July 11, 2006

Mr. Thomas D. Walt, Vice President
Carolina Power & Light Company
H. B. Robinson Steam Electric Plant
Unit No. 2
3581 West Entrance Road
Hartsville, South Carolina 29550

SUBJECT: H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 — ISSUANCE OF AN AMENDMENT ON IMPLEMENTATION OF THE ALTERNATE SOURCE TERM FOR THE LOSS-OF-COOLANT ACCIDENT (TAC NO. MC5709)

Dear Mr. Walt:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 207 to Renewed Facility Operating License No. DPR-23 for the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP2). This amendment is in response to your application dated January 21, 2005, as supplemented by letters dated May 26, 2005, September 19, 2005, and March 31, 2006.

The amendment approves the implementation of the alternative source term methodology for a loss-of-coolant accident at HBRSEP2.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Chandu P. Patel, Project Manager,
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-261

Enclosures:
1. Amendment No. 207 to DPR-23
2. Safety Evaluation

cc w/encls: See next page

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Carolina Power & Light Company

H. B. Robinson Steam Electric Plant,
Unit No. 2

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July 11, 2006

Mr. Thomas D. Walt, Vice President
Carolina Power & Light Company
H. B. Robinson Steam Electric Plant
Unit No. 2
3581 West Entrance Road
Hartsville, South Carolina 29550

SUBJECT: H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 — ISSUANCE OF AN AMENDMENT ON IMPLEMENTATION OF THE ALTERNATE SOURCE TERM FOR THE LOSS-OF-COOLANT ACCIDENT (TAC NO. MC5709)

Dear Mr. Walt:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 207 to Renewed Facility Operating License No. DPR-23 for the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP2). This amendment is in response to your application dated January 21, 2005, as supplemented by letters dated May 26, 2005, September 19, 2005, and March 31, 2006.

The amendment approves the implementation of the alternative source term methodology for a loss-of-coolant accident at HBRSEP2.

A copy of the related Safety Evaluation is enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Chandu P. Patel, Project Manager,
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-261

Enclosures:
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cc w/encls: See next page

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CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-261

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 207
Renewed License No. DPR-23

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Carolina Power & Light Company (the licensee), dated January 21, 2005, as supplemented by letters dated May 26, 2005, September 19, 2005, and March 31, 2006, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended and paragraph 3.B. of Renewed Facility Operating License No. DPR-23 is revised to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 207, are hereby incorporated in the license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Michael L. Marshall, Jr., Branch Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License No. DPR-23

Date of Issuance: July 11, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 207

RENEWED FACILITY OPERATING LICENSE NO. DPR-23

DOCKET NO. 50-261

Replace page 3 of Renewed Facility Operating License No. DPR-23 with the attached page 3.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 207 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-23

CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261

1.0 INTRODUCTION

By letter dated January 21, 2005, as supplemented by letters dated May 26, 2005, September 19, 2005, and March 31, 2006, the Carolina Power & Light Company (CP&L, licensee) requested an amendment to Renewed Facility Operating License DPR-23 for H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP2). The amendment would implement the alternative source term (AST) methodology for a design-basis loss-of-coolant accident (LOCA).

The May 26, 2005, September 19, 2005, and March 31, 2006, letters provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 REGULATORY EVALUATION

A licensee's adoption of AST requires analyses of those accidents appropriate for the type of reactor facility. The Nuclear Regulatory Commission (NRC) guidance on the performance of such analyses is presented in Regulatory Guide 1.183 "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000. An acceptable demonstration involves showing that both the exclusion area boundary (EAB) and low population zone (LPZ) doses are less than 25 rem total effective dose equivalent (TEDE) or some fraction thereof, depending upon the accident. In addition, the licensee must demonstrate that the control room operator dose meets Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.67 criteria.

Accidents which are typically analyzed are based upon reactor type. For a pressurized-water reactor, the typical accidents analyzed include a main steam line break (MSLB), locked rotor, rod ejection, steam generator tube rupture (SGTR), fuel handling accident, and a large break LOCA. The licensee has previously received approval for use of the AST methodology for a fuel handling accident in Amendment 195, and for accidents involving a MSLB, SGTR, locked rotor, and single-rod control cluster assembly withdrawal in Amendment 201.

3.0 TECHNICAL EVALUATION

3.1 Assessment of Radiological Consequences

3.1.1 CP&L Analysis of Large Break LOCA

The licensee calculated the potential consequences of a postulated large break LOCA. Doses were calculated for individuals located at the EAB, at the LPZ, in the control room, and in the technical support center (TSC)/emergency operating facility (EOF).

