SCE&G
A SCANA COMPANY

January 27, 2000
RC-00-0025

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Ms. K. R. Cotton

Gentlemen:

Gary J. Taylor
Vice President
Nuclear Operations

Subject: VIRGIL C. SUMMER NUCLEAR STATION
DOCKET NO. 50/395
TECHNICAL SPECIFICATION AMENDMENT REQUEST
TSP 99-0160 - SPENT FUEL POOL - K_∞

South Carolina Electric & Gas Company (SCE&G), acting for itself and as agent for South Carolina Public Service Authority, hereby requests an amendment to the Virgil C. Summer Nuclear Station (VCSNS) Technical Specifications (TS). This request is being submitted pursuant to 10 CFR 50.90.

The proposed changes will revise the Spent Fuel Pool reactivity limit requirement by removing the value for K infinity (K_∞) from Specification 5.6.1.1 and replacing it with a figure of Integral Fuel Burnable Absorbers (IFBA) rods versus nominal Uranium-235 enrichment. The proposed change will also delete the value for K_∞ from Specification 5.6.1.2, since IFBA credit is not considered or required in the new fuel storage criticality analysis.

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The purpose for this request is to change the methodology for new and spent fuel pool reactivity limits. Both the current methodology of K_∞ and the new methodology of using the IFBA rods per assembly versus enrichment chart assure that 10 CFR 50 Appendix A, General Design Criteria 62, "Prevention of Criticality in Fuel Storage and Handling," remains satisfied. WCAP-14416-NP-A, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology", (part of our current licensing basis) presented both methodologies, and the V. C. Summer Nuclear Station spent fuel pool criticality licensing basis limit ($K_{eff} \leq 0.95$) is maintained with either methodology.

SCE&G desires that this amendment request be approved by August 1, 2000, to permit implementation of the change, including training, prior to receipt of the new fuel, scheduled for September 2000.

A001

The TS amendment request is contained in the following attachments:

Attachment I	Explanation of Changes Summary Marked-up Technical Specification Pages Revised Technical Specification Pages
Attachment II	Safety Evaluation
Attachment III	No Significant Hazards Evaluation

This proposed amendment has been reviewed and approved by the Plant Safety Review Committee and the Nuclear Safety Review Committee.

These statements and matters set forth herein are true and correct to the best of my knowledge, information, and belief.

Should you have questions, please call Mr. Philip A. Rose at (803) 345-4052.

Very truly yours,

Gary J. Taylor

PAR/GJT/dr
Attachments (3)

c: J. L. Skolds
J. J. Galan (w/o Attachment)
R. J. White
L. A. Reyes
K. R. Cotton
NRC Resident Inspector
Paulett Ledbetter
J. B. Knotts, Jr.
T. P. O'Kelly
RTS (TSP 99-0160)
File (813.20)
DMS (RC-00-0025)

STATE OF SOUTH CAROLINA :
: TO WIT :
COUNTY OF FAIRFIELD :

I hereby certify that on the 27th day of January 2000, before me, the subscriber, a Notary Public of the State of South Carolina personally appeared Gary J. Taylor, being duly sworn, and states that he is Vice President, Nuclear Operations of the South Carolina Electric & Gas Company, a corporation of the State of South Carolina, that he provides the foregoing response for the purposes therein set forth, that the statements made are true and correct to the best of his knowledge, information, and belief, and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal

Notary Public

My Commission Expires July 13, 2005

Date

SCE&G -- EXPLANATION OF CHANGES

Page	Affected Section	Bar #	Description	Reason
5-7	5.6.1.1	1	Deleted reference to K_∞ and insert reference to Figure 5.6-1 and provide discussion on IFBA Boron loading versus number of IFBA rods	Utilizing different methodology for assuring licensing basis for spent fuel pool is maintained.
5-7	5.6.1.2	2	Deleting reference to K_∞ and IFBAs	Utilizing different methodology for assuring licensing basis for spent fuel pool is maintained and no credit for IFBAs in new fuel racks is in the new fuel storage criticality analysis.
5-8 (NEW)	Figure 5.6-1	1	Inserting new figure of IFBA rods versus fuel enrichment as Page 5-8	Utilizing different methodology for assuring licensing basis for spent fuel pool is maintained.
5-7a	5.6.2 and 5.7	1	Renumbering page to Page 5-9	Allows figure 5.6-1 to be next to Section 5.6.1.1
5-8	Table 5.7-1	1	Renumbering page to Page 5-10	Allows figure 5.6-1 to be next to Section 5.6.1.1

