

February 20, 2003

Mr. Gregory M. Rueger
Senior Vice President, Generation and
Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Nuclear Power Plant
P.O. Box 3
Avila Beach, CA 93424

SUBJECT: DIABLO CANYON NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2 -
ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL
SPECIFICATION 1.1, "DEFINITIONS, DOSE EQUIVALENT I-131," AND
REVISED STEAM GENERATOR TUBE RUPTURE AND MAIN STEAM LINE
BREAK ANALYSES (TAC NOS. MB3516 AND MB3518)

Dear Mr. Rueger:

The Commission has issued the enclosed Amendment No. 156 to Facility Operating License No. DPR-80 and Amendment No. 156 to Facility Operating License No. DPR-82 for the Diablo Canyon Nuclear Power Plant (DCPP), Unit Nos. 1 and 2, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated November 16, 2001, as supplemented by your letter dated September 13, 2002.

The amendments revise TS 1.1 to allow the use of thyroid dose conversion factors listed in the International Commission on Radiological Protection Publication 30, "Limits for Intakes of Radionuclides by Workers," 1979, in the steam generator tube rupture and main steam line break radiological consequences analyses. Additionally, the amendments authorize revision of the Final Safety Analysis Report (FSAR) Update to reflect the revised steam generator tube rupture and main steam line break radiological consequences analyses.

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

Sincerely,

/by G. S. Shukla for/

Brian Benney, Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-275
and 50-323

Enclosures: 1. Amendment No. 156 to DPR-80
2. Amendment No. 156 to DPR-82
3. Safety Evaluation

cc w/encls: See next page

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Package No.: ML030580168

TS Page No.: ML030520331

ADAMS Accession No.: ML030510452

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Diablo Canyon Power Plant, Units 1 and 2

cc:

NRC Resident Inspector
Diablo Canyon Nuclear Power Plant
c/o U.S. Nuclear Regulatory Commission
P.O. Box 369
Avila Beach, CA 93424

Dr. Richard Ferguson, Energy Chair
Sierra Club California
1100 11th Street, Suite 311
Sacramento, CA 95814

Ms. Nancy Culver
San Luis Obispo
Mothers for Peace
P.O. Box 164
Pismo Beach, CA 93448

Chairman
San Luis Obispo County Board of
Supervisors
Room 370
County Government Center
San Luis Obispo, CA 93408

Mr. Truman Burns
Mr. Robert Kinoshian
California Public Utilities Commission
505 Van Ness, Room 4102
San Francisco, CA 94102

Diablo Canyon Independent Safety
Committee
ATTN: Robert R. Wellington, Esq.
Legal Counsel
857 Cass Street, Suite D
Monterey, CA 93940

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
Harris Tower & Pavilion
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

Christopher J. Warner, Esq.
Pacific Gas & Electric Company
P.O. Box 7442
San Francisco, CA 94120

Mr. David H. Oatley, Vice President and
General Manager
Diablo Canyon Nuclear Power Plant
P.O. Box 3
Avila Beach, CA 93424

City Editor
The Tribune
3825 South Higuera Street
P.O. Box 112
San Luis, Obispo, CA 94306-0112

Mr. Ed Bailey, Radiation Program Director
Radiologic Health Branch
State Department of Health Services
P.O. Box 942732 (MS 178)
Sacramento, CA 94327-7320

Mr. James D. Boyd, Commissioner
California Energy Commission
1516 Ninth Street (MS 31)
Sacramento, CA 95814

Mr. James R. Becker, Vice President
Diablo Canyon Operations and Station
Director
Diablo Canyon Nuclear Power Plant
P.O. Box 3
Avila Beach, CA 93424

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-275

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 156
License No. DPR-80

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Pacific Gas and Electric Company (the licensee) dated November 16, 2001, as supplemented by letter dated September 13, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's 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 amended to authorize revision of the Final Safety Analysis Report (FSAR) Update as set forth in the application for amendment by Pacific Gas and Electric Company dated November 16, 2001, and its supplement dated September 13, 2002. Pacific Gas and Electric Company shall update the FSAR Update to reflect the revised steam generator tube rupture and main steam line break radiological consequence analyses authorized by this amendment in accordance with 10 CFR 50.71(e).

