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## FIGURES



## TABLES

# 1. PURPOSE

The purpose of this calculation is to evaluate potential radon exposure to workers to support the License Application design effort of the subsurface ventilation system of the repository. The scope of this calculation is to provide estimates of radon exposure to workers based on the ventilation airflow networks described in *Ventilation Network Model Calculation* (BSC 2003a). The subsurface facility workers may be exposed to elevated airborne radon and its short-lived decay products. The ventilation system of the repository must be designed to control, to an acceptable degree or limit, the concentration of radon and its decay products (Minwalla 2003, p. 202).

The technical basis for calculating radon exposure was previously established in *Subsurface Radon Calculations* (CRWMS M&O 2000). This report updates the calculation by using the subsurface design layout for License Application presented in *Underground Layout Configuration* (BSC 2003b). The calculated radon exposure values for the subsurface facilities, therefore, supercede that described in CRWMS M&O (2000).

# 2. QUALITY ASSURANCE

This technical product was prepared in accordance with AP-3.12Q, *Design Calculations and Analyses.* In accordance with *Q-List* (BSC 2003c, p. A-7), both the subsurface emplacement and development ventilation systems are designated as ‘not important to waste isolation’ and ‘not important to safety’ and the safety category is non-SC (BSC 2003c, p. A-7). Therefore, this calculation is not subject to the requirements of *Quality Assurance Requirements and Description* (DOE 2003).

# 3. METHOD

Radon (Rn-222), produced by decay of radium-226 (Ra-226) in underground rocks, migrates through rock and emanates continuously from repository surfaces into all air spaces. After emanation, it is carried along in ventilation currents and decays to produce the solid short-lived decay progeny polonium-218 (Po-218), lead-214 (Pb-214) and bismuth-214 (Bi-214) (Figure 1).

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $\alpha$ | $\alpha$ | $\beta$ | $\beta$ | $\alpha$ | $\beta$ | $\beta$ | $\alpha$ | |
| $^{222}Rn \rightarrow$ | $^{218}Po \rightarrow$ | $^{214}Pb \rightarrow$ | $^{214}Bi \rightarrow$ | $^{214}Po \rightarrow$ | $^{210}Pb \rightarrow$ | $^{210}Bi \rightarrow$ | $^{210}Po \rightarrow$ | $^{206}Pb$ |
| 3.82 d | 3.05 m | 26.8 m | 19.9 m | 164 μs | 22.3 y | 5.01d | 138d | stable |

Source: Kocher 1981, p. 63.

Figure 1. Radon Decay Chain

Once in the repository air, Rn-222 remains entrained until the air is discharged aboveground. During the construction and operation of the repository, subsurface workers are exposed to airborne radon and their short-lived decay products. In underground facilities, the concentration of radon and its decay products, in the absence of adequate control measures, can reach relatively high values. Exposure of personnel in underground facilities is maintained within the recommended limits primarily by mechanical ventilation in combination with other protective techniques.

In this document, the calculation of radon concentration and working levels within the subsurface drifts are based on the repository layout presented in *Underground Layout Configuration*. (BSC 2003b) and the calculation models described in *Subsurface Radon Calculations* (CRWMS M&O 2000). The ventilation airflow and airway pressure distributions are based on data provided in *Ventilation Network Model Calculation* (BSC 2003a, Attachment D).

# 4. ASSUMPTIONS

The following assumptions have been made in order to calculate radon and the decay progeny concentrations given in Section 6.

## 4.1 RADON FLUX ESTIMATIONS

It is assumed that rock strata are uniform throughout each drift segment, and the average rate of radon release or annual average radon flux can be approximated by a linear relationship with differential pressure (Figure 2) generated by ventilation flow. It is also assumed that radon flux in the heated emplacement drifts is proportional to the 1.75 power of average rock temperature.

