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SOUTHERN COMPANY
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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

LCV-0828-B

Gentlemen:

VOGTLE ELECTRIC GENERATING PLANT
REQUEST TO REVISE TECHNICAL SPECIFICATIONS
ADDITIONAL FUEL STORAGE RACKS FOR UNIT 1 FUEL STORAGE POOL

In accordance with the provisions of 10 CFR 50.90 and 10 CFR 50.59, Southern Nuclear Operating Company (SNC) hereby requests an amendment to the Vogtle Electric Generating Plant (VEGP) Unit 1 and Unit 2 Technical Specifications, Appendix A to Operating Licenses NPF-68 and NPF-81. The revision to the Technical Specitications will change the capacity of the Unit 1 spent fuel storage pool from 288 to 1476 assemblies, and revise the design features description to reflect the criticality analyses and storage cell spacing.

The spent fuel storage pool for VEGP Unit 2 contains storage racks with a storage capacity for 2098 fuel assemblies. The Unit 1 fuel storage pool was designed and constructed to be the same as the Unit 2 fuel storage pool except that only two racks with a capacity of 288 storage locations were installed in the Unit 1 pool. Southern Nuclear proposes to replace the two racks in the Unit 1 pool with 26 racks with a capacity for storage of 1476 assemblies. These racks were previously licensed by the NRC and used at the Maine Yankee Nuclear Plant.

A report entitled " Modification Report for Spent Fuel Pool Increased Storage Capacity," prepared by SNC with assistance from its contractor, Holtec International, was previously transmitted to the NRC with letter LCV-828-A. The report demonstrated that installation and use of these racks, in the VEGP Unit 1 fuel storage pool. can be achieved with respect to thermal-hydraulic considerations, seismic and structural adequacy, radiological compliance, and mechanical integrity. The report did not include the results of the criticality analyses.

This letter requests the Technical Specifications changes required for use of the additional spent fuel storage capacity. It includes the results of criticality analyses performed using the recently approved methodology described in Westinghouse WCAP-14416-NP-A Rev. 1, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology," November, 1996.

By letter LCV-0849-E, SNC requested revisions to the Technical Specifications for the storage of spent fuel that would allow credit for soluble boron, burnup, and storage configurations for storage of fuel with initial enrichments up to 5.0 weight percent U-235. That change to the Technical Specifications is currently being reviewed by the NRC staff and is expected to be approved by about January 31, 1998. It is the intention of SNC to replace the two spent fuel racks currently in the Unit 1 spent fuel pool with 26 racks containing 1476 storage locations. Therefore, the Technical Specifications proposed by this letter are presented as a marked up version of the technical specifications as submitted to the NRC by LCV-0849-E. The criticality analyses described in this letter were performed in accordance with the same methodology described in LCV-0849-E.

In a meeting on January 16, 1997, SNC informed the NRC of the intent to install replacement fuel storage racks on a schedule consistent with the receipt and storage of new fuel in the fall of 1998, for the spring 1999 refueling outage of VEGP Unit 1. To meet this schedule, work must start shortly after the Unit 2 refueling outage which begins in March of 1998. Therefore, SNC requests that this change to the Technical Specifications be reviewed by April 15, 1998. This schedule is consistent with an installation schedule that allows the replacement to be conducted when there are no fuel assemblies in the Unit 1 pool, and during a time when there are no other concurrent refueling or fuel receipt activities in the fuel storage building.

Enclosure 1 contains a description of the change, enclosure 2 contains an evaluation in accordance with 10 CFR 50.92 which concludes that there are no significant hazards considerations, enclosure 3 includes the revised Technical Specification pages, enclosure 4 provides an environmental assessment and enclosure 5 includes the results of the criticality analyses.

Mr. C. K. McCoy states that he is a Vice President of Southern Nuclear and is authorized to execute this oath on behalf of Southern Nuclear and that, to the best of his knowledge and belief, the facts set forth in this letter and enclosures are true.

SOUTHERN NUCLEAR OPERATING COMPANY

By: C. K. McCoy

C. K. McCoy

Sworn to and subscribed before me this 20th day of November, 1997.

