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SCE&G®
A SCANA COMPANY

July 2, 2002

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

Attention: Ms. K. R. Cotton

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION
DOCKET NO. 50/395
TECHNICAL SPECIFICATION AMENDMENT REQUEST - TSP 99-0090
SPENT FUEL POOL STORAGE EXPANSION - SUPPLEMENTAL LETTER -
RESPONSE TO RAI DATED JUNE 20, 2002

Reference: S. A. Byrne Letter to Document Control Desk, RC-01-0135, Dated July 24, 2001

South Carolina Electric & Gas Company (SCE&G), acting for itself and as agent for South Carolina Public Service Authority, hereby submits a response to your docketed questions, dated June 20, 2002, concerning the above referenced license amendment request. This request for additional information asked specific questions related to implementation of the plant modification to expand spent fuel storage. The questions and responses are provided in Attachment I.

I certify under penalty of perjury that the foregoing is true and correct.

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

Very truly yours,

Stephen A. Byrne

PAR/SAB/dr
Attachment

c: N. O. Lorick
N. S. Carns
T. G. Eppink (without attachment)
R. J. White
L. A. Reyes
NRC Resident Inspector
Paulett Ledbetter
K. M. Sutton
T. P. O'Kelley
W. R. Higgins
RTS (0-L-99-0090)
File (813.20)
DMS (RC-02-0116)

A001

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

I hereby certify that on the 2nd day of July 2002, before me, the subscriber, a Notary Public of the State of South Carolina personally appeared Stephen A. Byrne, being duly sworn, and states that he is Senior 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

[signature]
Notary Public

My Commission Expires

July 13, 2005
Date

Attachment I
Responses to Request for Additional Information

In order to complete our review, the NRC staff requests that South Carolina Electric & Gas Company provide the following information:

(1) Neither Section 3 nor Section 10 of Attachment V to the amendment request provides a substantive description of the temporary gantry crane proposed for use in the rack replacement evolution. Describe key characteristics of the temporary gantry crane that will be used to install and remove racks from the spent fuel pool. At a minimum, this description should include the crane's rated capacity, how and where it will be mounted on the operating floor, its range of travel, and any special design features that reduce the risk of load drops due to mechanical failures, load hangups, and "two-blocking" events.

Response:

The 40,000 lbf rated temporary crane is needed to load and unload new and existing spent fuel racks from the spent fuel pool because the existing SCE&G Fuel Handling Building overhead crane cannot reach over the spent fuel pool. The temporary crane travels on the existing spent fuel handling bridge crane rails under its own power. The travel of the temporary crane covers the entire length of the rails in the east-west direction from the spent fuel pool to the decontamination and new fuel storage areas. There are existing mechanical bumpers at each end of the rails preventing the temporary crane from traveling beyond the limits of the rails. The trolley travels the entire width of the pool in the north-south direction. The temporary crane will be erected in the decontamination pit area at the east end of the Fuel Handling Building away from the Spent Fuel Pool.

The temporary crane is considered to be a non-safety related structure. However, it travels over safety related equipment and fuel. Therefore, the design has been analyzed to preclude any load drop or crane damage resulting in uncontrolled lowering of any portion of the crane into the pool. The crane has overall dimensions as shown in Figure 1 and weighs 30,500 lbf.

