

CALCULATION TITLE PAGE

Page No. 1



BYRON STATION

UNIT(S) 1&2

Calculation No: BYR97-332
Project No.: 9044-057
Description Code: R02
Discipline Code: M
System Code: VC, MS

TITLE: Control Room Dose for MSLB Accident

Safety Related Augmented Quality Non-Safety Related

REFERENCE NUMBERS

Type	Number	Type	Number
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COMMONWEALTH EDISON COMPANY CALCULATION REVISION PAGE

CALCULATION NO. BYR97-332 PROJECT NO. 9044-057 PAGE NO.: 2

REVISION SUMMARIES

REV: 0

REVISION SUMMARY:

Original issue, page 1 through 7, A1, A2, B1, C1

Electronic Calculation Data Files:

(Program Name, Version, File name ext/size/date/hour/: min)

None

Prepared by: W. J. Johnson / *[Signature]* 8/22/97
Print/Sign Date

Reviewed by: B. C. Schwarz / *[Signature]* 8/22/97
Print/Sign Date

Type of Review
 Detailed Alternate Test

DO ANY ASSUMPTIONS IN THIS CALCULATION REQUIRE LATER VERIFICATION YES NO

Tracked by: _____

REV:

REVISION SUMMARY:

Electronic Calculation Data Files:

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Prepared by: _____ _____
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Type of Review
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DO ANY ASSUMPTIONS IN THIS CALCULATION REQUIRE LATER VERIFICATION YES NO

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TABLE 6-4-1

EXPECTED DOSE TO CONTROL ROOM PERSONNEL AT BYRON STATION
FOLLOWING A LOSS-OF-COOLANT ACCIDENT (LOCA)

	CONCRETE SHIELD THICKNESS BETWEEN SOURCE AND CONTROL ROOM, INCHES		WHOLE BODY		ACCUMULATED 30 DAY DOSE, REM		THYROID
	SideWall -	Ceiling -	Y	β and γ	SEIN		
Direct Dose From Airborne Radioactivity in the Containment	102	58	0.023	--	--	--	--
Dose From Post-LOCA Plume Surrounding Control Room	24		9.093	--	--	--	--
Dose From Radioactivity Accumulated on Control Room Makeup Air Filters	8		0.013	--	--	--	--
Dose From Air Drawn into the Control Room	N/A		2.17	23.30	18.20		
From Containment Leakage	N/A		1.08x10 ⁻⁵	.65x10 ⁻⁵	0.274		
From ESP Equipment Leakage							

19 CFR 50, Appendix A, Criterion 19 limits

Note: Principal assumptions are listed in Table 6-4-1a.

BYRON-UFSAR

Calc No. BRY97-332, Rev 0
Page A-2

TABLE 6.4-1a

PRINCIPAL ASSUMPTIONS USED IN CONTROL ROOM
HABITABILITY CALCULATIONS

Core thermal power	3565 MW(t)
Containment volume: sprayed volume	2.55 x: 10 ⁶ ft ³
unsprayed volume	2.130 x: 10 ⁵ ft ³
Flow rate, sprayed to unsprayed volume	1.80 x: 10 ⁵ ft ³ /min.
Containment spray coefficients:	
elemental iodine	29.9/hr
particulate and organic iodine	0
Containment leak rate	0-24 hr 0.1%/day 1-30 day 0.02%/day
ECCS leak rate	1. ga./hr.
Auxiliary bldg filter efficiency	90%
Control room habitability methodology: Murphy/Campe	13th air cleaning conference paper.

Single inlet configuration is assumed at a distance of 100 feet from the containment surface.