Mary N. Bentley

Notary Public

CKM/HWM/gmb

Enclosures:
1. Bases for Proposed Change
2. 10 CFR 50.92 Evaluation
3. Instructions for Incorporation and revised pages
4. Environmental Assessment
5. Criticality Analyses

c(w): Southern Nuclear
Mr. J. B. Beasley, Jr.
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U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator
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Mr. L. C. Barrett, Commissioner, Department of Natural Resources

ENCLOSURE 1
VOGTLE ELECTRIC GENERATING PLANT
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ADDITIONAL FUEL STORAGE RACKS FOR UNIT 1 FUEL STORAGE POOL

BASIS FOR PROPOSED CHANGE

Proposed Changes:

The Vogtle Electric Generating Plant Unit 1 and Unit 2 spent fuel pools are the same size and design, each with its own independent and redundant cooling systems. The Unit 2 pool has been filled with fuel storage racks with 2098 fuel storage locations. The Unit 1 pool currently contains only two racks containing the neutron absorbing material, boraflex, with a capacity for storage of 288 fuel assemblies. The two racks in the Unit 1 pool are being replaced with 26 racks utilizing the neutron absorbing material, boral, with a storage capacity of 1476 fuel assemblies. The proposed changes to the Technical Specifications indicate the revised storage capacity, and the parameters associated with the criticality analyses for these racks. The criticality analyses were performed using the NRC approved methodology described in WCAP-14416-NP-A Rev. 1, November, 1996.

Revisions to the Technical Specifications

Replace figure 3.7.18-1 with a revised figure based on the criticality analyses for the Unit 1 racks containing boral.

The criticality information for Unit 2 is being placed unchanged into section 4.3.1.2 and 4.3.1.1. is being revised to address Unit 1

Revise Design Features section 4.3.1.1.c to indicate 600 ppm as the required amount of soluble boron to maintain $K_{eff} \leq 0.95$.

Revise Design Features section 4.3.1.1.d to include the reference K_∞ that is equivalent to the combination of burnup and initial enrichment defined by figure 3.7.18-1.

Revise Design Features section 4.3.1.1.e to indicate that fuel assemblies with up to 5 weight percent U-235 may be stored in 3-out-of-4 checkerboard storage configurations, delete figure 4.3.1-1, eliminate the reference to 2-out-of-4 storage for the Unit 1 pool and include the reference K_∞ acceptable for all cell storage in the Unit 1 fuel storage racks.

Revise Design Features section 4.3.1.1.f to include the pitch of the Unit 1 fuel storage racks.

Revise Design Features section 4.3.3 to indicate the Unit 1 fuel storage pool capacity of 1476 fuel assemblies.

Revise titles on figures 4.3.1-4, 4.3.1-6 and 4.3.1-7 to reflect the elimination of 2-out-of-4 storage configuration requirements for the Unit 1 fuel storage pool.

BASIS FOR PROPOSED CHANGE (Continued)

Revise bases section B 3.7.17 to indicate that 600 ppm of soluble boron is required for maintaining K_{eff} of the Unit 1 pool less than or equal to 0.95, to indicate that the misplacement of a fuel assembly between the rack and the pool wall was also evaluated, and to indicate a reduction in the required boron concentration to offset an accident in the Unit 1 fuel storage pool.

Revise bases section B 3.7.18 to include the results of the Unit 1 fuel storage criticality analyses.

Basis:

By letter LCV-0849-E Southern Nuclear Operating Company (SNC) proposed changes to the Unit 1 and Unit 2 technical specifications that based the criticality analyses on the recently NRC approved methodology described in WCAP 14416-NP-A Rev. 1, November 1996. Those changes to the technical specifications are expected to be approved by the NRC about January 31, 1998. The technical specification changes now being proposed are in addition to those contained in LCV-0849-E. They have the same analytical methodology and bases. The number of fuel storage locations is increased in the Unit 1 fuel storage pool and the criticality analyses have been reperformed for the boral racks.

Because these racks have boral as a neutron absorber, they are capable of storing fuel with up to 5.0 weight percent in a 3-out-of-4 checkerboard configuration without credit for burnup or IFBA; thus, there is no need for defining 2-out-of-4 checkerboard restrictions for the Unit 1 fuel storage racks. Typically, fuel with enrichments approaching 5.0 weight percent has sufficient burnable absorber to give it a reactivity equivalent to an enrichment of less than or equal 3.5 weight percent. That equivalent reactivity is being added to the Design Features section. These racks and the associated technical specifications will allow any fuel that is anticipated to be used at VEGP to meet the all cell storage requirements. Therefore, once approved and installed, these racks will simplify the practical fuel storage requirements, and greatly reduce the possibility of a misplacement of a fuel assembly in the fuel storage pool. Because the Unit 1 and Unit 2 pools are connected, the additional flexibility created by the addition of the fuel storage racks with boral neutron absorber in the Unit 1 fuel storage pool will also benefit the Unit 2 fuel storage pool.

