TS 5.5.14

Progress Energy

Serial: RNP-RA/04-0133

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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

TRANSMITTAL OF TECHNICAL SPECIFICATIONS BASES REVISIONS

Ladies and Gentlemen:

In accordance with Technical Specifications 5.5.14.d, Progress Energy Carolinas, Inc., also known as Carolina Power and Light Company, is transmitting a revision to the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, Technical Specifications Bases. The attachment to this letter provides Technical Specifications Bases pages for Revision Number 25.

If you have any questions concerning this matter, please contact me at (843) 857-1253.

Sincerely,

C. T. Baucom
Supervisor – Licensing/Regulatory Programs

CAC/cac

Attachment

c: Dr. W. D. Travers, NRC, Region II
NRC Resident Inspector, HBRSEP
C. P. Patel, NRC, NRR

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United States Nuclear Regulatory Commission
Attachment to Serial: RNP-RA/04-0133
8 Pages (including cover page)

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

TECHNICAL SPECIFICATIONS
BASES PAGES FOR REVISION NUMBER 25

B 3.7 PLANT SYSTEMS

B 3.7.13 Fuel Storage Pool Boron Concentration

BASES

BACKGROUND

The fuel storage pool contains both low and high density racks for spent fuel storage. The low density spent fuel storage racks provide space for storage of 176 fuel assemblies and have a nominal 21-inch center-to-center spacing. The low density storage racks can accommodate new or spent fuel assemblies with initial enrichments up to 5 weight percent U^{235} (nominal 4.95 ± 0.05 weight percent). The high density spent fuel storage racks provide space for storage of 368 fuel assemblies with a nominal 10.5-inch center-to-center cell spacing. Additionally, the high density storage racks contain Boraflex on each cell wall face. No credit is taken for the Boraflex in criticality analyses due to the potential for degradation over time. The high density storage racks can accommodate new or spent fuel assemblies with initial enrichments up to 5 weight percent U^{235} (nominal 4.95 ± 0.05 weight percent), with restrictions on loading patterns and fuel burnup as specified in Section 9.1 of the UFSAR.

The water in the spent fuel storage pool normally contains a minimum of 1500 ppm soluble boron, which results in large subcriticality margins under actual operating conditions.

The effective neutron multiplication factor, K_{eff}, was calculated for the most conservative conditions of temperature, fuel enrichment, fuel spacing, structural poisoning, and other parameters (Ref. 1). For both the high density and low density spent fuel racks 5.0 w/o (4.95 w/o nominal) enrichment was assumed as the maximum permissible.

APPLICABLE SAFETY ANALYSES

Criticality analyses for the high density storage racks take credit for soluble boron at 1500 ppm in order to maintain K_{eff} less than or equal to 0.95.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)	Accidents can be postulated that could increase the reactivity. For specific accidents, this increase in reactivity is unacceptable with unborated water in the storage pool. Thus, for these accidents, the presence of soluble boron in the storage pool prevents criticality. The postulated accidents are basically of two types. First, a fuel assembly could be incorrectly stored. Second, a fuel assembly could be dropped adjacent to the fully loaded storage rack. This could have a small positive reactivity effect. The negative reactivity effect of the soluble boron compensates for the increased reactivity caused by either one of the two postulated accident scenarios. The concentration of dissolved boron in the fuel storage pool satisfies Criterion 2 of the NRC Policy Statement.
LCO	The fuel storage pool boron concentration is required to be ≥ 1500 ppm. The specified concentration of dissolved boron in the fuel storage pool preserves the assumptions used in the analyses of the potential criticality accident scenarios as described in Reference 1 and in maintaining $K_{eff} \leq 0.95$ in the high density storage racks. This concentration of dissolved boron is the minimum required concentration for fuel assembly storage and movement within the fuel storage pool.
APPLICABILITY	This LCO applies at all times. The criticality analyses for the high density storage racks take credit for the soluble boron in order to maintain K_{eff} less than or equal to 0.95. It is assumed the fuel will remain in the spent fuel pool until the end of the Operating License, therefore, the specified boron concentration must be maintained at all times.

BASES

ACTIONS

The Required Actions are modified by a Note indicating that LCO 3.0.3 does not apply. The movement or storage of fuel in the spent fuel storage pool is independent of reactor operation. Therefore, inability to suspend movement of fuel assemblies or maintain the fuel storage pool boron concentration greater than 1500 ppm is not sufficient reason to require a reactor shutdown

A.1

When the concentration of boron in the fuel storage pool is less than required, immediate action must be taken to preclude the occurrence of an accident or to mitigate the consequences of an accident in progress. This is most efficiently achieved by immediately suspending the movement of fuel assemblies. Prior to resuming movement of fuel assemblies, the concentration of boron must be restored. This does not preclude movement of a fuel assembly to a safe position.

A.2

When the concentration of boron in the fuel storage pool is less than required, immediate action must be taken to return the concentration to the required limit to ensure K_{eff} remains less than or equal to 0.95 in the high density storage racks.

