Enclosure
Attachment 7
PG&E Letter DCL-11-072

PG&E Calculation STA-195

Design Calculation Cover Sheet

Unit(s): 1&2 File No.: SAP Calculation No.: 9000019634

Design Calculation: ☒ YES ☐ NO System No.: 07 Legacy No.: STA-195

Responsible Group: NCFM Quality Classification: Q

Structure, System or Component: Reactor Coolant System (RCS)

Subject: Design Basis Dose Consequences and Recirculation Loop Margin Leakage Rates. Determine Post-LOCA Doses for Control Room, Exclusion Area Boundary, and Low Population Zone; and establish the limiting margin leakage rates from post-LOCA recirculation loop components outside containment.

Computer/Electronic Calculation: ☐ YES ☒ NO

Computer ID	Application Name and Version	Date of Latest Installation/Validation Test
PC0000256245	LOCADOSE-NE319, v7.0	7/26/06

Calculation Page Index

Calculation Package	Contains pages	No. of pages
Cover Sheet	Page 1	1
Record of revisions	Page 1	1
Calculation checklist	Page 1-3	3
Calculation body	Pages 1 - 29	29
Attachments	Attachments 13.1 through 13.31, pages 30 - 226	197
Appendices	NA	0
Other:	NA	0
TOTAL		231

Design Calculation Record of Revisions

SAP Calculation No.: 9000019634

Legacy No.: STA-195

Rev No./ Ver. No.	Status	Pages affected	Reason for Revision (Requesting Document No.)	Prepared By	LBIE AD/ Screen	LBIE Eval	Check Method*	LBIE Evaluation Approval		Checked	Registered Professional Engineer	Supervisor	Owner's Acceptance per CF3.ID17
				Initials/ LAN ID/ Date	Yes/ No/ NA	Yes/ No/ NA		PSRC Mtg No.	PSRC Mtg Date	Initials/ LAN ID/ Date	Signature/ LAN ID/ Date	Initials/ LAN ID/ Date	Initials/ LAN ID/ Date
2	PI	226 + 5 cover, ROR, chcklist	Delay in Spray due to resolution of the 230kV degraded voltage issue; SAP Notification 50301167	REB2 9/30/11	[X]Yes [ ] No [ ] N/A	[ ] Yes [X] No [ ] N/A	[ ] A [ ] B [X] C	N/A	N/A	DDC1 10/4/11	SPBB 10/3/11	SPBB 10/3/11	N/A
					[ ] Yes [ ] No [ ] N/A	[ ] Yes [ ] No [ ] N/A	[ ] A [ ] B [ ] C						
					[ ] Yes [ ] No [ ] N/A	[ ] Yes [ ] No [ ] N/A	[ ] A [ ] B [ ] C						
					[ ] Yes [ ] No [ ] N/A	[ ] Yes [ ] No [ ] N/A	[ ] A [ ] B [ ] C						

* Check Method: A = Detailed Check B = Alternate Method (note added pages) C = Critical Point Check

A. Insert PE stamp or seal below:

REGISTERED PROFESSIONAL ENGINEER
STEPHEN P. BAKER
No. 27135
MECHANICAL
STATE OF CALIFORNIA
exp 6/30/13

B. Insert stamp directing to the PE stamp or seal:

Design Calculation Checklist

SAP Calc. No.: DCA 9000019634 Part. No.: 2 Version No.: 0
Legacy No.: STA-195

Item to Verify	Complete (enter N/A if not applicable)	
	Preparer Lan ID	Checker Lan ID
Correct calculation number taken out in SAP - document number, part number, version number.	REB2	DDC1 pc
Originating document is entered in SAP as superior document (e.g., DCP number) and/or on Object Links tab (notification number).	REB2	DDC1 pc
Cover Page		
Calculation number reflects SAP number and Legacy number.	REB2	DDC1 pc
Unit number is entered		DDC1 pc
Subject clearly stated.	REB2	DDC1 pc
If computer calculation, computer/application/validation information filled in.	REB2	DDC1 pc
Calculation Page Index completed.	REB2	DDC1 pc
Record of Revisions Page		
Rev No., revised pages and reason for revision clearly identified.	REB2	DDC1 pc
Status matches status in SAP (except if it is PI in SAP, status is F here).	REB2	DDC1
Prepared by, checked by and registered professional engineer blocks signed (full signature).	REB2	DDC1
CF3.ID17 block signed if contractor-completed calc.	N/A	N/A
PE stamp block completed.	REB2	DDC1
Calculation Body		
Purpose is clear and includes the requesting document reference (e.g., DCP No).	REB2	DDC1 pc
Background is established clearly so that the reader can understand the situation without going back to the author.	REB2	DDC1 pc
Assumptions are validated or clearly indicated "Preliminary" if verification is required. If preliminary, SAP Notification No.: _____	REB2	DDC1 pc
Inputs validated or clearly indicated "Preliminary" if verification is required. If preliminary, SAP Notification No.: _____	REB2	DDC1 pc
As-built configuration is verified as required (steps 5.3.2d.7 and 5.3.2d.9).	N/A	N/A
Methodology described is concise and clear.	REB2	DDC1 pc
Acceptance criteria provided are clear.	REB2	DDC1 pc
Body of the calculation is clear so that another person can understand the analysis and the logic without going back to the author.	REB2	DDC1 pc
Results provides a precise solution to the stated purpose.	REB2	DDC1 pc

Item to Verify	Complete (enter N/A if not applicable)	
	Preparer Lan ID	**Checker** Lan ID
Margin assessment includes affect on existing margin (quantitative) or a qualitative assessment.	REB2	DDC1 nc
Margin data recorded using SRM module	REB2	DDC1
Conclusion includes applicability and limitations.	REB2	DDC1 nc
Impact on other documents is performed (step 5.3.2k).	REB2	DDC1 nc
References are clearly identified as input, output and other references.	REB2	DDC1 nc
Attachments include references not readily retrievable.	REB2	DDC1 nc
All revised pages have the correct calc no, revision/version number (9*xxxx-yyy-zz).	REB2	DDC1 nc
LBIE AD/Screen completed.	Nmg	DDC1
LBIE evaluation completed, when necessary.	N/A	~~DDC1~~ N/A nc
Calculation input and output references correctly entered in SAP on Calculation record Object Links tab.	REB2	DDC1
Verification		
Check method A - Independent Review Of Calculation		N/A
Check method B - Alternate Calculation		
• Comparison to a sufficient number of simplified calculations to support the calculation.		N/A
• Comparison to an analysis by an alternate verified method.		N/A
• Comparison to a similar verified calculation.		N/A
• Comparison to test results.		N/A
• Comparison to measured and documented plant data for a comparable design.		N/A
• Comparison to published data and correlation confirmed by industry experience.		N/A
• Other (describe) _____		
Check method C - Critical Point Check		DDC1 nc
Approval:		
Operations concurrence documented for any operator action(s).	N/A	N/A
Eng director approval to issue design with calc in "Preliminary" status. Ref.: _____	N/A	N/A
Calc Approved/Preliminary has a tracking operation off the closure order and is included on design engineering review requirements. No.: _____	N/A	~~DDC1~~ N/A nc
PSRC approval if LBIE evaluation is required.	N/A	
PE stamp current for person signing as PE.	Nmg	
Approve as Final.	Nmg	

Item to Verify	Complete (enter N/A if not applicable)	
	Preparer Lan ID	Checker Lan ID
Processing Approved Calc:		
Calc status updated in SAP.	Nmy	
Calc Approved/Pending implementation has a tracking operation off the closure order.	Nmy	DDC1
Working copy of Approved Calculation package is transmitted to document services for filing in Library or if it is not stored in Library, returned to designated storage location.		
Copy of the approved revision transmitted to engineering department clerk for transmitting to RMS.		

DCA 90000019634 Part 002 Vs 00 (Legacy No. STA-195)

SAP Calc. No.: 9000019634 Part No.: 002 Version No. 00 Unit: 1 and 2

Legacy No. STA-195

Subject: Design Basis Dose Consequences and Recirculation Loop Margin Leakage Rates

Revision 0: Issued 2004

Revision 1:
Issued in 2008 as requested in AR A0725926 to be consistent with the FSARU discussion (Reference 12.a.4, Sections 3.1.1.1 and 6.3A.3) regarding the passive failure of the RHR pump seal occurring at 24 hours after the start of the accident. Revision 0 assumes that the failure occurs at 23.7 minutes after LOCA initiation. The Revision 1 assumption of a passive leak at 24 hours is consistent with the NRC Standard Review Plan Section 15.6.5.B.

Revision 2:
The calculation is revised to increase the assumed containment spray delay time from 86.5 seconds to 106 seconds and to increase the assumed times to close control room dampers from 10 seconds at both units to 18 seconds at the unaffected unit and 44.2 seconds at the unit undergoing a Loss of Coolant Accident (LOCA). The increase is due to changes in the Emergency Safeguards Features (ESF) actuation delay times resulting from resolution of the 230kV degraded voltage issue (Reference 12.a.24). A spray delay of 106 seconds and the assumed damper closure times bound the maximum potential delays associated with resolution of this issue and include the limiting delays for LOCA initiation to Safety Injection (SI) signal generation/ actuation. This calculation evaluates only the radiological impact of the increased ESF delay and response times, not other potential impacts of the delay.

While preparing this revision, the need was recognized to use a more conservative spray iodine removal rate (Reference 12.a.27), a more conservative control room air flow rate (Reference 12.a.20), a more conservative control room inleakage rate, and a more conservative distance to the Low Population Zone (LPZ) boundary (Reference 12.a.28). This revision includes these conservative inputs.

Revision 2 is issued 9/2011 pending implementation and will be issued final upon receipt of the License Amendment for License Amendment Request 11-06, PG&E Letter DCL-11-072.

Since the revision includes a change to current format, it is a full revision per CF3.ID4 5.7.2.a.1 and does not contain revision bars.

1. Purpose:

   This design calculation evaluates the design basis control room and offsite dose consequences, and establishes the limiting margin leakage rates from post-LOCA recirculation loop components outside containment. This calculation supersedes PG&E Calculations N-167, STA-090 and STA-087. This calculation also evaluates the control room post accident dose consequences of the closure times of the control room ventilation system (CRVS) outside air isolation dampers, and provides the basis for the allowable closure times of these dampers.

2. Background:

   Calculation N-167 Revision 0 (Reference 12.a.1) was issued in 1994 to document the design basis (loss of coolant accident [LOCA]) control room and offsite doses from all leakage pathways. These include containment leakage, RHR pump seal leakage, and expected post-LOCA recirculation loop leakage. Calculation N-167 also determines various control room and offsite doses for a one-gpm recirculation loop leak.

   Due to an increase in the assumed containment spray actuation delay time, Calculation STA-087 Revision 0 (Reference 12.a.2) was issued in 1998 to document the resultant change in control room and offsite dose consequences due to containment leakage. Since the spray delay time change did not impact the N-167 doses for RHR pump seal leakage and expected post-LOCA recirculation loop leakage, these values were used as-is in STA-087.

   Calculation STA-090 Revision 0 (Reference 12.a.3) was issued in 1998 to determine the limiting margin leakage rate from post-LOCA recirculation loop components outside containment. The margin leakage rate is defined as the amount of leakage in excess of the expected leakage from recirculation loop components outside containment, whose dose consequences, when combined with the dose consequences from containment leakage and RHR pump seal leakage, will not exceed 10 CFR 100 and 10 CFR 50, General Design Criteria (GDC) 19 dose limits.

   Prior to the issuance of STA-195 Revision 0, Section 9.4.1.2 of the FSARU (Reference 12.a.26) stated that the control room ventilation system outside air isolation dampers require about five seconds to close upon initiation of CRVS Modes 3 or 4. The source/basis for this closure time could not be determined. Since this damper closure time was sometimes difficult to achieve, AR A0528956 was initiated in April 2001 to request an evaluation of an acceptable tolerance band for this closure time. Revision 0 of this calculation, issued in 2004, provided the support for a 10-second allowable closure time which is reflected in the current FSAR (Reference 12.a.4, Section 9.4.1.3.7.2).

   STA-087 Revision 1 (Reference 12.a.5) was issued to correct an input error that resulted in "double counting" a portion of the calculated dose totals. This error correction, along with increasing the CRVS outside air isolation damper closure time, results in changes to the design basis control room dose due to containment leakage. Since this change to the containment leakage dose component impacts STA-090 and impacts the dose calculations of N-167 that assume nominal control room infiltration, STA-195 Revision 0 superseded both of these calculations.

STA-195 Revision 1 was issued in 2008 as requested in AR A0725926 to be consistent with the FSARU discussion (Reference 12.a.4, Sections 3.1.1.1 and 6.3A.3) regarding the passive failure of the RHR pump seal occurring at 24 hours after the start of the accident. Revision 0 assumes that the failure occurs at 23.7 minutes after LOCA initiation. The Revision 1 assumption of a passive leak at 24 hours is consistent with the NRC Standard Review Plan Section 15.6.5.B (Reference 12.a.19).

STA-195 is revised in Revision 2 to increase the assumed containment spray time delay from 86.5 seconds to 106 seconds. The additional assumed delay in CS delivery time is being assumed in the calculation to bound the maximum potential delay associated with resolution of the 230 kV degraded voltage issue described in SAP Notification 50301167. An additional six second delay from LOCA initiation to SI signal generation is included to provide consistency with the approach for determining the maximum overall containment spray delay time.

STA-195 Revision 2 also increases the control room damper closures from 10 seconds for both units to 18 seconds (non-LOCA unit) and 44.2 seconds (LOCA unit). These additional delays in CRVS inlet damper closure times are being assumed in the calculation to bound the maximum potential delays associated with resolution of the 230 kV degraded voltage issue described in SAP Notification 50301167, and to account for the limiting LOCA initiation to SI actuation time delay.

This revision evaluates only the radiological impact of the increased spray delay time, and not any other potential consequence of the increased spray delay time. Finally, this revision supersedes Calculation STA-087 since it changes the containment release doses based on the increased ESF delay and response times.

While preparing this calculation, the need was recognized to use a more conservative iodine removal rate (Reference 12.a.27), a more conservative distance to the LPZ boundary (Reference 12.a.28), a higher control room inleakage rate and a higher normal (Mode 1) CRVS intake air flow rate (Reference 12.a.20).

Revision 2 is issued 10/2011 pending implementation and will be issued final upon receipt of the License Amendment for License Amendment Request 11-06, PG&E Letter DCL-11-072. The LAR is associated with resolution of the 230 kV degraded voltage issue described above.

The LOCADOSE computer code (Reference 12.a.6) is used for this evaluation to calculate all control room and offsite doses. The code is installed and executed on PC0000256245, and has been verified and validated in accordance with PG&E's software quality assurance procedures (Reference 12.a.7).

3. Assumptions:

3.1. For all LOCADOSE calculations except those involving RHR pump seal leakage, the values assumed for individual core fission product inventories are calculated for a source term assuming approximately 105 percent full power operation (3580 Mw thermal) immediately preceding shutdown. The core source term is a composite of the source terms calculated for 3.5 percent enrichment and 4.5 percent enrichment (Reference 12.a.8) and is presented in Table 3.1. The composite is generated with the recognition that different isotopes have different maximum activities depending on assumptions regarding enrichment and burnup, with no particular combination of enrichment and burnup being obviously the most conservative. Four bounding source terms from Reference 12.a.8 are compared: 4.5% enrichment at 1000 MWD/tonU, 4.5% enrichment at 50,000 MWD/tonU, 3.5% enrichment at 1000 MWD/tonU, and 3% enrichment at 50,000 MWD/tonU. The highest concentration of each isotope is selected from the cases and listed as the Bounding Value in Table 3.1. This composite source term is assumed to exist in all fuel assemblies. This non-mechanistic but conservative approach was first used in Reference 12.a.1.

For the LOCADOSE calculations involving RHR pump seal leakage, the 24-hour post accident iodine fission product inventories are taken from Calculation RRA-4273-004-002 (Reference 12.a.23) and presented in Table 3.2.

3.2. Recirculation loop leakage and RHR pump seal leakage consists of 10% of the core iodine activity consisting of 99.75% elemental and 0.25% organic (Reference 12.a.4, Section 15.5.17.8).

3.3. Consistent with Regulatory Guide 1.4 (Reference 12.a.9), the following are assumed:

3.3.1. Airborne containment activity consists of 100% of the total core noble gas inventory (Section C.1.b of Reference 12.a.9), and 25% of the total core iodine inventory consisting of 91% elemental, 4% organic and 5% particulates (Section C.1.a of Reference 12.a.9). At the initiation of the LOCA, all activity is assumed to be instantaneously released to the free containment volume and mixed uniformly (Sections C.1.a & b of Ref. 12.a.9).

3.3.2. Consistent with ICRP 2 (Reference 12.a.10) whose use is directed by Section C.2.d of Ref. 12.a.9, the following thyroid dose conversion factors are used for this calculation and are incorporated into the LOCADOSE computer code:

I -131 1.49E+06 (Rem/Ci)
I -132 1.43E+04 (Rem/Ci)
I -133 2.69E+05 (Rem/Ci)
I -134 3.73E+03 (Rem/Ci)
I -135 5.60E+04 (Rem/Ci)

3.3.3. Containment leakage is 0.1%/day (Reference 12.a.11) for the first 24 hours and 0.05% from 24 hours to 30 days (Section C.1.e of Reference 12.a.9).

3.4. A total control room infiltration rate of 70 cfm is assumed. This includes 10 cfm in leakage consistent with Reference 12.a.9 plus an extra 60 cfm as a contingency to bound any additional unfiltered in leakage to the control room envelope that may be identified during normal plant operation.

3.5. As noted above, this evaluation assumes the immediate release of activity to the containment at the start of the postulated LOCA. For additional conservatism, limiting values are assumed after LOCA initiation for the time delays associated with SI signal generation/actuation and resultant CRVS equipment operation. Additional delays in CRVS inlet damper closure times are assumed in the calculation to bound the maximum potential delays associated with resolution of the 230 kV degraded voltage issue (Reference 12.a.24). All equipment time delays and the event sequence of events are presented in Table 5.1.

3.6 To simulate a 10-second closure time of the CRVS outside air isolation dampers, the dampers are assumed to stay full open for 10 seconds resulting in no filtration of the pressurization flow during this period. This delay is in addition to the SI signal generation/actuation delays (Reference 12.a.4, Table 15.4.1-1B) per Table 5.1.

3.7 The operation of CRVS and ABVS components as addressed by this evaluation was reviewed relative to resolution of the 230kV degraded voltage issue (Reference 12.a.24). It was determined that the assumptions in this analysis relative to these systems is limiting. Since early and continued operation of the CRVS fans result in the maximum integrated control room doses, shutdown of this equipment at any time due to loss of offsite power or due to degraded 230 kV conditions would be less conservative (i.e., lower integrated dose). Similar for the ABVS, equipment shutdown results in less exposure per gallon of post LOCA recirculation loop leakage (see section 5.4). Thus, normal operation of all ABVS and CRVS equipment as assumed in this analysis is bounding.

3.8 The control room operator breathing rate is assumed to be the public breathing rate for the first 8 hours (3.47E-04 m^3/s) after an accident and is conservatively applied for 30 days (Reference 12.a.9).

3.9 The dose at the EAB is calculated based on two hours following the fission product release per 10 CFR 100.11. The EAB dose calculation is discontinued after two hours by using a χ/Q value equal to zero during this period.

3.10 For containment leakage, the control room airflow is conservatively treated as though the pressurization flow starts upon LOCA initiation (at time equal to zero in the LOCADOSE models). This is conservative since more activity is admitted to the control room than if a delay time and fan startup time were to be modeled. The normal CRVS inlet flow to both units is assumed to continue after LOCA initiation at full flow rate for ten seconds until the inlet dampers close. This is conservative since actual damper closure would decrease the flow rate as the flow area decreased.

3.11 The CRVS inlet damper closure delay was not assumed to impact control room dose for auxiliary building leakage (the expected leakage case and the control room dose per one gpm post LOCA recirculation path leakage case (see Sections 5.2 and 5.4 for these leakage case descriptions, respectively). This conclusion is reasonable since the dampers will take less than a minute to close, and the earliest that post LOCA recirculation can commence is several minutes after LOCA initiation. Conservatism is already assured by the assumption that recirculation leakage starts at time zero. This assumption was established implicitly in Revision 1 to this calculation.

3.12 The RHR pump seal failure is assumed to occur at 24 hours after LOCA (Reference 12.a.19). This leakage does not contribute to the two hour EAB dose calculation. Similarly, the brief CRVS inlet damper closure delays following LOCA initiation do not impact control room dose for this leakage.

3.13 An expected recirculation leak rate of 1910 cc/hr (approximately 0.008 gpm), as described in Input 4.7, is conservatively assumed to start coincident with the LOCA and to spill to an unfiltered area. This is conservatively treated as a separate dose source independent of detected leakage discussed in Reference 12.b.1.

3.14 The LPZ boundary has traditionally been set to 10,000 meters for dose consequence assessments. This calculation uses 6 miles for conservatism and to be consistent with Safety Evaluation Reports, however, 10,000 meters remains the distance in other analyses and for emergency evacuation planning. See Section 5.7 for further discussion.

4. Inputs:

4.1. The containment free volume is 2.55E+06 ft3 with a sprayed volume of 2.103E+06 ft3 and an unsprayed volume of 4.47E+05 ft3 (Reference 12.a.13).

4.2. Containment spray commences at 106 seconds following LOCA initiation (see Section 5.1 for LOCADOSE modeling discussion). This value includes the limiting delay of 100 seconds following SI signal generation (Reference 12.a.24) and is based on the analyzed scenario in which the high high containment pressure actuation signal occurs prior to the containment spray pumps being sequenced onto the emergency diesel generators. The overall 106 second containment spray delay includes six seconds to account for the limiting LOCA initiation to SI signal generation time delay (Reference 12.a.4, Table 15.4.1-1B).

4.3. The containment spray system has an elemental iodine removal rate of 29/hour and a decontamination factor (DF) cutoff of 100 (crediting spray for iodine removal is directed by Section C.1.d of Ref. 12.a.9). The spray iodine removal rate had been 31/hour per Reference 12.a.17, but a more conservative value of 29/hr is used in Revision 2 to this calculation per Reference 12.a.29 as discussed in Reference 12.a.27. The removal rate and DF for organic and particulate iodine are each zero.

4.4. The mixing flow rate from the sprayed to unsprayed containment volumes and vice versa is 94,000 cfm (Reference 12.a.18).

