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SOUTHERN COMPANY
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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Director, Spent Fuel Project Office
Office of Nuclear Material Safety and Safeguards
Washington, D. C. 20555-0001

Edwin I. Hatch Nuclear Plant
Joseph M. Farley Nuclear Plant
Request for Exemption from 10 CFR 72.124(c) – Criticality Monitors

Pursuant to 10 CFR 72.7, Southern Nuclear Operating Company (SNC) requests Nuclear Regulatory Commission (NRC) approval of an exemption from the requirements of 10 CFR 72.124(c) for criticality monitors associated with operation of the Edwin I. Hatch Nuclear Plant (HNP) and Joseph M. Farley Nuclear Plant (FNP) independent spent fuel storage installations (ISFSIs). Specifically, 10 CFR 72.124(c) requires the following:

> *Criticality Monitoring. A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under this subpart is not required.*

SNC currently operates the HNP ISFSI and will operate the FNP ISFSI in accordance with the general license provisions of 10 CFR 72, Subpart K. SNC has selected the Holtec International HI-STAR 100 and HI-STORM 100 cask systems which were granted NRC Certificate of Compliance (CoC) 1008 and 1014, respectively, for use at HNP and the HI-STORM 100 cask system (CoC 1014) for the initial loading campaign at FNP.

During loading operations, the HI-STAR 100 overpack or HI-TRAC 125 transfer cask, as applicable, containing the multi-purpose canister (MPC) is placed in the cask loading pit and spent fuel is transferred from the spent fuel storage racks to the MPC. Upon completion of spent fuel transfer to the MPC, the MPC lid is set in place and the HI-STAR 100 or HI-TRAC 125 is moved to the cask preparation area where MPC closure operations are performed. Prior to removal of the spent fuel cask from the cask loading pit, spent fuel is handled or stored beneath water shielding and criticality monitoring is

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not required based on the underwater monitoring exception contained in 10 CFR 72.124(c). Upon removal of the HI-STAR 100 or HI-TRAC 125 from the cask loading pit, the spent fuel would no longer qualify for the criticality monitoring exception contained in 10 CFR 72.124(c). Accordingly, criticality monitoring is required by 10 CFR 72.124(c) when the HI-STAR 100 or HI-TRAC 125 is removed from the cask loading pit until the spent fuel is packaged in its stored configuration. Consistent with NRC letter to Holtec International dated August 1, 2000, the spent fuel is not considered to be packaged in its stored configuration until the MPC is drained, dried, inerted, and the confinement boundary established.

Similarly, unloading operations for the HI-STAR 100 and HI-STORM 100 cask systems involve movement of the MPC to the cask preparation area in a HI-STAR 100 or HI-TRAC 125 transfer cask, as applicable, and breaching the MPC confinement boundary. Upon breaching the MPC confinement boundary, the spent fuel contained in the MPC would no longer be packaged in its stored configuration and criticality monitoring is required in accordance with 10 CFR 72.124(c) until the cask is placed in the cask loading pit. Upon placement of the cask in the cask loading pit, the spent fuel is handled or stored beneath water shielding and as such, meets the criticality monitoring exception contained in 10 CFR 72.124(c).

Prior to future cask loading or unloading operations at HNP or FNP, SNC requests NRC approval of an exemption in accordance with the provisions of 10 CFR 72.7 to the requirements of 10 CFR 72.124(c). A detailed description of the specific exemption and corresponding justification as it applies to HNP and FNP is provided in Enclosures 1 and 2, respectively. In order to support HNP loading of the HI-STORM 100 system currently scheduled for May 2005, SNC requests NRC approval of the exemption for HNP by May 16, 2005. In order to support FNP loading of the HI-STORM 100 system currently scheduled for June 2005, SNC requests NRC approval of the exemption for FNP by June 1, 2005.