5.6 FUEL STORAGE

a minimum number of

CRITICALITY

5.6.1.1 The spent fuel storage racks consist of 1276 individual cells, each of which accommodates a single assembly. The cells are grouped into 3 regions. The spent fuel storage racks are designed and shall be maintained with a K_{eff} less than or equal to 0.95 when flooded with unborated water, which includes conservative allowances for uncertainties and biases. This is ensured by maintaining the following for each region:

a. REGION 1 - designated for storage of fresh fuel assemblies and freshly discharged fuel assemblies.

   1. A nominal 10.4025 inch center-to-center distance between fuel assemblies placed in the storage rack.

   2. A ~~maximum~~ nominal enrichment of 5.0 weight percent U-235 with ~~sufficient~~ integral fuel burnable absorbers, ~~such that the maximum reference fuel assembly K_∞ is less than or equal to 1.460 at 68°F.~~

   as shown on Figure 5.6-1

   insert 1

b. REGION 2 - designated for storage of discharged fuel assemblies.

   1. A nominal 10.4025 x 10.1875 inch center-to-center distance between fuel assemblies placed in the storage rack.

   2. A maximum nominal enrichment of 2.5 weight percent U-235 with no burnup and up to 5.0 weight percent U-235 with a minimum burnup of up to 21,600 MWD/MTU, as specified in Figure 3.9-1.

c. REGION 3 - designated for storage of discharged fuel assemblies.

   1. A nominal 10.116 inch center-to-center distance between fuel assemblies placed in the storage rack.

   2. A maximum nominal enrichment of 1.4 weight percent U-235 with no burnup and up to 5.0 weight percent U-235 with a minimum burnup of up to 48,000 MWD/MTU, as specified in Figure 3.9-2.

5.6.1.2 The new fuel storage racks consist of 60 individual cells, each of which accommodates a single assembly. The new fuel pit storage racks are designed and shall be maintained with a K_{eff} less than or equal to 0.95 when flooded with unborated water and less than or equal to 0.98 for low density optimum moderation conditions, including conservative allowances for uncertainties and biases. This is ensured by maintaining:

a. A nominal 21 inch center-to-center distance between new fuel assemblies placed in the storage rack.

b. A ~~maximum~~ nominal enrichment of 5.0 weight percent U-235. ~~with sufficient integral fuel burnable absorbers such that the maximum reference fuel assembly K_∞ is less than or equal to 1.460 at 68°F.~~

INSERT 1

The Integral Fuel Burnable Absorbers (IFBA) rod requirements shown in Figure 5.6-1 are based on a nominal IFBA linear B^{10} loading of 1.50 mg-B^{10}/inch (1.0X). For higher IFBA loadings up to 3.00 mg-B^{10}/inch (2.0X), the required number of IFBA rods may be reduced by the ratio of the increased B^{10} loading to the nominal 1.50 mg-B^{10}/inch loading. The poison length of the IFBA rods is greater than or equal to 108 inches.

DRAINAGE

5.6.2 The spent fuel pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 460'3".

CAPACITY

5.6.3 The spent fuel pool is designed and shall be maintained with a storage capacity limited to no more than 1276 fuel assemblies, 242 in Region 1, 99 in Region 2, and 935 in Region 3.

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 limits of Table 5.7-1.