4.5. Source activity for recirculation loop leakage is contained by a total water volume of 4.69E+05 gallons [9.396E+04 gallons from the RCS, 2.504E+04 gallons from the accumulators (Reference 12.a.4, Table 15.5-24), and 3.5E+05 gallons deliverable Refueling Water Storage Tank volume (Reference 12.a.14, Table 3-2)].

4.6. Source activity for RHR pump seal leakage is contained by a total water volume of 3.7322E+05 gallons (9.396E+04 gallons from the RCS, 2.504E+04 gallons from the accumulators, and 2.5422E+05 gallons from the minimum Refueling Water Storage Tank capacity) (Reference 12.a.4, Table 15.5-24).

4.7. Expected recirculation loop leakage is 1910 cc/hr (Reference 12.a.4, Table 15.5-24).

4.8. RHR pump seal leakage of 50 gpm lasting for 30 minutes starts at 24 hours following LOCA initiation (Reference 12.a.19).

4.9. The control room free volume (both units) is 170,000 cu ft (Reference 12.a.20).

4.10. The CRVS pressurization and recirculation flow rates are each 2100 cfm (Reference 12.a.20).

4.11. The CRVS iodine filter efficiency is 95% for elemental, organic and particulate iodine (Reference 12.a.21).

4.12. The Auxiliary Building Ventilation System (ABVS) iodine filter efficiency is 90% for elemental, 70% for organic and 90% for particulate (Reference 12.a.4, Table 15.5-24).

4.13. The DF for RHR pump seal leakage is 132 (Reference 12.a.4, Section 15.5.17.8 and Table 15.5-24).

4.14. All occupancy factors, atmospheric dispersion factors, and breathing rates used in this calculation are presented in Table 4.1.

4.15. The design bases egress/ingress doses to control room personnel are 4.72 rem thyroid, 6.60E-03 rem whole body, and 2.43E-02 rem beta skin (Reference 12.a.4, Section 15.5.17.10 and Table 15.5-33).

4.16 The normal unfiltered airflow to the control room is 4200 cfm (Reference 12.a.20)

4.17 The distance to the LPZ boundary for this calculation is 6 miles with associated atmospheric dispersion factors as discussed in Section 5.7 (Reference 12.a.28).

5. Methodology:

The recirculation loop margin leakage rate is defined as the amount of leakage in excess of the expected leakage from recirculation loop components outside containment, whose dose consequences, when combined with the dose consequences from containment leakage and RHR pump seal leakage, will not exceed 10 CFR 100 and 10 CFR 50, General Design Criteria (GDC) 19 dose limits. To determine the margin, the dose components from all post-LOCA leakage sources (i.e., containment leakage, RHR pump seal leakage, expected recirculation loop leakage) and from control room ingress/egress are determined, and subtracted from the

dose limit. The margin leakage is the dose margin divided by the dose per one gpm of recirculation loop leakage.

The LOCADOSE code is used to predict post accident doses at the control room, the Exclusion Area Boundary (EAB), and the Low Population Zone (LPZ). The leakage pathways contributing to dose (dose pathways) consist of leakage from the containment, normal leakage from post LOCA recirculation path piping in the Auxiliary Building (termed expected leakage), and leakage from a failed RHR pump seal assumed to occur 24 hours after the LOCA. In addition, operations personnel in the control room are assigned a fixed control room egress/ingress dose.

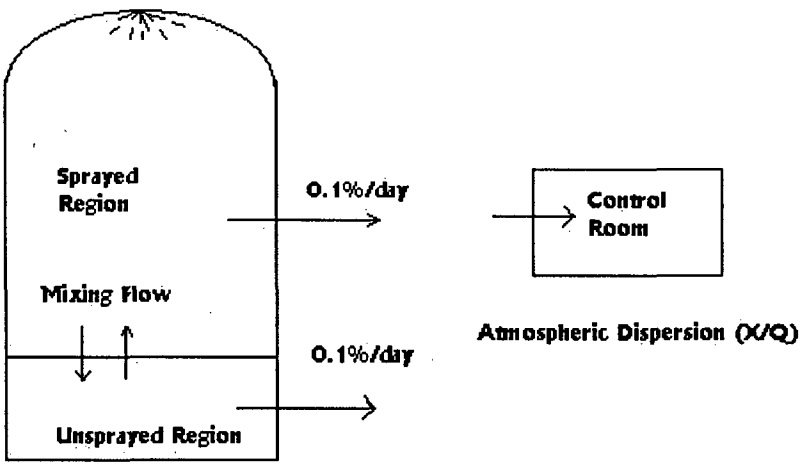
Additional analyses are performed to develop dose rates per gpm of post LOCA recirculation path leakage in either filtered or unfiltered locations of the Auxiliary Building. The results of these calculations are then used with the available dose margin to determine the margin leakage rates for ABVS filtered and unfiltered post LOCA recirculation path leakage for the control room, EAB and LPZ. The limiting location provides the acceptance criteria for operational post LOCA recirculation leakage that is routinely identified and tracked via STP M-87 (Reference 12.b.1). STP M-87 scales the unfiltered leakage detected (if any) by a multiplication factor to generate an equivalent filtered leakage. The minimum acceptable value of the scaling factor for the various dose mechanisms is generated in Section 7 by ratioing the dose consequences for unfiltered to filtered leakage.

A description of each of the LOCADOSE models used to determine the control room and offsite dose components due to post-LOCA leakage is as follows:

5.1 Containment leakage

The containment leakage model for this evaluation is depicted below in Figure 5.1:

Figure 5.1: LOCADOSE Model Schematic



In LOCADOSE, the sprayed containment region is modeled as user-defined Node 2 and the unsprayed region as user-defined Node 3. By default in LOCADOSE models of this type, the environment is always Node 1 and the control room is always the last node (Node 4 in this case). This model is identical to the model used in Calculation STA-087 Revision 1 except as

noted below.

The radioactivity release from containment is modeled as occurring immediately after the initiation of the LOCA. Containment spray is initiated at 106 seconds after LOCA initiation with an iodine removal rate of 29 per hour for elemental iodine. The activity in the upper containment region (sprayed volume of 2.103E+06 ft^3) is mixed with the activity in the lower region (unsprayed volume of 4.47E+05 ft^3) via a forced recirculation flow of 9.4E+04 cfm from two containment fan cooler units. The unfiltered release rates to the environment are assumed to be at the Technical Specifications maximum allowable leakage rate (L_a) of 0.1%/day of the containment volume during the first 24 hours of the accident and 0.05%/day of the containment volume from 24 hours to 30 days.

The CRVS normal intake is assumed to be isolated upon receipt of the SI actuation signal caused by the LOCA. A total inflow of 6370 cfm (4200 cfm unfiltered normal supply flow, 2100 cfm filtered pressurization supply flow and 70 cfm unfiltered control room boundary in-leakage) is assumed while the normal intake dampers are open for both units. After 18 seconds, the normal intake dampers in the unaffected unit (the unit without the LOCA) are assumed to be fully closed, reducing the unfiltered normal supply flow rate by 2100 cfm. After 44.2 seconds, the affected unit's normal intake dampers are also closed and the CRVS is assumed to be in Mode 4 line up with a pressurization flow of 2,100 cfm, a recirculation flow of 2100 cfm, and a total infiltration flow of 70 cfm. A summary of the preceding scenario is presented in Table 5.1 and an expanded discussion of relevant CRVS operation is presented in Section 5.5.

5.2 Expected recirculation loop leakage

Expected recirculation loop leakage of 1910 cc/hr (Input 4.7) is assumed to have existed prior to the LOCA and occurs throughout the 30-day analysis period. All leakage is assumed to have remained in the auxiliary building for a long period such that no partitioning occurs. Additionally, no ABVS filtration of the leakage is assumed to occur. The leakage is modeled in LOCADOSE with a single user-defined volume (Node 2) containing 4.69E+05 gallons of source activity (Input 4.5). The control room is Node 3, and the 1910 cc/hr leak occurs from Node 2 to the environment.

5.3 RHR pump seal leakage

RHR pump seal leakage is modeled in LOCADOSE with a single use defined volume (Node 2) containing 3.7322E+05 gallons of source activity (Input 4.6). The control room is Node 3. A leakage rate from Node 2 to the environment of 50 gpm starts at 24 hours after LOCA initiation and lasts for 30 minutes (Input 4.8).

ABVS filtration is assumed for all leakage. To take into account a DF of 132 (Input 4.13) applied to the elemental iodine contained in the leakage, the corresponding ABVS filter efficiency of 90% (Input 4.12) is further increased by a factor of 132 resulting in an adjusted efficiency of:

$\varepsilon_{RHR} = 100 \times \{1 - [(1 - 0.9)/132]\} = 99.924\%$

5.4 Dose per one gpm of recirculation loop leakage

After the dose components from all post-LOCA leakage sources and from control room ingress/egress are determined, and subtracted from the dose limit, the remaining dose margin is converted to an equivalent recirculation loop leakage. Four LOCADOSE calculations are performed to determine the dose per one gpm of recirculation loop leakage for control room

pressurization flow with and without ABVS filtration, and for control room infiltration with and without ABVS filtration. These calculations also provide similar dose per gpm values with and without ABVS filtration for the LPZ and EAB. For each dose component, the margin leakage is the dose margin divided by the dose per one gpm of recirculation loop leakage.

5.5 Control Room Ventilation System

The CRVS has two input paths, unfiltered outside air via the normal intake path, and filtered outside air through a pressurization path. Figure 5.2 shows a schematic that is typical for Unit 1 and for Unit 2.

In normal or Mode 1 operation, 2100 cfm normal inlet flow enters the control room via Dampers MOD-3 and MOD-3A and Fan E-35 exhausts to atmosphere via MOD-8 and MOD-8A. An equivalent supply flow is provided via the other unit, for a total of 4200 cfm of unfiltered air. Fan S-35 is on, Fan S-98 off and Damper M-4 is closed. While there is recirculation, there is no filtered recirculation.

Upon receipt of an SI signal/Phase A isolation signal, CRVS Mode 4 (Pressurization) is initiated for the selected unit and Mode 3 operation is initiated on the other unit. Figure 5.2 shows a typical alignment in pressurization mode. Dampers MOD-3 and MOD-3A close to stop the normal supply flow of unfiltered air and the normal exhaust path isolates. Pressurization Fan S-98 starts and dampers MOD-1B and MOD-1C open, bringing in 2100 cfm of filtered air. Only one pressurization fan may be operated between the two units at any one time, so the total filtered airflow into the control room is 2100 cfm. Damper M-4 opens resulting in 1050 cfm of recirculation flow through filters per unit (2100 cfm total). The control room envelope is actually pressurized such that any leakage would be outward to atmosphere. Previous revisions of this calculation assumed a constant 10 cfm of unfiltered inleakage into the control room envelope. This revision assumes an extra 60 cfm (for a total of 70 cfm) as a contingency to bound any additional unfiltered in leakage to the control room envelope that may be identified during normal plant operation.

The conservative sequence of events for this analysis assumes that the pressurization train starts immediately, since even though the flow is filtered, it adds radionuclides to the control room. The 70 cfm of inleakage is also conservatively added as starting immediately. The unaffected unit's normal inlet dampers start to close upon receipt of the SI actuation signal at 8 seconds. No closure is credited for 10 seconds such that full inlet flow is assumed for 18 seconds from the start of the event. The affected unit's normal inlet dampers are assumed to close at 44.2 seconds resulting in zero normal inlet flow at this time. The above sequence of events and associated control room envelope inlet flow summary is presented in Table 5.1.

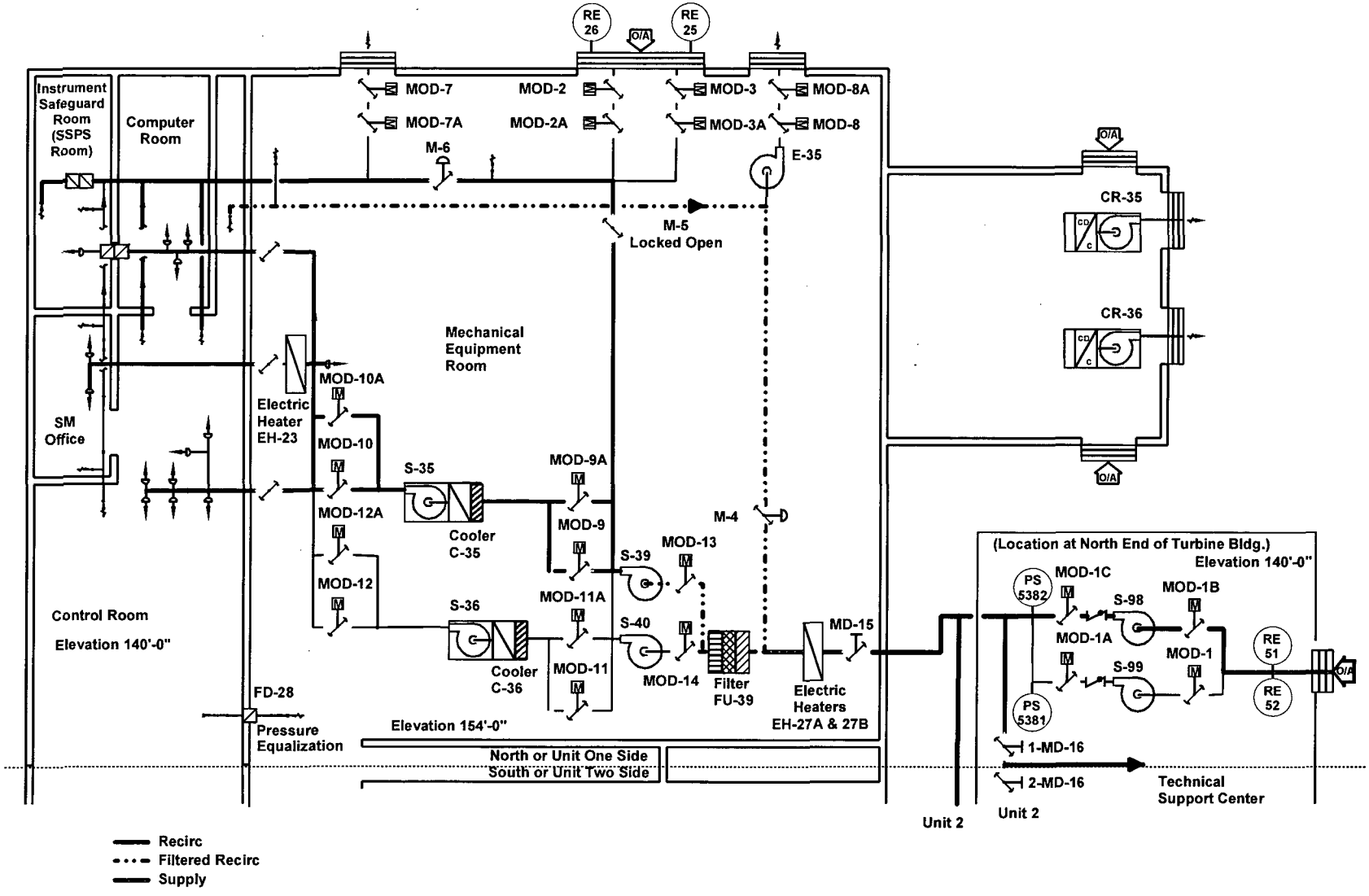
This analysis, consistent with previous analyses, is performed separately for the unfiltered inlet flow (termed infiltration cases) and the filtered inlet flow (termed pressurization cases). The resulting control room doses are combined to get the total control room dose.

In both the infiltration and pressurization cases, the total outlet flow is set equal to the total inlet flow. Total flow is 6370 cfm for the first 18 seconds based on 4200 cfm unfiltered plus 70 cfm in-leakage plus 2100 cfm pressurization. The total outlet flow between 18 and 44.2 seconds is reduced to 4270 cfm. The total outlet flow after 44.2 seconds is 2170 cfm based on 70 cfm infiltration and 2100 cfm pressurization flow. This approach was verified to produce the same control room dose as that predicted by modeling both infiltration and pressurization flows simultaneously. Maintaining the separate files demonstrates that though the unfiltered flow is small in integrated airflow compared to filtered flow over 30 days, the dose from the infiltration case is more than one third of the total control room thyroid dose.

In this calculation, each dose pathway's unfiltered infiltration inlet flow is modeled in a LOCADOSE model scenario labeled "xxx-inf2" where "xxx" is "con" for containment leakage,

"rhr" for RHR seal failure, "exp" for expected leakage, "unf" for the 1 gpm of unfiltered recirculation loop leakage, and "fil" for the 1 gpm filtered recirculation loop leakage. The number 2 indicates Revision 2 of the calculation.

Figure 5.2: Control Room Ventilation Schematic



In this calculation, each dose pathway's filtered pressurization inlet flow is modeled in a LOCADOSE model scenario labeled "xxx-pre2" where "xxx" is "con" for containment leakage, "rhr" for RHR seal failure, "exp" for expected leakage, "unf" for the 1 gpm of unfiltered recirculation loop leakage, and "fil" for the 1 gpm filtered recirculation loop leakage.

Consistent with previous revisions of this calculation and to allow better quantification of the impact of changes on flow path dose contributions, the dose contributions due to infiltration and pressurization are determined in separate models (i.e., the "-inf2" and "pres2" case pairs discussed above). Each case pair could be run as a single case (and would be more physically realistic) using a common CRVS exhaust flow rate that is the total of the infiltration and pressurization flow rates. Since the cases are separated, it is intuitive that the same exhaust flow should be used in each case pair. (Note that mass balance is not maintained but this is not a necessary property in the LOCADOSE calculational framework.) Using the same exhaust flow for the case pairs is numerically correct since LOCADOSE uses the inlet flow to determine the quantity of radionuclides entering the control room, and the outlet flow to model the reduction in radionuclide concentration due to exhaust. Additionally, sensitivity runs verify that the combined dose of the inf2 and pre2 cases exactly equals the resultant dose should both the infiltration and pressurization flows be modeled simultaneously.

5.6 Spray Termination

LOCADOSE has the ability to track the time that the sprays have lowered the Iodine concentration to the point where a specified DF is achieved. Calculation N-167 (Reference 12.a.1) established a DF of 100 as a reasonable lower limit to spray efficiency per Reference 12.a.17 and its use is continued in this calculation.

5.7 Atmospheric Dispersion Factors at LPZ Boundary

The Atmospheric Dispersion Factors (X/Q values) used for the LPZ in Reference 12.a.1 were apparently selected from Regulatory Guide (RG) 1.4 assuming a distance of 10,000 meters. However, the original Diablo Canyon Safety Evaluation Report (SER) described X/Q values that appear appropriate for 6 miles. Specifically, X/Q values from the SER are, for 0-8 hours, 8-24 hours, 1-4 days, and 4-30 days: 2.40E-5, 4.8E-6, 1.5E-6, and 3.4E-7 sec/m^3, respectively. The respective X/Q values from Reference 12.a.1 are: 2.20E-5, 4.75E-6, 1.54E-6, and 3.4E-7 sec/m^3. It was decided, for this calculation, to use the more conservative value (i.e., the larger of each X/Q) for each distance, which generally corresponds to 6 miles.

The sources for these values are charts in Regulatory Guide 1.4. Using the shorter distance of 6 miles (conservatively rounded down to 9600 meters for use in the tables), and bounding all the X/Q values used historically, suggests X/Q values for 0-8 hours, 8-24 hours, 1-4 days, and 4-30 days of: 2.40E-5, 4.8E-6, 1.54E-6, and 3.4E-7 sec/m^3, respectively. Figures 5.3 and 5.4 show the support for these values. Note that in Figure 5.4, the value of 1.54E-6 sec/m^3 is higher than indicated by the graph and the value in the original SER was lower at 1.5E-6 sec/m^3. However, 1.54E-6 sec/m^3 is conservative and consistent with Reference 12.a.1.