SURVEILLANCE REQUIREMENTS

SR 3.7.13.1

This SR verifies that the concentration of boron in the fuel storage pool is within the required limit. As long as this SR is met, the analyzed accidents and criticality analyses are fully addressed. The 7 day Frequency is appropriate because no major replenishment of pool water is expected to take place over such a short period of time.

REFERENCES

1. UFSAR Section 9.1.2.

B 3.7 PLANT SYSTEMS

B 3.7.14 New and Spent Fuel Assembly Storage

BASES

BACKGROUND

The new fuel storage racks are used for temporary storage capacity of 2/3 of the core inventory which is equivalent to 105 storage cells located on 21-inch centers. Of these 72 are available for fuel storage. The low density spent fuel storage racks provide space for storage of 176 fuel assemblies and have a nominal 21-inch center-to-center spacing. The high density spent fuel storage racks provide space for storage of 368 fuel assemblies with a nominal 10.5-inch center-to-center cell spacing. This capacity of 544 assemblies is equivalent to 3 1/3 cores.

The new fuel storage racks are normally maintained in a dry condition, i.e., the new fuel is stored in air. However, the NRC acceptance criteria (Ref. 2) for new fuel storage requires that the effective multiplication factor, k_{eff}, of the storage rack be no greater than 0.95 if accidentally flooded with pure water, and no greater than 0.98 if accidentally moderated with a low density hydrogenous material (optimum moderation). The new fuel storage racks have been analyzed for 5.0 w/o U^{235} enriched fuel for the full density flooding scenario and for the optimum moderation scenario (Ref. 3). The calculated worst-case k_{eff} for a full rack of 5.0 w/o U^{235} fuel does not meet the acceptance criteria stated above without the restrictions imposed on the storage configuration to prevent fuel from being placed in certain locations. For the fully flooded accident condition, the resulting k_{eff} is less than 0.95. The optimum moderation condition occurs at about 5 percent interspersed water volume and results in a k_{eff} of less than 0.98 (Ref. 1).

The low density region in the spent fuel storage pool is flooded with water borated to at least 1500 ppm. However, criticality analyses (Ref. 3) demonstrate that k_{eff} remains less than or equal to 0.95 in this region with no credit taken for the dissolved boron. There are no restrictions on storage locations except that no empty fuel rod locations are permitted in fuel assemblies with enrichment greater than 4.25 weight percent U^{235}.

(continued)

BASES

BACKGROUND (continued)	The high density region in the spent fuel storage pool is flooded with water borated to at least 1500 ppm. This region includes Boraflex neutron absorber material in the cell walls. However, no credit is taken for the Boraflex in criticality analyses (Ref. 4). The analyses assume water in the locations where Boraflex has been installed. The criticality analyses demonstrate that, should the concentration of dissolved boron go to zero, k_{eff} will remain less than 1.0. Taking credit for the dissolved boron results in a k_{eff} less than or equal to 0.95. In order to ensure the calculated k_{eff} criteria are met, there are loading restrictions in the high density racks. The details of these restrictions are given in Section 9.1 of the UFSAR, which specifies acceptable loading patterns as a function of enrichment and burnup.
APPLICABLE SAFETY ANALYSES	By closely controlling the manufacture of each fuel assembly, by controlling the movement of each fuel assembly, and by checking the location of each fuel assembly after movement, the potential for an inadvertent criticality becomes very small. The restrictions on fuel location are designed to ensure the assumptions of the criticality analyses of References 3 and 4 are met. The configuration of fuel assemblies in the new and spent fuel storage racks satisfies Criterion 2 of the NRC Policy Statement.
LCO	The restrictions on the placement of fuel assemblies within the new and spent fuel storage racks ensures the k_{eff} of the stored fuel will always remain within the criteria of Section 4.3.1.1 of these Technical Specifications. The approved storage locations for fuel are identified in the fuel storage requirements contained in Updated Final Safety Analysis Report (UFSAR) Section 9.1 (Ref. 1).
APPLICABILITY	This LCO applies whenever any fuel assembly is stored in the new or spent fuel storage racks.

(Continued)

BASES (Continued)

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating that LCO 3.0.3 does not apply. When the configuration of fuel assemblies stored in the new and spent fuel storage racks is not in accordance with UFSAR Section 9.1, the immediate action is to initiate action to make the necessary fuel assembly movement(s) to bring the configuration into compliance with UFSAR Section 9.1.

If unable to move irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not be applicable. If unable to move irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the action is independent of reactor operation. Therefore, inability to move fuel assemblies is not sufficient reason to require a reactor shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.7.14.1

This SR verifies by administrative means that fuel assembly storage is in accordance with UFSAR Section 9.1.

REFERENCES

1. UFSAR Section 9.1.
2. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," July 1987.
3. EMF-94-113, "H. B. Robinson New and Spent Fuel Criticality Analysis," Siemens Power Corporation, July 1994 (transmitted to NRC by CP&L letter dated July 28, 1994).
4. Holtec International Report HI-992350, "Criticality Safety Analyses of the Robinson Spent Fuel Racks with Loss of Boraflex," Revision 3.

BASES

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