TABLE 5.7-1

COMPONENT CYCLIC OR TRANSIENT LIMITS

COMPONENT	CYCLIC OR TRANSIENT LIMIT	DESIGN CYCLE OR TRANSIENT
Reactor Coolant System	200 heatup cycles at ≤ 100°F/hr and 200 cooldown cycles at < 100°F/hr.	Heatup cycle - T_{avg} from ≤ 200°F to > 550°F. Cooldown cycle - T_{avg} from ≥ 550°F to ≤ 200°F.
	200 pressurizer cooldown cycles at ≤ 200°F/hr.	Pressurizer cooldown cycle temperatures from ≥ 650°F to ≤ 200°F.
	80 loss of load cycles, without immediate turbine or reactor trip.	≥ 15% of RATED THERMAL POWER to 0% of RATED THERMAL POWER.
	40 cycles of loss of offsite A.C. electrical power.	Loss of offsite A.C. electrical ESF Electrical System.
	400 reactor trip cycles.	100% to 0% of RATED THERMAL POWER.
	10 inadvertent auxiliary spray actuation cycles.	Spray water temperature differential > 320°F.
	50 leak tests.	Pressurized to ≥ 2485 psig.
	5 hydrostatic pressure tests.	Pressurized to ≥ 3107 psig.
	200 large stepload decrease with steam dump	Load decreases of more than 10% RATED THERMAL POWER occurring in 1 minute or less.
Secondary System	1 steam line break.	Break in a > 6 inch steam line.
	5 hydrostatic pressure tests.	Pressurized to ≥ 1350 psig.

5.6 FUEL STORAGE

CRITICALITY

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a. REGION 1 - designated for storage of fresh fuel assemblies and freshly discharged fuel assemblies.

   1. A nominal 10.4025 inch center-to-center distance between fuel assemblies placed in the storage rack.

   2. A nominal enrichment of 5.0 weight percent U-235 with a minimum number of integral fuel burnable absorbers as shown on Figure 5.6-1. The Integral Fuel Burnable Absorbers (IFBA) rod requirements shown in Figure 5.6-1 are based on a nominal IFBA linear B^{10} loading of 1.50 mg-B^{10}/inch (1.0X). For higher IFBA loadings up to 3.00 mg-B^{10}/inch (2.0X), the required number of IFBA rods may be reduced by the ratio of the increased B^{10} loading to the nominal 1.50 mg-B^{10}/inch loading. The poison length of the IFBA rods is greater than or equal to 108 inches.

b. REGION 2 - designated for storage of discharged fuel assemblies.

   1. A nominal 10.4025 x 10.1875 inch center-to-center distance between fuel assemblies placed in the storage rack.

   2. A maximum nominal enrichment of 2.5 weight percent U-235 with no burnup and up to 5.0 weight percent U-235 with a minimum burnup of up to 21,600 MWD/MTU, as specified in Figure 3.9-1.