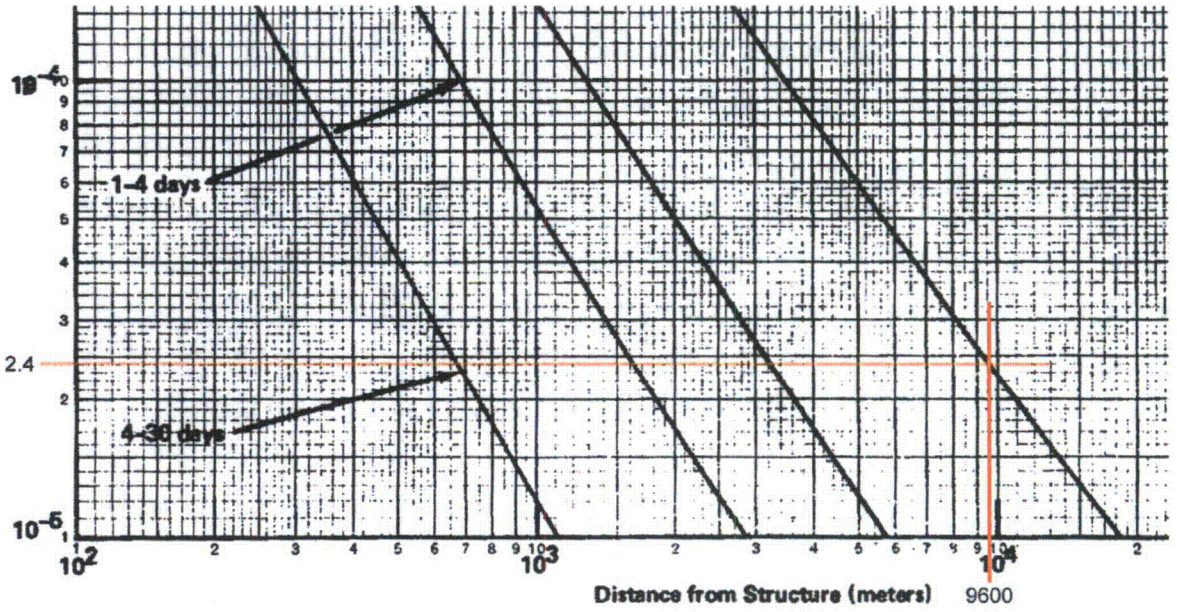


Figure 5.3: Detail from Regulatory Guide 1.4 (Reference 12.a.9) showing development of X/Q = 2.4E-05 sec/m^3 at a distance of 6 miles (9600 m) for the 0 to 8 hour line (far right line is 0 to 8 hours)

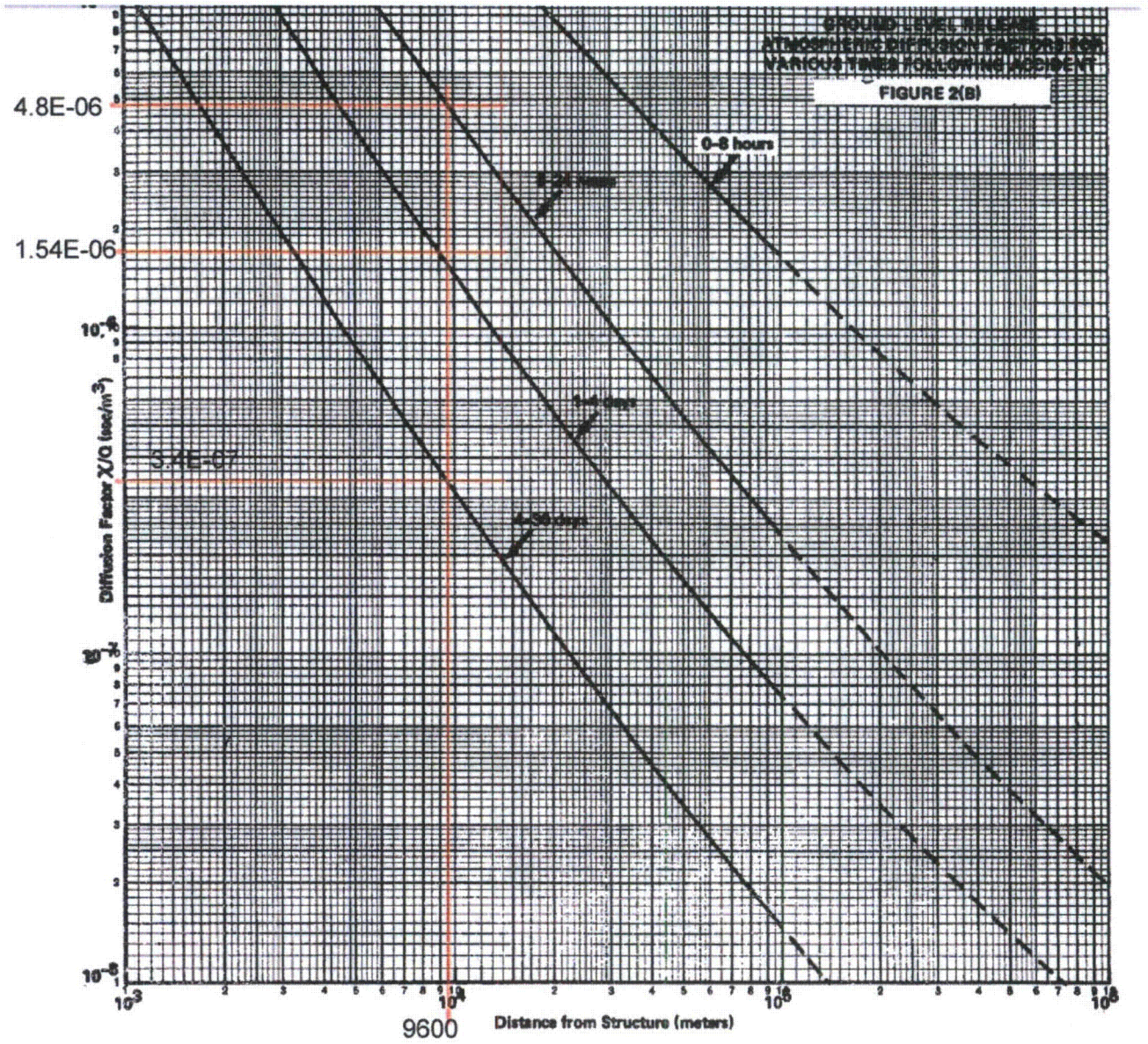


Figure 5.4: Detail from Regulatory Guide 1.4 (Reference 12.a.9) showing development of X/Q =4.8E-06 sec/m^3 at a distance of 6 miles (9600 m) for the 8 to 24 hour line, of X/Q = 1.54E-06 sec/m^3 at a distance of 6 miles for the 1 to 4 day line, and of X/Q = 3.4E-07 sec/m^3 at a distance of 6 miles for the 4 to 30 day line.

6. Acceptance Criteria:

The dose components from all post-LOCA leakage sources and from control room ingress/egress added to the dose margin designated for post-LOCA recirculation loop leakage margin will not exceed the applicable dose limits of 10 CFR 100 and 10 CFR 50, General Design Criteria (GDC) 19 for the control room, the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) as delineated in Table 7.2.

7. Body of Calculation:

As described in Section 5.5, two calculations are performed for each dose pathway – one for the control room with pressurization flow and no infiltration, and one for the control room with infiltration and no pressurization flow. The offsite doses at EAB and LPZ determined from each calculation are identical since no parameters impacting these doses are changed.

For illustrative purposes and similar for all calculations (as previously discussed above), the LOCADOSE files associated with the control room infiltration case (each named with prefix "xxx-inf2" where "xxx" is "con" for containment leakage, "exp" for expected leakage, "rhr" for RHR seal failure, "unf" for the 1 gpm of unfiltered recirculation loop leakage, and "fil" for the 1 gpm filtered recirculation loop leakage) are presented in the Attachments and are described as follows:

- Radiation transport input model (for the transport of radiation from the release point to the environment - input file xxx-inf2.lti
- Dose consequences model - input file xxx-inf2.ldi
- Isotopic library - input file con-inf2.lib (other cases use identical libraries)
- Dose calculation results - output file xxx-inf2.lto

The isotopic library input file is the same for each calculation and is only presented once since only the file name changes from calculation to calculation. Also, the radiation transport output file (i.e., xxx-infi.lto) for each calculation is not included in the appendices. See the attached CD for all files associated with each calculation.

Similar files are created with titles xxx-pre2 for the pressurization cases. These files differ from the xxx-inf2 files only in terms of the air flow rate to the control room. EAB and LPZ doses are identical between the xxx-inf2 and xxx-pre2 files.

Table 7.1 presents a description of each calculation, the file name for each calculation and the appendix that lists the content of each file for that calculation.

Table 7.2 presents the calculated control room and offsite doses using the LOCADOSE models described above and in Section 5, Methodology. By inspection, the thyroid dose is the limiting dose for the control room and offsite locations, so only the thyroid doses need be considered for margin leakage rate determinations. Using the doses in Table 7.2, the margin leakage rates are determined below based on:

Margin leakage (ML) = dose margin / dose per one gpm recirculation loop leakage (filtered or unfiltered)

Control Room

For filtered leakage:

$ML_{filtered}$ = (30 – 20.70) rem / 22.091 rem/gpm = 0.421 gpm

For unfiltered leakage:

$ML_{unfiltered}$ = (30 – 20.70) rem / 219.82 rem/gpm = 0.042 gpm

EAB

For filtered leakage:

$ML_{filtered}$ = (300 – 118.223) rem / 98.2 rem/gpm = 1.851 gpm

For unfiltered leakage:

$ML_{unfiltered}$ = (300 – 118.223) rem / 977.1 rem/gpm = 0.186 gpm

LPZ

For filtered leakage:

$ML_{filtered}$ = (300 – 22.761) rem / 26.61 rem/gpm = 10.40 gpm

For unfiltered leakage:

$ML_{unfiltered}$ = (300 – 22.761) rem / 264.80 rem/gpm = 1.047 gpm

8. Results:

The calculated dose rates are shown in Table 7.2. The dose that is the greatest fraction of its respective regulatory limit is the control room personnel thyroid dose of 20.70 rem relative to the GDC 19 criterion of 30 rem.

The margin leakage rates for the control room and offsite locations are summarized below:

Dose Location	Filtered/Unfiltered	Margin Leakage (gpm)
Control Room	Filtered	0.421
Control Room	Unfiltered	0.042
EAB	Filtered	1.851
EAB	Unfiltered	0.186
LPZ	Filtered	10.40
LPZ	Unfiltered	1.047

Table 7.2 also includes minimum scaling factors for use in Reference 12.b.1 for converting leakage in unfiltered areas into leakage within filtered areas.

9. Margin Assessment:

   The calculated dose margins and margin leakage rates are shown in Table 7.2.

   The margins established in STA-195, Revision 1, are decreased in Revision 2 due to the additional containment spray delay, slightly more conservative control room flow assumption (the unit dampers closing at 18 and 44.2 seconds), more control room inleakage, and the more conservative iodine removal rate. The limiting dose margin in Revision 1 was 18.45 rem (30 rem – 11.55 rem) for Control Room personnel thyroid dose relative to the limit of 30 rem. In this calculation the margin is reduced to 9.30 rem which is a decrease of 9.15 rem or reduction of 50% from the Revision 1 margin.

   The limiting margin leakage rate is decreased from 1.85 gpm filtered to 0.421 gpm filtered, and from 0.186 unfiltered to 0.042 unfiltered. Each constitutes a 77% reduction in leakage rate.

10. Conclusion:

    All criteria regarding maximum post-LOCA doses are met. Table 7.2 presents the calculated dose margins and margin leakage rates.

    The limiting margin leakage rate is for the control room with 0.42 gpm filtered and 0.0421 gpm unfiltered.

    Including the infiltration due to the assumed delays in closure of the CRVS normal inlet air isolation dampers and the increase leakage rate, and including the delay in spray to 106 seconds after SI signal initiation, the total control room thyroid dose is 20.70 rem. The total dose in Revision 1 of this calculation is 11.55 rem, hence the total increase in dose is 9.15 rem. However, since all reported doses are below the applicable regulatory criteria, increasing the closure times of the normal inlet dampers and delaying spray to 106 seconds is deemed acceptable.

11. Impact on other documents:

Note: Necessary document changes will be tracked upon issuance of the final calculation as part of the implementation of the license amendment associated with License Amendment Request 11-06.

11.1 FSAR

FSAR changes are suggested for FSARU Sections 9.4.1.3.7.2, 15.5.17.2, 15.5.17.5.2, 15.5.17.5, 15.5.17.8, 15.5.17.8.1, and 15.5.17.10, and Tables 6.2-36, 15.5-32, 15.5-63, and 15.5-75 (Reference 12.b.2). Note that per Assumption 3.14, this calculation does not impact other analyses that use X/Q values associated with an LPZ distance of 10,000 meters.

11.2 Technical Specifications

No impact. This calculation does not change any technical specification or basis.

11.3 Design Criteria Memoranda

DCM T-15 (Reference 12.b.3) will be updated to reflect the new analysis details and results.

11.4 Emergency Planning Procedures

No impact. This calculation does not change the emergency plan.

11.5 Operating Procedures

No impact. This calculation does not change any operating procedure.

11.6 Learning Services

No impact. This calculational revision does not impact training.

11.7 Surveillance Test Procedures

STP M-87 lists the limiting margin leakage rates as 1.85 gpm into filtered areas, and 0.186 gpm into unfiltered areas. These values will need to be changed to 0.421 gpm and 0.042 gpm, respectively (Reference 12.b.1).

11.8 Maintenance Procedures

No impact. This calculation does not change any maintenance procedure.

11.9 Calculations

Calculation STA-087 will be taken to history and replaced by this calculation (Reference 12.b.4).

11.10 System Performance

The results of this calculation imply higher offsite doses following a LOCA. This is evaluated through the 10CFR 50.59 process.

11.11 Emergency Operating Procedures

No impact. This calculation does not change any emergency operating procedures.

12. References

a. Input References:

12.a.1. Calculation 9000006827 P001 V00, legacy N-167, "Post-LOCA Doses."

12.a.2. Calculation 9000019274 P001 V00, legacy STA-087, "Post-LOCA Doses with Containment Spray Delay Time 86.5 Seconds."

12.a.3. Calculation 9000019285 P000 V00, legacy STA-090, "Margin Leakage Rate from Post-LOCA Recirculation Loop Components Outside Containment."

12.a.4. Diablo Canyon Updated Final Safety Analysis Report, Revision 19, May 2010.

12.a.5. Calculation 9000019274 P001 V00, Legacy STA-087, "Post-LOCA Doses with Containment Spray Delay Time 86.5 Seconds," Revision 1.

12.a.6. LOCADOSE-NE319, "A Computer Code System for Multi-Region Radioactive Transport and Dose Calculation," Release 7, Bechtel Corporation.

12.a.7. Software Quality Assurance Plan, "LOCADOSE 7.0 SQA Plan – IDAP CF2.ID3," dated 7/26/06.

12.a.8. Calculation 9000038165 P000 V00, legacy File No. 860221-0,"Fission Product Activities," dated 2/21/86.

12.a.9. NRC Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for a Pressurized Water Reactor," Revision 2, June 24, 1974.

12.a.10. International Commission on Radiological Protection (ICRP) Publication 2, "Permissible Dose for Internal Radiation," 1959.

12.a.11. DCPP Technical Specifications Bases B 3.6.1, "Containment," Revision 2.

12.a.12. NRC Standard Review Plan 6.4, "Control Room Habitability System," Revision 2.

12.a.13. Calculation 9000007101 P00 V00, legacy N-231, "Evaluate Containment Sprayed Volume for CSS," Revision 0, June 6, 1997.

12.a.14. WCAP-13907, "Analysis of Containment Response Following Loss-of-Coolant Accidents for Diablo Canyon Units 1 and 2," Westinghouse, December 1993.

12.a.15. Not used.

12.a.16. Not used.

12.a.17. WCAP-7977, "Iodine Removal by Spray in the Diablo Canyon Station Containment," Westinghouse, November 1972.

12.a.18. Westinghouse Letter PGE-94-658, "Containment Fan Cooler Unit Performance Evaluation Revised Report PCE-91-0073," dated September 23, 1994.

12.a.19. NRC Standard Review Plan 15.6.5 Appendix B, "Leakage from Engineered Safety Feature Components Outside Containment," Revision 2.

12.a.20. Design Criteria Memorandum S-23F, "Control Room HVAC," Revision 18, dated December 2010.

12.a.21. NRC Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Revision 3, June 2001.

12.a.22. Bechtel Nuclear Staff Calculation 1006, "Control Room Atmospheric Dispersion Factors and Doses," Revision 2, dated July 26, 1985.

12.a.23. Calculation RRA-4273-004-002, "Reactor Coolant Source Terms Following LOCA," dated 8/29/79.

12.a.24 DIT 50301167-1-0, 230 kV Sequence of Events for use by Westinghouse in Safety Analyses (see also SAP Notification 50301167).

12.a.25 Bechtel Staff Calculation 1022, Rev 0, 1/27/88 (PG&E Calc number M-735), "Maximum Allowable Post-LOCA Recirculation Loop Leakage for Acceptable Offsite and Control Room Operator Doses".

12.a.26 Diablo Canyon Updated Final Safety Analysis Report, Revision 15, September 2003.

12.a.27 SAP notification 50377324 "Spray Iodine Removal Rate Inconsistency".

12.a.28 SAP notification 50377323 "Inconsistent LPZ distance in FSARU".

12.a.29 Westinghouse letter PGE-91-533, dated 2/7/91.

b. Output References:

12.b.1 STP M-87, "Operational Leak Inventory of ECCS Systems Outside Containment Likely to Contain Highly Radioactive Fluids Following an Accident," Units 1 and 2, Revision 17.

12.b.2 Diablo Canyon Final Safety Analysis Report Update.

12.b.3 DCM T-15, "Radiation Protection".

12.b.4 Calculation 9000019274 P001 V00, Legacy STA-087, Post-LOCA doses with Containment Spray Delay Time 86.5 seconds

c. Other:

N/A

TABLES

Table 3.1 – Source Term Isotopic Activities (Composite based on Ref. 12.a.8)

Isotope	Activities Assuming 4.5% Enrichment, 50,000 MWD/tonU	Activities Assuming 4.5% Enrichment, 1,000 MWD/tonU	Activities Assuming 3.5% Enrichment, 50,000 MWD/tonU [1]	Bounding Value	Composite Source Term (Ci) [2]
I-131	5.030E+05	3.943E+05	5.057E+05	5.057E+05	9.760E+07
I-132	7.211E+05	6.663E+05	7.283E+05	7.283E+05	1.406E+08
I-133	9.976E+05	1.032E+06	1.013E+06	1.032E+06	1.992E+08
I-134	1.093E+06	1.165E+06	1.111E+06	1.165E+06	2.248E+08
I-135	9.385E+05	9.611E+05	9.516E+05	9.611E+05	1.855E+08
Kr-83m	5.571E+04	8.196E+04	5.829E+04	8.196E+04	1.582E+07
Kr-85m	1.131E+05	1.901E+05	1.202E+05	1.901E+05	3.669E+07
Kr-85	6.353E+03	1.776E+02	4.398E+03	6.353E+03	1.226E+06
Kr-87	2.130E+05	3.828E+05	2.282E+05	3.828E+05	7.388E+07
Kr-88	2.988E+05	5.416E+05	3.206E+05	5.416E+05	1.045E+08
Kr-89	3.583E+05	6.855E+05	3.869E+05	6.855E+05	1.323E+08
Xe-131m	5.040E+03	2.536E+03	5.661E+03	5.661E+03	1.093E+06
Xe-133m	3.153E+04	3.035E+04	3.187E+04	3.187E+04	6.151E+06
Xe-133	9.993E+05	9.355E+05	9.913E+05	9.993E+05	1.929E+08
Xe-135m	2.007E+05	1.752E+05	2.021E+05	2.021E+05	3.901E+07
Xe-135	2.113E+05	2.886E+05	2.206E+05	2.886E+05	5.570E+07
Xe-137	8.721E+05	9.140E+05	8.852E+05	9.140E+05	1.764E+08
Xe-138	8.050E+05	9.477E+05	8.241E+05	9.477E+05	1.829E+08

[1] Although 3.5%, 1,000 MWD/tonU data were also evaluated, none of the limiting activities come from these data.

[2] Equal to the bounding value multiplied by 193 assemblies.

Table 3.2 – Source Term Isotopic Activities (24-hours post LOCA from page 3, Ref. 12.a.23)

Isotope	Source Term (Ci)
I-131	9.120E+07
I-132	1.140E+08
I-133	9.160E+07
I-134	6.140E+00
I-135	1.460E+07

Table 4.1 - Occupancy Factors, Atmospheric Dispersion Factors, and Breathing Rates versus Time after LBLOCA

Post - LOCA Time Frame (hr)	0 to 2	2 to 8	8 to 24	24 to 96	96 to 720
Control Room Occupancy Factors (normalized) [Reference 12.a.12]	1.0			0.6	0.4
Control Room Infiltration Atmospheric Dispersion Factors (sec/ m^3) [Reference 12.a.22 & 25]	1.96E-04		1.49E-04	1.08E-04	6.29E-05
Control Room Pressurization Atmospheric Dispersion Factors (sec/ m^3) [Reference 12.a.22 & 25]	7.05E-05		5.38E-05	3.91E-05	2.27E-05
EAB (800 m) Atmospheric Dispersion Factors (sec/cu m) [Reference 12.a.4, Table 15.5-32]	5.29E-04	N/A			
LPZ (6 miles) Atmospheric Dispersion Factors (sec/ m^3) [Reference 12.a.4 per Section 5.7 of this calculation]	2.40E-05		4.8E-06	1.54E-06	3.40E-07
Control Room Breathing Rate (m^3/sec) [Reference 12.a.9]	3.47E-04				
Offsite Breathing Rate (m^3/sec) [Section C.2.c of Reference 12a.9]	3.47E-04		1.75E-04	2.32E-04	

Table 5.1 - Scenario Event Sequence

Event	Time (sec)	Notes	Unfiltered CR flow (cfm)	Filtered CR flow (cfm)
LOCA pipe break	0		4270	2100
All fission products assumed dispersed	0		4270	2100
All CRVS supply fans assumed running	0	1	4270	2100
SI signal generated	6	2	4270	2100
SI signal and CRVS Mode 4 actuated	8	3	4270	2100
Non-LOCA unit CRVS inlet damper starts to close	8	4	4270	2100
Non-LOCA unit CRVS inlet damper fully closed	18 (.005 hrs)	5	2170	2100
LOCA unit CRVS inlet damper starts to close	34.2	6	2170	2100
LOCA unit CRVS inlet damper fully closed	44.2 (0.012278 hrs)	5	70	2100
Containment spray begins	106 (0.029444 hrs)	7	70	2100
Containment spray ends	1028 (0.285 hrs)	8	70	2100

Notes:

1 - Consistent with STA-195 Revision 1 and for ease of modeling, CRVS fans running during Mode 4 operation are assumed to be running at time zero. Since supply fan operation increases control room dose, maximizing fan run time by coincidentally assuming all fans operating at time zero is conservative. Per design for Mode 4 operation, one normal supply fan (S35-38) and one booster fan (S39-41) per unit is running, and one pressurization fan (S96-99) total is running. (See Section 5.5 for a schematic showing these fans and associated dampers)

2 - Six sec delay from LOCA initiation to SI signal generation (Reference 12.a.4, Table 15.4.1-1B)

3 - Two sec delay from SI signal generation to actuation (Reference 12.a.24, Table 2)

4 - MOD-3, 3A in each unit are normally open and MOD-2, 2A are normally closed. Infiltration is 2100 cfm per unit.

5 - Ten sec delay assumed for inlet damper closure (Ref. STA-195 Rev. 2)

6 - 28.2 sec delay from SI signal generation to DGs loading onto 4kv buses (Reference 12.a.24, Table 2)

7 - 100 sec (limiting) delay from SI signal generation until containment spray begins (Reference 12.a.24, Table 2)

8 - The containment spray stops based on iodine concentration assuming DF = 100, therefore this time for spray termination is an output of the model, not an assumed input (see Section 5.6).

Table 7.1 – Calculation File Descriptions and Listings

Leakage Source Modeled	Infiltration/ Pressurization	Name of Calculation Files	Appendix Listing Calculation Files
Containment	Infiltration	con-inf2	13.2, 13.12, 13.22
Containment	Pressurization	con-pre2	13.3, 13.13, 13.23
Expected	Infiltration	exp-inf2	13.4, 13.14, 13.24
Expected	Pressurization	exp-pre2	13.5, 13.15, 13.25
RHR Pump Seal	Infiltration	rhr-inf2	13.6, 13.16, 13.26
RHR Pump Seal	Pressurization	rhr-pre2	13.7, 13.17, 13.27
1 gpm - Filtered	Infiltration	fil-inf2	13.8, 13.18, 13.28
1 gpm - Filtered	Pressurization	fil-pre2	13.9, 13.19, 13.29
1 gpm - Unfiltered	Infiltration	unf-inf2	13.10, 13.20, 13.30
1 gpm - Unfiltered	Pressurization	unf-pre2	13.11, 13.21, 13.31

Note: The number 2 in the title reflects that all files were rerun in Revision 2 to this calculation.

