



September 20, 2012  
RC-12-0141

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

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1  
DOCKET NO. 50-395  
OPERATING LICENSE NO. NPF-12  
SOUTH CAROLINA ELECTRIC & GAS (SCE&G) RESPONSE TO  
REQUEST FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST - LAR 10-03912  
TECHNICAL SPECIFICATION CHANGE REQUEST FOR TS 3.5.4,  
REFUELING WATER STORAGE TANK (RWST)

- References:
1. Thomas D. Gatlin Letter (RC-12-0075) dated June 29, 2012,  
License Amendment Request - LAR 10-03912  
Technical Specification Change Request for TS 3.5.4,  
Refueling Water Storage Tank (RWST);  
ADAMS Accession No. ML121850005
  2. SCE&G Response to Request for Additional Information (RC-12-0132)  
License Amendment Request - LAR 10-03912  
Technical Specification Change Request for TS 3.5.4,  
Refueling Water Storage Tank (RWST)
  3. Electronic Mail Message transmitted Monday, September 17, 2012 from  
Robert E. Martin, NRC Region II Project Manager to Bruce L. Thompson,  
Manager, Nuclear Licensing, V. C. Summer Nuclear Station Unit 1


South Carolina Electric & Gas Company (SCE&G) is submitting this response to a request for additional information (RAI) by the Nuclear Regulatory Commission (NRC) regarding License Amendment Request LAR 10-03912, Technical Specification Change Request for TS 3.5.4, Refueling Water Storage Tank (RWST). This request for additional information was identified during conference calls with the NRC. The NRC RAI and SCE&G's response is provided in the Attachment. There are no regulatory commitments made by this letter.

A001  
NRR

If you have any questions about this submittal, please contact Mr. Bruce L. Thompson at (803) 931-5042.

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

9-20-2012  
Executed on

  
Thomas D. Gatlin

JW/TDG/wm

Attachment: SCE&G's Response to NRC Question

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**VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) Unit 1  
DOCKET NO. 50-395  
OPERATING LICENSE NO. NPF-12**

**ATTACHMENT**

**SCE&G's Response to NRC Question**

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## **NRC Question**

**On June 29, 2012, South Carolina Electric and Gas Company submitted a proposed license amendment request (LAR), Agencywide Documents Access and Management System (ADAMS) Accession No. ML121850005 to the Nuclear Regulatory Commission (NRC) to revise the Virgil C. Summer Nuclear Station, Unit 1, Technical Specification (TS) 3.5.4, "Refueling Water Storage Tank." The proposed change would allow non-seismically qualified piping of the Spent Fuel Pool to be connected to the Refueling Water Storage Tank (RWST).**

**In the LAR, the licensee stated that the failure of the boundary valve (XVT06701-SF) would be considered a credible single failure. In accordance with Summer's licensing basis accident dose analysis, the boundary valve functions to isolate potentially radioactive sump fluid from non-seismic piping. The existing analysis approved by the NRC staff in License Amendment 183, dated October 4, 2010, "Virgil C. Summer Nuclear Station, Unit No. 1, Issuance of Amendment Regarding Alternative Source Term Implementation (TAC No. ME0663)" (ADAMS No. ML102160020) assumed the valve remained closed during operation.**

**After the end of post-loss-of-coolant-accident (post-LOCA) injection phase, the Emergency Core Cooling Systems (ECCS) and containment spray systems [ESF systems that recirculate sump water] are switched to the recirculation phase. This requires that water from the containment sump replace the RWST as the ESF systems water supply by realigning several system valves that interface between these ESF systems and the RWST and the pathways leading back to the RWST. If these system valves leak by design or the leakage of these valves is unknown, a leakage path between the containment sump and the RWST and any interfacing piping may exist. For the design basis LOCA radiological analyses, it is assumed that 40% of the core iodine inventory is mixed homogeneously and instantaneously in the primary containment sump water at the time of release from the core. Because the ECCS takes suction from the sump, the sump water is assumed to be radioactive. Per, RG 1.183, Regulatory Position 5.1.2 any piping downstream of the failed valve that is non-safety related or not in technical specifications would not be credited in the design basis radiological analyses. Therefore, the proposed change would create a potential release pathway for radioactivity to the environment which is not considered in the current design basis accident analyses.**

**An active failure of the boundary valve would allow any radioactive ESF leakage to the RWST tank or in route to the RWST to drain to non-seismic piping after a design basis accident (i.e. LOCA). Please describe how the credible failure of the boundary valve (XVT06701-SF) impacts the assumptions for the most limiting single active failure considered in the licensing basis**