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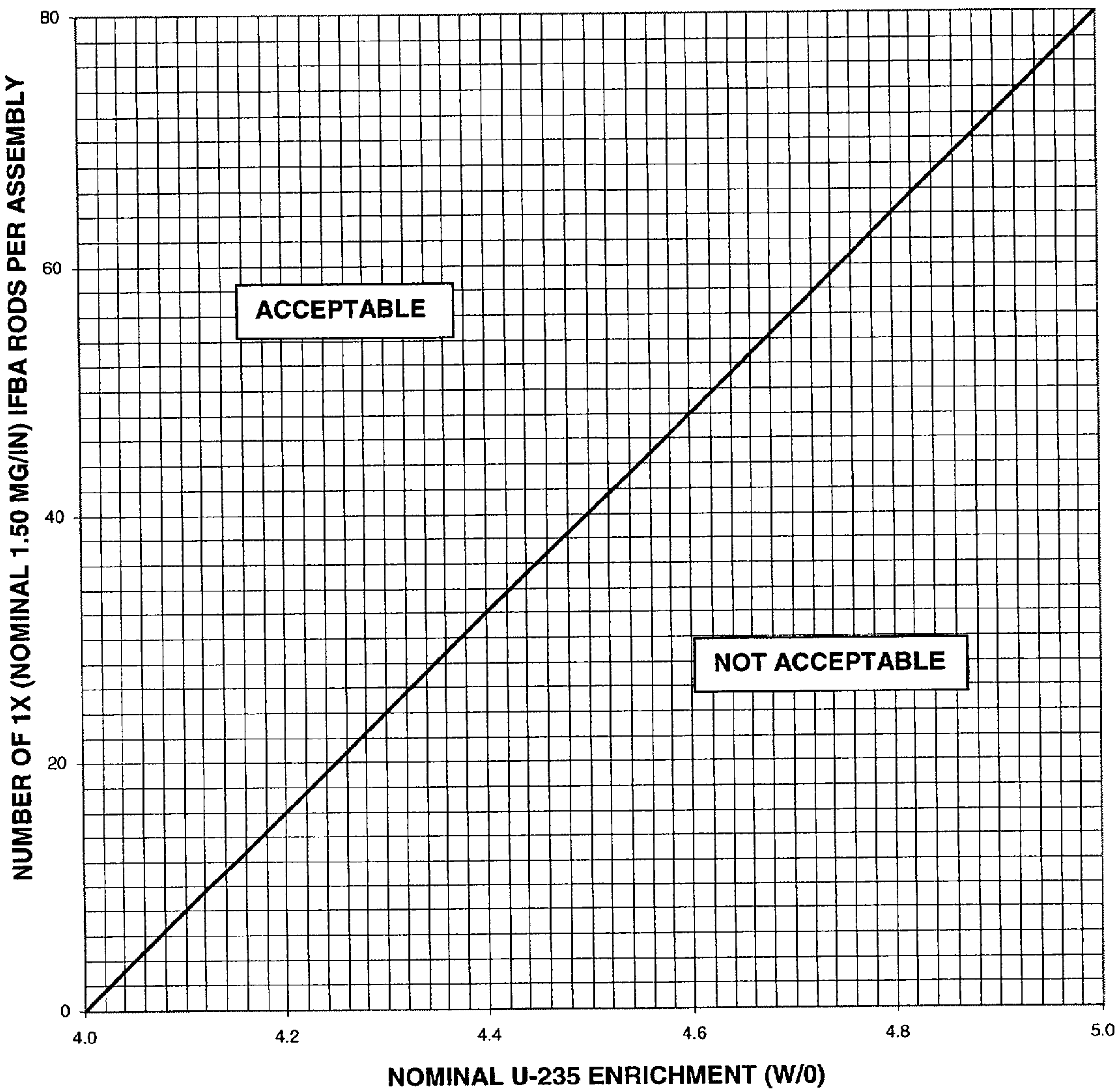
a. A nominal 21 inch center-to-center distance between new fuel assemblies placed in the storage rack.

b. A nominal enrichment of 5.0 weight percent U-235.



SOUTH CAROLINA ELECTRIC & GAS CO.
VIRGIL C. SUMMER NUCLEAR STATION
Region 1 Minimum
IFBA Requirements
FIGURE 5.6-1

DRAINAGE

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	200 pressurizer cooldown cycles at ≤ 200°F/hr.	Pressurizer cooldown cycle temperatures from ≥ 650°F to ≤ 200°F.
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	40 cycles of loss of offsite A.C. electrical power.	Loss of offsite A.C. electrical ESF Electrical System.
	400 reactor trip cycles.	100% to 0% of RATED THERMAL POWER.
	10 inadvertent auxiliary spray actuation cycles.	Spray water temperature differential > 320°F.
	50 leak tests.	Pressurized to ≥ 2485 psig.
	5 hydrostatic pressure tests.	Pressurized to ≥ 3107 psig.
	200 large stepload decrease with steam dump.	Load decreases of more than 10% RATED THERMAL POWER occurring in 1 minute or less.
Secondary System	1 steam line break.	Break in a > 6 inch steam line.
	5 hydrostatic pressure tests.	Pressurized to ≥ 1350 psig.

