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SCE&G®
A SCANA COMPANY

July 15, 2002
Rc-02-0122

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

Attention: Ms. K. R. Cotton

Ladies and Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
TECHNICAL SPECIFICATION AMENDMENT REQUEST - TSP 99-0090
SPENT FUEL POOL STORAGE EXPANSION - RESPONSE TO RAI DATED
APRIL 1, 2002

References:
1. S. A. Byrne Letter to Document Control Desk, RC-01-0135, Dated July 24, 2001
2. S. A. Byrne Letter to Document Control Desk, RC-02-0089, Dated May 7, 2002

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 verbal questions, dated April 1, 2002, requesting information concerning the above referenced license amendment request (LAR) (Reference 1). This request for additional information requested a response to specific questions related to control room ventilation and control room habitability. The questions and responses are provided in Attachment I. This letter supercedes the response submitted in Reference 2.

Additionally, new pages 3/4.7-40 and 3/4.7-41 were affected by the issuance of Amendment 159. New markups and revised pages are included in Attachment II

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
Attachments

A001

c: N. O. Lorick
N. S. Carns
T. G. Eppink (without attachments)
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-02-0122)

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

I hereby certify that on the 15th 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

Notary Public

My Commission Expires

July 13, 2005
Date

Attachment I
Responses to Request for Additional Information

RAI:

a. *Your submittal does not address the radiological consequences of the reduction in the requisite decay period on meeting 10 CFR 50 Appendix A, GDC-19. Please provide the values of the control room operator whole body, thyroid, and skin doses for the two fuel handling accident (FHA) cases for the 30 day duration. Although VCSNS FSAR Section 15.4.1.4.4 addresses the control room dose for a loss-of-coolant accident (LOCA), the staff is unable to determine, from the information you have submitted, that these postulated doses would be bounding for the FHA. The staff notes:*

1) *FSAR Section 15.4.1.4.4 postulates a control room thyroid dose of 30 Rem for an event which results in an exclusion area boundary dose of 110 Rem. Your July 2001 submittal identifies the EAB dose as 259 Rem for a FHA inside containment. The result suggests that the associated control room dose could exceed the criteria of 10 CFR 50 Appendix A, GDC-19.*

2) *The LOCA analysis assumes control room emergency ventilation is initiated by a safety injection signal, which will not be present for a FHA. Although RM-A1 is powered from diesel backed instrumentation power, there is no redundant sampler or monitoring channel.*

3) *FSAR Section 12.2.4.2.1 describes the flow path through radiation monitor RM-A1, as being drawn successively through a particulate sampler, iodine sampler, and a gas sampler. The control room emergency ventilation actuation signal is taken from the gas channel. Given the resulting monitor insensitivity to iodine, the monitor may not alarm on noble gas concentration soon enough to preclude a significant intake of iodine.*

In your response, please provide a tabulation of the analysis assumptions, inputs, and results for each case, in sufficient detail for the staff to perform independent analyses to confirm your reported results. Please also justify the basis for the FSAR assumption of only 10 cfm unfiltered inleakage given recent industry experience with integrated tracer gas testing of the control room envelope.

RESPONSE:

Item a) responses are provided in the following sections that provide additional information on offsite doses for the Fuel Handling Accident inside containment, a tabulation of key inputs and assumptions for control room dose predictions, an overview of the bases for assumptions related to initiation of Emergency Control Room Ventilation and unfiltered inleakage, and analyses results which show that the control room doses for the postulated Fuel Handling Accidents are within the limits defined in 10CFR 50 Appendix A, GDC-19.

Offsite Doses For The Fuel Handling Accident (FHA) Inside Containment

During periods of core alterations or fuel movement inside containment, the reactor building purge supply and exhaust system (FSAR Figure 9.4-28) is normally operated while operation of the refueling cavity/canal surface ventilation system (FSAR Figure 9.4-30) is secured.