Also, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. DPR-80 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 156, are hereby incorporated in the license. Pacific Gas and Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented in the next periodic update to the FSAR Update in accordance with 10 CFR 50.71(e). Implementation of the amendment is the incorporation into the FSAR Update of the changes to the description of the facility as described in the licensee's application dated November 16, 2001, and its supplement dated September 13, 2002, and evaluated in the staff's Safety Evaluation attached to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: February 20, 2003

PACIFIC GAS AND ELECTRIC COMPANY

DOCKET NO. 50-323

DIABLO CANYON NUCLEAR POWER PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 156
License No. DPR-82

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Pacific Gas and Electric Company (the licensee) dated November 16, 2001, as supplemented by letter dated September 13, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's 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 amended to authorize revision of the Final Safety Analysis Report (FSAR) Update as set forth in the application for amendment by Pacific Gas and Electric Company dated November 16, 2001, and its supplement dated September 13, 2002. Pacific Gas and Electric Company shall update the FSAR Update to reflect the revised steam generator tube rupture and main stream line break radiological consequence analyses authorized by this amendment in accordance with 10 CFR 50.71(e).

Also, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-82 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 156, are hereby incorporated in the license. Pacific Gas and Electric Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan, except where otherwise stated in specific license conditions.

3. This license amendment is effective as of its date of issuance and shall be implemented in the next periodic update to the FSAR Update in accordance with 10 CFR 50.71(e). Implementation of the amendment is the incorporation into the FSAR Update of the changes to the description of the facility as described in the licensee's application dated November 16, 2002, and its supplement dated September 13, 2002, and evaluated in the staff's Safety Evaluation attached to this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Stephen Dembek, Chief, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: February 20, 2003

ATTACHMENT TO

LICENSE AMENDMENT NO. 156 TO FACILITY OPERATING LICENSE NO. DPR-80

AND AMENDMENT NO. 156 TO FACILITY OPERATING LICENSE NO. DPR-82

DOCKET NOS. 50-275 AND 50-323

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

1.1-3

INSERT

1.1-3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 156 TO FACILITY OPERATING LICENSE NO. DPR-80
AND AMENDMENT NO. 156 TO FACILITY OPERATING LICENSE NO. DPR-82
PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON NUCLEAR POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 50-275 AND 50-323

1.0 INTRODUCTION

By application dated November 16, 2001, as supplemented by letter dated September 13, 2002, Pacific Gas and Electric Company (the licensee) requested changes to the Technical Specifications (TSs) for the Diablo Canyon Nuclear Power Plant (DCNPP), Unit Nos. 1 and 2. The proposed changes would (1) modify TS Section 1.1, "Definitions, Dose Equivalent I-131," to allow the use of the thyroid dose conversion factors, listed in the International Commission on Radiological Protection Publication 30 (ICRP-30), "Limits for Intakes of Radionuclides by Workers," 1979, in the steam generator tube rupture (SGTR) accident and main steam line break (MSLB) accident radiological consequence analyses, and (2) revise the SGTR and MSLB radiological consequence analyses in the DCNPP Final Safety Analysis Report (UFSAR) Update Sections 3.9.4 and 15.4.3, respectively.

The staff previously approved the use of the thyroid dose conversion factors listed in ICRP-30 that modified TS Section 1.1, "Definitions," in License Amendment No. 155 dated October 21, 2002. The staff is reissuing TS page 1.1-3 since the licensee has spelled out ICRP. This was not done in Amendment No. 155. Therefore, this safety evaluation (SE) addresses only the proposed revisions of the postulated SGTR and MSLB design basis radiological analyses in the Diablo Canyon FSAR Update. The proposed revisions addressed Westinghouse Nuclear Safety Advisory Letter (NSAL)-00-004, "Non-conservatism in Iodine Spiking Calculations," dated March 7, 2000. The Westinghouse letter identified non-conservative assumptions used in calculating the iodine release rates for certain design basis radiological consequence analyses at Westinghouse pressurized water reactor (PWR) plants. Affected design basis accidents for DCNPP are the SGTR and MSLB accidents.