### 4.1.1 Uniform Rock Strata

The assumption of the uniform rock strata throughout each drift segment for flux calculation is used to average the heterogeneity effect of rock strata. For the main drifts, the attenuation of radon flux by concrete liners, if present, is neglected for conservatism. This assumption is used in Section 6.3 for concentration calculation.

### 4.1.2 Ventilation Effect

The pressure differentials created by barometric pressure changes and ventilation conditions of the Exploratory Studies Facility (ESF) have been found to induce significant movement of rock gas and the respective transport of radon within the rocks in *Subsurface Radon Flux Calculation* (BSC 2003d, p. 16). The average radon flux from the rock surfaces was estimated in BSC (2003d, p. 14) using radon concentration measurements made at 3900 m and 5035 m within the ESF. The average radon fluxes for ventilation using one fan and two fans (with average velocities of 1.59 m/s and 2.70 m/s, respectively) are shown in Table 1. The flux values indicate that under the ESF negative pressure (suction) system higher airflow generates higher radon flux. The negative pressure system means a repository in which the air pressure underground is negative during venting with respect to the ambient air pressure on the surface. A 70 percent increase in ventilation airflow resulted in about a 50 percent increase in radon flux.

Table 1. Average Radon Flux vs. Pressure Differential

| ESF Operation | Average Airflow velocity[a] (m/s) | Flux[a] ($pCi/m^2$-s) | Pressure Differential[b] (mbar) |
|---|---|---|---|
| Two Fans | 2.70 | 21 | -2.51 |
| One Fan | 1.59 | 14 | -0.73 |

Sources: [a]BSC 2003d, p. 14.
[b]The section below.

To estimate the ventilation-induced pressure effect on radon flux, differential pressures at 4,468 m [(3,900 m + 5035 m)/2] in the ESF Main, with one fan and two fans in operation, are calculated. The differential pressures are calculated using the data and formulas described in *Pressure Distribution in the ESF for One and Two Fan Operation* (BSC 2003e, Sections 4, 5, and 6).

The differential pressures are calculated by determining the frictional pressure loss from the surface to the underground locations. The following calculations determine the differential pressure between the ESF Main at 4468 m and the surface.

Length of the drift from the Enhanced Characterization of the Repository Block (ECRB) to ESF Main at 4468m = 4468m – 1992m or 2476m (8123 ft) (Source of 1992 m: BSC 2003e, 6.3.1).
Equivalent length of drift to account for shock losses = 10% of actual airway length or 1,040.7 ft (BSC 2003e, Section 6.3.1).
Average cross sectional area = 411.07 $ft^2$ (BSC 2003e, Section 6.3.1).
Average perimeter of the drift = 78.54 ft (BSC 2003e, Section 6.3.1).
Average airflow in ECRB duct = 101.5 kcfm (BSC 2003e, Section 6.2)
Resistance of drift section North Portal to ECRB = 0.00782 PU (BSC 2003e, Section 6.3.1)

Friction factor used for the resistance calculation is $50\times10^{-10}$ $lbfmin^2/ft^4$ (BSC 2003e, Section 6.3.1).
Resistance of drift section ECRB to ESF Main 4468m (BSC 2003e, Eq. 1, Section 6.3.1) =
$50 \times 8123 \times 1.1 \times 78.54 / (52 \times 411.07)^3 = 0.00971$ PU

(1) For Air Velocity in Main Drift = 1.59 m/s (313 ft/min)
Main Drift Airflow = 313 x 411.07/1000 = 129 kcfm
Pressure Differential ($\Delta P_1$) between surface and ESF Main at 4468 (BSC 2003e, Eq. 2, Section 6.4)
$\Delta P_1 = 0.00782 \times (101.5 + 129)^2 + 0.00971 \times 129^2 = 575$ m.in.w.g. or 1.43 mbar

(2) For Air Velocity in Main Drift = 2.70 m/s (531 ft/min)
Main Drift Airflow = 531 x 411.07/1000 = 218 kcfm
Pressure Differential ($\Delta P_2$) between surface and ESF Main at 4468 (BSC 2003e, Eq. 2, Section 6.4)
$\Delta P_2 = 0.00782 \times (101.5 + 218)^2 + 0.00971 \times 218^2 = 1264$ m.in.w.g. or 3.15 mbar.