CP&L postulated that the occurrence of a LOCA would result in releases to the environment from two sources, namely, containment leakage and Engineered Safety Feature (ESF) Systems recirculation leakage.

For the containment leakage pathway, it was postulated that the release of aerosols, and elemental and particulate forms of iodine within containment would be reduced by containment sprays, diffusiophoresis, and by natural deposition. Removal would be based upon the physical form of the release and whether sprays were in operation. HBRSEP2 has containment fan coolers that would promote mixing between the sprayed and unsprayed regions of containment. Licensee's calculations assumed containment leakage occurred at the maximum allowable leakage provided in the containment leakage rate testing program in the technical specifications for HBRSEP2. At 24-hours post-LOCA, licensee assumed that the containment leakage rate was reduced to 50 percent of the maximum allowable value for the duration of the accident.

CP&L proposed to take credit for the removal of aerosols in containment by diffusiophoresis. Most licensees who have requested the implementation of AST into their licensing bases have assumed such a credit.

Diffusiophoresis is the movement of a particle due to concentration gradients of the component gases in an isothermal gas mixture. For a LOCA environment, diffusiophoresis is due to the water vapor gradient and will occur at the relatively cold containment walls where the condensation of water vapor takes place. The calculation of the diffusiophoresis removal rate is a function of the vapor condensation rate.

The HBRSEP2 containment response to a large break LOCA was evaluated in detail by the Westinghouse Commercial Atomic Power (WCAP) report, WCAP-15304 "Carolina Power & Light Company, H. B. Robinson Steam Electric Plant, Unit No. 2, LOCA Containment Integrity Analysis, September 1999." The output of that WCAP report analysis consists of tables of mass and energy releases and containment atmospheric conditions.

From that report, the licensee extracted containment relative humidity, containment atmospheric total pressure and steam temperature, sump water temperature, break flow, and break flow energy/enthalpy. The licensee determined the WCAP report event progression and compared it to the LOCA AST dose consequence event progression. The licensee did this to determine the suitability of the WCAP report results for use in dose applications.

The WCAP report does not contain steam condensation rates as a direct output. Therefore, the licensee used the WCAP report outputs and steam tables to determine steam condensation

rates for the HBRSEP2 LOCA. Break flow mass and energy inputs from the WCAP report were used to determine a steam addition rate that was assumed to be balanced by steam condensation rates during times when the containment pressure was not changing rapidly. The licensee modeled steam condensation for active heat removal mechanisms, such as containment fan coolers and containment sprays as well as for the derived condensation on heat sinks within the containment. The licensee compared the results of these calculations to two previous applications of diffusiophoresis in Fort Calhoun and Beaver Valley. The licensee found the HBRSEP2 condensation rate results similar, but conservative, compared to the other two applications.

The licensee calculated diffusiophoresis factors based upon a method provided in "Direct Measurement of Diffusiophoretic Deposition of Particles at Elevated Temperatures," Buntz, H., and Schock, W., *Aerosol: Science, Technology*, *and Industrial Applications of Airborne Particles, Proceedings of the First International Aerosol Conference*, September 17-21, 1984, Minneapolis, Minnesota. This method converts the plant-specific containment steam/vapor fractions into a ratio of aerosol deposition velocity to the steam deposition velocity and then uses that ratio, along with the time dependent steam density and steam condensation rate in the containment to determine time dependent removal coefficients. While the licensee calculated time dependent removal coefficients, it assumed a constant rate diffusiophoretic factor for HBRSEP2. In addition, the licensee limited the application of this factor to only the sprayed region of the containment and only during those times in which the sprays were operating.

A March 5, 2004, submittal in support of Amendment 201 addressed the mechanical mixing in the containment by the fan coolers. In prior applications to implement AST for a LOCA, CP&L had initially assumed that the fan coolers removed 130,000 cubic feet per minute (cfm) of air from the sprayed region and transferred that air to the unsprayed region. It was also assumed that 130,000 cfm of the air in the unsprayed region was then transferred to the sprayed region. The March 5, 2004, submittal provided an analysis that justified assuming that 65,000 cfm of air is taken from the sprayed region and transferred to the unsprayed region and visa versa.