Mr. L. M. Stinson states he is a Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

This letter contains no NRC commitments. If you have any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

L. M. Stinson

Sworn to and subscribed before me this 19th *day of* January, *2005.*

Gloria H. Bise
Notary Public

My commission expires: 6-7-05

LMS/TWS/sdl

Enclosures:

1. Edwin I. Hatch Nuclear Plant – Request for Exemption to 10 CFR 72.124(c)
2. Joseph M. Farley Nuclear Plant – Request for Exemption to 10 CFR 72.124(c)

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. H. L. Sumner, Vice President – Plant Hatch
Mr. G. R. Frederick, General Manager – Plant Hatch
Mr. J. R. Johnson, General Manager – Plant Farley
RTYPE: CFA04.054; CHA02.004; LC#14190

U. S. Nuclear Regulatory Commission
Dr. W. D. Travers, Regional Administrator
Mr. C. Gratton, NRR Project Manager – Hatch
Mr. S. E. Peters, NRR Project Manager – Farley
Mr. C. A. Patterson, Senior Resident Inspector – Farley
Mr. D. S. Simpkins, Senior Resident Inspector – Hatch
Mr. J. D. Monninger, NMSS Project Manager – Farley, Hatch

Alabama Department of Public Health
Dr. D. E. Williamson, State Health Officer

Georgia Department of Public Health
Mr. L. C. Barrett, Commissioner – Department of Natural Resources

Enclosure 1

Edwin I. Hatch Nuclear Plant
Request for Exemption from 10 CFR 72.124(c) – Criticality Monitors

1. Need

Edwin I. Hatch Nuclear Plant (HNP) Units 1 and 2 have separate spent fuel pools that are connected by a transfer canal. The current combined Units 1 and 2 spent fuel pool installed capacity is 6094 storage spaces. Although not required by regulation, SNC believes it is prudent to maintain sufficient spent fuel storage capacity to provide full-core offload capability for HNP Units 1 and 2.

In order to provide additional spent fuel storage capacity beyond that achievable in the spent fuel pools, SNC has chosen to store spent fuel in accordance with the general license provisions of 10 CFR 72.210. The general license issued pursuant to 10 CFR 72.210 allows Part 50 licensees to store spent fuel they are licensed to possess under the specific license for the site in an independent spent fuel storage installation (ISFSI). The general license is limited to storage of spent fuel in NRC-approved casks in accordance with the conditions of the applicable certificate of compliance (CoC). SNC selected the Holtec International Inc., HI-STAR 100 and HI-STORM 100 cask systems, in conjunction with the MPC-68 multi-purpose canister, for use at HNP in accordance with the conditions of CoC 1008 and 1014, respectively. Continued operation of HNP requires that spent fuel be transferred from the Unit 1 and Unit 2 spent fuel pools on a periodic basis to provide sufficient capacity to maintain full-core offload capability. The next such transfer of spent fuel from the spent fuel pool to the ISFSI is scheduled for May 2005.

2. Specific Exemption Request

In accordance with the provisions of 10 CFR 72.7, SNC requests NRC approval of a specific exemption to the requirements of 10 CFR 72.124(c) for installation of criticality monitors. Specifically, 10 CFR 72.124(c) requires the following:

> *Criticality Monitoring. A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under this subpart is not required.*

The HI-STAR 100 cask and multi-purpose canister (MPC) is designed to be placed in the spent fuel cask pit during loading and unloading operations. The HI-STORM 100 system requires the use of the HI-TRAC transfer cask for loading and unloading activities performed in the spent fuel cask pit. Upon completion of MPC loading operations, the HI-STAR 100 or HI-TRAC transfer cask, as applicable, is removed from the spent fuel cask pit and moved to the reactor head laydown area on Hatch Unit 1 where MPC closure operations are performed.