A correlation between the pressure differential (ΔP) and radon flux (F) was constructed assuming F is linearly depending on ΔP. The correlation equation is shown as follows:

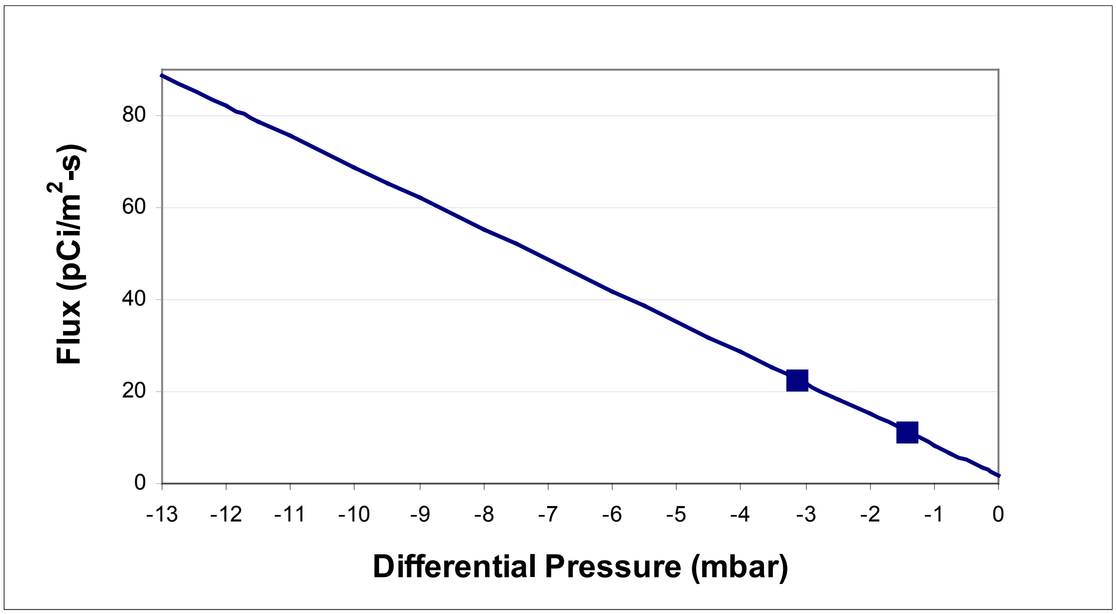
$$F(\Delta P) = 1.71 - 6.70(\Delta P) \qquad \text{(Eq. 1)}$$

where

| | |
|---|---|
| F ($\Delta$P) | = average radon flux (pCi/m$^2$-s) at pressure differential $\Delta$P |
| $\Delta$P | = pressure differential (mbar) = $P_d$ - $P_a$ |
| $P_d$ | = air pressure underground during ventilating |
| $P_a$ | = ambient air pressure at the surface |

Figure 2 graphically shows the correlation between radon flux and pressure differential generated by ventilation airflow. In applying Equation 1, $\Delta$P is limited to values equal to or less than zero for conservatism.

This assumption is used in Section 6.2.4 for flux calculations.




Source: Equation 1.

Figure 2. Average Radon Flux in Exploratory Studies Facility Main versus Differential Pressure

### 4.1.3 Temperature Effect

The basis for assuming radon flux is proportional to the 1.75 power of average rock temperature of the emplacement drifts was derived based on the relationship between temperature (T) and the gas diffusion coefficients (CRWMS M&O 2000, p. 10). The radon flux at rock temperature T is calculated by applying a temperature adjusting factor f(T) to the flux value as follows (CRWMS M&O 2000, p. 10):

$$f(T) = \frac{F(T)}{F(Tr)} = \left(\frac{Te}{Tr}\right)^{1.75} = 1.21 \qquad \text{(Eq. 2)}$$

where

f(T) = radon flux temperature factor at rock temperature T
F(T) = radon flux at average rock temperature T (pCi/$m^2$-s)
F(Tr) = radon flux at average rock temperature Tr (pCi/$m^2$-s)
Te = average emplacement drift rock absolute temperature, (329 $^oK$, CRWMS M&O 2000, p. 10)
Tr = reference absolute temperature, (296 $^oK$, CRWMS M&O 2000, p. 10)