Table 7.2 – Dose Summary

	Case	Control Room Thyroid	Control Room Beta	Control Room Whole Body	EAB Thyroid	EAB Beta	EAB Whole Body	LPZ Thyroid	LPZ Beta	LPZ Whole Body
GDC 19 (Rem)		30	5	5	-	-	-	-	-	-
10CFR100 (Rem)		-	-	-	300	25	25	300	25	25
Containment Leakage (Rem)	Infl	9.566	0.051	4.468E-03	110.000	1.678	3.256	20.430	0.160	0.319
	Press	4.484	0.459	0.038						
	Total	14.050	0.510	0.042	110.000	1.678	3.256	20.430	0.160	0.319
RHR Pump Seal (Rem)	Infl	0.031	3.779E-06	4.597E-07				9.138E-02	1.690E-05	4.113E-05
	Press	0.017	2.052E-06	2.496E-07						
	Total	0.048	5.831E-06	7.093E-07	0	0	0	9.138E-02	1.690E-05	4.113E-05
Ingress/ Egress (Rem)		4.720	2.43E-02	6.60E-03						
Expected Leakage (Rem)	Infl	1.218	2.489E-04	3.477E-05	8.223	7.194E-03	2.539E-02	2.240	1.099E-03	3.353E-03
	Press	0.660	1.346E-04	1.880E-05						
	Total	1.878	3.835E-04	5.357E-05	8.223	7.194E-03	2.539E-02	2.240	1.099E-03	3.353E-03
Total Dose (Rem)		20.70	0.535	0.049	118.223	1.685	3.281	22.761	0.161	0.322
Margin (Rem)		9.30	4.465	4.951	181.777	23.315	21.719	277.239	24.839	24.678

Table 7.2 – Dose Summary (Continued)

	Case	Control Room Thyroid	Control Room Beta	Control Room Whole Body	EAB Thyroid	EAB Beta	EAB Whole Body	LPZ Thyroid	LPZ Beta	LPZ Whole Body
Per gpm Dose, Filtered (Rem/gpm)	Infl	14.330	2.956E-03	4.131E-04	98.200	8.592E-02	0.304	26.610	1.311E-02	3.998E-02
	Press	7.761	1.599E-03	2.234E-04						
	Total	22.091	4.555E-03	6.365E-04	98.200	8.592E-02	0.304	26.610	1.311E-02	3.998E-02
Margin Leakage Rate (gpm)		0.421	980	7778	1.851	271	71.4	10.4	1894	617
Per gpm Dose, Unfiltered (Rem/gpm)	Infl	142.600	2.941E-02	4.110E-03	977.100	0.855	3.017	264.800	0.131	0.398
	Press	77.220	1.591E-02	2.223E-03						
	Total	219.820	4.532E-02	6.333E-03	977.100	0.855	3.017	264.800	0.131	0.398
Margin Leakage Rate (gpm)		0.042	98.5	781	0.186	27.2	7.199	1.047	189	62.0
Scaling Factor (Unfiltered/ Filtered dose)		9.95	9.95	9.95	9.95	9.95	9.92	9.95	9.99	9.95

13. Enclosures and Attachments:

Attachment 13.1: con-inf2.lib

All library files are identical; therefore only one is presented here.

These are dose factors taken directly from FGR 11 and 12. This file is copied and renamed for each case.

```
Version 2.0           Federal Guidance Report 11 and 12
Thyroid   Lung      Whole BodyBeta Skin Whole Body
Elem IodOrg Iod Part IodNbl Gas  Cs, Rb  Te, Se  Sr, Ba Nbl MetlRa Earth Other
HalogensTrnsUran
I--131 2.726E+04 9.976E-07 1.490E+06 2.073E+04 2.560E+03 3.170E-02 8.720E-02  1
1  22  0  0  0  0  0 1.100E-02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00   1 1.817E-01 3.789E-01
I--131 2.726E+04 9.976E-07 1.490E+06 2.073E+04 2.560E+03 3.170E-02 8.720E-02  2
1  22  0  0  0  0  0 1.100E-02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00   2 1.817E-01 3.789E-01
I--131 2.726E+04 9.976E-07 1.490E+06 2.073E+04 2.560E+03 3.170E-02 8.720E-02  3
1  22  0  0  0  0  0 1.100E-02 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00   3 1.817E-01 3.789E-01
I--132 3.926E+04 8.425E-05 1.430E+04 8.879E+02 1.450E+02 1.320E-01 5.130E-01  1
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00   4 4.824E-01 3.559E+00
I--132 3.926E+04 8.425E-05 1.430E+04 8.879E+02 1.450E+02 1.320E-01 5.130E-01  2
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00   5 4.824E-01 3.559E+00
I--132 3.926E+04 8.425E-05 1.430E+04 8.879E+02 1.450E+02 1.320E-01 5.130E-01  3
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00   6 4.824E-01 3.559E+00
I--133 5.564E+04 9.211E-06 2.690E+05 5.064E+03 5.650E+02 7.350E-02 1.550E-01  1
2  24 23  0  0  0  0 9.710E-01 2.900E-02 0.000E+00 0.000E+00 0.000E+00
0.000E+00   7 4.067E-01 6.047E-01
I--133 5.564E+04 9.211E-06 2.690E+05 5.064E+03 5.650E+02 7.350E-02 1.550E-01  2
2  24 23  0  0  0  0 9.710E-01 2.900E-02 0.000E+00 0.000E+00 0.000E+00
0.000E+00   8 4.067E-01 6.047E-01
I--133 5.564E+04 9.211E-06 2.690E+05 5.064E+03 5.650E+02 7.350E-02 1.550E-01  3
2  24 23  0  0  0  0 9.710E-01 2.900E-02 0.000E+00 0.000E+00 0.000E+00
0.000E+00   9 4.067E-01 6.047E-01
I--134 6.281E+04 2.200E-04 3.730E+03 3.627E+02 7.690E+01 9.230E-02 5.320E-01  1
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  10 6.052E-01 2.620E+00
I--134 6.281E+04 2.200E-04 3.730E+03 3.627E+02 7.690E+01 9.230E-02 5.320E-01  2
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  11 6.052E-01 2.620E+00
I--134 6.281E+04 2.200E-04 3.730E+03 3.627E+02 7.690E+01 9.230E-02 5.320E-01  3
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  12 6.052E-01 2.620E+00
I--135 5.181E+04 2.912E-05 5.600E+04 1.971E+03 3.210E+02 1.290E-01 4.210E-01  1
2  26 25  0  0  0  0 8.450E-01 1.550E-01 0.000E+00 0.000E+00 0.000E+00
0.000E+00  13 3.691E-01 1.617E+00
```

```
I--135 5.181E+04 2.912E-05 5.600E+04 1.971E+03 3.210E+02 1.290E-01 4.210E-01  2
2  26 25  0  0  0  0 8.450E-01 1.550E-01 0.000E+00 0.000E+00 0.000E+00
0.000E+00  14 3.691E-01 1.617E+00
I--135 5.181E+04 2.912E-05 5.600E+04 1.971E+03 3.210E+02 1.290E-01 4.210E-01  3
2  26 25  0  0  0  0 8.450E-01 1.550E-01 0.000E+00 0.000E+00 0.000E+00
0.000E+00  15 3.691E-01 1.617E+00
KR-83M 4.419E+03 1.052E-04 0.000E+00 5.190E-01 0.000E+00 0.000E+00 2.396E-06  4
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  16 0.000E+00 4.610E-04
KR-85M 1.025E+04 4.297E-05 0.000E+00 2.910E+00 0.000E+00 4.626E-02 3.708E-02  4
1  18  0  0  0  0  0 2.100E-01 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  17 2.902E-01 1.610E-01
KR--85 3.425E+02 2.054E-09 0.000E+00 2.410E+00 0.000E+00 4.246E-02 5.102E-04  4
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  18 2.505E-01 2.236E-03
KR--87 2.064E+04 1.514E-04 0.000E+00 1.530E+01 0.000E+00 3.083E-01 1.876E-01  4
1   0  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  19 1.324E+00 8.032E-01
KR--88 2.920E+04 6.731E-05 0.000E+00 3.130E+01 0.000E+00 7.510E-02 4.658E-01  4
1   0  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  20 3.587E-01 1.981E+00
KR--89 3.696E+04 3.632E-03 0.000E+00 2.130E+01 0.000E+00 3.200E-01 5.260E-01  4
1   0  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  21 1.363E+00 1.867E+00
XE131M 3.052E+02 6.815E-07 0.000E+00 1.400E+00 0.000E+00 1.508E-02 2.899E-03  4
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  22 0.000E+00 3.116E-03
XE133M 1.718E+03 3.663E-06 0.000E+00 1.890E+00 0.000E+00 3.150E-02 7.954E-03  4
1  24  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  23 0.000E+00 2.332E-02
XE-133 5.387E+04 1.528E-06 0.000E+00 1.570E+00 0.000E+00 9.697E-03 9.316E-03  4
0   0  0  0  0  0  0 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  24 1.004E-01 2.997E-02
XE135M 1.090E+04 7.380E-04 0.000E+00 2.220E+00 0.000E+00 2.253E-02 9.887E-02  4
1  26  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  25 3.000E-01 4.266E-01
XE-135 1.556E+04 2.115E-05 0.000E+00 4.050E+00 0.000E+00 5.894E-02 5.736E-02  4
1   0  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  26 3.028E-01 2.466E-01
XE-137 4.927E+04 3.024E-03 0.000E+00 1.740E+01 0.000E+00 3.866E-01 4.500E-02  4
1   0  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  27 1.774E+00 1.895E-01
XE-138 5.109E+04 8.151E-04 0.000E+00 2.440E+01 0.000E+00 1.309E-01 2.798E-01  4
1   0  0  0  0  0  0 1.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
0.000E+00  28 6.140E-01 1.241E+00
```

Attachment 13.2: con-inf2.lti

```
Containment Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
con-inf2.LTO
 STA-195 2
      1
   2   1   0   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  1  0  0
CFM  CUFT CURIES
 2.500E-01 2.500E-01 2.500E-01 1.000E+00 0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9100000       3.9999999E-02  5.0000001E-02
    Node2    Node3
  2
 0.00000E+00 0.005  1  1  1  1  <<< Interval 1, no spray, all dampers open
  1  0  1  1  1  1  0
  2  2  3
I--131  8.05300E+07 1.71200E+07
I--131  8.05300E+07 1.71200E+07
I--131  8.05300E+07 1.71200E+07
I--132  1.16000E+08 2.46600E+07
I--132  1.16000E+08 2.46600E+07
I--132  1.16000E+08 2.46600E+07
I--133  1.64000E+08 3.49000E+07
I--133  1.64000E+08 3.49000E+07
I--133  1.64000E+08 3.49000E+07
I--134  1.86000E+08 3.94000E+07
I--134  1.86000E+08 3.94000E+07
I--134  1.86000E+08 3.94000E+07
I--135  1.53000E+08 3.25000E+07
I--135  1.53000E+08 3.25000E+07
I--135  1.53000E+08 3.25000E+07
KR-83M  1.30500E+07 2.78000E+06
KR-85M  3.02800E+07 6.44000E+06
KR--85  1.01200E+06 2.15000E+05
KR--87  6.09700E+07 1.30000E+07
KR--88  8.62600E+07 1.83000E+07
```

```
KR--89  1.09000E+08 2.32000E+07
XE131M  9.01600E+05 1.92000E+05
XE133M  5.07500E+06 1.08000E+06
XE-133  1.59000E+08 3.38000E+07
XE135M  3.22000E+07 6.84000E+06
XE-135  4.59700E+07 9.77000E+06
XE-137  1.46000E+08 3.09000E+07
XE-138  1.51000E+08 3.21000E+07
DONE
 2.10300E+06 4.47000E+05
  2  1 0.00000E+00 1.46040E+00     0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  3  1 0.00000E+00 3.10400E-01
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  3 0.00000E+00 9.40000E+04    0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  3  2 0.00000E+00 9.40000E+04    0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1  0 0.00000E+00 0.00000E+00
  1  2 0.00000E+00
 -1  0 0.00000E+00
 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
  1 -1.00000E+00
 1.70000E+05  0.  4270.  2100. 6370.
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 0.005 1.2278E-02  1  1  1  1  <<< Interval 2, no spray, one set CR dampers open
  0  0  0  0  1  0  0
  1  2 0.00000E+00
 -1  0 0.00000E+00
  1 -1.00000E+00
 1.70000E+05 0.0 2170. 2100. 4270.
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  7.05000E-05 1.96000E-04
```

```
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 1.2278E-02  2.9444E-02  1  1  1  1  <<< Interval 3, no spray, CR dampers closed
  0  0  0  0  1  0  0
  1  2 0.00000E+00
 -1  0 0.00000E+00
  1 -1.00000E+00
1.70000E+05 0.0 70. 2100. 2170.
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 2.9444E-02 2.9E-01  1  1  1  1  <<< Interval 4, spray, CR dampers closed
  0  0  0  0  1  1  0
  1  2 2.90000E+01
 -1  0 0.00000E+00
 1.00000E+00 1.00000E+02 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 2.9E-01 2.00  1  1  1  1  <<< Interval 5, no spray to 2 hrs, CR dampers closed
  0  0  0  0  1  0  0
  1  2 2.90000E+01
 -1  0 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 2.00000E+00 8.00  1  1  1  1 <<< Interval 6, 2 to 8 hours
  0  0  0  0  1  0  0
  1  2 2.90000E+01
 -1  0 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
```

```
8.00000E+00 24.00  1  1  1  1  <<< Interval 7, 8 to 24 hours
 0  0  0  0  1  0  0
 1  2 2.90000E+01
-1  0 0.00000E+00
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
 3  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1  <<< Interval 8, 1 to 4 days
 0  0  0  1  1  0  0
 2  1 0.00000E+00 7.30200E-01
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 3  1 0.00000E+00 1.55200E-01
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  3 0.00000E+00 9.40000E+04
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 3  2 0.00000E+00 9.40000E+04
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1  2 2.90000E+01
-1  0 0.00000E+00
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
 3  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1   <<< Interval 9, 4 to 30 days
 0  0  0  0  1  0  0
 1  2 2.90000E+01
-1  0 0.00000E+00
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
 3  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.3: con-pre2.lti

```
Containment Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
con-pre2.LTO
 STA-195 2
      1
   2   1   0   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  1  0  0
CFM  CUFT CURIES
 2.500E-01 2.500E-01 2.500E-01 1.000E+00 0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9100000       3.9999999E-02  5.0000001E-02
    Node2    Node3
  2
 0.00000E+00 0.005  1  1  1  1  <<< Interval 1, no spray, all dampers open
  1  0  1  1  1  1  0
  2  2  3
I--131  8.05300E+07 1.71200E+07
I--131  8.05300E+07 1.71200E+07
I--131  8.05300E+07 1.71200E+07
I--132  1.16000E+08 2.46600E+07
I--132  1.16000E+08 2.46600E+07
I--132  1.16000E+08 2.46600E+07
I--133  1.64000E+08 3.49000E+07
I--133  1.64000E+08 3.49000E+07
I--133  1.64000E+08 3.49000E+07
I--134  1.86000E+08 3.94000E+07
I--134  1.86000E+08 3.94000E+07
I--134  1.86000E+08 3.94000E+07
I--135  1.53000E+08 3.25000E+07
I--135  1.53000E+08 3.25000E+07
I--135  1.53000E+08 3.25000E+07
KR-83M  1.30500E+07 2.78000E+06
KR-85M  3.02800E+07 6.44000E+06
KR--85  1.01200E+06 2.15000E+05
KR--87  6.09700E+07 1.30000E+07
```

```
KR--88   8.62600E+07 1.83000E+07
KR--89   1.09000E+08 2.32000E+07
XE131M   9.01600E+05 1.92000E+05
XE133M   5.07500E+06 1.08000E+06
XE-133   1.59000E+08 3.38000E+07
XE135M   3.22000E+07 6.84000E+06
XE-135   4.59700E+07 9.77000E+06
XE-137   1.46000E+08 3.09000E+07
XE-138   1.51000E+08 3.21000E+07
DONE
 2.10300E+06 4.47000E+05
  2  1 0.00000E+00 1.46040E+00     0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  3  1 0.00000E+00 3.10400E-01
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  3 0.00000E+00 9.40000E+04    0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  3  2 0.00000E+00 9.40000E+04    0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1  0 0.00000E+00 0.00000E+00
  1  2 0.00000E+00
 -1  0 0.00000E+00
 1.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
  1 -1.00000E+00
 1.70000E+05  2100.  0.  2.10000E+03 6.37000E+03
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 0.005 1.2278E-02  1  1  1  1 <<< Interval 2, no spray, one set CR dampers open
  0  0  0  0  1  0  0
  1  2 0.00000E+00
 -1  0 0.00000E+00
  1 -1.00000E+00
1.70000E+05 2.10000E+03 0.0 2.10000E+03 4.27000E+03
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
```

```
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 1.2278E-02 2.9444E-02  1  1  1  1 <<< Interval 3, no spray, CR dampers closed
  0  0  0  0  1  0  0
  1  2 0.00000E+00
 -1  0 0.00000E+00
  1 -1.00000E+00
1.70000E+05 2.10000E+03 0.0 2.10000E+03 2.17000E+03
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 2.9444E-02 2.9E-01  1  1  1  1   <<< Interval 4, spray, CR dampers closed
  0  0  0  0  1  1  0
  1  2 2.90000E+01
 -1  0 0.00000E+00
 1.00000E+00 1.00000E+02 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 2.9E-01 2.00  1  1  1  1    <<< Interval 5, no spray to 2 hrs
  0  0  0  0  1  0  0
  1  2 2.90000E+01
 -1  0 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 2.00000E+00 8.00  1  1  1  1  <<< Interval 6, 2 to 8 hours
  0  0  0  0  1  0  0
  1  2 2.90000E+01
 -1  0 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
  3  7.05000E-05 1.96000E-04
```

```
-1  0.00000E+00 0.00000E+00
8.00000E+00 24.00  1  1  1  1   <<< Interval 7, 8 to 24 hours
 0  0  0  0  1  0  0
 1  2 2.90000E+01
-1  0 0.00000E+00
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
 3  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1  <<< Interval 8, 1 to 4 days
 0  0  0  1  1  0  0
 2  1 0.00000E+00 7.30200E-01
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 3  1 0.00000E+00 1.55200E-01
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  3 0.00000E+00 9.40000E+04
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 3  2 0.00000E+00 9.40000E+04
   0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1  2 2.90000E+01
-1  0 0.00000E+00
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
 3  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1   <<< Interval 9, 4 to 30 days
 0  0  0  0  1  0  0
 1  2 2.90000E+01
-1  0 0.00000E+00
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
 3  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.4: exp-inf2.lti

```
Expected Recirc Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
exp-inf2.LTO
 STA-195 2
      1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
     Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.760E+07
I--131      9.760E+07
I--131      9.760E+07
I--132  1.406E+08
I--132      1.406E+08
I--132  1.406E+08
I--133      1.992E+08
I--133      1.992E+08
I--133      1.992E+08
I--134      2.248E+08
I--134  2.248E+08
I--134      2.248E+08
I--135  1.855E+08
I--135  1.855E+08
I--135      1.855E+08
DONE
 62700.
  2  1  1.125E-03  0.0
```

```
   0.    0.    0.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1 -1.00000E+00
1.70000E+05  0.0  7.00000E+01 2.10000E+03 2.17000E+03
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
0.01  2.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
2.00000E+00 8.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
8.00000E+00 24.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.5: exp-pre2.lti

```
Expected Recirc Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
exp-pre2.LTO
 STA-195 2
      1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
    Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.760E+07
I--131      9.760E+07
I--131      9.760E+07
I--132  1.406E+08
I--132      1.406E+08
I--132  1.406E+08
I--133      1.992E+08
I--133      1.992E+08
I--133      1.992E+08
I--134      2.248E+08
I--134  2.248E+08
I--134      2.248E+08
I--135  1.855E+08
I--135  1.855E+08
I--135      1.855E+08
DONE
 62700.
  2  1  1.125E-03  0.0
```

```
   0.    0.    0.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1 -1.00000E+00
1.70000E+05  2100.0  0.0 2.10000E+03 2.17000E+03
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
0.01  2.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
2.00000E+00 8.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
8.00000E+00 24.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.6: rhr-inf2.lti

```
RHR Pp Seal Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
rhr-inf2.LTO
 STA-195 2
      1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
     Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.120E+07
I--131      9.120E+07
I--131      9.120E+07
I--132  1.140E+08
I--132      1.140E+08
I--132  1.140E+08
I--133      9.160E+07
I--133      9.160E+07
I--133      9.160E+07
I--134      6.140E+00
I--134  6.140E+00
I--134      6.140E+00
I--135  1.460E+07
I--135  1.460E+07
I--135      1.460E+07
DONE
 49897.
  2  1 0.0 0.0
```

```
    90.   70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1  0 0.00000E+00 0.00000E+00
  1 -1.00000E+00
1.70000E+05  0.0  7.00000E+01 2.10000E+03 2.17000E+03
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 0.01  0.895  1  1  1  1
  0  0  0  0  0  0  0
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
0.895 8.00  1  1  1  1
  0  0  0  1  0  0  0
  2  1 0.0 0.0
   99.924   70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1  0 0.00000E+00 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 8.00000E+00 24.00  1  1  1  1
  0  0  0  0  0  0  0
  0 -1.00000E+00
  2  5.38000E-05 1.49000E-04
 -1  0.00000E+00 0.00000E+00
 24.0  24.5  1  1  1  1
  0  0  0  1  0  0  0
  2  1 6.685 0.0
   99.924   70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1  0 0.00000E+00 0.00000E+00
  0 -1.00000E+00
  2  3.91000E-05 1.08000E-04
 -1  0.00000E+00 0.00000E+00
 2.45000E+01 9.60000E+01  1  1  1  1
  0  0  0  1  0  0  0
  2  1 0.0 0.0
```

```
   99.924   70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.7: rhr-pre2.lti

