



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 131 TO FACILITY OPERATING LICENSE NO. NPF-12

SOUTH CAROLINA ELECTRIC & GAS COMPANY

VIRGIL C. SUMMER NUCLEAR STATION

DOCKET NO. 50-395

1.0 INTRODUCTION

By letter dated February 10, 1996, South Carolina Electric & Gas Company (the licensee) submitted an emergency request for changes to the Virgil C. Summer Nuclear Station Technical Specifications (TSs). The requested changes would revise TS pages 3/4 7-15 and 3/4 9-13 relating to Surveillance Requirements for charcoal filter laboratory testing to revise the testing methodology used to determine operability of the charcoal filters in the engineering safeguards features (ESF) air handling units.

Currently the licensee tests charcoal in the ESF air handling units per ANSI Standard N509-1980. Although this method of testing provides more accurate assurance that these air handling units will perform their design function, it does not meet the requirements of the TS. Therefore, the emergency TS amendment recognizes the current testing methodology. Absent relief from the NRC, a plant shutdown would be required due to the licensee's inability to conduct the test required by the TS in the time available.

2.0 EVALUATION

The proposed amendment changes the testing requirements in the TS used to determine the operability of the charcoal in the ESF air handling units. The charcoal is provided to remove iodine from the air as it passes through the air handling units. There are no changes to the physical design or operation of the facility. TS Bases, Updated Final Safety Analysis Report (FSAR) design basis are not affected.

The requirements of Regulatory Guide (RG) 1.52, "Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants," and American National Standards Institute (ANSI) N509-1976, "Nuclear Power Plant Air Cleaning Units and Components," presently form the licensing basis test requirements. The essential elements of this test are:

- 70% Relative Humidity (RH)
- A pre-test carbon sample equilibration for temperature and humidity at 25 degrees Celsius
- A test medium temperature of 80 degrees Celsius

- A post-test sweep for two hours at 25 degrees Celsius
- Methyl iodide penetration of less than 1 percent

The essential elements of the proposed TS change are those required by RG 1.52 and ANSI N509-1980 which refers to ASTM D 3803-1979, "Standard Test Methods for Radiation Testing of Nuclear-Grade Gas-Phase Adsorbents." ASTM D 3803-1979 is updated guidance based on RDT M16-1T, "Gas Phase Adsorbents for Trapping Radioactive Iodine and Iodine Components."

The essential elements of the proposed TS change for testing per ASTM D 3803-1979 (Method A for used carbon) and from Regulatory Guide 1.52 are:

- 95% relative humidity (RH) for the Fuel Handling Building carbon
- 70% RH for the Control Room carbon
- No pre-test carbon sample equilibration for humidity
- Equilibration of the sample to test temperature
- A test medium temperature of 25°C for control room emergency ventilation carbon. A test medium temperature of 30°C for the Fuel Handling Building Exhaust System carbon. ASTM D 3803-1979 specifies 30°C
- A post-test sweep for four hours at test temperature (25°C for the Control Room and 30°C for the fuel handling building) and humidity per N509-1980
- Methyl iodide penetration less than 1%

The differences between the current TS and the proposed TS change requirements for carbon testing are:

- A test temperature of 25°C (Control Room) and 30°C (fuel handling building) versus 80°C
- No pre-test humidity equilibration versus a pre-test humidity equilibration
- Temperature equilibration of the test carbon to the test air temperature
- A four hour post-test sweep versus a two hour post-test sweep
- For the fuel handling building, the test medium will be at 95% relative humidity versus 70%

These differences will be addressed individually and will be shown to be more conservative than the present TS requirement.

The quantity of water retained by charcoal (carbon) is dependent on temperature. Generally, the higher the temperature the less water retained. The water retained by the carbon decreases the efficiency of the carbon to adsorb other contaminants. At 25°C and 95% RH, carbon will retain about 40 weight percent water. At 80°C and 95% RH, carbon retains only about 2 to 3 weight percent water. Therefore, the lower temperature test medium of the proposed TS will yield more conservative results than present TS.

ASTM D 3803-1979 specifies a test temperature of 30°C instead of 25°C. There is little difference in the adsorption behavior of carbon between these two temperatures. The 25°C parameter is more conservative.

Twenty-five degrees Celsius has been used and will continue to be used for the control room for the duration of the TS reference to N509-1980/ASTM D 3803-1979. This is because the Control Room area is maintained at $75^{\circ} \pm 2^{\circ}\text{F}$ (approximately 25°C). Thirty degrees Celsius testing medium will be used for testing fuel handling building carbon. This is less than the expected area temperature of 104°F (about 40°C).

