fuel storage configuration and minimizes the possibility of an FHA but allows for the movement of the affected fuel assemblies to their correct location. The 15 minute Completion Time is sufficient to safely bring crane operations to a halt and is based on engineering judgment.

A note states that suspension of movement of loads as required by this Required Action shall not preclude completion of movement of a component to a safe, conservative position. This allows for movement of the affected fuel assembly to its proper location and the movement of other components to a position which minimizes load drop considerations.

A.3 and A.4

These Required Actions provide for the initiation of efforts to move the affected fuel assembly or assemblies to their correct location(s) and to continue these efforts as necessary until complete. A Completion Time of 15 minutes is provided to initiate movement of the affected fuel assembly. This is sufficient to evaluate the situation and initiate a safe and controlled evolution. The Completion Time is based on engineering judgment.

An unlimited Completion Time is allowed to complete the movement of the affected fuel assemblies to their correct location. This time is not meant to allow an unnecessary delay in resolution, but is a reflection of the fact that the complexity of the corrective actions is unknown.

A.5

Required Action A.5 states that the boron concentration in the affected storage pools must be verified to be greater than or equal to the boron concentration specified in the CORE OPERATING LIMITS REPORT for the reactor coolant system and refueling canal during MODE 6 (LCO 3.8.1, Boron Concentration). The criticality analyses for the spent fuel

(continued)

BASES

ACTIONS

A.5 (Cont'd)

pools do not take credit for the boron contained in the pools. However, verifying that the spent fuel pools do contain a specified concentration of boron provides additional assurance against an inadvertent criticality when one or more fuel assemblies is not stored as specified.Although not required for safe storage of spent fuel assemblies under normal conditions (References 1, 2 and 9 show that k_{eff} will remain less than 0.95 with unborated water), the spent fuel pool water is also borated so that the fuel transfer canal water will not be diluted during fuel transfer operations (Ref. 7). This concentration also provides a safety margin to account for any excess reactivity arising from an unknown fuel configuration if the assemblies are not stored properly.

Completion Times of within 1 hour and once per 8 hours are specified for this Required Action. These times are sufficient to ensure that the boron concentration remains at acceptable levels considering the volume of the spent fuel pool and the slow rate of dilution that would occur with available makeup water. The Completion Times are based on engineering judgment.

A note provided with this Required Action states that the verification of boron concentration is not required if the affected assembly or assemblies are located in the dry storage racks. This is appropriate as this storage location does not contain a boron solution.

SURVEILLANCE REQUIREMENTS

SR 3.6.16.1

This Surveillance requires verification of the initial enrichment of new fuel assemblies to be ≤4.5 weight percent U-235. This enrichment limit was assumed in the criticality analysis for the dry fuel storage areas. In addition, this surveillance ensures that fuel enrichment limits, as specified in the spent fuel pool criticality safety analyses are not exceeded by any new fuel on site. The surveillance

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.16.1 (Cont'd)

Frequency (prior to fuel storage in the dry fuel storage rack) is appropriate since fuel enrichment cannot increase after fabrication of the assembly. The Frequency is based on engineering judgement.

SR 3.6.16.2

Verification of initial enrichment and fuel burnup of fuel assemblies in accordance with Figure 3.6.16-1 is required prior to storage of spent fuel in storage pool A. This Surveillance ensures that fuel enrichment limits, as specified in the criticality safety analysis (Ref. 1), are not exceeded. The surveillance Frequency (prior to storage in fuel storage pool A) is appropriate since the initial fuel enrichment and fuel burnup cannot change after removal from the core.

SR 3.6.16.3

This Surveillance requires verification of initial enrichment of spent fuel assemblies to be stored in Region 1 of fuel storage pool B to be $\leq$ 4.2 weight percent U-235. This surveillance ensures that fuel enrichment limits as specified in the criticality safety analysis (Ref. 9) are not exceeded. The surveillance Frequency (prior to storage in Region 1 of fuel storage pool B) is appropriate since the initial fuel enrichment is fixed upon delivery of the fuel to the site and cannot increase. The Frequency is based on engineering judgement.

SR 3.6.16.4

Verification of initial enrichment and fuel burnup of fuel assemblies in accordance with Figure 3.6.16-2 is required prior to storage of spent fuel in Region 2 of storage pool B. This Surveillance ensures that fuel enrichment limits, as specified in the criticality safety analysis (Ref. 9) are not exceeded. The surveillance frequency (prior to storage in Region 2 of storage pool B) is appropriate since the initial fuel enrichment and fuel burnup cannot change after removal from the core.

(continued)

BASES (continued)

REFERENCES

1. Criticality Safety Analysis of the Crystal River Unit 3 Pool A Spent Fuel Storage Rack, S.E. Turner, Southern Science, SS-162.

2. Criticality Safety Analysis of the Crystal River Pool B Fuel Storage Rack with Fuel of 4% Enrichment, SSA-160, September 1985.

3. NUREG 0800, Standard Review Plan, Section 9.1.1 and 9.1.2, Rev. 2, July 1981.

4. CR-3 FSAR, Section 14.2, Revision 11.

5. 10 CFR 100.