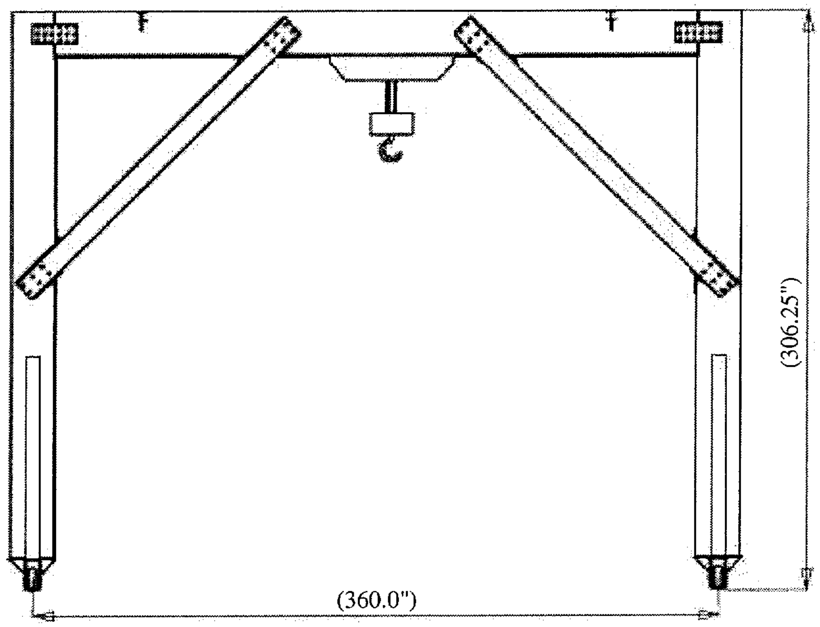

Figure 1 Temporary Crane Outline

The hoist is rated for 37 ½ metric tons and selected to conform to CMAA-70 (2000). The hoist and its brake are rated such that it maintains a 10:1 safety factor in order to meet the requirements stipulated in section 5.1.6 (3)(b) of NUREG-0612. The load holding brakes comply with items 4.9.1.1 through 4.9.1.4 of section 4.9 of CMAA-70 (2000). The hoist braking system shuts off in the closed braking position upon loss of power. In the case of a failed braking system, pendant controls can be used to activate the hoist motor in order to control the load until safely landed. The hoist has upper and lower electric limits preventing two blocking events.

(2) Section 3.5 of Attachment V to the amendment request states that racks will not be carried directly over stored fuel. Describe any additional measures that will be used to protect the stored fuel from damage or limit the consequences of such damage. Measures for consideration include establishment of a minimum separation distance between load paths and stored fuel, features that prevent rotation or tipping of the racks should a partial rigging failure occur, limits on load height near stored fuel, and establishment of a minimum decay time for stored fuel prior to rack movement.

Response:

In compliance with NUREG 0612, safe load paths will be included in project specific procedures to ensure that heavy loads shall not be carried over stored fuel in the SFP. Safe load paths will maximize the benefits of strategic fuel shuffles that allow for the greatest distance between a suspended rack and stored fuel while the suspended load is at a height that would allow it to be dropped on stored fuel. A minimum horizontal distance of 3 feet will be maintained between lifted racks and stored fuel. Suspended racks or any other heavy loads that are handled as part of the rerack operation will never be moved over stored fuel assemblies. Additionally, new racks being installed into the SFP will be lowered to a minimal height just above the SFP floor as soon as the rack safely clears the pool perimeter and any pool wall protrusions. As part of the defense-in-depth approach, the action of lowering the rack to a height just above the pool floor prior to commencing any horizontal movement reduces the amount of time that the rack is in a position to do damage to stored spent fuel.

All steps involving the handling of heavy loads in and around the spent fuel pool shall be governed and controlled by a project specific procedure. As suggested in NUREG-0612, this procedure will include the safe load paths that will be used for heavy loads traveling over or near the spent fuel pool. Additionally, the procedure will include detailed exhibits showing the rigging configurations for lifting each heavy load. Each rigging exhibit will include the minimum ratings required for each rigging component to comply with NUREG-0612. In general, all steps and quality oversight of the handling of heavy loads will be included as part of the procedure.

Training will be performed with the crew on multiple levels in order to educate them on the many tasks and their associated governing procedures and regulations. Crane operators will get a training session on the functions of the cranes and the new parameters that are introduced by the allowance of travel over the spent fuel pool. In addition to this, and along with the rest of the crew, a training session is given to offer a general overview of the tasks, associated safe load paths, and the applications of NUREG-0612 with respect to the many tasks that will be completed during the project.

(3) Figure 7.2.4 of Attachment V to the amendment request depicts a rack drop in a vertical orientation. Describe the basis for using this orientation to evaluate potential damage to the spent fuel pool structure from a rack drop event.

Response:

The racks will be removed and installed in the vertical position and are expected to remain in this position subsequent to any drop accident. No rack rotations are required during removal of the existing racks or installation of the new racks. Therefore, all rack handling that will be performed in and around the spent fuel will be performed with the racks in a vertical position.

The racks will be lifted in the vertical configuration using lifting rigs that are designed in accordance with NUREG 0612. These lift rigs provide redundant lifting legs with safety factors of 6 and 10 against yield and ultimate stresses, respectively. The lift rigs are designed and tested to 300% loading. Therefore, failure of these components is not considered credible. The temporary crane above the special lifting device is designed in accordance with established crane standards. However, if there were an uncontrolled lowering of the rack, the rack would remain vertical, or would rotate back to a vertical orientation during the lowering to the floor. A dropped rack will tend to orient itself vertically upon hitting the water surface and during its fall through the water to the pool floor, due to drag forces on the rack base-plate and walls from the flow of water through cells.

There are no loaded cells near the location of raising and lowering the rack. If the rack struck any adjacent objects during a rack drop, such as previously installed racks, then the kinetic energy at the final point of impact with the pool floor would be significantly reduced.

(4) Section 7.5.3 of Attachment V to the amendment request states that the evaluated rack drop event may result in water leakage across the liner that will be controlled by the concrete pool structure. Describe procedural steps and design features that would be used to control or stop spent fuel pool coolant loss through the leakage detection system channels behind the liner following a rack drop event.