In the January 21, 2005, submittal it was assumed that the removal of elemental iodine ceased when a decontamination factor (DF) of 200 was achieved and that this occurred at 2.01 hours post-LOCA for train A sprays and at 2.03 hours for train B. The January 21, 2005, submittal also assumed that the spray removal rate would decrease once a DF of 50 was achieved for aerosol forms of iodine. The January 21, 2005, submittal indicated that the DF of 50 occurred at 2.58 hours post-LOCA for train A and at 2.62 hours post-LOCA for train B. At the time that a DF of 50 was achieved, the spray removal rate for aerosol iodine would be reduced by a factor of 10.

For the ESF recirculation leakage pathway, the licensee assumed emergency core cooling system leakage was twice the limit in the HBRSEP2 Technical Requirements Manual 3.23 "Post Accident Recirculation Heat Removal System Leakage." The value presently in the Manual is 2 gallons per hour (gph). CP&L assumed that leakage began at the earliest time that recirculation flow starts and continues for the duration of the accident.

In the September 19, 2005, letter, the licensee made two substantive changes to the LOCA analysis in its January 21, 2005, submittal. The first change was related to the diffusiophoresis aerosol removal rate. In the original submittal this factor was presented as 0.5 per hour. In the

determination of the value for this factor one of the inputs is the density of steam. The density of steam can be calculated using either the total containment pressure or the partial steam pressure. In the January 21, 2005, letter, the licensee calculated the containment steam density using the steam temperature at saturated steam conditions, which is equivalent to using the saturated steam partial pressure. The NRC staff indicated that use of the total containment pressure would be more appropriate. Therefore, in its September 19, 2005, letter, CP&L revised the diffusiophoresis removal factor based upon total containment pressure. The revised removal rate was 0.2 per hour.

The second substantive change was associated with the flashing fraction used to determine the airborne quantity of iodine originating from the ESF leakage outside containment. The January 21, 2005, letter assumed the portion which flashed was 5.3 percent. In its letter dated September 19, 2005, CP&L revised the flashing portion to 10 percent. This value is consistent with the guidance in Regulatory Guide 1.183. With the change in flashing portion, the licensee also reduced the assumed ESF leakage from 4 gph to 2 gph. With this change, the leakage value in HBRSEP2 Technical Requirements Manual 3.23 will need to be changed to 1 gph from 2 gph.

As a result of the above changes, revised LOCA calculations were performed and the revised consequences were provided in the September 19, 2005, letter.

3.1.2 Staff Analysis of Large Break LOCA

The NRC staff performed confirmatory calculations of the potential consequences of a LOCA based upon information provided in the licensee's January 21, 2005, May 26, 2005, and September 19, 2005, letters. The staff calculated the doses to individuals located at the EAB, LPZ, control room and TSC. The LOCA calculation assumptions, and the atmospheric dispersion factors utilized by the NRC staff are presented in the attached Tables 1 and 2, respectively. The staff finds the licensee's use of the diffusiophoresis removal mechanism acceptable because:

1) They used total containment pressure not steam pressure;
2) The calculation of the diffusiophoresis removal factors was based upon plant-specific containment response to a large break LOCA, including plant-specific containment steam/vapor fractions and time dependent steam density and steam condensation rate in containment;
3) Diffusiophoresis removal is only accounted for during the times sprays are operational; and
4) The spray removal coefficient does not include the impact of diffusiophoresis.

The NRC staff's assumptions utilized for the control room and TSC doses are presented in the attached Tables 3 and 4, respectively. The consequences as determined by the NRC staff are presented in Table 5 (attached).

The estimate of diffusiophoretic removal rates is based on a calculated effective steam condensation rate in the containment as evaluated by WCAP-15304. The NRC staff reviewed the methodology and questioned the basis for the choice of steam density based upon the steam partial pressure, rather than containment pressure in the determination of the diffusiophoretic removal rate. As noted above, in response to a staff question, the licensee

chose to revise its analysis. In the September 19, 2005, letter, the licensee proposed a revised diffusiophoresis removal rate using the steam density based on the total containment pressure. This change is acceptable to the NRC staff.

The NRC staff reviewed the change in flash portion of the ESF leakage component. The NRC staff finds the change to 10 percent acceptable and consistent with the guidance in Regulatory Guide 1.183.

In the September 19, 2005, letter, the licensee calculated a revised time at which a DF of 50 was achieved for aerosol forms of iodine to be 2.66 hours for train A and 2.70 hours for train B. The NRC staff determined that train B would be the limiting case (i.e., result in the larger dose consequence). The NRC staff calculated that for the limiting condition the DF of 50 would be achieved at approximately 2.53 hours post-LOCA.