As stated in HI-STORM 100 FSAR Section 6.1, the HI-STAR, HI-STORM, and HI-TRAC cask designs differ only in the overpack reflector materials which do not significantly affect reactivity. Consequently, analyses for the HI-STAR 100 system are directly applicable to

the HI-STORM 100 system and vice versa. Accordingly, the following discussion regarding the HI-STORM 100 cask system, including the HI-TRAC transfer cask, is applicable to the HI-STAR 100 cask system.

During spent fuel cask loading operations, a HI-TRAC transfer cask containing an MPC is placed in the spent fuel cask pit and spent fuel is transferred from the spent fuel storage racks to the MPC. The spent fuel transfer from the spent fuel storage racks to the MPC is performed underwater (i.e., beneath water shielding) and, consistent with 10 CFR 72.124(c) above, criticality monitoring is not required. Prior to removal of the HI-TRAC transfer cask from the spent fuel cask pit, the MPC lid is lowered into place and the cask is moved to the reactor vessel head laydown area where MPC closure operations are performed. Upon removal of the HI-TRAC transfer cask from the spent fuel pool cask pit, the spent fuel contained in the MPC no longer meets the exception contained in 10 CFR 72.124(c) and criticality monitors would be required. That is, the spent fuel is no longer handled or stored beneath water shielding and is not packaged in its stored configuration under a license issued under Part 72. Accordingly, compliance with 10 CFR 72.124(c) would require that criticality monitoring be provided when the HI-TRAC transfer cask is removed from the spent fuel cask pit until the water is removed from the MPC; the MPC is dried and backfilled with helium; and the MPC closure welds are completed.

Similarly, a HI-TRAC transfer cask and MPC would be moved to the reactor head laydown area during MPC unloading operations. In preparation for removal of the spent fuel, the MPC confinement boundary would be breached and the spent fuel would no longer be packaged in its stored configuration under a license issued under Part 72 and would not be handled or stored beneath water shielding. Accordingly, compliance with 10 CFR 72.124(c) would require that criticality monitors be provided during unloading operations from the time that the MPC confinement boundary is breached until the HI-TRAC transfer cask is placed in the spent fuel cask pit.

A description of the criticality analysis applicable to spent fuel in the HI-TRAC transfer cask system is provided in Section 6 of the HI-STORM 100 Final Safety Analysis Report (FSAR). Section 6 of the HI-STORM 100 FSAR identifies the four principal design parameters for criticality safety for the HI-STORM 100 system. These are:

1. *The inherent geometry of the fuel basket designs within the MPC;*
2. *The incorporation of permanent fixed neutron-absorbing panels in the fuel basket structure;*
3. *An administrative limit on the maximum planar average enrichment for BWR fuel; and*
4. *An administrative limit on the minimum soluble boron concentration in the water for loading/unloading fuel with higher enrichments in the MPC-24, MPC-24E and MPC-24EF, and for loading/unloading fuel in the MPC-32.*

HNP is a boiling water reactor (BWR) plant and as such, does not rely on soluble boron for criticality control. Accordingly, principle design parameter 4 above does not apply to HNP.

Section 6.1 of the HI-STORM 100 FSAR states:

> *These results confirm that the maximum k_{eff} values for the HI-STORM 100 System are below the limiting design criteria ($k_{eff} < 0.95$) when fully flooded and loaded with any of the candidate fuel assemblies and basket configurations. Analyses for the various conditions of flooding that support the conclusion that the fully flooded condition corresponds to the highest reactivity, and thus is most limiting, are presented in Section 6.4.*

As stated in HI-STORM 100 FSAR Section 6.1, the highest reactivity of the fuel occurs when the MPC is fully flooded and, assuming fresh fuel (i.e., no credit for burnup), the resulting k_{eff} is less than 0.95. Following completion of the transfer of spent fuel from the spent fuel storage racks to the MPC, the MPC lid is set into place and the HI-TRAC transfer cask containing the loaded MPC is moved to the reactor head laydown area. Once the MPC lid is set in place, no further changes are made to the cask or its contents prior to removal from the spent fuel cask pit. Therefore, the potential for an inadvertent criticality event is not increased when the loaded MPC and transfer cask are removed from the spent fuel cask pit. Upon removal of the water from the MPC following completion of the MPC lid-to-shell weld, the k_{eff} of the spent fuel is decreased by removal of the moderator and the potential for inadvertent criticality is further reduced.

