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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to Staff Questions on Proposed Amendment to Technical Specifications for
Spent Fuel Storage Pool Rack Criticality Analysis with Soluble Boron Credit

Reference: Letter from T. H. Cloninger, South Texas Project, to the Nuclear Regulatory Commission dated July 7, 1998 (NOC-AE-000178)

In response to NRC staff questions on the referenced letter regarding the proposed Amendment to Technical Specifications for Spent Fuel Storage Pool Rack Criticality Analysis with Soluble Boron Credit, the STP Nuclear Operating Company hereby submits the requested information. The questions and answers are attached.

Should you have any questions in regard to this response, please contact Mr. D. F. Hoppes at (512) 972-8132 or me at (512) 972-7795.

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KAW

Attachment

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Question #1) **What neutron cross-section libraries were used with KENO and PHOENIX?**

Answer #1) A 227 energy group cross-section library is the common starting point for all cross sections used for the benchmarks of KENO calculations. This cross-section library is generated from ENDF/B-V data.

The transport theory computer code PHOENIX-P is a depletable, two-dimensional, multigroup, discrete theory code which utilizes a 42 energy group nuclear data library from ENDF/B-V data.

For more information see Chapter 2 of WCAP-14416-P, the Westinghouse topical for Spent Fuel Rack Criticality Analysis Methodology.

Question #2) **Explain the difference between the 1.7 w/o U-235 Categories 5 and 6, and 1.4 w/o categories 8,9,10.**

Answer #2) For both Category 5 and Category 6 fuel, with no burnup, 1.7 w/o U235 will satisfy the criticality requirements for the configurations in which they are allowed. When considering burnup credit reactivity equivalencing (higher initial enrichments with associated burnup), differences arise between the Category 5 and Category 6 allowed enrichments for a given burnup. For example, at an initial 4.0 w/o the Category 5 minimum allowable burnup is 27,839 MWD/MTU while the Category 6 minimum allowable burnup is 30,965 MWD/MTU.

The reason for this difference is that the two configurations are neutronically different, and the burned assembly (with built-in plutonium) has different reactivity effects in the two configurations. The configuration for Category 5 fuel is a three-out-of-four loading of all Category 5 assemblies in a Region 2 (closer packed) cell array. The configuration for Category 6 fuel is a four-out-of-four loading of Category 1, 4, 6, and 10 fuel in a Region 1 cell array.

The same type of configuration differences applies to the three different configurations in which the Category 8, 9 and 10 fuel are allowed.

Question # 3) **Where RCCAs are required to be in the loaded fuel assemblies, how is the presence of the RCCA in the initial loading assured?**

Answer #3) The South Texas Project is preparing to shuffle the fuel in each Spent Fuel Pool (SFP), including any required RCCA moves, to ensure the storage configurations match the Technical Specification submittal. After approval of the proposed Technical Specification amendment, fuel stored in the SFP will be reconfigured to comply with the approved storage configurations; this is the reason for the 90-day implementation period. This activity will involve categorizing all of the fuel in the SFP, moving fuel into new checkerboard configurations, and moving RCCAs into applicable assemblies.

Question #4) **Credit for added absorber (rod, plates, or other configurations) has been allowed by the NRC provided it can be clearly demonstrated that design features prevent such absorbers from being removed, either inadvertently or intentionally, without unusual effort such as the necessity for special equipment maintained under positive administrative controls. Although the postulated misload accident for the RCCA #1 and #2 checkerboard configurations accounts for the replacement of an RCCA-contained fuel assembly by an unrodded assembly, specify the controls that are in place to prevent removal of an RCCA from an assembly.**

Answer #4) STP procedures require a move sheet to move fuel or core components stored in the Spent Fuel Pool (SFP). These move sheets are prepared and verified to ensure that required fuel storage configurations are maintained in accordance with Technical Specifications. Correct preparation and execution of these move sheets are the primary methods to control fuel storage configurations. In addition, dual verification methods are used during physical movement of fuel or core components in the SFP. The RCCA top fixtures are readily seen from the fuel handling machine bridge when the RCCAs are contained in fuel assemblies seated in spent fuel pool rack cells. Senior Reactor Operator (Shift/Unit Supervisor) approval is required prior to moving items in the SFP. The procedures used to control preparation of the move sheets will be revised to ensure RCCAs are not moved if they are needed to satisfy a fuel storage configuration.

In order to move RCCAs in the SFP, special equipment, i.e., the RCCA Change Tool, is required to perform the operation. Operation of this tool requires a unique electrical power cord and an instrument air line with regulator. Authorization to use this equipment is controlled by the Core Loading Supervisor during refueling outages, or by the Shift Supervisor at all other times.

The referenced RCCA checkerboard configurations are applicable only to the Region 2 spent fuel storage racks. These racks are typically used for storage of fuel not intended for reuse in the core. During refuelings, the freshly offloaded fuel assemblies are typically stored only in the Region 1 spent fuel storage racks and thus do not require RCCAs for meeting fuel storage configurations. In addition, RCCA movements in the SFP are performed infrequently at STP. This is due to a reactor vessel feature which enables the RCCAs to be left in the upper internals during rapid refueling outages (typically outages other than those requiring a 10-year inservice inspection).