This assumption is used in Section 5.2.4 to account for temperature effect on radon flux from the emplacement drifts.

## 4.2 VENTILATION FLOW

The airflow is assumed to be at a steady state.

The steady state assumption is valid for repository operation under normal conditions when the ventilation is maintained at a constant airflow rate. This assumption is used in Section 6.1 for concentration modeling and calculation.

# 5. USE OF COMPUTER SOFTWARE

The Microsoft Excel 97 spreadsheet program was used to perform the calculations as documented in Section 6 of this document. The user-defined formulas, input, and results are documented in sufficient detail in Section 6 to allow for independent duplication of the various computations without recourse to the originator. This software is considered exempt from the requirements of AP-SI.1Q, *Software Management*.

# 6. CALCULATION

## 6.1 RADON AND ITS PROGENY CONCENTRATIONS

The mass balance equations for radon and its decay products in a segment of the repository with respect to time resulting from airflow velocity of v and radon exhalation flux of F from the repository walls are (CRWMS M&O 2000, pp. 11 and 13):

$$\frac{\partial C_0}{\partial t} = -v\frac{\partial C_0}{\partial x} + 2\frac{F}{R} - \lambda_0 C_0 \qquad \text{(Eq. 3)}$$

$$\frac{\partial C_i}{\partial t} = -v\frac{\partial C_i}{\partial x} - 2\frac{V_d C_i}{R} - \lambda_i C_i + \lambda_i C_{i-1} \quad (i = 1,2,3) \qquad \text{(Eq. 4)}$$

where

$C_0$ = radon concentration in repository air (pCi/m$^3$)
$C_i$ = ith radon progeny concentration in repository air (pCi/m$^3$)
$C_1$ = Po-218 concentration in repository air (pCi/m$^3$)
$C_2$ = Pb-214 concentration in repository air (pCi/m$^3$)
$C_3$ = Bi-214 concentration in repository air (pCi/m$^3$)
F = average radon flux (pCi/m$^2$/s)
$\lambda_0$ = radon decay constant (s$^{-1}$)
$\lambda_i$ = ith radon progeny decay constant (s$^{-1}$) = 0.693/$T_i$
$T_i$ = ith radon progeny decay half-life (s)
R = drift radius (m)
v = airflow velocity (m/s)
$V_d$ = deposition velocity of radon progeny (m/s).

The solutions of Equations 3 and 4, assuming steady conditions (Assumption 4.2), for a location x, using the boundary conditions that the radon and its progeny concentrations at an upstream location $x_1$ are known, are given by (CRWMS M&O 2000, pp. 14 through 17):

$$C_0(x) = A_0 + A_{00}\, e^{-a_0 x} \qquad \text{(Eq. 5)}$$

$$C_1(x) = A_1 + A_{10}\, e^{-a_0 x} + A_{11}\, e^{-d_1 x} \qquad \text{(Eq. 6)}$$

$$C_2(x) = A_2 + A_{20}\, e^{-a_0 x} + A_{21}\, e^{-d_1 x} + A_{22}\, e^{-d_2 x} \qquad \text{(Eq. 7)}$$

$$C_3(x) = A_3 + A_{30}\, e^{-a_0 x} + A_{31}\, e^{-d_1 x} + A_{32}\, e^{-d_2 x} + A_{33}\, e^{-d_3 x} \qquad \text{(Eq. 8)}$$