SAFETY EVALUATION
FOR REVISING SPENT FUEL STORAGE REQUIREMENTS IN THE VIRGIL C. SUMMER NUCLEAR STATION TECHNICAL SPECIFICATIONS

Description of Amendment Request

The Virgil C. Summer Nuclear Station (VCSNS) Technical Specifications (TS), Section 5.6.1, are being revised to replace the maximum reference fuel assembly K infinity (K_∞) with a figure of Integral Fuel Burnable Absorbers (IFBA) rods per assembly versus nominal fuel enrichment. This change will assure that the reactivity requirements for spent fuel storage remain satisfied. Additionally, the requirement for new fuel storage is being revised to remove K_∞ since IFBAs are not considered or required in the criticality analysis for new fuel storage.

Safety Evaluation

10 CFR 50 Appendix A, General Design Criteria 62 – Prevention of Criticality in Fuel Storage and Handling, requires that criticality is prevented by physical systems or processes, preferably by the use of geometrically safe configurations. This criterion is met by ensuring that K_{eff} remains less than or equal to 0.95 under all conditions for fuel storage.

The proposed Technical Specification changes remove the value for K infinity (K_∞) from TS 5.6.1.1 and replace it with a figure of IFBA rods per assembly versus nominal Uranium-235 enrichment. The proposed changes also delete the value for K_∞ in TS 5.6.1.2 since the licensing basis is satisfied without crediting IFBAs.

Credit for IFBA is utilized in the V. C. Summer Nuclear Station (VCSNS) spent fuel storage rack criticality analysis that was previously performed by Westinghouse. This analysis assures that the enrichment and IFBA combinations for spent fuel storage satisfies the licensing basis limit. The analysis was performed with two different methodologies that are discussed in WCAP-14416-NP-A, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology."

Calculations using Monte Carlo techniques are performed to define the "base enrichment of U-235" without IFBA credit, which can be stored in the Spent Fuel Pool, rack geometry. All calculations are performed using existing rack geometry and include manufacturing tolerances and method biases. For storage of fuel assemblies with enrichments greater than this "base" enrichment, the minimum number of IFBAs are determined such that the reactivity is less than or equal to the reactivity of the fuel assembly with the "base" enrichment. The result of these analyses is a curve (IFBA-enrichment curve), which identifies the minimum number if IFBAs required for various fuel enrichments.

An alternative methodology (K_∞) is based on the reactivity of the "base" enrichment calculated at room temperature (68°F), without IFBA credit, and at reactor core conditions. A conservatism of 1% in reactivity is used in this value to define a "reference K_∞". For storage of fuel assemblies with higher enrichments containing a given number of IFBAs, the K_∞ can be calculated with a lattice code. If the calculated K_∞ is less than the reference K_∞, the fuel assembly can be stored in the spent fuel racks.

The K_∞ method utilizes the reactor configuration rather than the SFP rack configuration. A review of the methods by Westinghouse shows that the K_∞ method could lead to IFBA requirements which are lower than those required by the IFBA-enrichment curve. Thus, there is the potential for non-conservative IFBA requirements determined using the K_∞ methodology.

Westinghouse no longer uses the K_∞ method to determine the IFBA requirements in spent or new fuel storage rack analyses. The IFBA requirements are only determined using the IFBA-enrichment curve methodology.

There is some conservatism inherent in calculations using either of the methods; therefore, a violation of the IFBA-enrichment curve does not necessarily mean that the licensing basis limit on reactivity in the spent fuel pool ($K_{eff} \leq 0.95$) would be violated.

All fuel utilized in previous reloads at VCSNS was reviewed for impact with respect to this change in methodologies and was found to be acceptable.

IFBA credit is not taken in the new fuel storage criticality analysis.

NO SIGNIFICANT HAZARDS EVALUATION FOR REVISING SPENT FUEL STORAGE REQUIREMENTS IN THE VIRGIL C. SUMMER NUCLEAR STATION TECHNICAL SPECIFICATIONS

Description of Amendment Request

The Virgil C. Summer Nuclear Station (VCSNS) Technical Specifications (TS), Section 5.6.1, are being revised to replace the maximum reference fuel assembly K infinity (K_∞) with a figure of Integral Fuel Burnable Absorbers (IFBA) rods per assembly versus nominal fuel enrichment. This change will assure that the reactivity requirements for spent fuel storage remain satisfied. Additionally, the requirement for new fuel storage is being revised to remove K_∞ since IFBAs are not considered or required in the criticality analysis for new fuel storage.