The proposed changes to the technical specifications are in enclosure 3. Enclosure 3 includes a marked up version of the technical specifications as submitted to the NRC by LCV-0849-E. Installation of the boral racks will begin shortly after the Unit 2 refueling outage, in the Spring of 1998. The installation schedule is designed to allow the racks to

BASIS FOR PROPOSED CHANGE (Continued)

be installed while there is no fuel in the Unit 1 pool. The analytical bases for the limits proposed for the technical specifications were calculated using NRC approved methods and are consistent with the information and analyses presented in LCV-0849-E. The physical design of the boral racks and the evaluation of their installation were sent to the NRC by letter LCV-0828-A dated September 4, 1997. The capacity of the Unit 1 fuel storage pool remains well within the capacity which has already been reviewed and accepted by the NRC for the Unit 2 pool. Therefore, SNC has requested that this revision be reviewed by April 15, 1998.

ENCLOSURE 2
VOGTLE ELECTRIC GENERATING PLANT
REQUEST TO REVISE TECHNICAL SPECIFICATIONS
ADDITIONAL FUEL STORAGE RACKS FOR UNIT 1 FUEL STORAGE POOL

10 CFR 50.92 EVALUATION

Background

Each of the Vogtle Electric Generating Plant (VEGP) Units has an independent fuel storage pool. Each pool has it own independent, redundant cooling system. The two pools are connected to a shared spent fuel cask loading pit. This allows fuel to be moved between the two fuel storage pools. The Unit 2 pool is completely filled with fuel storage racks and has 2098 storage locations. The Unit 1 pool, even though designed and built the same as the Unit 2 pool, only has two racks with 288 storage locations.

The racks in each pool contain the neutron absorbing material boraflex. Boraflex is being eliminated from the licensing basis of the fuel storage racks. By letter LCV-0849-E, SNC proposed changes that eliminate credit for the boraflex, from the bases for meeting NRC requirements for maintaining the fuel storage pool in a subcritical condition. That request was based on revised analyses performed in accordance with the recently NRC approved methodology contained in WCAP-14416-NP-A, Rev. 1 "Westinghouse Spent Fuel Rack Criticality Analysis Methodology," November, 1996. The analyses defined combinations of burnup and initial enrichments that can be stored in the fuel storage racks, without credit for boraflex. It also defined acceptable checkerboard loading patterns, interface requirements or equivalent K_{∞} for storage of fuel that does not meet the combination of initial burnup and enrichment. Those changes, which are currently being reviewed by the NRC, will allow complete utilization of the storage capacity of both pools without reliance on credit for boraflex as a neutron absorbing material.

The proposed addition of the storage racks containing boral as a neutron absorbing material, not only increases the fuel storage capacity but also eliminates a source of silica contamination in the fuel storage pool coolant. The analyses demonstrate that the fuel storage racks containing boral meet the subcriticality requirements with fuel up to the maximum allowable enrichment with a minimum of burnup. The analyses show that the K_{∞} requirements are met for unburned fuel containing integral fuel burnable absorbers (IFBA) within the range of that which is normally included in higher enriched fuel. Fuel enrichment and IFBA combinations that are currently expected to be used in the future, would probably not require checkerboard storage. Therefore, in addition to providing more storage capacity, the proposed changes will allow simplified administrative controls for assuring that the storage is in accordance with the regulatory and design bases.

10 CFR 50.92 EVALUATION (Continued)

Proposed Changes

The proposed changes are described in enclosure 1. The marked up technical specifications are included in enclosure 3. The changes incorporate the increased number of fuel storage locations in the Unit 1 pool. Changes to the design features section are necessary to be consistent with the criticality analyses, and the inclusion of the reference K_{∞} for all cell storage in the Unit 1 fuel storage racks. The marked-up pages are revisions to the specifications that were proposed by letter LCV-0849-E.

Safety Evaluation

The potential safety consequences for this change are those associated with the physical rack change and the increased number of fuel assemblies, and those associated with the requirements to maintain the pool in a subcritical condition. These are addressed below.