```
RHR Pp Seal Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
rhr-pre2.LTO
 STA-195 2
      1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
     Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.120E+07
I--131      9.120E+07
I--131      9.120E+07
I--132  1.140E+08
I--132      1.140E+08
I--132  1.140E+08
I--133      9.160E+07
I--133      9.160E+07
I--133      9.160E+07
I--134      6.140E+00
I--134  6.140E+00
I--134      6.140E+00
I--135  1.460E+07
I--135  1.460E+07
I--135      1.460E+07
DONE
 49897.
  2  1 0.0 0.0
```

```
    90.    70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1   0 0.00000E+00 0.00000E+00
  1 -1.00000E+00
 1.70000E+05  2100.0  0.0 2.10000E+03 2.17000E+03
   95.00    95.00    95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
   95.00    95.00    95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  2  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 0.01  0.895  1  1  1  1
  0  0  0  0  0  0  0
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
0.895 8.00  1  1  1  1
  0  0  0  1  0  0  0
  2  1 0.0 0.0
    99.924    70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1  0 0.00000E+00 0.00000E+00
  0 -1.00000E+00
  2  7.05000E-05 1.96000E-04
 -1  0.00000E+00 0.00000E+00
 8.00000E+00 24.00  1  1  1  1
  0  0  0  0  0  0  0
  0 -1.00000E+00
  2  5.38000E-05 1.49000E-04
 -1  0.00000E+00 0.00000E+00
 24.0  24.5  1  1  1  1
  0  0  0  1  0  0  0
  2  1 6.685 0.0
    99.924    70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 -1  0 0.00000E+00 0.00000E+00
  0 -1.00000E+00
  2  3.91000E-05 1.08000E-04
 -1  0.00000E+00 0.00000E+00
 2.45000E+01 9.60000E+01  1  1  1  1
  0  0  0  1  0  0  0
  2  1 0.0 0.0
```

```
   99.924   70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.8: fil-inf2.lti

```
1 gpm Leakage - Filtered
Ralph Berger
Diablo Canyon
fil-inf2.LTO
 STA-195 2
      1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
     Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.760E+07
I--131      9.760E+07
I--131      9.760E+07
I--132  1.406E+08
I--132      1.406E+08
I--132  1.406E+08
I--133      1.992E+08
I--133      1.992E+08
I--133      1.992E+08
I--134      2.248E+08
I--134  2.248E+08
I--134      2.248E+08
I--135  1.855E+08
I--135  1.855E+08
I--135      1.855E+08
DONE
 62700.
  2  1 0.1337 0.0
```

```
   90.   70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1 -1.00000E+00
1.70000E+05  0.0  70.0 2.10000E+03 2.17000E+03
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
0.01  2.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
2.00000E+00 8.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
8.00000E+00 24.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.9: fil-pre2.lti

```
1 gpm Leakage - Filtered
Ralph Berger
Diablo Canyon
fil-pre2.LTO
 STA-195 2
      1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
     Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.760E+07
I--131      9.760E+07
I--131      9.760E+07
I--132  1.406E+08
I--132      1.406E+08
I--132  1.406E+08
I--133      1.992E+08
I--133      1.992E+08
I--133      1.992E+08
I--134      2.248E+08
I--134  2.248E+08
I--134      2.248E+08
I--135  1.855E+08
I--135  1.855E+08
I--135      1.855E+08
DONE
 62700.
  2  1 0.1337 0.0
```

```
   90.   70.    90.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1 -1.00000E+00
1.70000E+05  2100.0  0.0 2.10000E+03 2.17000E+03
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
0.01  2.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
2.00000E+00 8.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
8.00000E+00 24.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.10: unf-inf2.lti

```
1 gpm Leakage - Unfiltered
Ralph Berger
Diablo Canyon
unf-inf2.LTO
 STA-195 2
      1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
     Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.760E+07
I--131      9.760E+07
I--131      9.760E+07
I--132  1.406E+08
I--132      1.406E+08
I--132  1.406E+08
I--133      1.992E+08
I--133      1.992E+08
I--133      1.992E+08
I--134      2.248E+08
I--134  2.248E+08
I--134      2.248E+08
I--135  1.855E+08
I--135  1.855E+08
I--135      1.855E+08
DONE
 62700.
  2  1 0.1337 0.0
```

```
   0.    0.    0.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1 -1.00000E+00
1.70000E+05  0.0  7.00000E+01 2.10000E+03 2.17000E+03
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
0.01  2.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
2.00000E+00 8.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
8.00000E+00 24.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.11: unf-pre2.lti

```
1 gpm Leakage - Unfiltered
Ralph Berger
Diablo Canyon
unf-inf2.LTO
 STA-195 2
     1
   1   1   0   0
 0 0  3.58000E+03  0.00000E+00  2  0  0  0
CFM  CUFT CURIES
 0.1  0.1  0.1  0.0  0.000E+00 0.000E+00
 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
  0.9975000   0.0025  0.0
     Sump
 0.00000E+00  0.01  1  1  1  1
  1 0 1 1 0 0 0
  1  2
I--131      9.760E+07
I--131      9.760E+07
I--131      9.760E+07
I--132  1.406E+08
I--132      1.406E+08
I--132  1.406E+08
I--133      1.992E+08
I--133      1.992E+08
I--133      1.992E+08
I--134      2.248E+08
I--134  2.248E+08
I--134      2.248E+08
I--135  1.855E+08
I--135  1.855E+08
I--135      1.855E+08
DONE
 62700.
  2  1 0.1337 0.0
```

```
   0.    0.    0.    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
-1  0 0.00000E+00 0.00000E+00
 1 -1.00000E+00
1.70000E+05  2100.0  0.0 2.10000E+03 2.17000E+03
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
  95.00   95.00   95.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
0.01  2.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
2.00000E+00 8.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  7.05000E-05 1.96000E-04
-1  0.00000E+00 0.00000E+00
8.00000E+00 24.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  5.38000E-05 1.49000E-04
-1  0.00000E+00 0.00000E+00
2.40000E+01 9.60000E+01  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  3.91000E-05 1.08000E-04
-1  0.00000E+00 0.00000E+00
9.60000E+01 720.00  1  1  1  1
 0  0  0  0  0  0  0
 0 -1.00000E+00
 2  2.27000E-05 6.29000E-05
-1  0.00000E+00 0.00000E+00
```

Attachment 13.12: con-inf2.ldi

```
Containment Leakage post-LOCA dose
Ralph Berger
Diablo Canyon
con-inf2.LDO
 STA-195 2
      1
DRRDORDOF
   3   2   3  4
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAB      LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.13: con-pre2.ldi

```
Containment Leakage post-LOCA dose
Ralph Berger
Diablo Canyon
con-pre2.LDO
 STA-195 2
      1
DRRDORDOF
   3   2   3  4
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAB       LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.14: exp-inf2.ldi

```
Expected Recirc Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
exp-inf2.LDO
 STA-195 2
 1.
DRRDORDOF
   2  2  3
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAB      LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.15: exp-pre2.ldi

```
Expected Recirc Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
exp-pre2.LDO
 STA-195 2
 1
DRRDORDOF
   2  2  3
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAB       LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.16: rhr-inf2.ldi

```
RHR Pp Seal Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
Rhr-inf2.LDO
 STA-195 2
      1
DRRDORDOF
   2   2   3
   2   5   3   3   1   0
REM REM/HR
 5.290E-04 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 3.470E-04 1.750E-04 2.320E-04
 2.400E-05 2.400E-05 4.800E-06 1.540E-06 3.400E-07
 3.470E-04 1.750E-04 2.320E-04
 2.000E+00 8.000E+00 2.400E+01 9.600E+01 7.200E+02
 8.000E+00 2.400E+01 7.200E+02
 1.000E+00 1.000E+00
      EAB       LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.17: rhr-pre2.ldi

```
RHR Pp Seal Leakage post-LOCA doses
Ralph Berger
Diablo Canyon
rhr-pre2.LDO
 STA-195 2
      1
DRRDORDOF
   2   2   3
   2   5   3   3   1   0
REM REM/HR
 5.290E-04 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 3.470E-04 1.750E-04 2.320E-04
 2.400E-05 2.400E-05 4.800E-06 1.540E-06 3.400E-07
 3.470E-04 1.750E-04 2.320E-04
 2.000E+00 8.000E+00 2.400E+01 9.600E+01 7.200E+02
 8.000E+00 2.400E+01 7.200E+02
 1.000E+00 1.000E+00
      EAB       LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.18: fil-inf2.ldi

```
1 gpm Leakage - Filtered
Ralph Berger
Diablo Canyon
Fil-inf2.LDO
 STA-195 2
      1
DRRDORDOF
   2  2  3
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAP      LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.19: fil-pre2.ldi

```
1 gpm Leakage - Filtered
Ralph Berger
Diablo Canyon
Fil-pre2.LDO
 STA-195 2
      1
DRRDORDOF
   2  2  3
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAP      LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.20: unf-inf2.ldi

```
1 gpm Leakage - Unfiltered
Ralph Berger
Diablo Canyon
unf-inf2.LDO
 STA-195 2
 1
DRRDORDOF
   2  2  3
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAP       LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.21: unf-pre2.ldi

```
1 gpm Leakage - Unfiltered
Ralph Berger
Diablo Canyon
unf-pre2.LDO
 STA-195 2
 1
DRRDORDOF
   2  2  3
 2  5  3  3  1 0
REM REM/HR
5.2900E-04 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00
3.4700E-04 1.7500E-04 2.3200E-04
2.4000E-05 2.4000E-05 4.8000E-06 1.5400E-06 3.4000E-07
3.4700E-04 1.7500E-04 2.3200E-04
2.0000E+00 8.0000E+00 2.4000E+01 9.6000E+01 7.2000E+02
8.0000E+00 2.4000E+01 7.2000E+02
1.0000E+00 1.0000E+00
      EAP      LPZ
0.0000E+00 0.0000E+00 0.0000E+00
0.0000E+00
1.0000E+00 6.0000E-01 4.0000E-01
3.4700E-04
2.4000E+01 9.6000E+01 7.2000E+02
7.2000E+02
1.0000E+00 1.0000E+00 1.0000E+00
```

Attachment 13.22: con-inf2.ldo

```
 Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
 Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
 Originator: Ralph Berger         Date: 30 Sep 2011
 Project: Diablo Canyon           Job No.: con-inf2.LDO        Sheet No.    1
 Subject: Containment Leakage post-LOCA dose
=============================================================================
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      ________________________________________________
     |                                                |
     |           Standard Computer Program            |
     |          NE319 LOCADOSE Version 7.0            |
     |                                                |
     |________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

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Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.    2
Subject: Containment Leakage post-LOCA dose
================================================================================

NE319 Dose Input Summary


This run uses the file con-inf2.ltf
generated on 30 Sep 2011  at  7:42:57

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  5 regions
         Offsite doses for  2 dose points will be calculated

The library file con-inf2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

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Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.    3
Subject: Containment Leakage post-LOCA dose
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NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3	4	5
Factor	1.000E+00	1.000E+00	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)		Region	2	3	4	5
0.000	- 24.00		0.000E+00	0.000E+00	1.000E+00	0.000E+00
24.00	- 96.00		0.000E+00	0.000E+00	6.000E-01	0.000E+00
96.00	- 720.0		0.000E+00	0.000E+00	4.000E-01	0.000E+00

Breathing Rates (m^3/sec) for Each Region

Period (hrs)		Region	2	3	4	5
0.000	- 720.0		0.000E+00	0.000E+00	3.470E-04	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.    4
Subject: Containment Leakage post-LOCA dose
================================================================================
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NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAB NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

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Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.    5
Subject: Containment Leakage post-LOCA dose
================================================================================
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NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Node2

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.652E+06	1.626E+06
5.000E-03	0.000E+00	0.000E+00	0.000E+00	9.315E+06	1.592E+06
1.228E-02	0.000E+00	0.000E+00	0.000E+00	8.856E+06	1.545E+06
2.944E-02	0.000E+00	0.000E+00	0.000E+00	7.909E+06	1.449E+06
2.900E-01	0.000E+00	0.000E+00	0.000E+00	2.499E+06	5.598E+05
2.000E+00	0.000E+00	0.000E+00	0.000E+00	9.983E+05	2.596E+05
8.000E+00	0.000E+00	0.000E+00	0.000E+00	3.187E+05	7.522E+04
2.400E+01	0.000E+00	0.000E+00	0.000E+00	1.359E+05	1.755E+04
9.600E+01	0.000E+00	0.000E+00	0.000E+00	6.441E+04	7.342E+03
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.721E+03	2.961E+02

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Calc No.: STA-195 Rev No.: 2 Input: con-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-inf2.LDO Sheet No. 6
Subject: Containment Leakage post-LOCA dose

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Node3

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.643E+06	9.631E+05
5.000E-03	0.000E+00	0.000E+00	0.000E+00	9.306E+06	9.428E+05
1.228E-02	0.000E+00	0.000E+00	0.000E+00	8.849E+06	9.152E+05
2.944E-02	0.000E+00	0.000E+00	0.000E+00	7.905E+06	8.580E+05
2.900E-01	0.000E+00	0.000E+00	0.000E+00	2.561E+06	3.476E+05
2.000E+00	0.000E+00	0.000E+00	0.000E+00	9.983E+05	1.538E+05
8.000E+00	0.000E+00	0.000E+00	0.000E+00	3.187E+05	4.457E+04
2.400E+01	0.000E+00	0.000E+00	0.000E+00	1.359E+05	1.040E+04
9.600E+01	0.000E+00	0.000E+00	0.000E+00	6.441E+04	4.350E+03
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.721E+03	1.754E+02

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Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.    7
Subject: Containment Leakage post-LOCA dose
================================================================================
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NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 4 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5.000E-03	1.125E+00	1.941E-02	2.435E-03	1.143E-02	8.344E-04
1.228E-02	1.938E+00	3.342E-02	4.194E-03	1.878E-02	1.399E-03
2.944E-02	1.952E+00	3.361E-02	4.221E-03	1.707E-02	1.332E-03
2.900E-01	1.530E+00	2.609E-02	3.272E-03	8.117E-03	8.937E-04
2.000E+00	3.457E-01	5.882E-03	7.048E-04	4.541E-03	5.023E-04
8.000E+00	2.247E-01	3.580E-03	4.285E-04	1.599E-03	1.582E-04
2.400E+01	1.446E-01	2.159E-03	2.600E-04	5.182E-04	2.674E-05
9.600E+01	3.478E-02	4.921E-04	6.003E-05	9.132E-05	4.248E-06
7.200E+02	2.084E-03	2.913E-05	3.581E-06	3.885E-06	9.114E-08

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Calc No.: STA-195 Rev No.: 2 Input: con-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-inf2.LDO Sheet No. 8
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Doses in REM for region 2 Node2

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5.0000E-03	-1.2278E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.2278E-02	-2.9444E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.9444E-02	-0.2900	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.2900	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: con-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-inf2.LDO Sheet No. 9
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Node2

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.228E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.944E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.900E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.   10
Subject: Containment Leakage post-LOCA dose
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NE319 Doses Within Regions Summary

Doses in REM for region 3 Node3

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5.0000E-03	-1.2278E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.2278E-02	-2.9444E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.9444E-02	-0.2900	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.2900	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: con-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-inf2.LDO Sheet No. 11
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Node3

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.228E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.944E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.900E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: con-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-inf2.LDO Sheet No. 12
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Doses in REM for region 4 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	2.818E-03	4.866E-05	6.103E-06	2.897E-05	2.105E-06
5.0000E-03	-1.2278E-02	1.115E-02	1.924E-04	2.414E-05	1.104E-04	8.152E-06
1.2278E-02	-2.9444E-02	3.338E-02	5.753E-04	7.223E-05	3.073E-04	2.342E-05
2.9444E-02	-0.2900	4.622E-01	7.914E-03	9.943E-04	2.865E-03	2.752E-04
0.2900	- 2.000	1.218E+00	2.071E-02	2.552E-03	9.808E-03	1.076E-03
2.000	- 8.000	1.474E+00	2.432E-02	2.894E-03	1.589E-02	1.772E-03
8.000	- 24.00	2.541E+00	3.896E-02	4.682E-03	1.226E-02	8.727E-04
24.00	- 96.00	1.850E+00	2.671E-02	3.237E-03	5.505E-03	2.625E-04
96.00	- 720.0	1.975E+00	2.770E-02	3.395E-03	4.088E-03	1.763E-04
	Total	9.566E+00	1.471E-01	1.786E-02	5.087E-02	4.468E-03

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Calc No.: STA-195 Rev No.: 2 Input: con-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-inf2.LDO Sheet No. 13
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 4 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	2.818E-03	4.866E-05	6.103E-06	2.897E-05	2.105E-06
1.228E-02	1.397E-02	2.411E-04	3.024E-05	1.394E-04	1.026E-05
2.944E-02	4.735E-02	8.164E-04	1.025E-04	4.467E-04	3.368E-05
2.900E-01	5.096E-01	8.730E-03	1.097E-03	3.311E-03	3.089E-04
2.000E+00	1.727E+00	2.944E-02	3.649E-03	1.312E-02	1.385E-03
8.000E+00	3.201E+00	5.375E-02	6.543E-03	2.901E-02	3.156E-03
2.400E+01	5.742E+00	9.272E-02	1.122E-02	4.127E-02	4.029E-03
9.600E+01	7.591E+00	1.194E-01	1.446E-02	4.678E-02	4.292E-03
7.200E+02	9.566E+00	1.471E-01	1.786E-02	5.087E-02	4.468E-03

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Calc No.: STA-195 Rev No.: 2 Input: con-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-inf2.LDO Sheet No. 14
Subject: Containment Leakage post-LOCA dose

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAB

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	2.029E+00	3.503E-02	4.394E-03	2.096E-02	3.042E-02
5.0000E-03	-1.2278E-02	2.953E+00	5.095E-02	6.393E-03	2.922E-02	4.316E-02
1.2278E-02	-2.9444E-02	6.963E+00	1.200E-01	1.507E-02	6.349E-02	9.707E-02
2.9444E-02	-0.2900	2.921E+01	5.124E-01	6.294E-02	4.682E-01	7.879E-01
0.2900	- 2.000	6.881E+01	1.194E+00	1.434E-01	1.096E+00	2.298E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00

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Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.   15
Subject: Containment Leakage post-LOCA dose
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NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAB

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	2.029E+00	3.503E-02	4.394E-03	2.096E-02	3.042E-02
1.228E-02	4.982E+00	8.599E-02	1.079E-02	5.017E-02	7.357E-02
2.944E-02	1.195E+01	2.060E-01	2.585E-02	1.137E-01	1.706E-01
2.900E-01	4.115E+01	7.184E-01	8.880E-02	5.819E-01	9.585E-01
2.000E+00	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
8.000E+00	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
2.400E+01	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
9.600E+01	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
7.200E+02	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO          Sheet No.   16
Subject: Containment Leakage post-LOCA dose
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NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	9.205E-02	1.589E-03	1.993E-04	9.508E-04	1.380E-03
5.0000E-03	-1.2278E-02	1.340E-01	2.312E-03	2.900E-04	1.326E-03	1.958E-03
1.2278E-02	-2.9444E-02	3.159E-01	5.444E-03	6.835E-04	2.881E-03	4.404E-03
2.9444E-02	-0.2900	1.325E+00	2.325E-02	2.856E-03	2.124E-02	3.574E-02
0.2900	- 2.000	3.122E+00	5.416E-02	6.505E-03	4.971E-02	1.042E-01
2.000	- 8.000	1.025E+01	1.662E-01	2.009E-02	6.507E-02	1.469E-01
8.000	- 24.00	2.421E+00	3.684E-02	4.459E-03	1.247E-02	1.837E-02
24.00	- 96.00	1.713E+00	2.460E-02	2.997E-03	4.023E-03	4.057E-03
96.00	- 720.0	1.060E+00	1.481E-02	1.822E-03	1.752E-03	1.602E-03
	Total	2.043E+01	3.292E-01	3.990E-02	1.594E-01	3.187E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-inf2.LDO         Sheet No.   17
Subject: Containment Leakage post-LOCA dose
================================================================================
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	9.205E-02	1.589E-03	1.993E-04	9.508E-04	1.380E-03
1.228E-02	2.260E-01	3.901E-03	4.894E-04	2.276E-03	3.338E-03
2.944E-02	5.419E-01	9.345E-03	1.173E-03	5.157E-03	7.742E-03
2.900E-01	1.867E+00	3.259E-02	4.029E-03	2.640E-02	4.349E-02
2.000E+00	4.989E+00	8.675E-02	1.053E-02	7.611E-02	1.477E-01
8.000E+00	1.523E+01	2.530E-01	3.063E-02	1.412E-01	2.946E-01
2.400E+01	1.766E+01	2.898E-01	3.508E-02	1.537E-01	3.130E-01
9.600E+01	1.937E+01	3.144E-01	3.808E-02	1.577E-01	3.171E-01
7.200E+02	2.043E+01	3.292E-01	3.990E-02	1.594E-01	3.187E-01

Attachment 13.23: con-pre2.ldo

```
 Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
 Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
 Originator: Ralph Berger         Date: 30 Sep 2011
 Project: Diablo Canyon           Job No.: con-pre2.LDO        Sheet No.    1
 Subject: Containment Leakage post-LOCA dose
==========================================================================================
```

```
          ________________________________________________
         |                                                |
         |            Standard Computer Program           |
         |           NE319 LOCADOSE Version 7.0           |
         |                                                |
         |________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-pre2.LDO         Sheet No.    2
Subject: Containment Leakage post-LOCA dose
================================================================================

NE319 Dose Input Summary


This run uses the file con-pre2.ltf
generated on 30 Sep 2011  at  7:43:06

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  5 regions
         Offsite doses for  2 dose points will be calculated

The library file con-pre2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-pre2.LDO         Sheet No.    3
Subject: Containment Leakage post-LOCA dose
================================================================================

NE319 Dose Input Summary

        Finite Cloud Correction Factors for Each Region

    Region     2         3         4         5
    Factor 1.000E+00 1.000E+00 1.000E+00 1.000E+00


        Occupancy Factor for Each Region

      Period (hrs)    Region     2         3         4         5
     0.000    - 24.00         0.000E+00 0.000E+00 1.000E+00 0.000E+00
     24.00    - 96.00         0.000E+00 0.000E+00 6.000E-01 0.000E+00
     96.00    - 720.0         0.000E+00 0.000E+00 4.000E-01 0.000E+00