The effects of off-normal and accident conditions have been considered in the design of the HI-STORM 100 cask system. As stated in Section 6.1 of the HI-STORM 100 FSAR, the off-normal and accident conditions defined in Chapter 2 and considered in Chapter 11 of the HI-STORM 100 FSAR have no adverse effect on the design parameters important to criticality safety, and therefore, the off-normal and accident conditions are identical to those for normal conditions. Accordingly, an inadvertent criticality is not considered credible.

3. Regulatory Considerations

The HI-STAR 100 and HI-STORM 100 cask systems have been approved by the NRC for use under the general license provisions of 10 CFR 72, Subpart K, based on the analyses contained in applicable FSAR. As stated in HI-STORM 100 FSAR Section 6.1, the HI-STAR, HI-STORM, and HI-TRAC cask designs differ only in the overpack reflector materials which do not significantly affect reactivity. Accordingly, analyses for the HI-STAR system are directly applicable to the HI-STORM 100 system and vice versa. The analyses provided in the HI-STORM 100 FSAR include evaluation of the potential for an inadvertent criticality event and a determination that such an event is not considered credible under all normal, off-normal, and accident conditions involving handling, packaging, transfer, or storage.

SNC's request for exemption is justified based on special circumstances. That is, application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. The purpose of the criticality monitors required by 10 CFR 72.124(c) is to ensure that if a criticality were to occur during the handling of special nuclear material, personnel would be alerted to that fact and would take appropriate action. The design of the HI-STAR 100 and HI-STORM 100 cask systems provides adequate protection to preclude an inadvertent criticality. In addition, compliance with General Design Criterion 63 provides assurance that appropriate safety actions will be initiated in the unlikely event of an inadvertent criticality. Accordingly, installation of criticality monitors is not necessary to meet the underlying purpose of the 72.124(c).

4. Summary

As stated above, an inadvertent criticality event is not considered to be credible under normal, off-normal, and accident conditions associated with use of the HI-STAR 100 and HI-STORM 100 cask systems. In addition, compliance with General Design Criterion 63 provides assurance that appropriate safety actions will be initiated in the unlikely event of an inadvertent criticality. Accordingly, SNC requests an exemption in accordance with the provisions of 10 CFR 72.7 to the requirements of 10 CFR 72.124(c). Specifically, the exemption requested by SNC eliminates the need for criticality monitors during: (1) spent fuel cask loading operations from the time that the cask is removed from the spent fuel cask pit until the MPC is placed in its final storage configuration as defined by NRC letter dated August 1, 2000, to Holtec International; and (2) spent fuel cask unloading operations from the time the MPC confinement boundary is breached until the cask is placed in the spent fuel cask pit. In order to support HNP's May 2005, loading campaign, NRC approval of the requested exemptions is requested by May 16, 2005.

Enclosure 2
Joseph M. Farley Nuclear Plant
Request for Exemption to 10 CFR 72.124(c)

1. Need

Joseph M. Farley Nuclear Plant (FNP) Units 1 and 2 have separate and independent spent fuel pools. The current Unit 1 and Unit 2 spent fuel pools have an installed capacity of 1407 storage spaces each. Although not required by regulation, SNC believes it is prudent to maintain sufficient spent fuel storage capacity to provide full-core offload capability for FNP Units 1 and 2.