Rack Installation

Removal of the existing racks and the installation of the new racks has been described in "Installation Report for Increased Spent Fuel Pool Storage Capacity" which was transmitted to the NRC with letter LCV-0828-A on September 4, 1997. The installation of the racks will be accomplished while there are no fuel assemblies in the Unit 1 fuel storage pool. This greatly reduces the risks associated with the movement of heavy loads associated with installation. Because the racks were previously installed and used for fuel storage at another plant, and because fuel has been previously stored in the Unit 1 fuel storage pool, precautions will be taken to minimize radiological exposure to personnel during installation.

Heat Loads

The additional storage capacity of the Unit 1 pool will result in actual peak heat loads less than those resulting from the currently licensed configurations. The current fuel storage arrangement for the two units requires that fuel from Unit 1 be stored in the Unit 2 pool because it contains a larger number of storage locations. The discharged fuel from Unit 1 is transferred to the Unit 2 pool prior to the next Unit 1 refueling outage. The Unit 2 pool was analyzed to demonstrate that it is capable of removing the increased decay heat due to the storage of fuel assemblies from both units. This analysis is described in FSAR section 9.1.3. The analysis was reviewed by the NRC and the conclusions documented in Safety Evaluation Report (SER) NUREG-1137, supplement 8. The SER acknowledged that the analyzed heat loads were increased to account for storage of discharged fuel from two units and that the analyses were also applicable to the Unit 1 fuel pool cooling system. The increased storage capacity of the Unit 1 pool reduces the requirements for movement of fuel between the two pools. This will result in peak heat loads that are lower than those that are currently projected for the arrangement of 2098 storage locations in one pool and 288 in the other pool. Therefore, the increased storage capacity of the Unit 1 pool will

not result in heat loads that are in excess of those previously reviewed and accepted by the NRC. The analyses which are described in the FSAR included assumptions about fuel cycles and fuel discharge schemes that were chosen to assure that full utilization of the pool would be achieved while remaining within the analyzed heat loads. The actual number and power history of fuel assemblies remaining in the pool following a refueling outage depends on the fuel cycle design for each operating cycle.

It is the practice at VEGP, to verify that the pool heat loads, resulting from each significant fuel transfer either from the reactor or between the pools, will remain within the heat loads used in the analyses. The report transmitted to the NRC with LCV-0828-A, included an analysis of fuel pool temperature demonstrating that the previously licensed pool temperature limit for only one train of fuel pool cooling is met with a steady state heat load of about 51.87×10^6 Btu/hr. The steady state heat load assumption is very conservative because a typical full core has a decay heat load of about 40×10^6 Btu/hr at 100 hours after shutdown; it has decayed to about 32×10^6 Btu/hr after an additional 50 hours, and continues to decay rapidly.

Structural Analysis

The racks and their interface with the Unit 1 fuel storage building have been extensively evaluated, including a complete seismic evaluation. The total mass of racks and fuel assemblies is less than that which was already analyzed, reviewed and accepted for the Unit 2 pool. Because these racks were previously licensed for use at another plant with a different seismic design requirement, the racks have been reanalyzed for the appropriate VEGP seismic criteria. The results of the seismic analyses are included in the report submitted with LCV-0825-A. That report describes analyses demonstrating that the structural integrity of the fuel, fuel cells, rack modules, fuel storage pool walls and floor will be maintained during postulated seismic and accident conditions.

Criticality

Topical report WCAP-14416-P-A describes a methodology for analyses of fuel storage rack criticality. This methodology has been reviewed by the NRC and determined to be acceptable for fuel storage rack criticality analyses. Analyses using this methodology have been performed and revisions to the technical specifications have been proposed for the storage of fuel in both the Unit 1 and Unit 2 fuel storage pools. Those analyses were submitted to the NRC by letter LCV-0849-E, dated August 8, 1997. Approval of those changes is expected about January 31, 1998. The criticality analyses, and proposed technical specifications changes being proposed for the racks to be placed in the Unit 1 pool, were performed using the same methodology. Therefore, the changes are described in terms of revisions to the Technical Specifications as they will be following approval of the request made by LCV-0849-E.

10 CFR 50.92 EVALUATION (Continued)

The criticality methodology requires a calculation demonstrating that K_{eff} remains below 1.0 (subcritical) with no credit for soluble boron. The amount of boron required to assure that the K_{eff} remains ≤ 0.95 is then determined in accordance with the methodology described in the topical report. For higher enrichments (up to 5.0 weight percent U-235), reactivity equivalencing methodologies in accordance with the topical report are used to determine burnup or IFBA credit.