Pre-test humidity equilibration is achieved by sweeping air of the appropriate humidity through the test carbon. This condition is for testing new carbon and until 1977 it also was applied for testing used carbon. In 1977, RDT M16-1T-1977 was released stating that for testing used carbon, "the material shall not be pre-equilibrated before testing." NUREG/CR-0771, "Effects of Weathering on Impregnated Charcoal Performance," May 10, 1979, provides a basis by stating that, "it is thought that the elimination of the pre-humidification is a better simulation of accident conditions since a carbon filter must be ready at all times...." It also states that, "several investigators do not recommend any pre-treatment (of the carbon) in order to prevent a partial regeneration of the carbon which would increase the measured trapping efficiency." Therefore, by the release of the 1979 ASTM D 3803, it was established that the better test method was not to pre-equilibrate the humidity of the carbon.

The present TS reference to N509-1976 (RDT M16-1T) requires the carbon to be equilibrated to 25°C and 70% RH. The methyl iodide test medium would then be instantaneously introduced at 80°C . Carbon testing is not performed this way because this would cause condensation to form on the carbon (the dew point temperature of the test medium at these conditions is approximately 71°C). Condensation on the carbon sample itself ("wetting the bed") results in the test being invalid. This is supported by paragraph 12.41. of ASTM D 3803-1979 which states with respect to relative humidity of the test medium that, "tests at saturation or above give very erratic results." Because of this, the testing standards after 1976 (i.e., RDT M16-1T-1977, ASTM D3803-1979, N509-1980), have been changed to include pre-test thermal equilibration at the test temperature.

The post-test sweep of the carbon is performed to evaluate the ability of the carbon to hold the adsorbate once it is captured. The current TS test specifies a two hour test at 25°C . The proposed TS change will use a four hour sweep at the test medium temperature (25°C for Control Room Carbon, 30°C for fuel handling building). The longer time is more conservative as more radioiodine would be swept off.

Ninety-five percent RH versus 70% RH for the fuel handling building was addressed earlier. Higher moisture content of the carbon resulted in lower adsorption of radioiodines. At a constant temperature the weight percent of water adsorbed by the carbon increases with increasing relative humidity. Therefore it is more conservative to test at higher RH.

Previous tests of the fuel handling building carbon had been performed at 70% RH. RG 1.52 allows for this in Table 2 for, "air filtration system designed to operate outside the primary containment and RH is controlled to 70%." Section 3.3-b of Table 6.5-1 of the FSAR refers to the fuel handling

building exhaust system charcoal adsorbers and states that no heaters are included in the design. The filters process room air and room RH should not exceed 70 percent. Therefore, a heater is not required. On the basis of these statements, past fuel handling building charcoal carbon testing has been performed at 70% RH.

A review performed as part of the plant uprate identified the potential for an increase in the fuel handling building exhaust system RH. Therefore the fuel handling building exhaust system charcoal testing RH is being increased to 95% RH. This is consistent with the requirements of ASTM D 3803-1979.

The control room emergency ventilation system, by design, maintains RH less than 70%. This is accomplished by recirculating approximately 95% of the total system airflow. This air is drawn from the control room (75°C, 50% RH) and mixed with approximately 5% outside air. Under all design conditions, the air passing through the charcoal plenums is maintained below the 70% requirement. Testing of the carbon at 70% RH is acceptable since RH is controlled to less than 70%. This is consistent with the guidance of RG 1.52, Revision 2.

The requested changes revise TS pages 3/4 7-15 and 3/4 9-13, relating to Surveillance Requirements for charcoal filter laboratory testing, such that existing flawed test methodology in the TS will reflect the currently utilized acceptable test methodology in accordance with industry standards. The staff has evaluated this change and concludes that the testing methodology proposed by the licensee adequately demonstrates the operability of the air handling units, and is therefore acceptable.

3.0 EMERGENCY CIRCUMSTANCES

In its February 10, 1996, application, the licensee requested that this amendment be treated as an emergency amendment. In accordance with 10 CFR 50.91(a)(5), the licensee provided the following information regarding why this emergency situation occurred and how it could not have been avoided.

While performing analysis to support an NRC submittal, the licensee recognized that the TS requirements for testing the Emergency Safeguards Features (ESF) charcoal plenum is different from that used by the licensee. The TS refers to Regulatory Guide (RG) 1.52, Revision 2 which references ANSI Standard N509-1976. The licensee has been using ANSI N509-1980 in conjunction with RG 1.52 to meet the TS requirements. The licensee and vendor have determined that this method of testing better demonstrates the ability of these ESF systems to perform their functions than the test specified in the TS. The licensee promptly report this condition to the NRC, requested the emergency amendment to correct this discrepancy and avoid an unnecessary plant shutdown.