In order to provide additional spent fuel storage capacity beyond that achievable in the spent fuel pools, SNC has chosen to store spent fuel in accordance with the general license provisions of 10 CFR 72.210. The general license issued pursuant to 10 CFR 72.210 allows Part 50 licensees to store spent fuel they are licensed to possess under the specific license for the site in an independent spent fuel storage installation (ISFSI). The general license is limited to storage of spent fuel in NRC-approved casks in accordance with the conditions of the applicable certificate of compliance (CoC). SNC selected the Holtec International Inc., HI-STORM 100 cask system and the MPC-32 for use at FNP in accordance with the conditions of CoC 1014. Continued operation of FNP requires that spent fuel be transferred from the Unit 1 and Unit 2 spent fuel pools on a periodic basis to provide sufficient capacity to maintain full-core offload capability. The first such transfer of spent fuel from the spent fuel pool to the ISFSI is scheduled for June 2005.

2. Specific Exemption Request

In accordance with the provisions of 10 CFR 72.7, SNC requests NRC approval of a specific exemption to the requirements of 10 CFR 72.124(c) for installation of criticality monitors. Specifically, 10 CFR 72.124(c) requires the following:

> *Criticality Monitoring. A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration under a license issued under this subpart is not required.*

During spent fuel cask loading operations, a HI-TRAC transfer cask containing a multi-purpose canister (MPC) is placed in the spent fuel cask storage pit and spent fuel is transferred from the spent fuel storage racks to the MPC. The spent fuel transfer from the spent fuel storage racks to the MPC is performed underwater (i.e., beneath water shielding) and, consistent with 10 CFR 72.124(c) above, criticality monitoring is not required. Prior to removal of the HI-TRAC transfer cask from the spent fuel cask storage pit, the MPC lid is lowered into place and the cask is moved to the spent fuel cask wash area where MPC closure operations are performed. Upon removal of the HI-TRAC transfer cask from the spent fuel cask storage pit, the spent fuel contained in the MPC no longer meets the exception contained in 10 CFR 72.124(c) and criticality monitors would be required. That is, the spent fuel is no longer handled or stored beneath water shielding and is not packaged

in its stored configuration under a license issued under Part 72. Accordingly, compliance with 10 CFR 72.124(c) would require that criticality monitoring be provided when the HI-TRAC transfer cask is removed from the spent fuel cask storage pit until the water is removed from the MPC; the MPC is dried and backfilled with helium; and the MPC closure welds are completed.

Similarly, a HI-TRAC transfer cask and MPC would be moved to the spent fuel cask wash area during MPC unloading operations. In preparation for removal of the spent fuel, the MPC confinement boundary would be breached and the spent fuel would no longer be packaged in its stored configuration under a license issued under Part 72 and would not be handled or stored beneath water shielding. Accordingly, compliance with 10 CFR 72.124(c) would require that criticality monitors be provided during unloading operations from the time that the MPC confinement boundary is breached until the HI-TRAC transfer cask is placed in the spent fuel cask storage pit.

A description of the criticality analysis applicable to spent fuel in the HI-TRAC transfer cask system is provided in Section 6 of the HI-STORM 100 Final Safety Analysis Report (FSAR). Section 6 of the HI-STORM 100 FSAR identifies the four principal design parameters for criticality safety for the HI-STORM 100 system. These are:

1. *The inherent geometry of the fuel basket designs within the MPC;*
2. *The incorporation of permanent fixed neutron-absorbing panels in the fuel basket structure;*
3. *An administrative limit on the maximum enrichment for PWR fuel; and*
4. *An administrative limit on the minimum soluble boron concentration in the water for loading/unloading fuel with higher enrichments in the MPC-24, MPC-24E and MPC-24EF, and for loading/unloading fuel in the MPC-32.*

Section 6.1 of the HI-STORM 100 FSAR states:

> *These results confirm that the maximum k_{eff} values for the HI-STORM 100 System are below the limiting design criteria ($k_{eff} < 0.95$) when fully flooded and loaded with any of the candidate fuel assemblies and basket configurations. Analyses for the various conditions of flooding that support the conclusion that the fully flooded condition corresponds to the highest reactivity, and thus is most limiting, are presented in Section 6.4.*