where

$$A_0 = \frac{2F}{R\lambda_0} \qquad \text{(Eq. 9)}$$

$$A_1 = \frac{a_1}{d_1} A_0 \qquad \text{(Eq. 10)}$$

$$A_{00} = C_0(x_1) - A_0 \qquad \text{(Eq. 11)}$$

$$A_{10} = \frac{a_1 A_{00}}{d_1 - d_0} \qquad \text{(Eq. 12)}$$

$$A_{11} = C_1(x_1) - A_1 - A_{10} \qquad \text{(Eq. 13)}$$

$$A_2 = \frac{a_2}{d_2} A_1 \quad \text{(Eq. 14)}$$

$$A_{20} = \frac{a_2 A_{10}}{d_2 - d_0} \quad \text{(Eq. 15)}$$

$$A_{21} = \frac{a_2 A_{11}}{d_2 - d_1} \quad \text{(Eq. 16)}$$

$$A_{22} = C_2(x_1) - A_2 - A_{20} - A_{21} \quad \text{(Eq. 17)}$$

$$A_3 = \frac{a_3}{d_3} A_2 \quad \text{(Eq. 18)}$$

$$A_{30} = \frac{a_3 A_{20}}{d_3 - d_0} \quad \text{(Eq. 19)}$$

$$A_{31} = \frac{a_3 A_{21}}{d_3 - d_1} \quad \text{(Eq. 20)}$$

$$A_{32} = \frac{a_3 A_{22}}{d_3 - d_2} \quad \text{(Eq. 21)}$$

$$A_{33} = C_3(x_1) - A_3 - A_{30} - A_{31} - A_{32} \quad \text{(Eq. 22)}$$

$$a_0 = \frac{\lambda_0}{v};\ a_1 = \frac{\lambda_1}{v};\ a_2 = \frac{\lambda_2}{v};\ a_3 = \frac{\lambda_3}{v} \quad \text{(Eq. 23)}$$

$$d_0 = a_0;\ d_1 = a_1 + \frac{2V_d}{vR};\ d_2 = a_2 + \frac{2V_d}{vR};\ d_3 = a_3 + \frac{2V_d}{vR} \quad \text{(Eq. 24)}$$

where

$C_0(x)$ = radon concentration at x ($pCi/m^3$)
$C_i(x)$ = ith radon progeny concentration at x ($pCi/m^3$)

### 6.1.1 Working Level

The working level (WL) value for an atmosphere containing a mixture of radon progeny can be calculated by (CRWMS M&O 2000, p.17):

$$WL = 1.06 \times 10^{-6}\, C_1 + 5.13 \times 10^{-6}\, C_2 + 3.81 \times 10^{-6}\, C_3 \quad \text{(Eq. 25)}$$

where $C_1$, $C_2$, and $C_3$ represent the individual concentrations of Po-218, Pb-214, and Bi-214, respectively, in units of pCi/m$^3$. The previous equation is used for calculating the WL using the radon progeny concentrations in the air.

### 6.1.2 Equivalent Radius for Non-Circular Drifts

The concentrations of radon and its progeny in a non-circular shaped segment of a drift can be calculated by substituting the drift radius $R = \frac{2A}{p}$ in Equations 5 through 24 (CRWMS M&O 2000, p. 15 & p. 16), where A is the drift cross-section area (m$^2$) and p is the drift rock wall perimeter (m).

For a circular drift with radius r and airflow cross section area $A = \pi r^2$, the equivalent radius R is:

$$R = \frac{2A}{p} = \frac{2\pi r^2}{2\pi r} = r$$

## 6.2 INPUT PARAMETERS

This section identifies and documents calculation inputs and sources of input that are used in this document.

### 6.2.1 Radiological Parameters

The radiological parameters or radiological decay half-lives used in calculations made in this section are listed in Table 2. These decay half-lives are taken from Kocher (1981, p. 63) and are well-established scientific facts.