The licensee recognizes that NRC Information Notice (IN) 87-32, "Deficiencies in the Testing of Nuclear-Grade Activated Charcoal," dated July 10, 1987, identified that serious problems existed with the testing capabilities of many of the testing companies and the testing standards. All areas were vendor specific. Guidance to licensees was to seek direct contact with the

individual testing companies to improve test accuracy. INEL report EGG-CS-7653, referenced in IN 87-32, recognizes Nuclear Containment Systems, Inc. (NCS), the vendor used by V.C. Summer as one of the few vendors whose laboratory performance meets NRC criteria. They were also determined to fully satisfy the licensee's Vendor Quality Assurance Program. IN 87-32 further identified serious shortcomings with the Standard (RG 1.52, Revision 2) which has not been revised since 1978. Based on the information provided in IN 87-32, the licensee took action to verify the test methodology and accuracy. The IN did not cause the licensee to review the TS for any needed changes.

The licensee identified the inconsistency between their existing practice and the TS requirements, and promptly notified the NRC and proposed this emergency amendment to resolve the inconsistency. As a result of prior information about problems with the testing of charcoal, the licensee took action to ensure that the testing done to support operation of V.C. Summer was conservative. Absent relief from the NRC, a plant shutdown would be required due to the inconsistency between the testing procedures used and the TS requirements.

The staff concludes that an emergency condition exists in that failure to act in a timely way would result in shutdown of the V.C. Summer Nuclear Station. In addition, the staff has assessed the licensee's reasons for failing to file an application sufficiently in advance to preclude an emergency, and concludes that the licensee identified the deficiency in the TS, promptly notified the staff of the deficiency, and promptly proposed this amendment to remedy the situation. Thus, the staff concludes that the licensee has not abused the emergency provisions by failing to make timely application for the amendment. Thus, conditions needed to satisfy 10 CFR 50.91(a)(5) exist, and the amendment is being processed on an emergency basis.

4.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92(c) state that the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of the facility in accordance with the amendment would not:

- (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or,
- (2) Create the possibility of a new or different kind of accident from any previously evaluated; or,
- (3) Involve a significant reduction in a margin of safety.

The proposed changes do not involve a significant hazards consideration, because operation of the Virgil C. Summer Nuclear Station in accordance with the proposed change would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

The charcoal testing protocol changes will not affect system operation or performance, nor do they affect the probability of any event initiators. These changes do not affect any Engineered Safety Features actuation setpoints or accident mitigation capabilities. Therefore, the proposed changes will not significantly increase the consequences of an accident or malfunction of equipment important to safety previously evaluated in the Final Safety Analysis Report (FSAR).

2. Create the possibility of a new or different kind of accident from any previously evaluated; or,

The changes to the charcoal sample testing protocol will not affect the method of operation of the system. The proposed changes only affect the testing criteria for the charcoal samples. No new or different accident scenarios, transient precursors, failure mechanisms, or limiting single failures will be introduced as a result of these changes. Therefore, the possibility of a new or different kind of accident other than those already evaluated will not be created by this change.

3. Involve a significant reduction in a margin of safety.

The new charcoal adsorber sample laboratory testing protocol more accurately demonstrates the required performance of the adsorbers in the Control Room Emergency Ventilation System (CREVS) following a design basis Loss of Coolant Accident (LOCA) or in the Fuel Handling Building Exhaust following a fuel handling accident outside containment. The change in charcoal sample testing protocol will not affect system performance or operation. The decontamination efficiencies used in the offsite and control room dose analyses are not affected by this change. Therefore, all offsite and control room dose analyses are not affected by this change, and all offsite and control room doses will remain with the limits of 10 CFR Part 100 and 10 CFR Part 50 Appendix A, GDC 19. Thus, these changes will not result in a significant reduction in any margin of safety.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the South Carolina State official (Max Batavia) was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATIONS

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant changes in the types, of any effluent that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. Accordingly, the amendment meets the eligibility criteria for categorical

exclusion set forth in 10 CFR 51.22(c)(9). The Commission has made a final no significant hazards finding with respect to this amendment. Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) the amendment does not (a) significantly increase the probability or consequences of an accident previously evaluated, (b) increase the possibility of a new or different kind of accident from any previously evaluated or, (c) significantly reduce a margin of safety and, therefore, the amendment does not involve a significant hazards consideration; (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (3) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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