As noted in our July 2001 submittal, the 259 Rem EAB thyroid dose for the postulated FHA inside containment was a hypothetical dose not crediting any actions to limit the release of activity to the environment. Instrumentation (RM-G17 A or B) is available, however, to detect a release and to quickly close (i.e., within 5.35 seconds) the purge supply and exhaust isolation valves, thereby, minimizing the release of activity from containment following the postulated event. This instrumentation is described in FSAR section 15.4.5.1.4 and forms the basis for compliance with the 75 Rem SRP 15.7.4 acceptance criteria for the EAB as noted in Section 15.4.2 of NUREG-0717 (initial issue), Safety Evaluation Report Related to the Operation of the Virgil C. Summer Nuclear Station. RM-G17A/B are tested and declared operable for MODE 6 in accordance with Technical Specification 3.3.3.1.

Inputs and Assumptions For Control Room Doses

As requested, the resultant control room operator whole body, thyroid and skin doses following the postulated FHA inside and outside containment are provided herein using the inputs and assumptions tabulated below. For the FHA inside containment, no credit for any actions to limit the release of activity to the environment is taken. Instead, a hypothetical dose is calculated assuming 100 % of the activity within the containment atmosphere is released to the environment over a two-hour period. For the FHA outside containment, a two-hour release is also assumed, but credit is taken for the Fuel Handling Building purge exhaust charcoal filters.

Fuel Handling Accident Input Parameters		
Parameter	FHA Inside Containment	FHA Outside Containment (Inside Fuel Handling Building)
Time between plant shutdown and accident	72 hours	72 hours
Fuel assembly damage	All rods in 1.19 assemblies or 314 rods	All rods in 1.19 assemblies or 314 rods
Fuel rod peaking factor	1.7	1.7
Activity released to pool	Gap activity in ruptured rods	Gap activity in ruptured rods
Percent of rod activity in gap, %	I-131 12 KR-85 30 All Others 10	I-131 12 KR-85 30 All Others 10
Iodine composition, % Elemental Organic	 99.75 0.25	 99.75 0.25
Pool decontamination factors Elemental iodine Organic iodine Noble gases	 133 1 1	 133 1 1
Activity released from pool that is released to the environment prior to filtration, %	100	100
Charcoal filter exhaust efficiencies, %	0 (No credit taken for reactor building purge exhaust charcoal filters)	95 (Fuel handling building purge exhaust charcoal filters)
Control room habitability envelope (CRHE) volume, ft^3	226040	226040
Control building walls and roof concrete shielding, ft.	2	2
Control room emergency ventilation system (CREVS) actuation.	No credit taken for auto-matic initiation via RM-A1. Manually start within 10 minutes of the start of the accident.	No credit taken for auto-matic initiation via RM-A1. Manual start within 60 minutes of the start of the accident
CRHE unfiltered makeup air, CFM	1000 (0 to 10 minutes at which time the CREVS is manually started.) 0 (10 minutes to 30 days)	1000 (0 to 60 minutes at which time the CREVS is manually started.) 0 (60 minutes to 30 days)