**LOCA analysis and the resulting consequences. If this proposed change results in a new limiting single active failure assumption, please provide the inputs and results for the revised LOCA analysis in order for the staff to conduct an independent analysis to confirm radiological doses would remain below the criteria in 10 CFR 50.67.**

**As an alternative to the information requested above, to address NRC staff concerns provide a justification for creditable actions to be taken to prevent and/or mitigate a radiological release through an unanalyzed pathway via non-seismic piping while in the proposed configuration. The response should consider creditable actions such as additional means available to isolate flow through the non-seismic piping after a design basis accident and a failure of the boundary valve (XVT0607-SF) to close.**

### **SCE&G Response**

The LOCA analysis and associated radiological consequences were updated when the station submitted License Amendment and Related Technical Specification Changes to Implement Full-Scope Alternative Source Term In Accordance With 10 CFR 50.67 on February 17, 2009 (ML090720887). The LOCA analysis was described in Attachment 2, section 4.3. Attachment 3 "Regulatory Guide 1.183 Compliance Table", page 23 describes the station's compliance with Regulatory Guide 1.183 section 5.2 concerning leakage from all components in the ESF recirculation systems. In that attachment we stated that "Leakage through the RWST and NaOH Tank is neglected in this calculation based on plant procedures (EOPs) that require closure of the 20" RWST outlet valve (XVT06700-SF) and closure of the 3" NaOH outlet valve (XVG03012-SP) following the transition to cold leg recirculation. This results in 3-valve isolation and a minimum of 2-valve isolation in the long term with a single failure". The NRC accepted this as documented on page 13 of the Safety Evaluation related to license amendment 183 (ML102160020).

The RWST is isolated from the recirculation flow paths by at least three closed valves in series including manually-operated XVG06700-SF. Valve XVG06700-SF is manually closed outside the control room after the recirculation switchover has been completed, as directed in EOP-2.2 - Transfer to Cold Leg Recirculation. Valve XVT06701-SF is physically adjacent to and in parallel with XVG06700-SF. XTV06701-SF is the third isolation valve between the recirculation flow path and the non-safety related Spent Fuel Pool (SFP) Purification System inside the Auxiliary Building.

To address the single failure concern, before aligning the RWST to the SFP Purification System, XTV06701-SF is cycled from its normally full closed position to full open and back to full closed each time. Cycling the valve verifies the valve is

mechanically functional and capable of being closed prior to being placed in service. The purification system will not be placed in service if any anomaly is identified. Should the valve fail to close while being cycled, the RWST would be declared inoperable and TS 3.5.4 action statement would be entered.

The license amendment request allows XVT06701-SF to be opened in modes 1 through 4 under administrative controls, which require a dedicated operator to close the valve should plant conditions dictate. The operator actions are judged to be feasible in that there are adequate indication to initiate the actions, sufficient time to perform the actions, and adequate access to the equipment being utilized. The administrative controls specifically require closing the XVT06701-SF within approximately 20 minutes of a reactor trip. This means XVT06701-SF is closed prior to the recirculation phase if the reactor trip is due to a LOCA. Once XVT06701-SF is closed, the system configuration is returned to its normal alignment.

The license amendment request also limits this alignment to four hours per week and 30 days per operating cycle, while in modes 1 through 4. The alignment was evaluated from a risk perspective and the probability of not closing XVT06701-SF following a seismic event was determined to be  $5.04E-8$  per year.

This evaluation was based on the following assumptions: The pipe will not break at earthquake magnitudes less than OBE. The frequency of exceeding an OBE is  $3.0E-4$  per year. The time allowed in the LAR for XVT06701-SF to be open translates into an annual fraction of  $8.14E-2$ . These are independent events so the probability of having an earthquake large enough to cause pipe failure while XVT06701-SF is open is  $2.4E-5$ . Mitigation is accomplished by dedicated operator manual action to secure the pump and close the manual valve. The failure mechanisms are failure of the pump breaker to open on demand ( $1.0E-3$ ), failure of the manual valve to close on demand ( $1.0E-4$ ), and failure of the operator to perform the task ( $9.8E-4$ ). Since any one of these can cause a failure, the probability of failure is the sum of the events ( $2.1E-3$ ). Therefore the probability of having a seismic event while XVT06701-SF is open and then not closing it becomes  $5.04E-8$  per year. This is not considered to be risk significant. It should also be noted that the LAR allowing this alignment is limited to two operating cycles to provide time for a design change to eliminate the administrative controls.

In summary, by testing the valve prior to placing the purification system in service, conducting the evolution under robust administrative controls, and limiting the duration of the alignment, a new single failure is obviated.