Enclosure 2

OFFSITE DOSE CALCULATION MANUAL

REVISION 10

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This revision incorporates changes to establish a new release pathway (steam generator blowdown bypass) for potentially radioactive liquid effluents. This pathway addition includes adding radiation monitors 2RT-6753, 2RT-6759, 3RT-6753 and 3RT-6759 (page 1-12) and flow indicators 2 FIC-4055, 2 FIC-4056, 3 FIC-4055 and 3 FIC-4056 (page 1-13). Suitable calibration constants (Table 1-1) based on I-131 and Cs-137 are added for the Unit 2 monitors (2RT-6753 and 2RT-6759), with the note that Unit 3 monitor calibration constants would be added before use of the Unit 3 blowdown bypass (page 1-16).

A reduction in the administrative value (from 0.8 to 0.7) used to determine the maximum allowable concentration of liquid in the liquid radwaste discharge line (2/3 RT-7813) was made to provide for addition to the new effluent pathway. (See page 1-4 and page 1-6.)

The new effluent pathway, "steam generator blowdown bypass," is a continuous style stream, and the calculation and methodology is the same as for steam generator blowdown. Therefore, the changes do not reduce the accuracy or reliability of dose calculations or setpoint determinations. Administrative values were included in this calculation so as not to constitute an increase in the total release rate from the site. The value assigned is 0.1 distributed as 0.05 per steam generator.

This revision was presented and accepted by the Onsite Review Committee on May 18, 1983.

Step 2) The adjustment factor, A, for each batch tank (or sump) is determined using:

$$A = \sum_i \frac{C_{\gamma i}}{MPC_{\gamma i}} + \frac{C_s}{MPC_s} + \frac{C_t}{MPC_t} + \frac{C_\alpha}{MPC_\alpha} + \frac{C_{Fe}}{MPC_{Fe}} \quad (1\text{-}3)$$

$MPC\gamma_i$, MPC_s, MPC_t, MPC_{Fe}, $MPC\ \alpha$ = the limiting concentrations of the appropriate radionuclide from 10CFR20, Appendix B, Table II, Column 2. For dissolved or entrained noble gases, the concentration shall be limited to 2.0 E-4μCi/mℓ total activity.

Step 3) The radioactivity monitor setpoint may now be specified based on the values of $\sum_i C\gamma_i$, F, A and R to provide compliance with the limits of 10CFR20, Appendix B, Table II, Column 2. The monitor setpoint (cpm) is taken from the applicable calibration constants given in Table 1-1 to correspond to the calculated monitor limit C_m.

<u>2/3 RT - 7813</u>

$$C_m < \frac{0.7\ F\ C_{eff}}{R_1\ A_1 + R_2\ A_2 + \ldots + R_n\ A_n} \quad (1\text{-}4)$$ R

A_1, A_2, etc. = Value of A from equation (1-3) for first tank, second tank, etc.

The 0.7 is an administrative value used to account for the potential activity for other releases. This assures that the total concentration from all release points to the plant discharge will not result in a release of concentrations exceeding the limits of 10CFR20, Appendix B, Table II, Column 2 from the site. R

NOTE: If $C_m \leq C_{eff}$ then no release is possible. To increase C_m, increase dilution flow F (by running more circulating water pumps in the applicable discharge structure), and/or decrease the effluent flow rates R_1, R_2, etc. (by throttling the combined flow as measured on 2/3 FI-7643), and recalculate C_m using the new F, R and equation (1-4).

NOTE: If $C_m < \sum_i C_{\gamma i}$ then no release is possible. To increase C_m, increase dilution flow F (by running more circulating water pumps), and/or decrease the effluent flow rate R (by throttling the flow as measured on 2FI 3772 and 3FI 3772), and recalculate C_m using the new F, R and equation (1-6).

If there is no release associated with this monitor, the monitor setpoint should be established as close to background as practical to prevent spurious alarms and yet assure an alarm should an inadvertant release occur.

1.1.2 Continuous Release Setpoint Determination

Step 1) The isotopic concentration for the continuous releases are obtained for each release stream (steam generator blowdown, and steam generator blowdown bypass, and turbine building sump) from the sum of the respective measured concentrations as determined by analysis: R

$$C = \sum_{i} C_{\gamma i} + C_{\alpha} + C_{t} + C_{s} + C_{Fe} \qquad (1\text{-}7)$$

where:

$\Sigma C_{\gamma i}$ = the total gamma activity (μCi/cc) associated with each radionuclide, i, in the weekly composite analysis for the release stream.

C_{α} = The total measured gross alpha concentration (μCi/cc) determined from the previous monthly composite analysis for the release stream.

C_{Fe} = The total Fe-55 concentration as determined in the previous quarterly composite sample for the release stream.

C_{t} = the total measured H-3 concentration (μCi/cc) determined from the previous monthly composite analysis for the release stream.

C_{s} = the total measured concentration (μCi/cc) of Sr-89 and Sr-90 as determined from the previous quarterly composite analysis for the release stream.

Step 2) The adjustment factor, B, for each release stream (steam generator blowdown or turbine building sump) is determined using:

$$B = \sum_i \frac{C_{\gamma i}}{MPC_i} + \frac{C_s}{MPC_s} + \frac{C_t}{MPC_t} \quad \frac{C_\alpha}{MPC_\alpha} + \frac{C_{Fe}}{MPC_{Fe}} \qquad (1\text{-}8)$$

Step 3) The setpoint for each continuous release radioactivity monitor may now be specified based on the respective values of $\sum_i C_{\gamma i}$, F, B and R to provide compliance with the limits of 10CFR50, Appendix B, Table II, Column 2. The monitor setpoint (cpm) is taken from the applicable calibration constants given in Table 1-1 to correspond to the calculated monitor limit, C_m.