Fuel Handling Accident Input Parameters		
Parameter	FHA Inside Containment	FHA Outside Containment (Inside Fuel Handling Building)
CRHE filtered makeup air, CFM	0 (0 to 10 minutes) 1000 (10 minutes to 30 days)	0 (0 to 60 minutes) 1000 (60 minutes to 30 days)
CRHE unfiltered inleakage, CFM	10 (ingress/egress)	10 (ingress/egress)
CRHE filtered recirculation flow, CFM	0 (0 to 10 minutes) 18143 (10 minutes to 30 days)	0 (0 to 60 minutes) 18143 (60 minutes to 30 days)
CRHE recirculation filter efficiency, %	95 (all species of iodine)	95 (all species of iodine)
Breathing rate, m^3/sec	3.47E-04	3.47E-04
CRHE occupancy factors	0 to 24 hours 1.0 1 to 4 days 0.6 4 to 30 days 0.4	0 to 24 hours 1.0 1 to 4 days 0.6 4 to 30 days 0.4
Meteorology	Plume release with Murphy-Campe methodology using onsite meteorological data. X/Q (0 - 8 hour), 9.35×10^{-4} sec/m^3 Source Receptor distance, 61 meters (Per FSAR Sections 2.3.4.1 and 15.4.1.4.4)	Plume release with Murphy-Campe methodology using onsite meteorological data. X/Q (0 - 8 hour), 9.35×10^{-4} sec/m^3 Source Receptor distance, 61 meters (Per FSAR Sections 2.3.4.1 and 15.4.1.4.4)
Activity released to pool, Ci	I-131 1.14E+05 I-132 9.31E+04 I-133 2.29E+04 I-135 1.18E+02 Xe-131m 1.76E+03 Xe-133 1.95E+05 Xe-133m 4.39E+03 Xe-135 2.55E+03 Xe-135m 1.92E+01 Kr-85 2.97E+03 Kr-85m 4.61E-01 Kr-88 2.03E-03	I-131 1.14E+05 I-132 9.31E+04 I-133 2.29E+04 I-135 1.18E+02 Xe-131m 1.76E+03 Xe-133 1.95E+05 Xe-133m 4.39E+03 Xe-135 2.55E+03 Xe-135m 1.92E+01 Kr-85 2.97E+03 Kr-85m 4.61E-01 Kr-88 2.03E-03

Fuel Handling Accident Input Parameters		
Parameter	FHA Inside Containment	FHA Outside Containment (Inside Fuel Handling Building)
Activity released to environment (prior to decay), Ci	I-131 1.14E+03 I-132 9.31E+02 I-133 2.29E+02 I-135 1.18E+02 Xe-131m 1.76E+03 Xe-133 1.95E+05 Xe-133m 4.39E+03 Xe-135 2.55E+03 Xe-135m 1.92E+01 Kr-85 2.97E+03 Kr-85m 4.61E-01 Kr-88 2.03E-03	I-131 5.72E+01 I-132 4.65E+01 I-133 1.14E+01 I-135 5.90E-02 Xe-131m 1.76E+03 Xe-133 1.95E+05 Xe-133m 4.39E+03 Xe-135 2.55E+03 Xe-135m 1.92E+01 Kr-85 2.97E+03 Kr-85m 4.61E-01 Kr-88 2.03E-03
Duration of release	2 hours	2 hours
Duration of Accident	30 days	30 days
Method of Dose Calculation	FSAR Appendix 15A Using INHEC** Computer Code	FSAR Appendix 15A Using INHEC** Computer code
Iodine Dose Conversion Factors	ICRP-30	ICRP-30

** FSAR Section 15.4.7, Reference 22

Initiation of Emergency Control Room Ventilation (ECRV)

As indicated above, manual initiation of ECRV is credited at 10 minutes for the FHA inside containment and at 60 minutes for the FHA outside containment. Although RM-A1 is available to perform this function, manual initiation was conservatively assumed due to RM-A1's lack of redundancy. The assumed time of 10 minutes for the FHA inside containment is based on direct communications being maintained between the control room and personnel at the refueling station during core alterations in accordance with Technical Specification 3.9.5, the generation of a visual and audible indication (i.e., annunciator) within the control room following emergency closure of the reactor building purge supply and exhaust isolation values due to detection of high radiation inside containment by either RM-G17 A or B, and the ability to perform the required action from within the control room. The assumed time of 60 minutes for the FHA outside containment provides adequate time for the activity release from the spent fuel pool to be detected, either by operating personnel or area monitors, and for communication to be established with the control room. For the FHA outside containment, the timing for manual action is less critical since the release to the environment is pre-filtered.

10 CFM Unfiltered Inleakage

The 10 CFM unfiltered inleakage is the current licensing basis value for VCSNS. This value has been previously reviewed and accepted by the staff for demonstrating compliance with 10CFR50, Appendix A, GDC-19 requirements relative to control room habitability. Staff acceptance is indicated in Section 15.4.2 of NUREG-0717 (initial issue), Safety Evaluation Report Related to the Operation of the Virgil C. Summer Nuclear Station and again in "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 119 to Facility Operating License No. NPF-12" dated November 18, 1994.