The details of these analyses and the results are describe in the criticality analysis summary report in enclosure 5.

The results demonstrate that fuel assemblies with enrichments up to 3.5 weight percent U-235 may be stored in all cell locations and fuel assemblies with higher enrichments may be stored in all cells provided they meet burnup or IFBA content requirements. Fuel assemblies with initial enrichments up to 5.0 weight percent U-235 may be stored in 3-out-of-4 checkerboard patterns without credit for burnup. Fuel assemblies with initial enrichments of 5.0 weight percent U-235 and a burnup of 9786 MWD/MTU may be stored in all cells of the Unit 1 fuel storage racks. Fuel with initial enrichments of up to 5.0 weight percent U-235 and having sufficient IFBA to result in a $K_{\infty} \leq 1.431$ in cold reactor conditions may be stored in all storage cells. The required number of 1.5 X IFBA to meet this condition is 48. Based on these results, it is expected that the types of fuel currently planned for use at VEGP will meet the all cell storage requirements for the new Unit 1 storage racks.

The fuel pool boron concentrations previously proposed in LCV-0849-E included an allowance to assure that K_{eff} remains less than or equal to 0.95 under accident conditions. The new Unit 1 racks utilize a flux trap design taking credit for boral as a neutron absorbing material. Therefore, an additional evaluation of an accidental placement of a fuel assembly outside the racks was considered. The results of the criticality analyses indicated that the required boron concentration to maintain $K_{eff} \leq 0.95$ is 600 ppm. The amount of boron required to offset the effects of accidents was determined to be 800 ppm.

Enclosure 6 to LCV-0849-E provided an evaluation to demonstrate that very large amounts of water would be required to accidentally dilute the fuel storage pool to the boron concentration where K_{eff} could exceed the 0.95 limit. The increase in the boron concentration required to offset the unplanned dilution by maintaining $K_{eff} \leq 0.95$ is small relative to the specified limit of 2000 ppm and the typical value of 2400 ppm. The utilization of the new racks for the Unit 1 pool will not significantly affect the ability to detect and terminate an inadvertent boron dilution event. Therefore, the proposed change does not alter the conclusions concerning the potential for an inadvertent dilution of the fuel storage pool.

10 CFR 50.92 EVALUATION (Continued)

Determination of No Significant Hazards:

The proposed changes to the Operating License have been evaluated to determine whether they constitute a significant hazards consideration as required by 10 CFR 50, Section 50.91 using the standards provided in Section 50.92. The results are provided below:

1. The analyses methodologies are the same as previously approved for use by the NRC. The results of the analyses resulted in fuel pool boron concentrations, and fuel assembly storage limitations that are similar to those already submitted to the NRC. The increased number of fuel assemblies will remain less than the number previously accepted by the NRC for storage in VEGP Unit 2, which has a similarly designed and constructed facility, with the exception of the number of fuel storage locations.

Therefore, based on the conclusions of the above analysis, the proposed changes will not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. The effects of accidents that could affect the fuel were analyzed for the fuel storage racks, however the types of accidents have not changed. The fuel to be stored in the Unit 1 pool is expected to meet the all cell storage requirements. The racks will be placed in the Unit 1 pool without lifting any loads over spent fuel. After installation of the new racks, the Unit 1 pool will have 1476 storage locations which is well within the 2098 locations that the pool and structure is capable of storing, based on its similarity to the Unit 2 pool.

Therefore, the proposed changes will not create the possibility of a new or different kind of accident.

3. The changes to the technical specifications are necessary to incorporate the parameters resulting from the criticality analyses. The criticality analyses were performed using methods and criteria previously accepted by the NRC. The requirements are similar to the previously submitted requirements. The margins of safety provided by the previous technical specifications are not significantly affected because the new racks are based on the same acceptance values. The larger number of fuel assemblies to be stored in the Unit 1 pool remains well within the capability of the pool.

Therefore, the proposed changes in this license amendment will not result in a significant reduction in the plant's margin of safety.

10 CFR 50.92 EVALUATION (Continued)

Conclusion:

Based on the evaluation above, and pursuant to 10 CFR 50, Section 50.91, Southern Nuclear has determined that operation of the Vogtle Electric Generating Plant in accordance with the proposed license amendment request does not involve any significant hazards considerations as defined by NRC regulations in 10 CFR 50, Section 50.92.