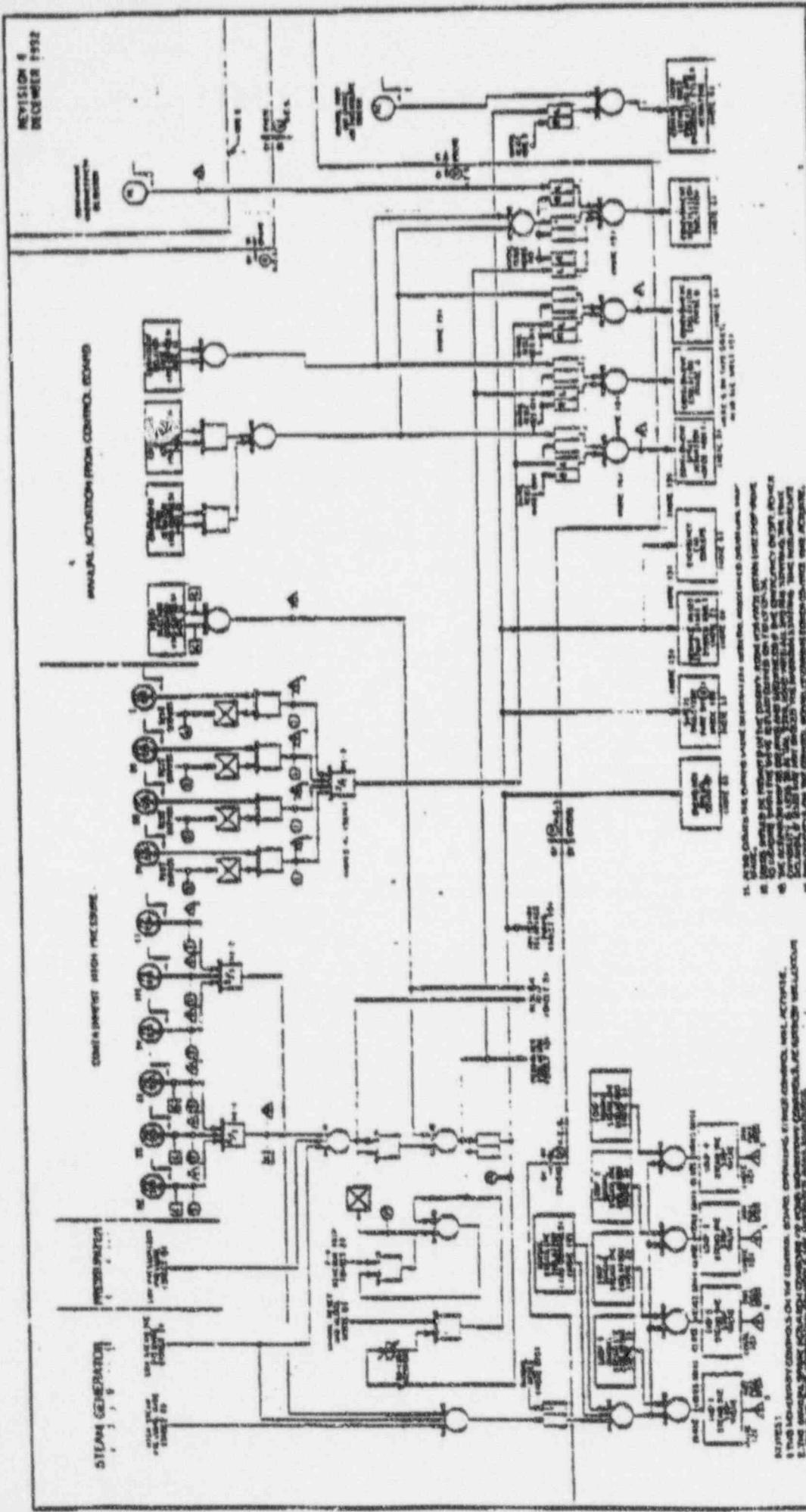
χ/Q (maximum 0-8 hour) in a direction 98° East of North from the Unit 2 containment = 4.05×10^{-3} sec/m³

TIME PERIOD	WINDSPEED FACTOR	<u>χ/Q REDUCTION FACTOR</u>		TOTAL χ/Q REDUCTION FACTOR
		WIND FACTOR DIRECTION	OCCUPANCY FACTOR	
0-8 hr	1.0	1.0	1.0	1.0
8-24 hr	0.549	0.856	1.0	0.470
24-96 hr	0.331	0.712	0.6	0.141
96-720 hr	0.199	0.424	0.4	0.034

Control room HVAC envelope volume	405,164 ft ³
Actual control room volume used for finite cloud correction	230,837 ft ³
Control room air intake filter efficiency	99%
Control room recirc. filter efficiency	90%
Control room flow rates (see Figures 6.4-6 and 6.4-7)	

Total unfiltered inleakage rate into the control room pressure boundary 78.75 ft³/min.