The 10 CFM unfiltered inleakage was based on the guidance in Standard Review Plan 6.4, item 6.4 III.3.a.(3) since the emergency mode of operation of the VCSNS Control Room Ventilation is one of "zone isolation with filtered recirculated air and a positive pressure".

The potential paths of air inleakage into the control room habitability envelope include: outside air valves in the non-operating redundant system and relief air dampers; openings around supply and return ducts in the control room walls and in duct chase floors; openings for electrical conduit and cables in the control room and chase walls and floors; doors; and piping. A review of these paths, as summarized below, indicates that air inleakage through these paths during the emergency mode is minimal:

1. In the non-operating redundant system, the outside air is sealed from the control room habitability envelope by two 14-inch butterfly valves in series. Both valves are the low leakage type and fail closed upon loss of control air or power. The maximum leakage through a single closed 14-inch butterfly valve is negligible.
2. The relief dampers are two 36-inch by 36-inch dampers, one in each train. Both dampers are gasketed and blanked closed, except during control room purge, to ensure negligible air inleakage.

3. The purge dampers are two 42-inch by 42-inch dampers in series. The inlet plenum to these dampers is gasketed and blanked closed, except during control room purge to ensure negligible air leakage. These dampers are fixed in the full open position.

4. Openings around supply and return ducts in the walls and floors of the control room habitability envelope and chases are sealed with air tight, expanded silicone foam with a fire resistance rating of three hours. Negligible air inleakage is present in these openings.

5. Openings for electrical conduit and cables in the walls and floors of the control room habitability envelope and chases are sealed in the same manner as the openings noted in item 4, above.

6. Doors from the control room habitability envelope to the chase area are three-hour fire rated doors with closures. The doors leading from the turbine building to the control room are gasketed, pressure tight doors.

7. Piping to plumbing fixtures, drains, and potable water leaving the control room habitability envelope are sealed in the manner noted in item 4, above.

None of the control room habitability envelope doors lead directly to the outside. Doors lead to closed chase spaces, stairwells, or corridor spaces. Thus, neither outside wind conditions or other ventilation systems cause infiltration or leakage into the control room habitability envelope.

Irrespective of the above positive features for minimizing potential inleakage into the control room habitability envelope, given the recent industry experience with integrated tracer gas tests of control room envelopes, SCE&G has taken a proactive role in the final development of NEI 99-03 (June 2001) and interacted with NRC attendees at the August 23-24, 2001 Control Room Habitability Workshop. A preliminary walkdown and assessment of the as-built system indicates minimal vulnerability to unfiltered inleakage. SCE&G is currently reviewing and preparing to offer comments on Draft Regulatory Guides DG-1114 and DG-1115, and we are anticipating the issuance of the forthcoming Generic Letter while preparing for the performance of an integrated tracer gas test in order to determine measured values of actual inleakage. Upon completion of inleakage testing, the related assumptions and radiological and toxic chemical analyses will be updated, as required, to assure all regulatory limits are met. As described in the next subsection, significant increases in the unfiltered inleakage can be tolerated for the postulated FHA while still meeting GDC-19 limits.

Additionally, as described in the VCSNS Final Safety Analysis Report, Section 6.4, Table 6.4-3, a commitment exists to maintain a supply of potassium iodide pills within immediate access of the control room for protection of the operations staff. This provides an additional level of protection for accident conditions where some amount of radioactive iodine is assumed to be present in the control room.

Control Room Dose Results

Control Room doses have been evaluated for the postulated Fuel Handling Accidents to demonstrate that the consequences do not exceed the criteria of 10 CFR 50 Appendix A, GDC-19. Although a high radiation signal from the gaseous activity channel of RM-A1 is predicted to occur well within 10 minutes of either accident, no credit for this protective action is taken even though the instrument is, per Table 3.3-6 of the Technical Specification, required to be operable in all modes. Only manual initiation of Emergency Control Room Ventilation (ECRV) is credited. Based on the assumptions and inputs described earlier, the following provides a tabulation of the resultant control room operator whole body, thyroid and skin doses following the postulated FHA inside and outside containment.