Table 2. Radiological Input Parameters

| Nuclide | Decay Half-life[a] | Decay Half-life (sec) |
|---|---|---|
| Rn-222 | 3.82 d | 3.30E+05 |
| Po-218 | 3.05 m | 1.83E+02 |
| Pb-214 | 26.8 m | 1.61E+03 |
| Bi-214 | 19.9 m | 1.19E+03 |

Source: [a]Kocher 1981, p. 63.

### 6.2.2 Repository Layout and Airflow Parameters

The input parameters for repository layout and ventilation network are taken from *Ventilation Network Model Calculation* (BSC 2003a, Attachment D) and are provided in Table 3. The input parameters include node numbers, branch number and description, length, cross-sectional area, perimeter, repository airflow distribution, and airway frictional pressure drop. The ventilation schematic with node numbers is detailed in *Ventilation Network Model Calculation* (BSC 2003a, Attachment A) and is not repeated in this document. The repository layout and airflow parameters were developed based on *Underground Layout Configuration* (BSC 2003b). Figure 3 shows the subsurface ventilation system layout including repository shaft locations (BSC 2003b, Figure 10).

### 6.2.3 Deposition Velocity

The input parameter of the deposition velocity for radon progeny is 0.0 m/s or no deposition. The use of zero deposition is a conservative approach in calculating radon progeny concentrations or working levels.