        Breathing Rates (m^3/sec) for Each Region
      Period (hrs)    Region     2         3         4         5
     0.000    - 720.0         0.000E+00 0.000E+00 3.470E-04 0.000E+00
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-pre2.LDO        Sheet No.    4
Subject: Containment Leakage post-LOCA dose
================================================================================
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NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAB NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 5
Subject: Containment Leakage post-LOCA dose

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Node2

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.652E+06	1.626E+06
5.000E-03	0.000E+00	0.000E+00	0.000E+00	9.315E+06	1.592E+06
1.228E-02	0.000E+00	0.000E+00	0.000E+00	8.856E+06	1.545E+06
2.944E-02	0.000E+00	0.000E+00	0.000E+00	7.909E+06	1.449E+06
2.900E-01	0.000E+00	0.000E+00	0.000E+00	2.499E+06	5.598E+05
2.000E+00	0.000E+00	0.000E+00	0.000E+00	9.983E+05	2.596E+05
8.000E+00	0.000E+00	0.000E+00	0.000E+00	3.187E+05	7.522E+04
2.400E+01	0.000E+00	0.000E+00	0.000E+00	1.359E+05	1.755E+04
9.600E+01	0.000E+00	0.000E+00	0.000E+00	6.441E+04	7.342E+03
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.721E+03	2.961E+02

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-pre2.LDO          Sheet No.    6
Subject: Containment Leakage post-LOCA dose
================================================================================
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NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Node3

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.643E+06	9.631E+05
5.000E-03	0.000E+00	0.000E+00	0.000E+00	9.306E+06	9.428E+05
1.228E-02	0.000E+00	0.000E+00	0.000E+00	8.849E+06	9.152E+05
2.944E-02	0.000E+00	0.000E+00	0.000E+00	7.905E+06	8.580E+05
2.900E-01	0.000E+00	0.000E+00	0.000E+00	2.561E+06	3.476E+05
2.000E+00	0.000E+00	0.000E+00	0.000E+00	9.983E+05	1.538E+05
8.000E+00	0.000E+00	0.000E+00	0.000E+00	3.187E+05	4.457E+04
2.400E+01	0.000E+00	0.000E+00	0.000E+00	1.359E+05	1.040E+04
9.600E+01	0.000E+00	0.000E+00	0.000E+00	6.441E+04	4.350E+03
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.721E+03	1.754E+02

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Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 7
Subject: Containment Leakage post-LOCA dose

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 4 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5.000E-03	9.947E-03	2.256E-04	2.154E-05	1.814E-03	1.080E-04
1.228E-02	2.425E-02	5.451E-04	5.249E-05	4.193E-03	2.537E-04
2.944E-02	5.759E-02	1.270E-03	1.246E-04	8.826E-03	5.556E-04
2.900E-01	1.504E-01	3.872E-03	3.218E-04	2.747E-02	2.548E-03
2.000E+00	1.336E-01	4.501E-03	2.724E-04	4.187E-02	4.512E-03
8.000E+00	1.212E-01	2.814E-03	2.312E-04	1.631E-02	1.577E-03
2.400E+01	7.833E-02	1.403E-03	1.408E-04	5.306E-03	2.517E-04
9.600E+01	1.889E-02	3.155E-04	3.260E-05	9.643E-04	4.255E-05
7.200E+02	1.128E-03	1.710E-05	1.939E-06	4.075E-05	8.062E-07

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Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 8
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Doses in REM for region 2 Node2

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5.0000E-03	-1.2278E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.2278E-02	-2.9444E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.9444E-02	-0.2900	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.2900	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 9
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Node2

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.228E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.944E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.900E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-pre2.LDO         Sheet No.   10
Subject: Containment Leakage post-LOCA dose
================================================================================
```

NE319 Doses Within Regions Summary

Doses in REM for region 3 Node3

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5.0000E-03	-1.2278E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.2278E-02	-2.9444E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.9444E-02	-0.2900	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.2900	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 11
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Node3

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.228E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.944E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.900E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 12
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Doses in REM for region 4 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	2.493E-05	5.666E-07	5.398E-08	4.604E-06	2.731E-07
5.0000E-03	-1.2278E-02	1.246E-04	2.811E-06	2.697E-07	2.204E-05	1.324E-06
1.2278E-02	-2.9444E-02	7.037E-04	1.564E-05	1.523E-06	1.136E-04	7.028E-06
2.9444E-02	-0.2900	3.448E-02	8.242E-04	7.413E-05	5.554E-03	4.562E-04
0.2900	- 2.000	2.395E-01	7.570E-03	4.992E-04	6.852E-02	7.014E-03
2.000	- 8.000	7.596E-01	2.144E-02	1.490E-03	1.591E-01	1.744E-02
8.000	- 24.00	1.376E+00	2.698E-02	2.535E-03	1.253E-01	8.472E-03
24.00	- 96.00	1.004E+00	1.726E-02	1.758E-03	5.747E-02	2.564E-03
96.00	- 720.0	1.069E+00	1.704E-02	1.838E-03	4.298E-02	1.733E-03
	Total	4.484E+00	9.114E-02	8.196E-03	4.590E-01	3.769E-02

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 13
Subject: Containment Leakage post-LOCA dose

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 4 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	2.493E-05	5.666E-07	5.398E-08	4.604E-06	2.731E-07
1.228E-02	1.495E-04	3.378E-06	3.237E-07	2.665E-05	1.598E-06
2.944E-02	8.533E-04	1.902E-05	1.846E-06	1.403E-04	8.626E-06
2.900E-01	3.534E-02	8.432E-04	7.598E-05	5.694E-03	4.648E-04
2.000E+00	2.749E-01	8.413E-03	5.752E-04	7.422E-02	7.478E-03
8.000E+00	1.034E+00	2.985E-02	2.065E-03	2.333E-01	2.492E-02
2.400E+01	2.410E+00	5.683E-02	4.600E-03	3.586E-01	3.339E-02
9.600E+01	3.415E+00	7.410E-02	6.358E-03	4.160E-01	3.596E-02
7.200E+02	4.484E+00	9.114E-02	8.196E-03	4.590E-01	3.769E-02

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Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 14
Subject: Containment Leakage post-LOCA dose

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAB

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	2.029E+00	3.503E-02	4.394E-03	2.096E-02	3.042E-02
5.0000E-03	-1.2278E-02	2.953E+00	5.095E-02	6.393E-03	2.922E-02	4.316E-02
1.2278E-02	-2.9444E-02	6.963E+00	1.200E-01	1.507E-02	6.349E-02	9.707E-02
2.9444E-02	-0.2900	2.921E+01	5.124E-01	6.294E-02	4.682E-01	7.879E-01
0.2900	- 2.000	6.881E+01	1.194E+00	1.434E-01	1.096E+00	2.298E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-pre2.LDO        Sheet No.   15
Subject: Containment Leakage post-LOCA dose
================================================================================
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAB

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	2.029E+00	3.503E-02	4.394E-03	2.096E-02	3.042E-02
1.228E-02	4.982E+00	8.599E-02	1.079E-02	5.017E-02	7.357E-02
2.944E-02	1.195E+01	2.060E-01	2.585E-02	1.137E-01	1.706E-01
2.900E-01	4.115E+01	7.184E-01	8.880E-02	5.819E-01	9.585E-01
2.000E+00	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
8.000E+00	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
2.400E+01	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
9.600E+01	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00
7.200E+02	1.100E+02	1.912E+00	2.322E-01	1.678E+00	3.256E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: con-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: con-pre2.LDO Sheet No. 16
Subject: Containment Leakage post-LOCA dose

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-5.0000E-03	9.205E-02	1.589E-03	1.993E-04	9.508E-04	1.380E-03
5.0000E-03	-1.2278E-02	1.340E-01	2.312E-03	2.900E-04	1.326E-03	1.958E-03
1.2278E-02	-2.9444E-02	3.159E-01	5.444E-03	6.835E-04	2.881E-03	4.404E-03
2.9444E-02	-0.2900	1.325E+00	2.325E-02	2.856E-03	2.124E-02	3.574E-02
0.2900	- 2.000	3.122E+00	5.416E-02	6.505E-03	4.971E-02	1.042E-01
2.000	- 8.000	1.025E+01	1.662E-01	2.009E-02	6.507E-02	1.469E-01
8.000	- 24.00	2.421E+00	3.684E-02	4.459E-03	1.247E-02	1.837E-02
24.00	- 96.00	1.713E+00	2.460E-02	2.997E-03	4.023E-03	4.057E-03
96.00	- 720.0	1.060E+00	1.481E-02	1.822E-03	1.752E-03	1.602E-03
	Total	2.043E+01	3.292E-01	3.990E-02	1.594E-01	3.187E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: con-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: con-pre2.LDO          Sheet No.   17
Subject: Containment Leakage post-LOCA dose
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
5.000E-03	9.205E-02	1.589E-03	1.993E-04	9.508E-04	1.380E-03
1.228E-02	2.260E-01	3.901E-03	4.894E-04	2.276E-03	3.338E-03
2.944E-02	5.419E-01	9.345E-03	1.173E-03	5.157E-03	7.742E-03
2.900E-01	1.867E+00	3.259E-02	4.029E-03	2.640E-02	4.349E-02
2.000E+00	4.989E+00	8.675E-02	1.053E-02	7.611E-02	1.477E-01
8.000E+00	1.523E+01	2.530E-01	3.063E-02	1.412E-01	2.946E-01
2.400E+01	1.766E+01	2.898E-01	3.508E-02	1.537E-01	3.130E-01
9.600E+01	1.937E+01	3.144E-01	3.808E-02	1.577E-01	3.171E-01
7.200E+02	2.043E+01	3.292E-01	3.990E-02	1.594E-01	3.187E-01

Attachment 13.24: exp-inf2.ldo

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO        Sheet No.    1
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

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 ____________________________________________
|                                            |
|           Standard Computer Program        |
|          NE319 LOCADOSE Version 7.0        |
|                                            |
|____________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO         Sheet No.    2
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================

NE319 Dose Input Summary


This run uses the file exp-inf2.ltf
generated on 30 Sep 2011  at  7:43:14

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file exp-inf2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO        Sheet No.    3
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3
Factor	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)	Region	2	3
0.000 - 24.00		0.000E+00	1.000E+00
24.00 - 96.00		0.000E+00	6.000E-01
96.00 - 720.0		0.000E+00	4.000E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO         Sheet No.    4
Subject: Expected Recirc Leakage post-LOCA doses
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NE319 Dose Input Summary

Breathing Rates (m^3/sec) for Each Region

Period (hrs)		Region 2	3
0.000	- 720.0	0.000E+00	3.470E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO        Sheet No.    5
Subject: Expected Recirc Leakage post-LOCA doses
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NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAB NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO          Sheet No.    6
Subject: Expected Recirc Leakage post-LOCA doses
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.642E+07	2.236E+06
1.000E-02	0.000E+00	0.000E+00	0.000E+00	1.637E+07	2.227E+06
2.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+07	1.190E+06
8.000E+00	0.000E+00	0.000E+00	0.000E+00	5.324E+06	5.227E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	2.310E+06	2.032E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.676E+05	5.286E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.723E+04	4.632E+03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO         Sheet No.    7
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	3.810E-04	6.468E-06	8.248E-07	4.177E-07	7.961E-08
2.000E+00	2.380E-02	3.886E-04	4.852E-05	1.698E-05	2.761E-06
8.000E+00	2.302E-02	3.580E-04	4.389E-05	9.311E-06	1.281E-06
2.400E+01	1.482E-02	2.190E-04	2.664E-05	3.071E-06	3.784E-07
9.600E+01	7.135E-03	1.000E-04	1.232E-05	5.470E-07	7.137E-08
7.200E+02	4.323E-04	6.015E-06	7.428E-07	2.651E-08	3.643E-09

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO         Sheet No.    8
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
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NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: exp-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: exp-inf2.LDO Sheet No. 9
Subject: Expected Recirc Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: exp-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: exp-inf2.LDO Sheet No. 10
Subject: Expected Recirc Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Doses in REM for region 3 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	1.910E-06	3.243E-08	4.135E-09	2.096E-09	3.996E-10
1.0000E-02	- 2.000	3.457E-02	5.719E-04	7.190E-05	2.883E-05	4.987E-06
2.000	- 8.000	1.432E-01	2.273E-03	2.807E-04	7.477E-05	1.105E-05
8.000	- 24.00	2.603E-01	3.934E-03	4.797E-04	7.473E-05	9.700E-06
24.00	- 96.00	3.733E-01	5.334E-03	6.530E-04	4.483E-05	5.531E-06
96.00	- 720.0	4.067E-01	5.663E-03	6.991E-04	2.571E-05	3.506E-06
	Total	1.218E+00	1.778E-02	2.184E-03	2.489E-04	3.477E-05

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: exp-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: exp-inf2.LDO Sheet No. 11
Subject: Expected Recirc Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	1.910E-06	3.243E-08	4.135E-09	2.096E-09	3.996E-10
2.000E+00	3.457E-02	5.719E-04	7.191E-05	2.883E-05	4.988E-06
8.000E+00	1.777E-01	2.845E-03	3.526E-04	1.036E-04	1.603E-05
2.400E+01	4.380E-01	6.779E-03	8.323E-04	1.783E-04	2.573E-05
9.600E+01	8.113E-01	1.211E-02	1.485E-03	2.232E-04	3.127E-05
7.200E+02	1.218E+00	1.778E-02	2.184E-03	2.489E-04	3.477E-05

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: exp-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: exp-inf2.LDO Sheet No. 12
Subject: Expected Recirc Leakage post-LOCA doses

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAB

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	4.194E-02	7.120E-04	9.080E-05	4.604E-05	1.757E-04
1.0000E-02	- 2.000	8.181E+00	1.359E-01	1.712E-02	7.148E-03	2.521E-02
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO         Sheet No.   13
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAB

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	4.194E-02	7.120E-04	9.080E-05	4.604E-05	1.757E-04
2.000E+00	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
8.000E+00	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
2.400E+01	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
9.600E+01	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
7.200E+02	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO          Sheet No.   14
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	1.903E-03	3.230E-05	4.119E-06	2.089E-06	7.973E-06
1.0000E-02	- 2.000	3.712E-01	6.165E-03	7.768E-04	3.243E-04	1.144E-03
2.000	- 8.000	1.050E+00	1.667E-02	2.058E-03	5.490E-04	1.624E-03
8.000	- 24.00	2.480E-01	3.747E-03	4.569E-04	1.405E-04	3.646E-04
24.00	- 96.00	3.513E-01	5.020E-03	6.146E-04	6.291E-05	1.554E-04
96.00	- 720.0	2.182E-01	3.038E-03	3.751E-04	2.063E-05	5.631E-05
	Total	2.240E+00	3.467E-02	4.286E-03	1.099E-03	3.353E-03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-inf2.LDO         Sheet No.   15
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
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NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	1.903E-03	3.230E-05	4.119E-06	2.089E-06	7.973E-06
2.000E+00	3.731E-01	6.198E-03	7.810E-04	3.264E-04	1.152E-03
8.000E+00	1.423E+00	2.286E-02	2.839E-03	8.754E-04	2.776E-03
2.400E+01	1.671E+00	2.661E-02	3.296E-03	1.016E-03	3.141E-03
9.600E+01	2.022E+00	3.163E-02	3.911E-03	1.079E-03	3.296E-03
7.200E+02	2.240E+00	3.467E-02	4.286E-03	1.099E-03	3.353E-03

Attachment 13.25: exp-pre2.ldo

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO        Sheet No.    1
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
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 _____________________________________________
|                                             |
|          Standard Computer Program          |
|          NE319 LOCADOSE Version 7.0         |
|                                             |
|_____________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO         Sheet No.    2
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================

NE319 Dose Input Summary


This run uses the file exp-pre2.ltf
generated on 30 Sep 2011  at  7:43:20

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file exp-pre2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO        Sheet No.    3
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3
Factor	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)		Region	2	3
0.000	- 24.00		0.000E+00	1.000E+00
24.00	- 96.00		0.000E+00	6.000E-01
96.00	- 720.0		0.000E+00	4.000E-01

Breathing Rates (m^3/sec) for Each Region

Period (hrs)		Region	2	3
0.000	- 720.0		0.000E+00	3.470E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.1di
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO        Sheet No.    4
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAB NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO         Sheet No.    5
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.642E+07	2.236E+06
1.000E-02	0.000E+00	0.000E+00	0.000E+00	1.637E+07	2.227E+06
2.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+07	1.190E+06
8.000E+00	0.000E+00	0.000E+00	0.000E+00	5.324E+06	5.227E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	2.310E+06	2.032E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.676E+05	5.286E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.723E+04	4.632E+03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO         Sheet No.    6
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	2.056E-04	3.490E-06	4.450E-07	2.254E-07	4.295E-08
2.000E+00	1.284E-02	2.097E-04	2.618E-05	9.161E-06	1.490E-06
8.000E+00	1.242E-02	1.931E-04	2.368E-05	5.024E-06	6.910E-07
2.400E+01	8.027E-03	1.186E-04	1.443E-05	1.663E-06	2.050E-07
9.600E+01	3.875E-03	5.431E-05	6.689E-06	2.971E-07	3.876E-08
7.200E+02	2.340E-04	3.256E-06	4.021E-07	1.435E-08	1.972E-09

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: exp-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: exp-pre2.LDO Sheet No. 7
Subject: Expected Recirc Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO         Sheet No.    8
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO          Sheet No.    9
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Doses Within Regions Summary

Doses in REM for region 3 Cont Room

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	1.031E-06	1.750E-08	2.231E-09	1.131E-09	2.156E-10
1.0000E-02	- 2.000	1.865E-02	3.086E-04	3.879E-05	1.555E-05	2.691E-06
2.000	- 8.000	7.724E-02	1.226E-03	1.514E-04	4.034E-05	5.960E-06
8.000	- 24.00	1.410E-01	2.130E-03	2.598E-04	4.046E-05	5.252E-06
24.00	- 96.00	2.027E-01	2.896E-03	3.546E-04	2.434E-05	3.003E-06
96.00	- 720.0	2.201E-01	3.066E-03	3.785E-04	1.392E-05	1.898E-06
	Total	6.597E-01	9.627E-03	1.183E-03	1.346E-04	1.880E-05

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO         Sheet No.   10
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	1.031E-06	1.750E-08	2.231E-09	1.131E-09	2.156E-10
2.000E+00	1.865E-02	3.086E-04	3.880E-05	1.556E-05	2.691E-06
8.000E+00	9.589E-02	1.535E-03	1.902E-04	5.590E-05	8.651E-06
2.400E+01	2.368E-01	3.665E-03	4.500E-04	9.636E-05	1.390E-05
9.600E+01	4.395E-01	6.562E-03	8.046E-04	1.207E-04	1.691E-05
7.200E+02	6.597E-01	9.627E-03	1.183E-03	1.346E-04	1.880E-05

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO        Sheet No.   11
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAB

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	4.194E-02	7.120E-04	9.080E-05	4.604E-05	1.757E-04
1.0000E-02	- 2.000	8.181E+00	1.359E-01	1.712E-02	7.148E-03	2.521E-02
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO         Sheet No.   12
Subject: Expected Recirc Leakage post-LOCA doses
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAB

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	4.194E-02	7.120E-04	9.080E-05	4.604E-05	1.757E-04
2.000E+00	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
8.000E+00	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
2.400E+01	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
9.600E+01	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02
7.200E+02	8.223E+00	1.366E-01	1.721E-02	7.194E-03	2.539E-02

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: exp-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: exp-pre2.LDO Sheet No. 13
Subject: Expected Recirc Leakage post-LOCA doses

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	1.903E-03	3.230E-05	4.119E-06	2.089E-06	7.973E-06
1.0000E-02	- 2.000	3.712E-01	6.165E-03	7.768E-04	3.243E-04	1.144E-03
2.000	- 8.000	1.050E+00	1.667E-02	2.058E-03	5.490E-04	1.624E-03
8.000	- 24.00	2.480E-01	3.747E-03	4.569E-04	1.405E-04	3.646E-04
24.00	- 96.00	3.513E-01	5.020E-03	6.146E-04	6.291E-05	1.554E-04
96.00	- 720.0	2.182E-01	3.038E-03	3.751E-04	2.063E-05	5.631E-05
	Total	2.240E+00	3.467E-02	4.286E-03	1.099E-03	3.353E-03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: exp-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: exp-pre2.LDO        Sheet No.   14
Subject: Expected Recirc Leakage post-LOCA doses
================================================================================
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	1.903E-03	3.230E-05	4.119E-06	2.089E-06	7.973E-06
2.000E+00	3.731E-01	6.198E-03	7.810E-04	3.264E-04	1.152E-03
8.000E+00	1.423E+00	2.286E-02	2.839E-03	8.754E-04	2.776E-03
2.400E+01	1.671E+00	2.661E-02	3.296E-03	1.016E-03	3.141E-03
9.600E+01	2.022E+00	3.163E-02	3.911E-03	1.079E-03	3.296E-03
7.200E+02	2.240E+00	3.467E-02	4.286E-03	1.099E-03	3.353E-03

Attachment 13.26: rhr-inf2.ldo

```
 Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
 Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
 Originator: Ralph Berger         Date: 30 Sep 2011
 Project: Diablo Canyon           Job No.: Rhr-inf2.LDO        Sheet No.    1
 Subject: RHR Pp Seal Leakage post-LOCA doses
=============================================================================================
```

```
          ________________________________________________
         |                                                |
         |            Standard Computer Program           |
         |           NE319 LOCADOSE Version 7.0           |
         |                                                |
         |________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO         Sheet No.    2
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================

NE319 Dose Input Summary


This run uses the file rhr-inf2.ltf
generated on 30 Sep 2011  at  7:43:50

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file rhr-inf2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO        Sheet No.    3
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3
Factor	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)		Region	2	3
0.000	- 24.00		0.000E+00	1.000E+00
24.00	- 96.00		0.000E+00	6.000E-01
96.00	- 720.0		0.000E+00	4.000E-01

Breathing Rates (m^3/sec) for Each Region

Period (hrs)		Region	2	3
0.000	- 720.0		0.000E+00	3.470E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO         Sheet No.    4
Subject: RHR Pp Seal Leakage post-LOCA doses
==========================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAB NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO         Sheet No.    5
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.766E+06	7.299E+05
1.000E-02	0.000E+00	0.000E+00	0.000E+00	6.753E+06	7.283E+05
8.950E-01	0.000E+00	0.000E+00	0.000E+00	5.759E+06	6.046E+05
8.000E+00	0.000E+00	0.000E+00	0.000E+00	2.578E+06	2.224E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	1.491E+06	1.198E+05
2.450E+01	0.000E+00	0.000E+00	0.000E+00	1.469E+06	1.180E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.905E+05	5.212E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	5.527E+04	5.019E+03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO         Sheet No.    6
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	5.371E-02	7.690E-04	9.403E-05	6.615E-06	8.043E-07
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO         Sheet No.    7
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================
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NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.50	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: rhr-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Rhr-inf2.LDO Sheet No. 8
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: rhr-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Rhr-inf2.LDO Sheet No. 9
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Doses in REM for region 3 Cont Room