As stated in HI-STORM 100 FSAR Section 6.1, the HI-TRAC transfer cask is flooded during spent fuel loading and unloading operations and as a result, the flooded HI-TRAC transfer cask represents the limiting case in terms of reactivity. As stated above, compliance with the administrative limits (i.e., technical specifications) on the minimum boron concentration is required for the MPC-32 during loading and unloading operations. Compliance with the administrative limits applicable to the MPC-32 during loading and

unloading operations provides adequate assurance that the resulting k_{eff} is less than 0.95 when loaded with fresh fuel (i.e., no credit for burnup). Following completion of the transfer of spent fuel from the spent fuel storage racks to the MPC, the MPC lid is set into place and the HI-TRAC transfer cask containing the loaded MPC is moved from the spent fuel cask storage pit to the spent fuel cask wash area. Once the MPC lid is set in place, no further changes are made to the cask or its contents prior to removal from the spent fuel cask storage pit and the potential for significant boron dilution in the MPC is minimized. Any addition of borated water to the MPC required to reset the time-to-boil clock during MPC closure operations will be administratively controlled to preclude the possibility of the MPC being flooded with unborated water. Accordingly, the potential for an inadvertent criticality event is not increased when the loaded MPC and transfer cask are removed from the spent fuel cask pit. Upon removal of the water from the MPC following completion of the MPC lid-to-shell weld, the k_{eff} of the spent fuel is decreased by removal of the moderator and the potential for inadvertent criticality is further reduced.

The effects of off-normal and accident conditions have been considered in the design of the HI-STORM 100 cask system. As stated in Section 6.1 of the HI-STORM 100 FSAR, the off-normal and accident conditions defined in Chapter 2 and considered in Chapter 11 of the HI-STORM 100 FSAR have no adverse effect on the design parameters important to criticality safety, and therefore, the off-normal and accident conditions are identical to those for normal conditions. Accordingly, an inadvertent criticality is not considered credible.

3. Regulatory Considerations

The HI-STORM 100 cask system has been approved by the NRC for use under the general license provisions of 10 CFR 72, Subpart K, based on the analyses contained in HI-STORM 100 FSAR. The analyses provided in the HI-STORM 100 FSAR include evaluation of the potential for an inadvertent criticality event and a determination that such an event is not considered credible under all normal, off-normal, and accident conditions involving handling, packaging, transfer, or storage.

SNC's request for exemption is justified based on special circumstances. That is, application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. The purpose of the criticality monitors required by 10 CFR 72.124(c) is to ensure that if a criticality were to occur during the handling of special nuclear material, personnel would be alerted to that fact and would take appropriate action. The design of the HI-STORM 100 cask system provides adequate protection to preclude an inadvertent criticality. In addition, compliance with General Design Criterion 63 provides assurance that appropriate safety actions will be initiated in the unlikely event of an inadvertent criticality. Accordingly, installation of criticality monitors is not necessary to meet the underlying purpose of the 72.124(c).

4. Summary

As stated above, an inadvertent criticality event is not considered to be credible under normal, off-normal, and accident conditions associated with use of the HI-STORM 100 cask system. In addition, compliance with General Design Criterion 63 provides assurance that appropriate safety actions will be initiated in the unlikely event of an inadvertent criticality. Accordingly, SNC requests an exemption in accordance with the provisions of 10 CFR 72.7 to the requirements of 10 CFR 72.124(c). Specifically, the exemption requested by SNC eliminates the need for criticality monitors during: (1) spent fuel cask loading operations from the time that the cask is removed from the spent fuel cask storage pit until the MPC is placed in its final storage configuration as defined by NRC letter dated August 1, 2000, to Holtec International; and (2) spent fuel cask unloading operations from the time the MPC confinement boundary is breached until the HI-TRAC transfer cask is placed in the spent fuel cask storage pit. In order to support FNP's June 2005, loading campaign, NRC approval of the exemption is requested by June 1, 2005.