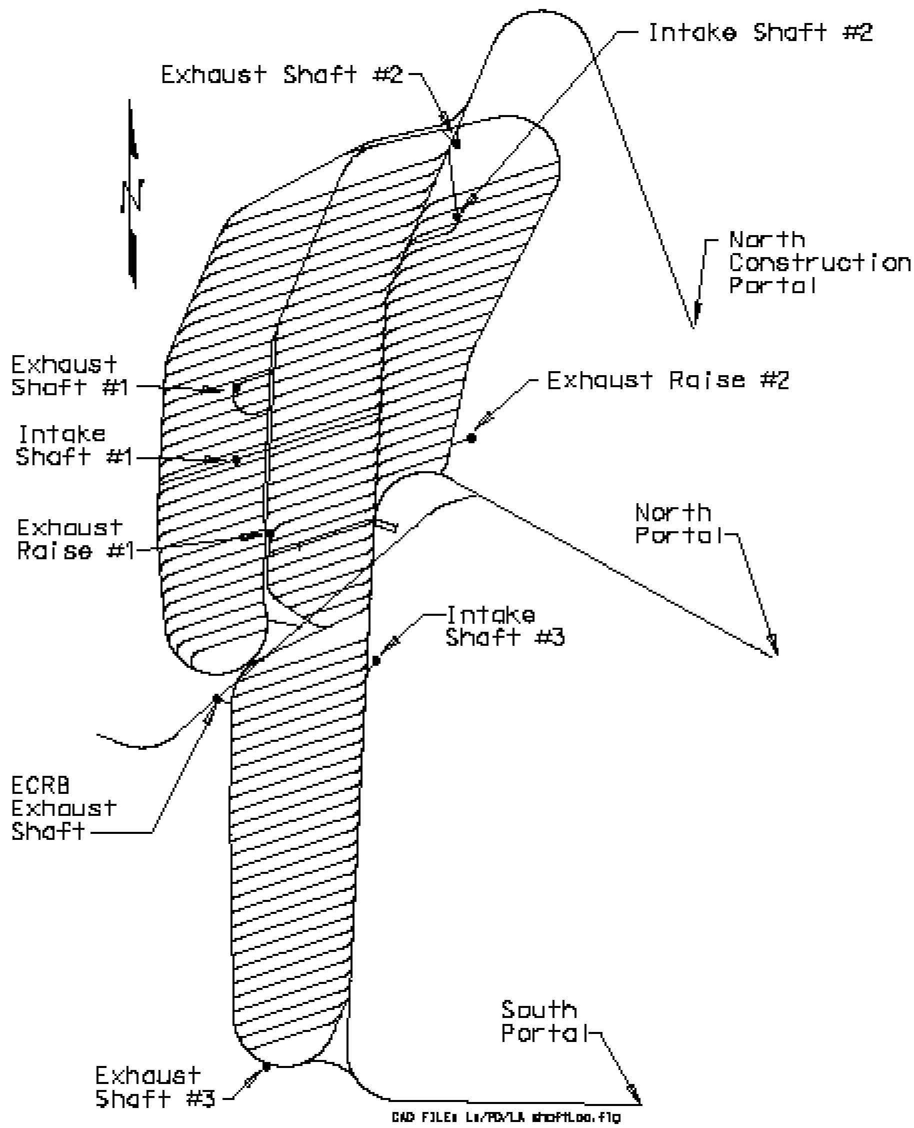
### 6.2.4 Radon Flux

The equation used to calculate input radon flux is Equation 26:

$$F\ (\Delta P) = [1.71 - 6.70\ (\Delta P)]\ f(Te),\ (\text{for } \Delta P < 0) \qquad \text{(Eq. 26)}$$

$$F\ (\Delta P) = 1.71\ f(Te),\ (\text{for } \Delta P \geq 0) \qquad \text{(Eq. 26a)}$$

The derivation of the previous equation is described in Section 4.1.3. For heated drifts (e.g., emplacement drift, emplacement vent raise, exhaust main drift, and exhaust shaft) the temperature factor f(Te) is assumed to be 1.21 (see Section 4.1.3). For all other types of drifts, f(Te) is 1.0 since there will be no heat sources.




Source: BSC 2003b, Fig. 10

Figure 3. Subsurface Ventilation System Layout

## 6.3 CONCENTRATION CALCULATION

Average radon and working level concentrations were calculated using equations described in Section 6.1. Excel spreadsheet files used for concentration calculations are provided in Attachment II. Attachment I provides formulas used in the spreadsheet calculations.

Table 3 defines the repository layout input parameters used in concentration calculations. The ventilation airflow network input parameters including airflow rates and pressure differentials are also provided in Table 3. The output results of the calculations are summarized in Section 6.3.1 (Table 4).