6. 52 FR 3788, NRC Interim Policy Statement on Technical Specification Improvement for Nuclear Power Reactors, February 6, 1987.

7. CR-3 FSAR, Section 9.6, Revision 11.

8. Letter from S.E. Turner of Southern Science to D.M. O'Shea of FPC, "Criticality Analysis of the Crystal River New Fuel Storage Rack with Fuel of 4.5% Enrichment", 10/31/85.

9. Westinghouse Elec. Corporation letter dated September 6, 1989, (Licensing Rpt. Rev. 1) (MK 1253/8934)

B 3.6 PLANT SYSTEMS

B 3.6.17 Fuel Storage Pool Missile Shields

BASES

BACKGROUND	Fuel handling and storage facilities must be designed to protect the fuel from mechanical damage caused by missiles produced by a design basis tornado (Ref. 1). The fuel storage pools and fuel storage racks are designed to seismic category I specifications. Both of the fuel storage pools are constructed of reinforced concrete and lined with stainless steel plate. Thus, the pools are vulnerable only to tornado produced missiles from above. The fuel storage pool missile shields provide protection from such missiles, and therefore must be installed at all times when fuel handling operations do not warrant their removal. During normal operations, whenever fuel storage is in the fuel storage pool, a total of 32 steel missile shields are installed to provide complete coverage of fuel storage pools A and B. The design and placement of the shields' vertical stiffeners is such that the penetration of high energy tornado generated missiles is prevented. The 30 inch wide shields are attached to the adjacent concrete structure at each end by anchor bolts and may be removed individually to provide access to any area within the fuel storage pools (Ref. 2).
APPLICABLE SAFETY ANALYSIS	The missiles generated by a maximum hypothetical tornado, as described in FSAR Section 5.2.1 (Ref. 3), are of sufficient size and velocity to produce damage to the fuel storage assemblies in excess of that produced by the postulated worst case fuel handling accident. Thus, the missile shields are required to prevent the potential breach of a fission product barrier or damage to the fuel storage racks in the event that missiles generated by the design basis tornado (Ref. 4) should enter the auxiliary building. Fuel Storage Pool Missile Shields satisfies Selection Criterion 3 of the NRC Interim Policy Statement (Ref. 5).

(continued)

BASES (continued)

LCOs

The fuel storage pool missile shields are required to be installed whenever irradiated fuel assemblies are present in the fuel storage pools to protect the assemblies from tornado generated missiles. Fuel assembly damage from such a missile could result in the release of significant quantities of radioactivity to the environs. The shields may be removed temporarily to facilitate handling of fuel assemblies as required.

APPLICABILITY

The probability of damage to fuel assemblies stored in the fuel storage pools from tornado generated missiles is independent of plant MODES. Therefore, this LCO is applicable whenever irradiated fuel assemblies are in the fuel storage pool.

A Note is provided with this LCO, stating that the provisions of LCO 3.0.3 are not applicable. Since the conditions required by this LCO are not affected by the MODE of operation, there is no reason to shut down the plant if the LCO cannot be met.

ACTIONS

To protect against the possibility of spent fuel damage from tornado generated missiles, the Required Actions are to install the missile shields whenever they are removed for reasons other than handling of fuel assemblies, and when a missile shield is removed and a Tornado Watch or Warning is in effect.

A.1 and A.2

With one or more missile shields removed for reasons other than handling of fuel assemblies, ACTIONS must be initiated within 15 minutes to reinstall the shield(s) over the fuel storage pool(s). The 15 minute Completion Time is based on engineering judgment and reflects the immediate need to provide protection for the stored fuel assemblies to prevent damage greater than that which would result from the worst case fuel handling accident. These ACTIONS must be continued until all of the shields are properly reinstalled.

(continued)

BASES

ACTIONS (continued)

B.1

Upon the issuance of a Tornado Watch or Warning while any fuel storage pool missile shield is removed for fuel handling operations, ACTIONS must be taken within 15 minutes to suspend the movement of fuel assemblies. The Completion Time is sufficient to safely bring crane operations to a halt and is consistent with industry-accepted practice.

A Note is provided with this Required Action stating that the suspension of fuel assembly movement shall not preclude completion of movement of a component to a safe, conservative position. This allows for movement of the affected fuel assembly to its proper location prior to restoring adequate missile protection.

B.2 and B.3

Upon the receipt of Tornado Watch or Warning, concurrent with moving the fuel assemblies to a safe, conservative position, ACTIONS are initiated within 15 minutes to reinstall the removed shield(s) over the fuel storage pool(s). The 15 minute Completion Time is based on engineering judgment and reflects the immediate need to provide protection for the stored fuel assemblies to prevent damage greater than that which would result from the worst case fuel handling accident. These ACTIONS are continued until all of the shields are properly reinstalled.