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	9.051E-03	1.296E-04	1.585E-05	1.118E-06	1.359E-07
24.50	- 96.00	2.183E-02	3.125E-04	3.821E-05	2.661E-06	3.238E-07
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	3.088E-02	4.421E-04	5.406E-05	3.779E-06	4.597E-07

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Calc No.: STA-195 Rev No.: 2 Input: rhr-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Rhr-inf2.LDO Sheet No. 10
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	9.051E-03	1.296E-04	1.585E-05	1.118E-06	1.359E-07
9.600E+01	3.088E-02	4.421E-04	5.406E-05	3.779E-06	4.597E-07
7.200E+02	3.088E-02	4.421E-04	5.406E-05	3.779E-06	4.597E-07

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Calc No.: STA-195 Rev No.: 2 Input: rhr-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Rhr-inf2.LDO Sheet No. 11
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAB

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.50	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO         Sheet No.   12
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAB

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: rhr-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Rhr-inf2.LDO Sheet No. 13
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05
24.50	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Rhr-inf2.LDO         Sheet No.   14
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05
9.600E+01	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05
7.200E+02	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05

Attachment 13.27: rhr-pre2.ldo

```
 Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
 Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
 Originator: Ralph Berger         Date: 30 Sep 2011
 Project: Diablo Canyon           Job No.: rhr-pre2.LDO        Sheet No.    1
 Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================
```

```
 ___________________________________________________
|                                                   |
|            Standard Computer Program              |
|          NE319 LOCADOSE Version 7.0               |
|                                                   |
|___________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO         Sheet No.    2
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================

NE319 Dose Input Summary


This run uses the file rhr-pre2.ltf
generated on 30 Sep 2011  at  7:44:00

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file rhr-pre2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO         Sheet No.    3
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3
Factor	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)		Region	2	3
0.000	- 24.00		0.000E+00	1.000E+00
24.00	- 96.00		0.000E+00	6.000E-01
96.00	- 720.0		0.000E+00	4.000E-01

Breathing Rates (m^3/sec) for Each Region

Period (hrs)		Region	2	3
0.000	- 720.0		0.000E+00	3.470E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO        Sheet No.    4
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAB NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO        Sheet No.    5
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	6.766E+06	7.299E+05
1.000E-02	0.000E+00	0.000E+00	0.000E+00	6.753E+06	7.283E+05
8.950E-01	0.000E+00	0.000E+00	0.000E+00	5.759E+06	6.046E+05
8.000E+00	0.000E+00	0.000E+00	0.000E+00	2.578E+06	2.224E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	1.491E+06	1.198E+05
2.450E+01	0.000E+00	0.000E+00	0.000E+00	1.469E+06	1.180E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.905E+05	5.212E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	5.527E+04	5.019E+03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO         Sheet No.    6
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	2.917E-02	4.176E-04	5.107E-05	3.592E-06	4.368E-07
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: rhr-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: rhr-pre2.LDO Sheet No. 7
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.50	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO         Sheet No.    8
Subject: RHR Pp Seal Leakage post-LOCA doses
================================================================================
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: rhr-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: rhr-pre2.LDO Sheet No. 9
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Doses Within Regions Summary

Doses in REM for region 3 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	4.915E-03	7.040E-05	8.607E-06	6.071E-07	7.381E-08
24.50	- 96.00	1.186E-02	1.697E-04	2.075E-05	1.445E-06	1.758E-07
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	1.677E-02	2.401E-04	2.936E-05	2.052E-06	2.496E-07

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO         Sheet No.   10
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	4.915E-03	7.040E-05	8.607E-06	6.071E-07	7.381E-08
9.600E+01	1.677E-02	2.401E-04	2.936E-05	2.052E-06	2.496E-07
7.200E+02	1.677E-02	2.401E-04	2.936E-05	2.052E-06	2.496E-07

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO        Sheet No.   11
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAB

Time Interval (hr)		Inhalation			Immersion	
		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.50	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: rhr-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: rhr-pre2.LDO Sheet No. 12
Subject: RHR Pp Seal Leakage post-LOCA doses

==========

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAB

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: rhr-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: rhr-pre2.LDO        Sheet No.   13
Subject: RHR Pp Seal Leakage post-LOCA doses
```

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	-0.8950	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
0.8950	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 24.50	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05
24.50	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: rhr-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: rhr-pre2.LDO Sheet No. 14
Subject: RHR Pp Seal Leakage post-LOCA doses

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.950E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.450E+01	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05
9.600E+01	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05
7.200E+02	9.138E-02	1.309E-03	1.600E-04	1.690E-05	4.113E-05

Attachment 13.28: fil-inf2.ldo

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO        Sheet No.    1
Subject: 1 gpm Leakage - Filtered
==========================================================================================
```

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 ________________________________________________
|                                                |
|           Standard Computer Program            |
|          NE319 LOCADOSE Version 7.0            |
|                                                |
|________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO         Sheet No.    2
Subject: 1 gpm Leakage - Filtered
================================================================================

NE319 Dose Input Summary


This run uses the file fil-inf2.ltf
generated on 30 Sep 2011  at  7:43:26

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file fil-inf2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO        Sheet No.    3
Subject: 1 gpm Leakage - Filtered
```

NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3
Factor	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)		Region	2	3
0.000	- 24.00		0.000E+00	1.000E+00
24.00	- 96.00		0.000E+00	6.000E-01
96.00	- 720.0		0.000E+00	4.000E-01

Breathing Rates (m^3/sec) for Each Region

Period (hrs)		Region	2	3
0.000	- 720.0		0.000E+00	3.470E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO         Sheet No.    4
Subject: 1 gpm Leakage - Filtered
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1 EAP	NOT APPLIC	1.000E+00
2 LPZ	NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO        Sheet No.   5
Subject: 1 gpm Leakage - Filtered
================================================================================
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.642E+07	2.236E+06
1.000E-02	0.000E+00	0.000E+00	0.000E+00	1.637E+07	2.227E+06
2.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+07	1.189E+06
8.000E+00	0.000E+00	0.000E+00	0.000E+00	5.319E+06	5.222E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	2.303E+06	2.025E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.607E+05	5.222E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.310E+04	4.228E+03

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-inf2.LDO Sheet No. 6
Subject: 1 gpm Leakage - Filtered

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	4.551E-03	7.726E-05	9.851E-06	4.989E-06	9.509E-07
2.000E+00	2.842E-01	4.640E-03	5.795E-04	2.028E-04	3.297E-05
8.000E+00	2.747E-01	4.271E-03	5.237E-04	1.111E-04	1.528E-05
2.400E+01	1.765E-01	2.608E-03	3.173E-04	3.657E-05	4.506E-06
9.600E+01	8.420E-02	1.180E-03	1.453E-04	6.455E-06	8.422E-07
7.200E+02	4.713E-03	6.557E-05	8.098E-06	2.890E-07	3.971E-08

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-inf2.LDO Sheet No. 7
Subject: 1 gpm Leakage - Filtered

NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO         Sheet No.    8
Subject: 1 gpm Leakage - Filtered
================================================================================

NE319 Doses Within Regions Summary

                Cumulative doses in REM for region  2      Sump

                          Inhalation                    Immersion
  Time      Thyroid       Lung         Whole Body  Beta Skin   Whole Body
1.000E-02  0.000E+00   0.000E+00   0.000E+00   0.000E+00   0.000E+00
2.000E+00  0.000E+00   0.000E+00   0.000E+00   0.000E+00   0.000E+00
8.000E+00  0.000E+00   0.000E+00   0.000E+00   0.000E+00   0.000E+00
2.400E+01  0.000E+00   0.000E+00   0.000E+00   0.000E+00   0.000E+00
9.600E+01  0.000E+00   0.000E+00   0.000E+00   0.000E+00   0.000E+00
7.200E+02  0.000E+00   0.000E+00   0.000E+00   0.000E+00   0.000E+00
```

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-inf2.LDO Sheet No. 9
Subject: 1 gpm Leakage - Filtered

NE319 Doses Within Regions Summary

Doses in REM for region 3 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	2.281E-05	3.873E-07	4.939E-08	2.503E-08	4.773E-09
1.0000E-02	- 2.000	4.128E-01	6.830E-03	8.587E-04	3.443E-04	5.956E-05
2.000	- 8.000	1.709E+00	2.713E-02	3.351E-03	8.926E-04	1.319E-04
8.000	- 24.00	3.103E+00	4.690E-02	5.719E-03	8.909E-04	1.157E-04
24.00	- 96.00	4.426E+00	6.325E-02	7.744E-03	5.320E-04	6.563E-05
96.00	- 720.0	4.677E+00	6.514E-02	8.041E-03	2.960E-04	4.035E-05
	Total	1.433E+01	2.093E-01	2.571E-02	2.956E-03	4.131E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO         Sheet No.   10
Subject: 1 gpm Leakage - Filtered
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	2.281E-05	3.873E-07	4.939E-08	2.503E-08	4.773E-09
2.000E+00	4.129E-01	6.830E-03	8.587E-04	3.443E-04	5.957E-05
8.000E+00	2.122E+00	3.396E-02	4.210E-03	1.237E-03	1.914E-04
2.400E+01	5.225E+00	8.086E-02	9.928E-03	2.128E-03	3.071E-04
9.600E+01	9.651E+00	1.441E-01	1.767E-02	2.660E-03	3.727E-04
7.200E+02	1.433E+01	2.093E-01	2.571E-02	2.956E-03	4.131E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO        Sheet No.   11
Subject: 1 gpm Leakage - Filtered
```

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAP

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	5.009E-01	8.504E-03	1.084E-03	5.499E-04	2.099E-03
1.0000E-02	- 2.000	9.770E+01	1.623E+00	2.045E-01	8.537E-02	3.011E-01
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO        Sheet No.   12
Subject: 1 gpm Leakage - Filtered
================================================================================
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NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAP

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	5.009E-01	8.504E-03	1.084E-03	5.499E-04	2.099E-03
2.000E+00	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
8.000E+00	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
2.400E+01	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
9.600E+01	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
7.200E+02	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-inf2.LDO        Sheet No.   13
Subject: 1 gpm Leakage - Filtered
```

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	2.273E-02	3.858E-04	4.920E-05	2.495E-05	9.523E-05
1.0000E-02	- 2.000	4.432E+00	7.363E-02	9.277E-03	3.873E-03	1.366E-02
2.000	- 8.000	1.253E+01	1.989E-01	2.457E-02	6.553E-03	1.939E-02
8.000	- 24.00	2.957E+00	4.467E-02	5.446E-03	1.674E-03	4.347E-03
24.00	- 96.00	4.166E+00	5.952E-02	7.287E-03	7.465E-04	1.844E-03
96.00	- 720.0	2.509E+00	3.494E-02	4.314E-03	2.374E-04	6.479E-04
	Total	2.661E+01	4.121E-01	5.094E-02	1.311E-02	3.998E-02

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-inf2.LDO Sheet No. 14
Subject: 1 gpm Leakage - Filtered

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	2.273E-02	3.858E-04	4.920E-05	2.495E-05	9.523E-05
2.000E+00	4.455E+00	7.401E-02	9.327E-03	3.898E-03	1.376E-02
8.000E+00	1.698E+01	2.729E-01	3.389E-02	1.045E-02	3.315E-02
2.400E+01	1.994E+01	3.176E-01	3.934E-02	1.213E-02	3.749E-02
9.600E+01	2.410E+01	3.771E-01	4.663E-02	1.287E-02	3.934E-02
7.200E+02	2.661E+01	4.121E-01	5.094E-02	1.311E-02	3.998E-02

Attachment 13.29: fil-pre2.ldo

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.    1
Subject: 1 gpm Leakage - Filtered
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 ________________________________________________
|                                                |
|          Standard Computer Program             |
|         NE319 LOCADOSE Version 7.0             |
|                                                |
|________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.    2
Subject: 1 gpm Leakage - Filtered
================================================================================

NE319 Dose Input Summary


This run uses the file fil-pre2.ltf
generated on 30 Sep 2011  at  7:43:42

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file fil-pre2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO         Sheet No.    3
Subject: 1 gpm Leakage - Filtered
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3
Factor	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)		Region	2	3
0.000	- 24.00		0.000E+00	1.000E+00
24.00	- 96.00		0.000E+00	6.000E-01
96.00	- 720.0		0.000E+00	4.000E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO         Sheet No.    4
Subject: 1 gpm Leakage - Filtered
==========================================================================================
```

NE319 Dose Input Summary

Breathing Rates (m^3/sec) for Each Region			
Period (hrs)	Region	2	3
0.000 - 720.0		0.000E+00	3.470E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.    5
Subject: 1 gpm Leakage - Filtered
================================================================================

NE319 Dose Input Summary


         Finite Cloud Correction Factor for Each Dose Point

        Dose Point  Distance (m) Finite Cloud Factor
        1       EAP  NOT APPLIC      1.000E+00
        2       LPZ  NOT APPLIC      1.000E+00

         X/Q IN sec/m^3 for Each Dose Point

      Period (hrs)   Dosepoint   1         2
    0.000    - 2.000         5.290E-04 2.400E-05
    2.000    - 8.000         0.000E+00 2.400E-05
    8.000    - 24.00         0.000E+00 4.800E-06
    24.00    - 96.00         0.000E+00 1.540E-06
    96.00    - 720.0         0.000E+00 3.400E-07

        Breathing Rates in m^3/sec for Each Dose Point

      Period (hrs)   Dosepoint   1         2
    0.000    - 8.000         3.470E-04 3.470E-04
    8.000    - 24.00         1.750E-04 1.750E-04
    24.00    - 720.0         2.320E-04 2.320E-04
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.    6
Subject: 1 gpm Leakage - Filtered
================================================================================
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.642E+07	2.236E+06
1.000E-02	0.000E+00	0.000E+00	0.000E+00	1.637E+07	2.227E+06
2.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+07	1.189E+06
8.000E+00	0.000E+00	0.000E+00	0.000E+00	5.319E+06	5.222E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	2.303E+06	2.025E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.607E+05	5.222E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.310E+04	4.228E+03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.    7
Subject: 1 gpm Leakage - Filtered
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	2.456E-03	4.168E-05	5.315E-06	2.692E-06	5.130E-07
2.000E+00	1.534E-01	2.504E-03	3.126E-04	1.094E-04	1.779E-05
8.000E+00	1.482E-01	2.305E-03	2.826E-04	5.995E-05	8.246E-06
2.400E+01	9.559E-02	1.412E-03	1.719E-04	1.981E-05	2.441E-06
9.600E+01	4.572E-02	6.409E-04	7.893E-05	3.505E-06	4.574E-07
7.200E+02	2.551E-03	3.550E-05	4.384E-06	1.564E-07	2.150E-08

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.    8
Subject: 1 gpm Leakage - Filtered
================================================================================
```

NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

Time Interval (hr)	Inhalation			Immersion	
	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000 -1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000 - 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000 - 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00 - 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00 - 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-pre2.LDO Sheet No. 9
Subject: 1 gpm Leakage - Filtered

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-pre2.LDO Sheet No. 10
Subject: 1 gpm Leakage - Filtered

NE319 Doses Within Regions Summary

Doses in REM for region 3 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	1.231E-05	2.090E-07	2.665E-08	1.351E-08	2.575E-09
1.0000E-02	- 2.000	2.227E-01	3.685E-03	4.633E-04	1.858E-04	3.214E-05
2.000	- 8.000	9.220E-01	1.464E-02	1.808E-03	4.816E-04	7.115E-05
8.000	- 24.00	1.680E+00	2.539E-02	3.097E-03	4.824E-04	6.262E-05
24.00	- 96.00	2.404E+00	3.435E-02	4.205E-03	2.889E-04	3.564E-05
96.00	- 720.0	2.532E+00	3.526E-02	4.353E-03	1.602E-04	2.184E-05
	Total	7.761E+00	1.133E-01	1.393E-02	1.599E-03	2.234E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.   11
Subject: 1 gpm Leakage - Filtered
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	1.231E-05	2.090E-07	2.665E-08	1.351E-08	2.575E-09
2.000E+00	2.228E-01	3.685E-03	4.633E-04	1.858E-04	3.214E-05
8.000E+00	1.145E+00	1.833E-02	2.271E-03	6.673E-04	1.033E-04
2.400E+01	2.825E+00	4.372E-02	5.368E-03	1.150E-03	1.659E-04
9.600E+01	5.229E+00	7.807E-02	9.573E-03	1.439E-03	2.015E-04
7.200E+02	7.761E+00	1.133E-01	1.393E-02	1.599E-03	2.234E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.   12
Subject: 1 gpm Leakage - Filtered
================================================================================
```

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAP

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	5.009E-01	8.504E-03	1.084E-03	5.499E-04	2.099E-03
1.0000E-02	- 2.000	9.770E+01	1.623E+00	2.045E-01	8.537E-02	3.011E-01
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-pre2.LDO Sheet No. 13
Subject: 1 gpm Leakage - Filtered

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAP

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	5.009E-01	8.504E-03	1.084E-03	5.499E-04	2.099E-03
2.000E+00	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
8.000E+00	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
2.400E+01	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
9.600E+01	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01
7.200E+02	9.820E+01	1.631E+00	2.056E-01	8.592E-02	3.032E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: fil-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: Fil-pre2.LDO        Sheet No.   14
Subject: 1 gpm Leakage - Filtered
```

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	2.273E-02	3.858E-04	4.920E-05	2.495E-05	9.523E-05
1.0000E-02	- 2.000	4.432E+00	7.363E-02	9.277E-03	3.873E-03	1.366E-02
2.000	- 8.000	1.253E+01	1.989E-01	2.457E-02	6.553E-03	1.939E-02
8.000	- 24.00	2.957E+00	4.467E-02	5.446E-03	1.674E-03	4.347E-03
24.00	- 96.00	4.166E+00	5.952E-02	7.287E-03	7.465E-04	1.844E-03
96.00	- 720.0	2.509E+00	3.494E-02	4.314E-03	2.374E-04	6.479E-04
	Total	2.661E+01	4.121E-01	5.094E-02	1.311E-02	3.998E-02

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: fil-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: Fil-pre2.LDO Sheet No. 15
Subject: 1 gpm Leakage - Filtered

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	2.273E-02	3.858E-04	4.920E-05	2.495E-05	9.523E-05
2.000E+00	4.455E+00	7.401E-02	9.327E-03	3.898E-03	1.376E-02
8.000E+00	1.698E+01	2.729E-01	3.389E-02	1.045E-02	3.315E-02
2.400E+01	1.994E+01	3.176E-01	3.934E-02	1.213E-02	3.749E-02
9.600E+01	2.410E+01	3.771E-01	4.663E-02	1.287E-02	3.934E-02
7.200E+02	2.661E+01	4.121E-01	5.094E-02	1.311E-02	3.998E-02

Attachment 13.30: unf-inf2.ldo

```
 Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
 Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
 Originator: Ralph Berger         Date: 30 Sep 2011
 Project: Diablo Canyon           Job No.: unf-inf2.LDO         Sheet No.    1
 Subject: 1 gpm Leakage - Unfiltered
==========================================================================================
```

```
           ________________________________________________
          |                                                |
          |            Standard Computer Program           |
          |           NE319 LOCADOSE Version 7.0           |
          |                                                |
          |________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO        Sheet No.    2
Subject: 1 gpm Leakage - Unfiltered
================================================================================

NE319 Dose Input Summary


This run uses the file unf-inf2.ltf
generated on 30 Sep 2011  at  7:44:12

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file unf-inf2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO        Sheet No.    3
Subject: 1 gpm Leakage - Unfiltered
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factors for Each Region