Fuel Handling Accidents Control Room Doses

30 Day Integrated Dose	Acceptance Criteria GDC-19 (Rem)	FHA Inside Containment (Rem)	FHA Outside Containment (Rem)
Thyroid Inhalation	30	≈ 4.1	≈1.9
Whole Body Gamma	5	≈ 0.17	≈ 0.17
Beta Skin: Protected Unprotected	 30 75	 ≈ 1.1 ≈ 5.0	 ≈ 1.1 ≈ 5.0

The calculated doses are all within the GDC-19 acceptance criteria and are bounded by the control room doses for the Loss-of-Coolant Accident. Sensitivity analyses also show that significant increases (i.e., approximately a factor of 100) in the assumed value for unfiltered inleakage (i.e., 10 CFM) can be tolerated prior to the thyroid inhalation dose within the control room exceeding 30 Rem.

RAI:

b. *VCSNS FSAR Section 15.4.5.1.2.2 establishes a conservative case spent fuel pool DF of 500, while table 15.4-38 of the FSAR and Table 9.3 of the July 2001 submittal identifies the acceptable (Regulatory Guide 1.25) DF values of 133 for elemental iodine and 1.0 for organic iodine. Please confirm your intent to use the Regulatory Guide 1.25 guidance as the VCSNS licensing basis.*

RESPONSE:

The values provided in Regulatory Guide 1.25 are used in the licensing basis analyses for the VCSNS fuel handling accident evaluations inside and outside containment.

RAI:

c. *Table 9.3 of the submittal provides data and assumptions used for the evaluation of the fuel handling accident. Contained in this tabulation is the fuel burnup assumption which is given as "up to 70,000" MWd/MTU. The I-131 gap fraction identified in this table is based in part on NUREG/CR-5009, "Assessment of the Use of Extended Burnup Fuel in Light Water Power Reactors." The conclusions of that report were based on burnups to 60,000 MWd/MTU peak rod average. Although the staff has efforts in progress to assess the impact of higher burnups on fuel, the current staff guidance on gap fractions is limited to peak rod average burnups not exceeding 60,000 MWd/MTU. As such, the staff finds the Table 9.3 burnup entry to be unsupported as it applies to gap fractions and pool DF (impacted by increased fuel rod pressures). Please confirm your intent to limit the applicability of these assumptions to analyses involving fuel with burnups not exceeding 60,000 MWd/MTU peak rod average.*

RESPONSE:

SCE&G is not seeking to justify a generic fuel burnup limit exceeding 60,000 MWD/MTU with this submittal. For conservatism, the fuel burnup assumed in analysis of the FHA was based on an assembly average of 70,000 MWD/MTU. This assumption was made to conservatively maximize the I-131 source terms in calculating offsite and control room doses. Recognizing that the assumed power peaking factor (i.e., 1.7) is not realistic for high burnup fuel and that, on a best estimate basis, the I-131 gap fraction is less than the assumed analysis value of 12%, the predicted radiological consequences for the Fuel Handling Accident are judged to be very conservative for rod-average-burnups up to 60,000 MWD/MTU.

In the discharged fuel, fuel rod pressures can exceed 1200 psig. Justification for the conservative pool decontamination factor (DF) of 133 for elemental iodine provided in Regulatory Guide 1.25 for pin pressures greater than 1200 psig is provided as follows, based on experimental studies performed by Westinghouse and documented in WCAP-7828, Radiological Consequences of a Fuel Handling Accident, December, 1971.

Per WCAP-7828, the following equation was developed to define the elemental iodine pool DF:

$$DF = 73e^{0.313t/d}$$

where t = bubble rise time (seconds)

d = bubble diameter (cm)

Regulatory Guide 1.25 states, "For release pressures greater than 1200 psig and water depths less than 23 feet, the iodine decontamination factor will be less than those assumed in this guide and must be calculated on an individual basis using assumptions comparable in conservatism to those of this guide."