Calc No. BRY97-332, Rev 0
Page B-1



REVISION 8
DECEMBER 1972

BYRON STATION
UPDATED FINAL SAFETY ANALYSIS REPORT

FIGURE 7-2-1
FUNCTIONAL DIAGRAMS
15WEE1 8 OF 181

1. This diagram shows the primary loop of the reactor system, including the steam generator, pressurizer, condenser, and pumps.
2. The diagram illustrates the control system for the reactor, showing the analog actuation from the control board to various pumps and valves.
3. The diagram shows the interconnections between the primary loop and the secondary loop, including the condenser and pumps.
4. The diagram shows the safety system components, including the safety injection pumps and the safety shutdown system.
5. The diagram shows the electrical control system, including the relays and switches that actuate the pumps and valves.
6. The diagram shows the instrumentation system, including the sensors and transmitters that provide feedback to the control system.
7. The diagram shows the auxiliary systems, including the cooling water system and the steam heating system.
8. The diagram shows the overall layout of the reactor system, including the steam generator, pressurizer, condenser, and pumps.
9. The diagram shows the control room layout, including the control console and the operator's workstation.
10. The diagram shows the safety analysis report, including the description of the system and the results of the safety analysis.

TABLE 15.6-9

ACTIVITY RELEASES TO ATMOSPHERE FROM LOSS OF COOLANT ACCIDENT

(Realistic Analysis Activity Release (Ci))

ISOTOPE	0-2 HR	2-8 HR	8-24 HR	1-4 DAYS	4-30 DAYS
I-131	6.21 (-5)	1.58 (-4)	4.06 (-4)	3.91 (-4)	1.19 (-3)
I-132	1.82 (-4)	1.54 (-4)	3.08 (-5)	6.71 (-8)	3.47 (-17)
I-133	1.58 (-4)	3.56 (-4)	6.66 (-4)	2.16 (-4)	2.20 (-5)
I-134	1.66 (-5)	3.24 (-6)	2.82 (-8)	2.21 (-4)	3.80 (-39)
I-135	1.07 (-4)	1.84 (-4)	1.74 (-4)	1.03 (-5)	6.21 (-9)
Xe-133	1.63 (-2)	4.77 (-2)	1.20 (-1)	1.07 (-1)	2.13 (-1)
Xe-133m	1.86 (-3)	5.28 (-3)	1.22 (-2)	8.10 (-3)	5.35 (-3)
Xe-135	2.86 (-3)	6.38 (-3)	7.81 (-3)	8.28 (-4)	3.62 (-6)
Xe-135m	2.66 (-5)	1.29 (-7)	1.45 (-14)	1.06 (-33)	NEGLIGIBLE
Xe-138	9.86 (-5)	7.40 (-7)	3.05 (-13)	7.22 (-31)	NEGLIGIBLE
Kr-85	7.58 (-3)	2.27 (-2)	6.06 (-2)	6.81 (-2)	5.88 (-1)
Kr-85m	8.24 (-4)	1.38 (-3)	7.98 (-4)	1.70 (-5)	1.81 (-10)
Kr-87	3.71 (-4)	1.80 (-4)	7.01 (-6)	2.77 (-10)	2.18 (-27)
Kr-88	1.48 (-3)	1.78 (-3)	5.01 (-4)	2.34 (-6)	3.56 (-14)

(Regulatory Guide 1.4 Analysis Activity Release (Ci))

I-131	2.14 (+2)	5.45 (+2)	1.40 (+3)	2.69 (+3)	8.12 (+3)
I-132	2.57 (+2)	2.17 (+2)	4.35 (+1)	1.89 (+1)	NEGLIGIBLE
I-133	4.69 (+2)	1.06 (+3)	1.98 (+3)	1.28 (+3)	1.30 (+2)
I-134	3.20 (+2)	6.22 (+1)	5.42 (+1)	NEGLIGIBLE	NEGLIGIBLE
I-135	4.02 (+2)	6.84 (+2)	6.46 (+2)	7.68 (+1)	4.60 (-2)
Xe-133	1.69 (+4)	4.94 (+4)	1.24 (+5)	2.21 (+5)	4.40 (+5)
Xe-133m	4.26 (+4)	1.21 (+3)	2.81 (+3)	3.72 (+3)	2.45 (+3)
Xe-135	4.27 (+3)	9.53 (+3)	1.17 (+4)	2.47 (+3)	1.08 (+1)

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