The September 13, 2002, supplemental letter provided additional clarifying information, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination published in the *Federal Register* on January 8, 2002 (67 FR 931).

2.0 REGULATORY EVALUATION

The SE of the SGTR and MSLB accidents includes two cases for the reactor coolant iodine concentration corresponding to (1) a pre-accident iodine spike, and (2) a concurrent (accident-initiated) iodine spike. The acceptance criteria are based on the relevant dose guidelines provided in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 100, Standard Review Plan (SRP) Sections 15.1.5 and 15.6.3, and General Design Criterion (GDC) -19 as it relates to mitigating the radiological consequence of SGTR and MSLB accidents. The proposed revisions do not involve any physical plant changes or changes in operation of the plant.

3.0 TECHNICAL EVALUATION

3.1 SGTR Accident

This design basis accident (DBA) postulates a rupture in a tube in one of the four steam generators (SGs) resulting in the transfer of reactor coolant water to the ruptured SG. The primary-to-secondary flow through the ruptured tube (break flow) following an SGTR results in a depressurization of the reactor coolant system (RCS), a reactor trip, and actuation of safety injection. After safety injection actuates, it is assumed that the RCS pressure will stabilize at a value where the safety injection and break flows are equal. The break flow is assumed to continue until plant operators have taken action to reduce RCS pressure. When RCS pressure is less than the SG pressure, the pressure differential and the flow direction reverses, terminating the break flow. For this analysis, the licensee assumed that the single failure is the power-operated relief valve (PORV) on the ruptured SG. It is assumed to fail open at the time the ruptured SG is isolated. The ruptured SG PORV is isolated 30 minutes after the valve is assumed to have failed open.

For the ruptured SG, the analysis assumes that part of the break flow, known as the flash fraction, will immediately flash to steam and the entrained noble gases will be released to the environment with no holdup in the SG. The portion of the break flow that does not flash is assumed to mix with the bulk water of the SG and will be released at the steaming rate of the SG. The iodine release rates are reduced to account for partitioning between the liquid and vapor phases.

The licensee assumed the initial iodine inventory in the RCS and SGs to be at the maximum concentrations permitted by TSs. The initial noble gas inventory in the RCS is based on fuel damage equivalent to 1.0 percent failed fuel. Two iodine spiking cases are considered. The first case assumes that an iodine spike occurred just before the SGTR and that the RCS iodine inventory is at 60 $\mu\text{Ci/gm}$ dose equivalent I-131. The second case assumes the SGTR event initiates an iodine spike. In this case, iodine is released from the fuel to the RCS at a rate 335 times the normal iodine appearance rate.

The licensee stated that its thermal hydraulic analyses in determining the steam releases to the environment during an SGTR event and its radiological consequence analyses are based on the methodologies described in WCAP-10698, Supplement 1, "Evaluation of Offsite Radiation Doses for a Steam Generator Tube Rupture Accident," which was approved by the staff in

December 1985. The licensee used the revised accident-initiated iodine release rates during an SGTR event in its revised radiological consequence analysis.

Westinghouse identified in its NSAL-00-004, non-conservative assumptions used in calculating the iodine appearance rates for the SGTR radiological consequence analyses in Westinghouse PWR plants. These non-conservative assumptions include letdown flow rate, letdown demineralizer iodine removal efficiency, letdown flow rate uncertainty, primary coolant leakage, and reactor coolant mass. The licensee corrected the non-conservative assumptions identified by Westinghouse in the revised SGTR radiological consequence analysis. The staff has independently verified the new iodine appearance rates provided by the licensee with its own calculations.