In Table 3-5 of WCAP-7828, the relationship of bubble rise time and bubble diameter is presented for the range of fuel pin pressures from 100 to 1200 psig. Using the values from WCAP-7828 of a bubble rise time of 4.7 seconds and bubble diameter of 0.71 cm for 1200 psig and a 23-foot pool depth, the pool DF is calculated as 580. The specification of a DF of 133 by Regulatory Guide 1.25 represents a conservative factor of 4.36 relative to the WCAP-7828 results.

The limiting case for the offsite and control room dose consequences is for a postulated FHA inside containment. Assuming a bounding fuel pin pressure of 1500 psig and a 23-foot pool depth, an extrapolation of values from WCAP-7828 yields a bubble rise time of 3.85 seconds and bubble diameter of 0.645 cm. However, for VCSNS, the minimum water depth in the refueling cavity inside containment is in the area of the reactor vessel flange where the depth is slightly greater than 24 feet. The remainder of the refueling cavity has a depth much greater than 24 feet. Conservatively using the minimum depth of 24 feet results in a bubble rise time of 4 seconds for a bounding fuel rod pressure of 1500 psig. The resulting calculated DF using the WCAP-7828 equation with a bubble rise time of 4.0 seconds and bubble diameter of 0.645 cm. is 508, which represents a conservative factor of 3.82.

When considering a fuel pin pressure of 1200 psig and a pool depth of 23 feet, the level of conservatism associated with the pool DF is 4.36. Rounding this gives a general level of conservatism of a factor of 4. The value of 3.82 for a fuel pin pressure of 1500 psig and a pool depth of 24 feet is considered to represent a comparable conservatism as stated in Regulatory Guide 1.25 and therefore, the continued use of the DF of 133 is deemed appropriate for VCSNS for fuel pin pressures up to 1500 psig.

Attachment II

Revised Markups and Retyped pages affected by Amendment 159

3/4.7.11 SPENT FUEL POOL VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.11 Two independent spent fuel pool ventilation sub-systems shall be OPERABLE with at least one sub-system in operation.

APPLICABILITY: Whenever irradiated fuel is being moved in the spent fuel pool and during crane operation with loads over the pool.

ACTION:

a. With one spent fuel pool ventilation sub-system inoperable, fuel movement within the spent fuel pool or crane operation with loads over the spent fuel pool may proceed provided the OPERABLE spent fuel pool ventilation sub-system is capable of being powered from an OPERABLE emergency power source and is in operation and discharging through at least one train of HEPA filters and charcoal adsorbers.

b. With no spent fuel pool ventilation sub-system OPERABLE, suspend all operations involving movement of fuel within the spent fuel pool or crane operation with loads over the spent fuel pool.

c. The provisions of Specification 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11 The above required spent fuel pool ventilation sub-systems shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that each sub-system operates for at least 15 minutes.

b. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire or chemical release in any ventilation zone communicating with the system by:

   1. Verifying that the cleanup system satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the system flow rate is 30,000 ACFM ± 10%.

SURVEILLANCE REQUIREMENTS (Continued)

2. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of ASTM D3803-1989, at a relative humidity of 95% and 30°C with a methyl iodide penetration of <2.5%.

3. Verifying a system flow rate of 30,000 ACFM ± 10% during system operation when tested in accordance with ANSI N510-1975.

c. Prior to the movement of fuel or crane operation with loads over the pool by verifying that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of ASTM D3803-1989, at a relative humidity of 95% and 30°C with a methyl iodide penetration of <2.5%. Subsequent to each initial analysis (which must be completed prior to fuel movement or crane operation with loads over the pool), during the period of time in which there is to be fuel or crane movement with loads over the pool, verify charcoal adsorber operation every 720 hours by obtaining and analyzing a sample as described above. These subsequent analyses are to be completed within thirty-one (31) days of sample removal.

d. At least once per 18 months by:

1. Verifying that the pressure drop across the combined HEPA and roughing filters and charcoal adsorber banks is less than 6 inches Water Gauge while operating the system at a flow rate of 30,000 ACFM ± 10%.