For the dose to the control room operators, refer to Section 3.2 for additional details. For the TSC calculation the licensee assumed an unfiltered inleakage flow rate of 500 cfm. There is no evidence that the licensee has confirmed this inleakage rate. None of the submittals in support of this amendment request provided any documentation that indicated that the licensee had confirmed the value of 500 cfm. However, the NRC staff finds that this value would provide an acceptable dose in the TSC in the event of a design-basis accident.

The NRC staff's calculations confirmed that HBRSEP2's implementation of AST for a LOCA met the 10 CFR 50.67 dose acceptance criteria.

3.2 Assessment of Control Room Habitability

The licensee calculated the dose to the control room operators. The licensee assumed that the normal ventilation system would be operating for 35 seconds post-LOCA before a safety injection signal would result in the automatic initiation of the control room's emergency ventilation system. During this period of operation of the normal ventilation system, the licensee assumed that the inleakage rate to the control room envelope (CRE) was 170 cfm. When operated to mitigate the consequences of an accident, the control room emergency ventilation system brings 400 cfm of outside air, passes it through a filter and a charcoal absorber, and distributes the air to the CRE. Air from the CRE is recirculated back through the filter and the charcoal absorber at a rate of 2600 cfm.

The control room emergency ventilation system is actuated either by a safety injection signal or a signal from a radiation monitor. During the period when the normal control room ventilation system is operating, it is assumed that the normal makeup air to the CRE is 400 cfm, which is unfiltered, and that the unfiltered inleakage into the envelope is 170 cfm.

During the periods when the control room's emergency filtration system is operating, it is assumed that the unfiltered inleakage is initially at 170 cfm. After 1 hour, the unfiltered inleakage is assumed to be reduced by 70 cfm when the inleakage from the Hagan Room is reduced. The Hagan Room is a source of unfiltered inleakage into the CRE, when there is a loss of the auxiliary building exhaust fan HVE-7. Loss of this fan results in the Hagan Room, which is adjacent to the CRE, being at a higher pressure than the CRE. The Hagan Room will remain in this condition until operators can take certain actions that will result in the reduction of the pressure in the Hagan Room to below that of the CRE. The licensee's analysis assumed

that it would take approximately 1 hour to implement the actions and reduce the pressure in the Hagan Room.

The licensee performed testing of the HBRSEP2 CRE to establish its inleakage characteristics. A summary of these testing results were presented in an April 10, 2003, letter to the NRC staff. One of the tests determined the CRE's inleakage characteristics when the normal control room ventilation system was operating. This test measured inleakage of 141 cfm ± 5 cfm. The April 10, 2003, letter did not specify the pressure condition of the Hagen Room relative to the CRE when the test was performed. Therefore, there was a degree of uncertainty as to whether the test reflected the limiting condition for this operating scheme. However, in its March 31, 2006, letter, the licensee provided supplemental information on test data for the test performed with the normal control room ventilation system operating. This test data confirmed that the pressure in the Hagan Room was at negative pressure with respect to the CRE during the test with the normal control room ventilation system operating.

The NRC staff performed calculations to determine whether the licensee's implementation of the AST would result in postulated doses which would meet 10 CFR 50.67. The staff calculations confirmed that dose to the control room operators meet 10 CFR 50.67.

4.0 SUMMARY

The NRC staff has concluded, based on the considerations discussed above, that implementation of the AST methodology for a LOCA can be approved.

5.0 STATE CONSULTATION

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

6.0 ENVIRONMENTAL CONSIDERATION

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 change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (70 FR 29786). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). 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.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: A. Drozd
J. Hayes

Date: July 11, 2006

Attachments: Tables

Table 1 Staff Assumptions for the LOCA

Parameter	Value
Core Thermal Power Level (MWt)	2346
Gap Release Fraction:	
Halogens	0.05
Noble Gases	0.05
Alkali Metals	0.05
All others	0.00
Early In-Vessel Release Fraction:	
Halogens	0.35
Noble Gases	0.95
Alkali Metals	0.25
Tellurium Metals	0.05
Ba, Sr	0.02
Noble Metals	0.0025
Cerium Group	0.0005
Lanthanides	0.0002
Containment Leak Rate (%/Day)	
# 24 hours	0.1
> 24 hours	0.05
LOCA Release Phase Timing	
Gap	0 - 30 minutes
Early In-Vessel	30 minutes to 1.8 hours
Engineered Safety Feature (ESF) Systems Leakage Rate (gph)	
21 minutes - 30 days	2
ESF Leakage Flash Fraction	0.10
ESF Release Location	Auxiliary Building Residual Heat Removal Heat Exchanger Room
Containment Sump Water Volume (ft^3)	
21-40 minutes	35,850
40-51.5 minutes	40,889
51.5 minutes - 720 hours	43,939
Containment Natural Aerosol Deposition Rate (hr^{-1})	0.1
Containment Spray Operation (minutes post LOCA)	
RWST Initiation	3
RWST Termination	77