SURVEILLANCE REQUIREMENTS

SR 3.6.17.1

To ensure adequate missile protection is provided, verification of fuel storage pool missile shield installation is made within 15 minutes of notification of a Tornado Watch or Warning, and upon completion of fuel assembly handling operations. Since the shields are to be removed for fuel handling only, these Frequencies are adequate to verify placement of the shields as required by this LCO, and to reconfirm their proper installation during times when the probability of tornado generated missiles is greater.

(continued)

BASES (continued)

REFERENCES

1. Regulatory Guide 1.13, Fuel Storage Facility Design Basis, Revision 1, December 1975.

2. CR-3 FSAR, Section 9.3, Revision 11.

3. CR-3 FSAR, Section 9.6, Revision 11.

4. Regulatory Guide 1.76, Design Basis Tornado for Nuclear Power Plants, Revision 1, December 1975.

5. 52 FR 3788, NRC Interim Commission Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.

B 3.6 PLANT SYSTEMS

B 3.6.18 Fuel Storage Pool Water Level

BASES

BACKGROUND

The water contained in the spent fuel pool provides for removal of decay heat from the stored fuel elements, normally via the spent fuel cooling system. In the event fuel pool cooling is lost when the pool is 140°F, assuming a full core is discharged under the conditions of Reference 1, the pool volume provides approximately 8 hours before boiling would occur (Ref. 1). The spent fuel pool water also provides shielding to reduce the general area radiation dose during both spent fuel handling and storage.

Although maintaining adequate spent fuel pool water level is essential to both decay heat removal and shielding effectiveness, the minimum water level limit is based upon maintaining the pool's iodine retention effectiveness consistent with that assumed in the evaluation of a fuel handling accident (FHA). The fuel handling accident described in FSAR Section 14.2.2.3 (Ref. 2), assumes that a minimum of 23 feet of water is maintained above the damaged fuel assembly. This assumption, consistent with the methodology described in Regulatory Guide 1.25 (Ref. 3), verifies the use of the pool iodine decontamination factor used in the associated offsite dose calculation.

APPLICABLE SAFETY ANALYSIS

The minimum water level in the fuel storage pool is required to meet the assumptions of the fuel handling accident described in FSAR Section 14.2.2.3 (Ref. 2). Maintaining adequate pool water level ensures that the resultant two hour thyroid dose to a person at the exclusion area boundary and the 30-day dose at the low population zone are small fractions of the 10CFR100 limits (Ref. 4, 5).

Fuel Storage Pool Water Level satisfies the requirements of Selection Criterion 2 of the NRC Interim Policy Statement (Ref. 6).

LCOs

The specified water level is the minimum required to satisfy the iodine removal assumptions made in the evaluation of the offsite dose resulting from a design basis fuel handling accident (Ref. 2). As such, it is the minimum level allowed during the movement of fuel within the fuel storage pool.

(continued)

BASES (continued)

APPLICABILITY

This LCO is applicable whenever irradiated fuel is present in the fuel storage pool since a fuel handling accident can only occur if irradiated fuel is in the pool (or being put in the pool).

LCO 3.0.3 is not applicable as events in the fuel pool do not affect safe power operation.

ACTIONS

A.1 and A.2

When the initial conditions assumed in the design basis FHA are exceeded, steps must be taken to preclude the accident from occurring. With the fuel storage pool water level less than required, the movement of fuel and the movement of loads over the spent fuel, are suspended. The 15 minute Completion Time reflects the need to immediately cease activities which may result in a fuel handling accident and is based upon engineering judgment and plant operating experience. Suspension of fuel movement and crane operations in the fuel storage area effectively precludes the occurrence of a fuel handling accident. The suspension of load movement does not preclude completion of movement of a load to a safe, conservative position.

A.3 and A.4

A spent fuel pool water level of less than 23 feet results in a degraded barrier to radioactivity release. Therefore, the Required Actions to restore water level must be taken within 15 minutes and continue until water level is above 23 feet. The Completion Time is based upon engineering judgment and plant operating experience.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.18.1

The water level in the fuel storage pool must be checked periodically. As there is no mechanism for lowering the level during normal operations and there is a low level alarm sounded if the pool level drops below the point of having approximately 24.5 feet above fuel assemblies, a 7 day Frequency is sufficient to provide assurance of adequate water level. The Frequency is based on engineering judgment and industry-accepted practice. When refueling operations are taking place, the level in the fuel pool is at equilibrium with that in the refueling canal and in the reactor vessel. The level in the reactor vessel (and, therefore, the refueling canal and fuel storage pool) is checked daily under SR 3.8.7.1 when fuel handling is in progress.

REFERENCES

1. CR-3 FSAR, Section 9.3.1, Revision 11.
2. CR-3 FSAR, Section 14.2.2.3, Revision 11.
3. Regulatory Guide 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling Storage Facility for Boiling and Pressurized Water Reactors", March 23, 1972 (Safety Guide 25).
4. CR-3 FSAR, Table 14-34, Revision 11.
5. Title 10 Code of Federal Regulations Part 100 (10CFR100).
6. 52 FR 3788, NRC Interim Policy Statement on Technical Specification Improvements for Nuclear Power Reactors, February 6, 1987.