Response:

The leak chase system of the V. C. Summer pool is designed to channel water to a number of points where water flow is detected and measured. Each of these points is equipped with an isolation valve. These isolation valves are normally closed except during testing as directed by leak testing procedure STP-250.015. If a rack drop event were to open a penetration in the liner that permits pool water to flow into the leak chase system, these isolation valves would prevent the loss of pool water through the leak chase system. As a minimum, the pool liner leak chase system will be leak tested using procedure STP-250.015 shortly before and shortly after rack installation.

The Spent Fuel Pool is equipped with redundant safety grade level instrumentation that annunciates on the Main Control Board at the low level setpoint corresponding to a pool level of 461 feet. The normal pool level is 461.5 feet. Upon annunciation, operator corrective action is implemented in accordance with the annunciator response procedure (ARP-001-XCP-608 and 609). The response includes actions such as verifying the pool level; determining radiation levels in the pool area; implementing corrective procedural actions for pool level low and decreasing; and with the pool level less than or equal to 460.5 feet, suspending all fuel movements in the pool and crane operations with loads in the pool storage area.

(5) Attachment II to the amendment request states that 170°F is the maximum bulk pool temperature and that the air temperature directly above the pool is below 114°F under limiting heat load conditions. These temperature conditions have the potential to cause condensation of water vapor (fog) above the pool surface. Since the resultant reduction in visibility may increase the probability of a fuel handling accident, describe what administrative controls will be used to ensure adequate visibility during fuel handling evolutions.

Response:

As part of the calculations performed to determine the temperature of the air above the pool surface, the relative humidity of the air is calculated. These calculations indicate that the maximum exiting relative humidity of the air above the pool is only 78.5%. Because the air does not approach saturation condition, fog should not be a concern.

The Senior Reactor Operator (SRO) supervising fuel movement has the authority to stop fuel movement at any time if he feels conditions are not conducive to safe operation, which includes visibility concerns.

(6) Section 5.1 of Attachment V to the amendment request states that the bulk temperature is limited to 165°F during a partial core offload or a full core offload with two operating cooling loops, and 170°F during a full core offload with one operating cooling loop or an abnormal full core offload. However, Table 5.8.1 indicates that the maximum bulk temperature is about 150°F for all cases except a full core offload with a single cooling system pump discharging through two spent fuel heat exchangers, which had a maximum bulk temperature of about 170°F. Describe the basis for the large margin between the calculated maximum temperature (150°F) and the proposed temperature limit (165°F) when two cooling loops are operating.

Response:

The 165°F temperature limit was utilized during the analysis phase as a threshold value to judge the acceptability of the normal offload scenarios with two operating cooling loops. The limit value was set 5°F below the bulk temperature utilized for the pool structural evaluations (170°F) in order to build in margin for these "normal" offload scenarios. As indicated in Table 5.8.1 of the LAR, the maximum bulk temperature for these offload scenarios is approximately 151°F (case 2a) or 14°F below the limit value. Given the assumptions utilized in the thermal hydraulic analysis, the calculated maximum bulk temperature is very conservative and provides large margins to actual conditions expected during a refueling outage. Consequently, for these offload scenarios, it is requested that the amendment request be approved based on acceptability of the calculated value for the maximum bulk pool temperature. In addition, it is noted that the two spent fuel cooling loops are independent, each having a single pump discharging through a single heat exchanger.

(7) The V. C. Summer Final Safety Analysis Report states that the spent fuel pool cooling and makeup systems are safety-related and that the spent fuel pool cooling system is designed with redundancy to assure continued heat removal. Describe how the design basis scenarios will be translated into operating procedures with respect to availability of redundant heat removal paths during full-core offloads.

<u>Response:</u>

As described in Section 9.1.3.3 of the FSAR, the normal or routine refueling practice at the V. C. Summer Nuclear Station is to perform a full core off-load. Plant procedures assure that sufficient heat removal capacity is provided to ensure the pool indicated temperature remains below the design basis scenario calculated temperature limits. Plant procedures require the following:

1. Prior to the start of core offload, both spent fuel cooling loops be available with a minimum of one loop in operation.
2. If the indicated pool temperature is $\geq$ 120°F:
   a. Both spent fuel cooling loops be in operation, or
   b. In the event a spent fuel pump is unavailable, flow in the operating cooling loop is increased to $\geq$ 2400 gpm.
3. Multiple reliable sources of electric power be maintained to the SF pumps, including maintenance of at least one diesel generator backed, safety related electrical bus for spent fuel pool cooling at all times that spent fuel is being moved and while the full core is off-loaded.

In addition, during an extended refueling outage, administrative controls provide for an ESF bus outage when the core is offloaded and sufficient shutdown time has elapsed to reduce the decay heat load such that a single cooling loop is adequate. This condition is addressed, as currently described in the FSAR, by contingency plans which call for temporary cables to be pre-staged so that the idle SF cooling pump can be quickly connected to a reliable source of offsite power.