Containment Sump Initiation	87
Containment Sump Termination	167
Containment Spray Volume (ft^3)	
Train A	1,623,618
Train B	1,596,199
Containment Unsprayed Volume (ft^3)	
Train A	334,908
Train B	362,327
Spray Removal Rate (hr^{-1})	
Elemental Iodine	20
Aerosols	
Pre-DF=50	
Train A	3.484
Train B	3.427
Post DF=50	
Train A	0.3484
Train B	0.3427
Time to Reach Elemental Iodine DF = 200 (hrs.)	2.0
Time to Reach Particulate Iodine DF = 50 (hrs)	1.535
Diffusiophoresis Removal Rate (hr^{-1})	0.2
Containment Fan Cooler Flow Rate (cfm)	65,000
Containment Fan Cooler Initiation Time (Seconds Post LOCA)	76
Breathing Rates (m^3/sec)	
Offsite	
0-8 hours	3.47E-4
8-24 hours	1.75E-4
1-30 days	2.32E-4
Control Room/TSC	3.47E-4

Table 2 Robinson Atmospheric Dispersion (X/Q) Values

Offsite X/Q Values (s/m^3)

Location	0 - 2 hrs	2 - 8 hrs	8 - 24 hrs	1 - 4 days	4 - 30 days
EAB Limiting 2 hour interval	1.77 E-3				
LPZ	8.92 E-5	3.50 E-5	2.19 E-5	7.95 E-6	1.85 E-6

Control Room and TSC/EOF X/Q Values (s/m^3)

Release - Receptor Pair	0-2 hrs	2-8 hrs	8-24 hrs	1-4 days	4-30 days
Containment Nearest Point - CR	4.15E-03	2.74E-03	1.17E-03	8.18E-04	6.74E-04
Containment Nearest Point - TSC/EOF	1.64E-04	1.43E-04	6.49E-05	4.41E-05	3.50E-05
RHR Heat Exchanger Room - CR	7.13E-03	5.49E-03	2.29E-03	1.71E-03	1.37E-03
RHR Heat Exchanger Room - TSC/EOF	1.38E-04	1.23E-04	5.52E-05	3.78E-05	3.01E-05

CR - Control Room
TSC/EOF - Technical Support Center/Emergency Offsite Facility
RHR - Residual Heat Removal

Table 3 Assumptions for Control Room

Parameter	Value
Free Air Volume (ft^3)	20,124
Normal Ventilation Flow Rates (cfm)	
Makeup	400
Inleakage	
# 1 hour	170
Emergency Ventilation System Activated (Hours Post LOCA)	35
Emergency Mode Flow Rates (cfm)	
Filtered Makeup	400
Filtered Recirculation	2600
Inleakage	
# 1 hour	170
> 1 hour	100
Filter & Absorber Efficiencies (%)	
Elemental Iodine	94.05
Organic Iodine	94.05
Particulate	98.01

Table 4 Assumptions for TSC

Parameter	Value
Free Air Volume (ft^3)	262,640
Normal Ventilation Flow Rates (cfm)	
Makeup	3420
Inleakage	500
Emergency Ventilation System Activated (Hours Post LOCA)	2
Emergency Mode Flow Rates (cfm)	
Filtered Makeup	3420
Filtered Recirculation	N/A
Inleakage	500
Filter & Absorber Efficiencies (%)	
Elemental Iodine	98.01
Organic Iodine	98.01
Particulate	98.01

Table 5 Robinson Dose Consequences (TEDE)

Dose	Exclusion Area Boundary	Low-Population Zone	Control Room Operators	TSC
Containment Leakage	16.8	1.08	2.09	1.37
ESF Leakage	0.97	0.221	1.90	0.19
Total	17.8	1.30	3.99	1.56
(Acceptance Criteria)	(25)	(25)	(5)	(5)