The licensee re-evaluated the radiological consequences resulting from the postulated SGTR accident and concluded that the radiological consequences in the low population zone (LPZ) and in the control room are still within the dose acceptance criteria specified in the SRP. However, the two-hour dose to the thyroid for the accident initiated iodine spike case at the exclusion area boundary (EAB) exceeded the 30 rem thyroid dose acceptance criterion specified in SRP Section 15.6.3 by 0.5 rem to 30.5 rem. The staff stated in the SRP that the calculated doses with an assumed accident initiated iodine spike should not exceed a small fraction of the dose guidelines provided in 10 CFR Part 100 (i.e., 10 percent of 300 rem or 30 rem). The staff considers that the calculated 30.5 rem thyroid dose (less than 10.2 percent of the dose guidelines in 10 CFR Part 100) by the licensee is within the small fraction dose guideline criterion in SRP, and is therefore acceptable.

The staff reviewed the licensee's methods, parameters, and assumptions used in its radiological dose consequence analysis and finds that they are consistent with the guidance provided in the SRP. To verify the licensee's radiological consequence assessments, the staff performed confirmatory radiological consequence dose calculations for the postulated SGTR accident. The radiological consequences calculated by the staff are also within the dose criteria specified in the SRP and GDC-19. Although, the staff performed its independent radiological consequence dose calculation as a means of confirming the licensee's results, the staff's acceptance is based on the licensee's analyses. The major parameters and assumptions used by the licensee are acceptable to the staff and are listed in the attached Table 1.

3.2 MSLB Accident

This DBA postulates an unisolable failure in one of the main steam lines at a location outside the containment (between the containment building and the main steam line isolation valves), resulting in the release of steam from the affected steam line. The faulted SG will rapidly depressurize and release its entire liquid inventory and dissolved radioiodines through the faulted steam line to the environment. The released steam may be contaminated due to leakage of reactor coolant into the SGs via small tube leaks (i.e., primary-to-secondary leakage). The rapid secondary depressurization causes a reactor power transient, resulting in a reactor trip. The radiological consequences of a break outside containment will bound those results from a break inside containment. Thus, only the break outside containment is analyzed.

The licensee assumed that the faulted SG boils dry following the main steam pipe rupture as auxiliary feedwater to the faulted SG is isolated. During the MSLB accident, the licensee assumed that the primary-to-secondary leakage rate in each intact SG is at the TS limit of 150 gallons per day (gpd). The total leakage to the 3 intact SGs is 450 gpd. This leakage mixes with the bulk SG water. Transferred noble gases are released without a holdup. Iodine is released to the environment at the steaming rate of the SGs with credit for iodine partitioning.

The primary-to-secondary leakage rate in the faulted SG was assumed at the maximum rate of 10.5 gallons per minute (gpm). The licensee assumed that the MSLB accident initiates an iodine spike in the RCS to increase the iodine release rate from the fuel to a value 500 times greater than the normal equilibrium iodine release rate. All other remaining dose analysis assumptions and methodology including the correction to the non-conservative assumption identified by the NSAL-00-004 letter are the same as those used in the SGTR event.

The licensee assumed that the residual heat removal system will be available for heat removal at eight hours after the accident, and that after eight hours there will be no further steam releases to the environment from the intact SG. The licensee further assumed that within two hours of the accident, there will be no steam released from the faulted SG. No fuel damage is projected for the MSLB.

The licensee re-evaluated the radiological consequences resulting from the postulated MSLB accident and concluded that the radiological consequences at the EAB, LPZ and in the control room are within the dose acceptance criteria specified in SRP 15.1.5 and GDC-19. The staff reviewed the licensee's methods, parameters, and assumptions used in its radiological dose consequence analyses and finds that they are consistent with the guidance provided in the SRP.

To verify the licensee's radiological consequence assessments, the staff performed confirmatory radiological consequence dose calculations for the postulated MSLB accident. The radiological consequences calculated by the staff are also well within the dose criterion specified in GDC-19 and the dose acceptance criterion specified in SRP Section 15.1.5. Although the staff performed its independent radiological consequence dose calculation as a means of confirming the licensee's results, the staff's acceptance is based on the licensee's analyses. The major parameters and assumptions used by the licensee and acceptable to the staff are listed in Table 1.