Region	2	3
Factor	1.000E+00	1.000E+00

Occupancy Factor for Each Region

Period (hrs)	Region	2	3
0.000 - 24.00		0.000E+00	1.000E+00
24.00 - 96.00		0.000E+00	6.000E-01
96.00 - 720.0		0.000E+00	4.000E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO         Sheet No.    4
Subject: 1 gpm Leakage - Unfiltered
================================================================================
```

NE319 Dose Input Summary

Breathing Rates (m^3/sec) for Each Region			
Period (hrs)	Region	2	3
0.000 - 720.0		0.000E+00	3.470E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO        Sheet No.    5
Subject: 1 gpm Leakage - Unfiltered
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAP NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO        Sheet No.    6
Subject: 1 gpm Leakage - Unfiltered
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

	Inhalation			Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.642E+07	2.236E+06
1.000E-02	0.000E+00	0.000E+00	0.000E+00	1.637E+07	2.227E+06
2.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+07	1.189E+06
8.000E+00	0.000E+00	0.000E+00	0.000E+00	5.319E+06	5.222E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	2.303E+06	2.025E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.607E+05	5.222E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.310E+04	4.228E+03

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: unf-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-inf2.LDO Sheet No. 7
Subject: 1 gpm Leakage - Unfiltered

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	4.529E-02	7.687E-04	9.802E-05	4.965E-05	9.462E-06
2.000E+00	2.828E+00	4.617E-02	5.766E-03	2.018E-03	3.280E-04
8.000E+00	2.733E+00	4.250E-02	5.211E-03	1.106E-03	1.521E-04
2.400E+01	1.756E+00	2.595E-02	3.157E-03	3.639E-04	4.484E-05
9.600E+01	8.378E-01	1.174E-02	1.446E-03	6.423E-05	8.380E-06
7.200E+02	4.690E-02	6.525E-04	8.058E-05	2.875E-06	3.951E-07

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: unf-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-inf2.LDO Sheet No. 8
Subject: 1 gpm Leakage - Unfiltered

NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO        Sheet No.    9
Subject: 1 gpm Leakage - Unfiltered
================================================================================
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: unf-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-inf2.LDO Sheet No. 10
Subject: 1 gpm Leakage - Unfiltered

NE319 *Doses Within Regions Summary*

Doses in REM for region 3 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	2.270E-04	3.854E-06	4.914E-07	2.491E-07	4.749E-08
1.0000E-02	- 2.000	4.108E+00	6.796E-02	8.544E-03	3.426E-03	5.927E-04
2.000	- 8.000	1.700E+01	2.700E-01	3.334E-02	8.881E-03	1.312E-03
8.000	- 24.00	3.088E+01	4.667E-01	5.690E-02	8.865E-03	1.151E-03
24.00	- 96.00	4.404E+01	6.294E-01	7.706E-02	5.293E-03	6.530E-04
96.00	- 720.0	4.654E+01	6.481E-01	8.001E-02	2.945E-03	4.015E-04
	Total	1.426E+02	2.082E+00	2.559E-01	2.941E-02	4:110E-03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO        Sheet No.   11
Subject: 1 gpm Leakage - Unfiltered
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	2.270E-04	3.854E-06	4.914E-07	2.491E-07	4.749E-08
2.000E+00	4.108E+00	6.796E-02	8.545E-03	3.426E-03	5.927E-04
8.000E+00	2.111E+01	3.380E-01	4.189E-02	1.231E-02	1.905E-03
2.400E+01	5.199E+01	8.046E-01	9.879E-02	2.117E-02	3.056E-03
9.600E+01	9.603E+01	1.434E+00	1.758E-01	2.647E-02	3.709E-03
7.200E+02	1.426E+02	2.082E+00	2.559E-01	2.941E-02	4.110E-03

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Calc No.: STA-195 Rev No.: 2 Input: unf-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-inf2.LDO Sheet No. 12
Subject: 1 gpm Leakage - Unfiltered

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAP

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	4.984E+00	8.462E-02	1.079E-02	5.472E-03	2.088E-02
1.0000E-02	- 2.000	9.721E+02	1.615E+01	2.035E+00	8.494E-01	2.996E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00

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Calc No.: STA-195 Rev No.: 2 Input: unf-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-inf2.LDO Sheet No. 13
Subject: 1 gpm Leakage - Unfiltered

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAP

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	4.984E+00	8.462E-02	1.079E-02	5.472E-03	2.088E-02
2.000E+00	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
8.000E+00	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
2.400E+01	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
9.600E+01	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
7.200E+02	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: unf-inf2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-inf2.LDO Sheet No. 14
Subject: 1 gpm Leakage - Unfiltered

NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	2.261E-01	3.839E-03	4.896E-04	2.483E-04	9.475E-04
1.0000E-02	- 2.000	4.410E+01	7.326E-01	9.231E-02	3.854E-02	1.359E-01
2.000	- 8.000	1.247E+02	1.979E+00	2.445E-01	6.521E-02	1.929E-01
8.000	- 24.00	2.942E+01	4.444E-01	5.419E-02	1.666E-02	4.325E-02
24.00	- 96.00	4.145E+01	5.922E-01	7.251E-02	7.428E-03	1.834E-02
96.00	- 720.0	2.497E+01	3.477E-01	4.292E-02	2.362E-03	6.447E-03
	Total	2.648E+02	4.100E+00	5.069E-01	1.304E-01	3.979E-01

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-inf2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-inf2.LDO        Sheet No.   15
Subject: 1 gpm Leakage - Unfiltered
```

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	2.261E-01	3.839E-03	4.896E-04	2.483E-04	9.475E-04
2.000E+00	4.433E+01	7.365E-01	9.280E-02	3.879E-02	1.369E-01
8.000E+00	1.690E+02	2.716E+00	3.373E-01	1.040E-01	3.298E-01
2.400E+01	1.984E+02	3.160E+00	3.914E-01	1.207E-01	3.731E-01
9.600E+01	2.398E+02	3.753E+00	4.640E-01	1.281E-01	3.914E-01
7.200E+02	2.648E+02	4.100E+00	5.069E-01	1.304E-01	3.979E-01

Attachment 13.31: unf-pre2.ldo

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.    1
Subject: 1 gpm Leakage - Unfiltered
==========================================================================
```

```
 ________________________________________________
|                                                |
|           Standard Computer Program            |
|          NE319 LOCADOSE Version 7.0            |
|                                                |
|________________________________________________|
```

This is the Dose Calculation Program. This program calculates doses and dose rates for people at locations within building regions and at off-site locations.

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.    2
Subject: 1 gpm Leakage - Unfiltered
================================================================================

NE319 Dose Input Summary


This run uses the file unf-pre2.ltf
generated on 30 Sep 2011  at  7:44:16

         The following options and calculations are performed:

           Doserates within regions will be calculated
           Doses within regions will be calculated
           Offsite Doses will be calculated
           Control Room doses will be calculated

         This run evaluates  28 isotopes using  3 regions
         Offsite doses for  2 dose points will be calculated

The library file unf-pre2.lib is used in this run
Version 2.0  isotope data is used
Dose Conversion Factors from Federal Guidance Report 11 and 12 are used

         Isotopes Considered in this Run
         I--131  I--131  I--131  I--132  I--132  I--132  I--133  I--133
         I--133  I--134  I--134  I--134  I--135  I--135  I--135  KR-83M
         KR-85M  KR--85  KR--87  KR--88  KR--89  XE131M  XE133M  XE-133
         XE135M  XE-135  XE-137  XE-138
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.    3
Subject: 1 gpm Leakage - Unfiltered
================================================================================

NE319 Dose Input Summary

        Finite Cloud Correction Factors for Each Region

    Region     2         3
    Factor 1.000E+00 1.000E+00


        Occupancy Factor for Each Region

      Period (hrs)    Region     2         3
     0.000    - 24.00          0.000E+00 1.000E+00
     24.00    - 96.00          0.000E+00 6.000E-01
     96.00    - 720.0          0.000E+00 4.000E-01


        Breathing Rates (m^3/sec) for Each Region
      Period (hrs)    Region     2         3
     0.000    - 720.0          0.000E+00 3.470E-04
```

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.    4
Subject: 1 gpm Leakage - Unfiltered
================================================================================
```

NE319 Dose Input Summary

Finite Cloud Correction Factor for Each Dose Point

Dose Point	Distance (m)	Finite Cloud Factor
1	EAP NOT APPLIC	1.000E+00
2	LPZ NOT APPLIC	1.000E+00

X/Q IN sec/m^3 for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 2.000	5.290E-04	2.400E-05
2.000 - 8.000	0.000E+00	2.400E-05
8.000 - 24.00	0.000E+00	4.800E-06
24.00 - 96.00	0.000E+00	1.540E-06
96.00 - 720.0	0.000E+00	3.400E-07

Breathing Rates in m^3/sec for Each Dose Point

Period (hrs)	Dosepoint 1	2
0.000 - 8.000	3.470E-04	3.470E-04
8.000 - 24.00	1.750E-04	1.750E-04
24.00 - 720.0	2.320E-04	2.320E-04

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.    5
Subject: 1 gpm Leakage - Unfiltered
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.642E+07	2.236E+06
1.000E-02	0.000E+00	0.000E+00	0.000E+00	1.637E+07	2.227E+06
2.000E+00	0.000E+00	0.000E+00	0.000E+00	1.025E+07	1.189E+06
8.000E+00	0.000E+00	0.000E+00	0.000E+00	5.319E+06	5.222E+05
2.400E+01	0.000E+00	0.000E+00	0.000E+00	2.303E+06	2.025E+05
9.600E+01	0.000E+00	0.000E+00	0.000E+00	5.607E+05	5.222E+04
7.200E+02	0.000E+00	0.000E+00	0.000E+00	4.310E+04	4.228E+03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.    6
Subject: 1 gpm Leakage - Unfiltered
```

NE319 Dose Rate Within Regions Summary

Dose rates in REM/HR for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.000E-02	2.443E-02	4.148E-04	5.289E-05	2.679E-05	5.105E-06
2.000E+00	1.526E+00	2.491E-02	3.111E-03	1.089E-03	1.770E-04
8.000E+00	1.475E+00	2.293E-02	2.812E-03	5.965E-04	8.205E-05
2.400E+01	9.512E-01	1.405E-02	1.710E-03	1.971E-04	2.429E-05
9.600E+01	4.550E-01	6.377E-03	7.853E-04	3.488E-05	4.551E-06
7.200E+02	2.539E-02	3.532E-04	4.362E-05	1.557E-06	2.139E-07

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: unf-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-pre2.LDO Sheet No. 7
Subject: 1 gpm Leakage - Unfiltered

NE319 Doses Within Regions Summary

Doses in REM for region 2 Sump

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
1.0000E-02	- 2.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: unf-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-pre2.LDO Sheet No. 8
Subject: 1 gpm Leakage - Unfiltered

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 2 Sump

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2.400E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9.600E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7.200E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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Calc No.: STA-195 Rev No.: 2 Input: unf-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-pre2.LDO Sheet No. 9
Subject: 1 gpm Leakage - Unfiltered

NE319 Doses Within Regions Summary

Doses in REM for region 3 Cont Room

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	1.225E-04	2.079E-06	2.651E-07	1.344E-07	2.562E-08
1.0000E-02	- 2.000	2.216E+00	3.667E-02	4.610E-03	1.848E-03	3.198E-04
2.000	- 8.000	9.175E+00	1.457E-01	1.799E-02	4.792E-03	7.080E-04
8.000	- 24.00	1.672E+01	2.527E-01	3.081E-02	4.800E-03	6.231E-04
24.00	- 96.00	2.392E+01	3.418E-01	4.184E-02	2.874E-03	3.546E-04
96.00	- 720.0	2.520E+01	3.509E-01	4.331E-02	1.594E-03	2.174E-04
	Total	7.722E+01	1.128E+00	1.386E-01	1.591E-02	2.223E-03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO         Sheet No.   10
Subject: 1 gpm Leakage - Unfiltered
```

NE319 Doses Within Regions Summary

Cumulative doses in REM for region 3 Cont Room

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	1.225E-04	2.079E-06	2.651E-07	1.344E-07	2.562E-08
2.000E+00	2.216E+00	3.667E-02	4.610E-03	1.848E-03	3.198E-04
8.000E+00	1.139E+01	1.823E-01	2.260E-02	6.640E-03	1.028E-03
2.400E+01	2.811E+01	4.350E-01	5.341E-02	1.144E-02	1.651E-03
9.600E+01	5.203E+01	7.768E-01	9.525E-02	1.431E-02	2.005E-03
7.200E+02	7.722E+01	1.128E+00	1.386E-01	1.591E-02	2.223E-03

```
Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.   11
Subject: 1 gpm Leakage - Unfiltered
================================================================================
```

NE319 Offsite Dose Summary

Doses in REM for distance 1 EAP

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	4.984E+00	8.462E-02	1.079E-02	5.472E-03	2.088E-02
1.0000E-02	- 2.000	9.721E+02	1.615E+01	2.035E+00	8.494E-01	2.996E+00
2.000	- 8.000	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8.000	- 24.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24.00	- 96.00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96.00	- 720.0	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	Total	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00

Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.: STA-195 Rev No.: 2 Input: unf-pre2.ldi
Originator: Ralph Berger Date: 30 Sep 2011
Project: Diablo Canyon Job No.: unf-pre2.LDO Sheet No. 12
Subject: 1 gpm Leakage - Unfiltered

NE319 Offsite Dose Summary

Cumulative doses in REM for distance 1 EAP

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	4.984E+00	8.462E-02	1.079E-02	5.472E-03	2.088E-02
2.000E+00	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
8.000E+00	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
2.400E+01	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
9.600E+01	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00
7.200E+02	9.771E+02	1.623E+01	2.045E+00	8.549E-01	3.017E+00

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Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.   13
Subject: 1 gpm Leakage - Unfiltered
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NE319 Offsite Dose Summary

Doses in REM for distance 2 LPZ

		Inhalation			Immersion	
Time Interval (hr)		Thyroid	Lung	Whole Body	Beta Skin	Whole Body
0.000	-1.0000E-02	2.261E-01	3.839E-03	4.896E-04	2.483E-04	9.475E-04
1.0000E-02	- 2.000	4.410E+01	7.326E-01	9.231E-02	3.854E-02	1.359E-01
2.000	- 8.000	1.247E+02	1.979E+00	2.445E-01	6.521E-02	1.929E-01
8.000	- 24.00	2.942E+01	4.444E-01	5.419E-02	1.666E-02	4.325E-02
24.00	- 96.00	4.145E+01	5.922E-01	7.251E-02	7.428E-03	1.834E-02
96.00	- 720.0	2.497E+01	3.477E-01	4.292E-02	2.362E-03	6.447E-03
	Total	2.648E+02	4.100E+00	5.069E-01	1.304E-01	3.979E-01

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Bechtel Standard Computer Program LocaDose, NE319 Version 7.0, © 2004
Calc No.:  STA-195  Rev No.: 2   Input: unf-pre2.ldi
Originator: Ralph Berger         Date: 30 Sep 2011
Project: Diablo Canyon           Job No.: unf-pre2.LDO        Sheet No.   14
Subject: 1 gpm Leakage - Unfiltered
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NE319 Offsite Dose Summary

Cumulative doses in REM for distance 2 LPZ

		Inhalation		Immersion	
Time	Thyroid	Lung	Whole Body	Beta Skin	Whole Body
1.000E-02	2.261E-01	3.839E-03	4.896E-04	2.483E-04	9.475E-04
2.000E+00	4.433E+01	7.365E-01	9.280E-02	3.879E-02	1.369E-01
8.000E+00	1.690E+02	2.716E+00	3.373E-01	1.040E-01	3.298E-01
2.400E+01	1.984E+02	3.160E+00	3.914E-01	1.207E-01	3.731E-01
9.600E+01	2.398E+02	3.753E+00	4.640E-01	1.281E-01	3.914E-01
7.200E+02	2.648E+02	4.100E+00	5.069E-01	1.304E-01	3.979E-01

LBIE Screen – Applicability Determination

1. Proposed Activity/Implementing Document No: STA-195 (9000019634), Design Basis Dose Consequences and Recirculation Loop Margin Leakage Rates	Unit: ☐ 1 ☐ 2 ☒ 1&2	Imp Doc Rev No: 2

Briefly describe what is being changed and why:

SCOPE

Calculation STA-195: As the Analysis of Record (AOR), determines and documents the radiological dose following a Loss of Coolant Accident (LOCA). This includes the offsite dose release to demonstrate compliance to 10 CFR 100, and the control room personnel dose to demonstrate compliance with GDC 19. These results are then used to establish the post-LOCA recirculation loop allowable leakage rates.

CHANGES

STA-195 Changes

(1) Decrease the containment spray iodine removal rate from 31 hr^{-1} to 29 hr^{-1}.

(2) Redefine the Low Population Zone (LPZ) Boundary

(2)(a) Decrease the distance from 10 km to 6 miles.

(2)(b) To be consistent with the 6 mile LPZ boundary distance change in Item 2a, increase the following LPZ atmospheric dispersion factors (χ/Q):

(2)(b)(i) 0-8 hour: from 2.2E-5 to 2.4E-5 s/m^3

(2)(b)(ii) 8-24 hour: from 4.75E-6 to 4.8E-6 s/m^3

(3) Increase the delay time for Containment Spray (CS) delivery time from 86.5 seconds to 106 seconds (which includes a six second delay from LOCA initiation to SI signal generation).

The spray delay time of 86.5 seconds assumed in the AOR is calculated based on time to signal initiation, diesel generator start time, the sequence load time, and containment spray pipe fill time. [Note: The 86.5 second delay was not added to the FSAR when an earlier LOCA dose AOR (STA-087 Revision 0) was issued in 1998 to specifically address this new delay (previously 81.5 seconds). The 86.5 second delay was reported to the NRC via a routine 10 CFR 50.59 report via PG&E Letter DCL-02-049 dated 4/26/02.] The increase in spray delay time from 86.5 seconds to 106 seconds is due to potential delays associated with the undervoltage scenario described in SAPN 50301167.

Per PG&E Design Input Transmittal DIT-50301167-1-0, the 106 second spray delay is comprised of: 1) a limiting delay of six seconds between LOCA initiation and SI signal generation per FSARU Table 15.4.1-1B, and 2) a limiting delay of 100 seconds between the SI signal generation time and start of containment spray into containment per PG&E DIT-50301167-1-0, Table 1. In order to incorporate the longer delay times into the licensing basis, additional analysis is also being performed (such as containment integrity analyses) but which is outside the scope of this LBIE AD. This calculation revision includes the maximum potential containment spray delay impact on LOCA radiological dose associated with resolution of the 230 kV degraded voltage issue described in SAP Notification 50301167.

(4) Increase the initial Control Room Ventilation System (CRVS) intake air flow rate for normal (Mode 1 operation) from 2100 cfm to 4200 cfm.

The subject AOR assumes that the initial flow rate is increased from 2100 cfm total to 2100 cfm per unit (per DCM S-23F, Section 4.3.2) or 4200 cfm total. This intake flow rate is reduced to 2100 cfm total when the non LOCA unit inlet dampers are assumed to close.

(5) Increase the delay time of the normal CRVS inlet damper closure from 10 seconds to 18 seconds on the unit not experiencing the LOCA, and from 10 seconds to 44.2 seconds on the unit experiencing the LOCA.

The current damper closure delay time for both units is ten seconds from receipt of the SI actuation signal, which is assumed to occur at time zero. In addition to the existing ten second delay and to change the time zero of the analyzed sequence to the time of LOCA initiation, this activity will add the following additional damper closure delays to both units' dampers: 1) a limiting delay of six seconds between LOCA initiation and SI signal

generation per FSARU Table 15.4.1-1B, and 2) a limiting delay of two seconds between the SI signal generation time and SI actuation per PG&E DIT-50301167-1-0, Table 1. Also, the closure of the LOCA unit's intake dampers will be delayed until EDG start and loading due to degraded 230 kV voltage. Per Table 2 of the DIT, the EDGs are assumed to load onto the 4 kV buses at 26.2 seconds after SI actuation. In summary, the non-LOCA unit inlet damper closure delay is 18 seconds (6 + 2 + 10) and the LOCA unit inlet damper closure delay is 44.2 seconds (6 + 2 + 26.2 +10).

(6) Increase the assumed control room envelope infiltration rate from 10 cfm to 70 cfm.

The infiltration rate was increased as a contingency to bound any additional unfiltered in leakage to the control room envelope that may be identified during normal plant operation.

REASONS FOR CHANGES

STA-195 is being revised to include bounding equipment operation delays associated with resolution of the 230 kV degraded voltage issue and provide more conservative values for selected input parameters. Furthermore, Item (5) corrects a previous error that incorrectly used a single unit value of 2100 cfm. The actual Mode 1 intake air flow to the control room envelope is 2100 cfm per unit (per DCM S-23F Section 4.3.2), or 4200 cfm total.

2. Applicability Determination (refer to TS3.ID2, Appendix 7.1 Section 2 for instructions) Does the proposed activity involve:			Ref. TS3.ID2 Appendix 7.1
2.a A change to the Facility/ISFSI Operating License (OL), Environmental Protection Plan (EPP) or Technical Specifications (TS)?	☒ Y	☐ N	Block 2.a
2.b A change to the Quality Assurance Program?	☐ Y	☒ N	Block 2.b
2.c A change to the Security Plan?	☐ Y	☒ N	Block 2.c
2.d A change to the Emergency Plan?	☐ Y	☒ N	Block 2.d
2.e A change to the Inservice Testing (IST) Program Plan?	☐ Y	☒ N	Block 2.e
2.f A change to the Inservice Inspection (ISI) Program Plan?	☐ Y	☒ N	Block 2.f
2.g A change to the Fire Protection Program?	☐ Y	☒ N	Block 2.g
2.h A noncompliance with the Environmental Protection Plan or may create a situation adverse to the environment?	☐ Y	☒ N	Block 2.h
2.i A change to the FSARU (including documents incorporated by reference) excluded from the requirement to perform a 50.59/72.48 review?	☐ Y	☒ N	Block 2.i
2.j Maintenance that restores SSCs to their original or newly approved designed condition? (Check "No" if activity is related to ISFSI.)	☐ Y	☒ N	Block 2.j
2.k A temporary alteration supporting maintenance that will be in effect during at-power operations for 90 days or less? (Check "No" if activity is related to ISFSI.)	☐ Y	☒ N	Block 2.k
2.l Managerial or administrative procedure/process controlled under 10 CFR 50, App. B?	☐ Y	☒ N	Block 2.l
2.m Regulatory commitment not covered by another regulatory based change process?	☐ Y	☒ N	Block 2.m
2.n An impact to other plant specific programs (e.g., the ODCM) that are controlled by regulations, the OL, or TS?	☐ Y	☒ N	Block 2.n

3. Applicability Determination Conclusions (refer to TS3.ID2, Appendix 7.1 Section 3 for instructions):

☒ **A 10 CFR 50.59 or 72.48 screen is NOT required** because ALL aspects of the activity are controlled by one or more of the processes listed above, or have been approved by the NRC, or covered in full in another LBIE review.

☐ **A 10 CFR 50.59 or 72.48 screen will be completed** because some or all the aspects of the activity are not controlled by any of the processes listed above or cannot be exempted from the 10 CFR 50.59/72.48 screen.

4. Does the proposed activity involve a change to the plant where the change requires a safety assessment? (refer to TS3.ID2, Appendix 7.1 Section 4 for instructions)	☐ Y	☒ N

5. Remarks: (Use this section to provide sufficient justification(s) per TS3.ID2, step 5.1.3 for determinations in step 2 and conclusion in step 3.)

   2.a: The proposed activity involves a change to the Facility Operating License since the input assumption changes for the increased CS delay time and increased CRVS inlet damper closure time yields dose results that exceed the 10 CFR 100 and GDC 19 limits without offsetting input assumption changes for other input parameters. Chapter 15 of the current FSARU does not specifically allow the LOCA radiological consequences analysis input changes to be revised in order to maintain the consequences within the 10 CFR 100 and GDC 19 limits. The proposed activity must therefore be submitted to the NRC for approval to allow the proposed LOCA radiological consequences analysis input changes to be incorporated into the FSARU and to allow the offsetting analysis input changes to maintain the consequences within the 10 CFR 100 and GDC 19 limits.

Preparer Signature: (Qual: TLBIEAD or TLBIE) Hector M Garcia	Date: 10-5-11	Print Last Name: Garcia
Reviewer Signature: (Qual: TLBIEAD or TLBIE) Wm E Ballard	Date: 10-5-11	Print Last Name: Ballard
PG&E Acceptance Signature: (Qual: TLBIEAD or TLBIE) (N/A if performed or reviewed by PG&E)	Date:	Print Last Name: N/A

Refer to TS3.ID2, Section 6, for instructions on handling completed forms.