2RT - 7817, 3RT - 7817

$$C_m \leq \frac{(0.5)\ (0.1)\ F \sum_i C_{\gamma i}}{R\ B} \qquad (1\text{-}9a)$$

Where:

$\sum_i C_{\gamma i}$, B = values of $\sum_i C_{\gamma i}$ and B (as defined in Steps 1 and 2 above) for the steam generator blowdown.

Table 2-1

Gaseous Effluent Radiation Monitor
Calibration Constants

Monitor	Kr-85*	Xe-133*	
2RT-7804-1C	3.07 E-8	3.86 E-8	R
3RT-7804-1C	2.05 E-8	1.67 E-8	
2/3RT-7808C	2.76 E-8	3.72 E-8	
2/3RT-7814A	3.37 E-8	4.30 E-8	R
2/3RT-7814B	4.24 E-5	3.61 E-5	
2RT-7818A	3.06 E-8	5.30 E-8	
2RT-7818B	6.92 E-5	5.11 E-5	R
3RT-7818A	3.14 E-8	4.56 E-8	
3RT-7818B	3.00 E-5	2.83 E-5	
2RT-7865-1 (low)	1.41 E-8	3.02 E-8	
2RT-7865-1 (mid)		5.33 E-5	
2RT-7865-1 (high)		6.81 E-2	
3RT-7865-1 (low)	1.41 E-8	3.02 E-8	
3RT-7865-1 (mid)		8.02 E-5	
3RT-7865-1 (high)		2.39 E-2	
2RT-7870-1 (low)	1.41 E-8	3.02 E-8	
2RT-7870-1 (mid)		1.07 E-4	
2RT-7870-1 (high)		2.87 E-2	
3RT-7870-1 (low)	1.41 E-8	3.02 E-8	
3RT-7870-1 (mid)		1.08 E-4	
3RT-7870-1 (high)		2.17 E-2	

*μCi/cc/cpm

R = 400 gpm

where R is the effluent flow rate at the radiation monitor as defined in Step 2.

The 0.1 is an administrative value to account for the potential activity in other release pathways. This assures that the total concentration from all release points to the plant discharge will not result in a release of concentrations exceeding the limits of 10CFR20, Appendix B, Table II, Column 2 from the site. 0.5 is an administrative value used to account for simultaneous releases from both SONGS 2 and SONGS 3.

NOTE: $C_m < \sum_i C_{\gamma i}$ then no release is possible. To increase C_m, increase the dilution flow F (by running more circulating water pumps), and/or decrease the effluent flow rate R (by throttling the flow as measured on 2FI-3772 or 3FI-3772, as appropriate) and recalculate C_m using the new values of F, R and equation (1-9a). R

2RT - 6753, 2RT - 6759, 3RT - 6753, 3RT - 6759

$$C_m \leq \frac{(0.5)\ (0.05)\ F \sum_i C_{\gamma i}}{R\ B}$$

Where:

$\sum_i C_{\gamma i}$, B = values of $\sum_i C_{\gamma i}$ and B (as defined in Steps 1 and 2 above) for the steam generator blowdown bypass.

R = 200 gpm

N

where R is the maximum per steam generator blowdown bypass effluent flowrate.

The 0.05 is an administrative value to account for the potential activity in other release pathways. This assures that the total concentration from all release points to the plant discharge will not result in a release exceeding the limits of 10CFR20, Appendix B, Table II, Column 2 from the site. The 0.5 is an administrative value used to account for simultaneous releases from both SONGS 2 and SONGS 3.

Note: If $C_m \leq \sum_i C_{\gamma i}$ then no release is possible. To increase C_m, increase the dilution flow F (by running more circulating water pumps), and/or decrease the effluent flow rate R (by throttling the flow as measured on 2FIC-4055, 2FIC-4056, 3FIC-4055 or 3FIC-4056, as appropriate), and recalculate C_m in equation 1-9b) using the new values of F, R. N

2RT - 7821, 3RT - 7821

$$C_m < \frac{(0.5)\,(0.1)\,F \sum_i C_{\gamma i}}{RB} \qquad (1\text{-}10)$$

Where:

$\sum_i C_{\gamma i}$, B = values of $\sum_i C_{\gamma i}$ and B (as defined in steps 1) and 2) above) for the turbine building sump

R = 50 gpm/pump (x no. sump pumps to be run)

The 0.1 is an administrative value to account for the potential activity in other release pathways. This assures that the total concentration from all release points to the plant discharge will not result in a release of concentrations exceeding the limits of 10CFR20, Appendix B, Table II, Column 2 from the site. 0.5 is an administrative value used to account for simultaneous releases from both SONGS 2 and SONGS 3.

NOTE: If $C_m < \sum_i C_{\gamma i}$ then no release is possible. To increase C_m, increase the dilution flow F (by running more circulating water pumps) and recalculate C_m using the new value of F and equation (1-10).

Table 1-1

Liquid Effluent Radiation Monitor Calibration Constants

Monitor	Co-60*	Ba-133*	Cs-137*
2RT-6753		1.86 E-8	1.96 E-8
2RT-6759		1.79 E-8	1.91 E-8
3RT-6753		Note 1	Note 1
3RT-6759		Note 1	Note 1
2/3RT-7813	2.08 E-9	3.14 E-9	4.59 E-9
2RT-7817	2.11 E-9	3.20 E-9	4.71 E-9
2RT-7821	2.08 E-9	3.17 E-9	4.61 E-9
3RT-7817	2.24 E-9	2.99 E-9	4.63 E-9
3RT-7821	2.15 E-9	3.30 E-9	4.72 E-9

*μCi/cc/cpm

Note 1 -- These calibration constants will be provided prior to utilizing Unit 3 Steam Generator blowdown bypass lines.