The licensee stated in its response to the staff's request for additional information that it had performed a parametric assessment of the effect of unfiltered air leakage rates into the control room and found that the control room operator doses are relatively insensitive to the level of leakage rates assumed. The bounding case from this assessment is the MSLB with accident initiated iodine spike, and for this case, the licensee's results show the leakage would have to exceed approximately 4,400 cfm before the 30 rem thyroid dose acceptance criteria specified in SRP Section 6.4 would be exceeded. The normal control room air intake rate during normal plant operation is 4,200 cfm (unfiltered). The staff performed its independent control room operator dose calculations and also finds that the DCNPP control room can tolerate up to 4,400 cfm unfiltered air leakage into the control room without control room isolation. Therefore, the staff agrees with the licensee's assessment.

The staff finds, based on the considerations discussed above, that the proposed revisions to the radiological consequence analyses for the design basis SGTR and MSLB accidents in the DCNPP FSAR Update are acceptable.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

These amendments change a requirement with respect to the 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 amendments involve 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 amendments involve no significant hazards consideration and there has been no public comment on such finding (67 FR 931). Accordingly, the amendments meet 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 amendments.

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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Attachment: Table 1 - Parameters and Assumptions Used

Principal Contributor: Jay Lee

Date: February 20, 2003

Table 1
Parameters and Assumptions Used in
Radiological Consequence Calculations
Steam Generator Tube Rupture and Main Steam Line Break Accidents

<u>Parameter</u>	<u>Value</u>	
Iodine specific activities in primary coolant, $\mu\text{Ci/gm}$		
	Based on 1 $\mu\text{Ci/gm}$ of DEI-131	Based on 60 $\mu\text{Ci/gm}$ of DEI-131
I-131	0.793	47.58
I-132	0.204	12.24
I-133	1.113	66.78
I-134	0.139	8.34
I-135	0.589	35.34
Iodine appearance rates (Ci/min)		
	Case 1 ⁽¹⁾	Case 2 ⁽²⁾
I-131	148.4	221.5
I-132	119.3	178.0
I-133	251.6	375.5
I-134	171.5	256.0
I-135	189.3	282.5
Effective letdown flow rate, gpm		143
Primary coolant mass, lbm		5.66E+5
Primary to secondary leak rates		SGTR MSLB
Faulted steam generator, gpm		Break Flow 10.5
Intact steam generators, gpm per SG		0.3124 0.3124
Iodine spiking factor		335 500
Iodine specific activities in primary coolant for pre-accident iodine spike, $\mu\text{Ci/gm}$		60
Iodine specific activities in primary coolant for accident-initiated iodine spike, $\mu\text{Ci/gm}$		1.0
Iodine specific activities in secondary coolant, $\mu\text{Ci/gm}$		0.1
Offsite power		Not available
Main condenser		Not available

Table 1 (Continued)

<u>Parameter</u>	<u>Value</u>
SGTR	
Faulted steam generator	
Break flow, lb	2.72E+5
Flashed break flow, lb	1.79E+4
Break flow to condenser	1.57E+3
Break flow to atmosphere	1.63E+4
MSLB	
Atmospheric steam releases from faulted SG, lb	
0 to 2 hour	1.63E+5
2 to 8 hour	0
Atmospheric steam releases from intact SGs, lb	
0 to 2 hour	3.93E+5
2 to 8 hour	8.6E+5
Iodine partition factors	
Non-flashed	100
Flashed	1.0
Iodine species released to environment, %	
Elemental	97
Organic	3
Atmospheric Dispersion Factors (χ/Q values), sec/m^3	
0-2 hour EAB	5.29E-4
0 to 8 hour LPZ	2.20E-
8-24 hour LPZ	4.75E-6
1-4 day LPZ	1.54E-6
4-30 day LPZ	3.40E-7
Control room χ/Q values, sec/m^3	
0 to 8 hour	1.96E-4
8 to 24 hour	1.49E-4
1 to 4 day	1.08E-4
4 to 30 day	6.29E-5