Basis for No Significance Hazards Consideration Determination

South Carolina Electric & Gas Company (SCE&G) has evaluated the proposed changes to the VCSNS TS described above against the Significant Hazards Criteria of 10 CFR 50.92 and has determined that the changes do not involve any significant hazard. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The proposed changes revise the methodology utilized in determining the IFBA requirement for storage of spent fuel. IFBA credit is not used in the new fuel storage criticality analysis performed by Westinghouse. Removing K infinity (K_∞) from these Specifications and replacing the spent fuel requirement with the IFBA-enrichment curve will not result in any increase in the probability or consequences of an accident previously evaluated. The analysis of concern is the criticality analysis for storage of fuel in the spent fuel storage racks. The analysis must conclude that fuel stored in the configurations allowed in the spent fuel storage racks will not result in any unplanned criticality.

   The IFBA rods per assembly versus the nominal enrichment of the fuel assembly curve and the K_∞ methodology were both developed to ensure that K_{eff} in the spent fuel storage racks remains less than or equal to 0.95 under all postulated conditions. This limit is included in the VCSNS licensing basis. The IFBA versus enrichment curve results in determining more accurate IFBA requirements than the K_∞ methodology, and continues to maintain the licensing basis limit.

This change will not revise the geometry of the spent fuel storage racks, the poisons present to prevent criticality, or coolant capabilities. The licensing basis limit for reactivity control of the spent fuel storage racks remains satisfied.

Therefore, the change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   The proposed change does not result in any change to the design or operation of the spent fuel pool or any support systems associated with the spent fuel pool. The IFBA requirements developed from using the IFBA versus enrichment curve are potentially more conservative than developed using the K_∞ methodology. There are no scenarios that are postulated to occur that would create the possibility of a new or different kind of accident from any previously evaluated in the FSAR or FPER.

3. Does this change involve a significant reduction in margin of safety?

   The proposed changes do not alter the manner in which safety limits, limiting safety system settings or limiting conditions for operation are determined. IFBA is not assumed in any criticality analysis performed for new fuel storage. This change incorporates a more accurate method for determining IFBA requirements for fuel storage in the spent fuel storage racks. Both the current methodology and the proposed methodology have been reviewed and approved by the NRC in WCAP-14416-NP-A as acceptable methods for assuring that the licensing basis for the spent fuel pool reactivity limit remain satisfied. Therefore, the margin of safety with respect to unplanned criticality, for the storage of fuel in the spent fuel storage racks is not reduced.

Pursuant to 10 CFR 50.91, the preceding analyses provides a determination that the proposed Technical Specifications change poses no significant hazard as delineated by 10 CFR 50.92.

Environmental Assessment

This proposed Technical Specification change has been evaluated against criteria for and identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21. It has been determined that the proposed change meets the criteria for categorical exclusion as provided for under 10 CFR 51.22(c)(9). The following is a discussion of how the proposed Technical Specification change meets the criteria for categorical exclusion.

10 CFR 51.22(c)(9): Although the proposed change involves change to requirements with respect to inspection, Surveillance, or Design Requirements,

(i) the proposed change involves No Significance Hazards Consideration (refer to the No Significance Hazards Consideration Determination section of this Technical Specification Change Request);

(ii) there are no significant changes in the types or significant increase in the amounts of any effluents that may be released offsite since the proposed change does not affect the generation of any radioactive effluents nor does it affect any of the permitted release paths; and

(iii) there is no significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Based on the aforementioned and pursuant to 10 CFR 51.22 (b), no environmental assessment or environmental impact statement need be prepared in connection with issuance of an amendment to the Technical Specifications incorporating the proposed change.