2. Verifying that on a loss of offsite power test signal, the system automatically starts.

3. Verifying that the system maintains the spent fuel pool area at a negative pressure greater than or equal to 1/8 inches Water Gauge relative to the outside atmosphere during system operation.

e. After each complete or partial replacement of a HEPA filter bank by verifying that the HEPA filter banks remove greater than or equal to 99.95% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 30,000 ACFM ± 10%.

f. After each complete or partial replacement of a charcoal adsorber bank by verifying that the charcoal adsorbers remove greater than or equal to 99.95% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 30,000 ACFM ± 10%.

3/4.7.11 SPENT FUEL POOL VENTILATION SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.11 Two independent spent fuel pool ventilation sub-systems shall be OPERABLE with at least one sub-system in operation.

APPLICABILITY: Whenever irradiated fuel is being moved in the spent fuel pool and during crane operation with loads over the pool.

ACTION:

a. With one spent fuel pool ventilation sub-system inoperable, fuel movement within the spent fuel pool or crane operation with loads over the spent fuel pool may proceed provided the OPERABLE spent fuel pool ventilation sub-system is capable of being powered from an OPERABLE emergency power source and is in operation and discharging through at least one train of HEPA filters and charcoal adsorbers.

b. With no spent fuel pool ventilation sub-system OPERABLE, suspend all operations involving movement of fuel within the spent fuel pool or crane operation with loads over the spent fuel pool.

c. The provisions of Specification 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.11 The above required spent fuel pool ventilation sub-systems shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by initiating, from the control room, flow through the HEPA filters and charcoal adsorbers and verifying that each sub-system operates for at least 15 minutes.

b. At least once per 18 months or (1) after any structural maintenance on the HEPA filter or charcoal adsorber housings, or (2) following painting, fire or chemical release in any ventilation zone communicating with the system by:

   1. Verifying that the cleanup system satisfies the in-place testing acceptance criteria and uses the test procedures of Regulatory Positions C.5.a, C.5.c and C.5.d of Regulatory Guide 1.52, Revision 2, March 1978, and the system flow rate is 30,000 ACFM ± 10%.

SURVEILLANCE REQUIREMENTS (Continued)

2. Verifying within 31 days after removal that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of ASTM D3803-1989, at a relative humidity of 95% and 30°C with a methyl iodide penetration of <2.5%.

3. Verifying a system flow rate of 30,000 ACFM ± 10% during system operation when tested in accordance with ANSI N510-1975.

c. Prior to the movement of fuel or crane operation with loads over the pool by verifying that a laboratory analysis of a representative carbon sample obtained in accordance with Regulatory Position C.6.b of Regulatory Guide 1.52, Revision 2, March 1978, meets the laboratory testing criteria of ASTM D3803-1989, at a relative humidity of 95% and 30°C with a methyl iodide penetration of <2.5%. Subsequent to each initial analysis (which must be completed prior to fuel movement or crane operation with loads over the pool), during the period of time in which there is to be fuel or crane movement with loads over the pool, verify charcoal adsorber operation every 720 hours by obtaining and analyzing a sample as described above. These subsequent analyses are to be completed within thirty-one (31) days of sample removal.

d. At least once per 18 months by:

1. Verifying that the pressure drop across the combined HEPA and roughing filters and charcoal adsorber banks is less than 6 inches Water Gauge while operating the system at a flow rate of 30,000 ACFM ± 10%.

2. Verifying that on a loss of offsite power test signal, the system automatically starts.

3. Verifying that the system maintains the spent fuel pool area at a negative pressure greater than or equal to 1/8 inches Water Gauge relative to the outside atmosphere during system operation.

e. After each complete or partial replacement of a HEPA filter bank by verifying that the HEPA filter banks remove greater than or equal to 99.95% of the DOP when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 30,000 ACFM ± 10%.

f. After each complete or partial replacement of a charcoal adsorber bank by verifying that the charcoal adsorbers remove greater than or equal to 99.95% of a halogenated hydrocarbon refrigerant test gas when they are tested in-place in accordance with ANSI N510-1975 while operating the system at a flow rate of 30,000 ACFM ± 10%.