Table 3. Repository Layout Input Parameters

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 1 | 7621 | 7620 | 14 | 371 | -10.95 | 185 | Exhaust Raise #1 |
| 2 | 1010 | 1011 | 24 | 97 | -5.35 | 15 | Turnout 1 Panel 1 |
| 3 | 1020 | 1021 | 24 | 97 | -5.28 | 15 | Turnout 2 Panel 1 |
| 4 | 1030 | 1031 | 24 | 97 | -5.23 | 15 | Turnout 3 Panel 1 |
| 5 | 1040 | 1041 | 24 | 97 | -5.22 | 15 | Turnout 4 Panel 1 |
| 6 | 1050 | 1051 | 24 | 97 | -5.21 | 15 | Turnout 5 Panel 1 |
| 7 | 1060 | 1061 | 24 | 97 | -5.21 | 15 | Turnout 6 Panel 1 |
| 8 | 1070 | 1071 | 24 | 97 | -5.23 | 15 | Turnout 7 Panel 1 |
| 9 | 1080 | 1081 | 24 | 97 | -5.28 | 15 | Turnout 8 Panel 1 |
| 10 | 1011 | 1013 | 28 | 494 | -8.06 | 15 | Empl 1 Drift Panel 1 |
| 11 | 1021 | 1022 | 28 | 595 | -8.02 | 15 | Empl 2 Drift Panel 1 |
| 12 | 1031 | 1032 | 28 | 597 | -7.97 | 15 | Empl 3 Drift Panel 1 |
| 13 | 1041 | 1042 | 28 | 597 | -7.96 | 15 | Empl 4 Drift Panel 1 |
| 14 | 1051 | 1052 | 28 | 591 | -7.97 | 15 | Empl 5 Drift Panel 1 |
| 15 | 1061 | 1062 | 28 | 544 | -8.00 | 15 | Empl 6 Drift Panel 1 |
| 16 | 1071 | 1072 | 28 | 451 | -8.07 | 15 | Empl 7 Drift Panel 1 |
| 17 | 1081 | 1082 | 28 | 355 | -8.22 | 15 | Empl 8 Drift Panel 1 |
| 18 | 1012 | 7621 | 17 | 14 | -8.19 | 79 | 5x5 exhaust raise access |
| 19 | 7622 | 7621 | 17 | 23 | -8.15 | 105 | 5x5 exhaust raise access |
| 20 | 7110 | 7111 | 26 | 378 | -1.18 | 410 | Intake Shaft #1 |
| 21 | 7210 | 7211 | 26 | 350 | -1.04 | 399 | Intake Shaft #2 |
| 22 | 7211 | 7213 | 29 | 107 | -2.13 | 205 | 8x8.5 shaft access |
| 23 | 7211 | 3020 | 29 | 381 | -2.20 | 194 | 8x8.5 shaft access |
| 24 | 7213 | 7214 | 29 | 244 | -2.31 | 205 | 8x8.5 shaft access |
| 25 | 7121 | 7120 | 25 | 438 | -9.19 | 383 | Exhaust Shaft #1 |
| 26 | 7125 | 7121 | 29 | 247 | -7.97 | 192 | 8x8.5 south access |
| 27 | 7127 | 7121 | 29 | 251 | -7.96 | 192 | 8x8.5 north access |
| 28 | 7222 | 7220 | 25 | 428 | -11.35 | 383 | Exhaust Shaft #2 |
| 29 | 7224 | 7221 | 29 | 118 | -9.76 | 191 | 8x8.5 west access |
| 30 | 7225 | 7221 | 29 | 106 | -9.76 | 187 | 8x8.5 east access |
| 31 | 7223 | 7222 | 0 | 0 | -6.28 | 6 | 8x8.5 shaft access |
| 32 | 7011 | 7010 | 25 | 398 | -10.18 | 393 | ECRB Exhaust Shaft |
| 33 | 7229 | 4102 | 24 | 69 | -7.80 | 44 | lead-in drift |
| 34 | 3010 | 3011 | 24 | 122 | -5.22 | 15 | Turnout 1 Panel 3 |
| 35 | 3020 | 3021 | 24 | 122 | -5.10 | 15 | Turnout 2 Panel 3 |
| 36 | 3030 | 3031 | 24 | 122 | -5.05 | 15 | Turnout 3 Panel 3 |
| 37 | 3040 | 3041 | 24 | 122 | -5.02 | 15 | Turnout 4 Panel 3 |
| 38 | 3050 | 3051 | 24 | 122 | -5.01 | 15 | Turnout 5 Panel 3 |
| 39 | 3060 | 3061 | 24 | 122 | -5.00 | 15 | Turnout 6 Panel 3 |
| 40 | 3070 | 3071 | 24 | 122 | -5.03 | 15 | Turnout 7 Panel 3 |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 41 | 3080 | 3081 | 24 | 122 | -5.10 | 15 | Turnout 8 Panel 3 |
| 42 | 3090 | 3091 | 24 | 118 | -5.15 | 15 | Turnout 9 Panel 3 |
| 43 | 3100 | 3101 | 24 | 96 | -5.20 | 15 | Turnout 10 Panel 3 |
| 44 | 3110 | 3111 | 24 | 97 | -5.23 | 15 | Turnout 11 Panel 3 |
| 45 | 3120 | 3121 | 24 | 97 | -5.26 | 15 | Turnout 12 Panel 3 |
| 46 | 3130 | 3131 | 24 | 97 | -5.28 | 15 | Turnout 13 Panel 3 |
| 47 | 3140 | 3141 | 24 | 97 | -5.28 | 15 | Turnout 14 Panel 3 |
| 48 | 3150 | 3151 | 24 | 97 | -5.27 | 15 | Turnout 15 Panel 3 |
| 49 | 3160 | 3161 | 24 | 97 | -5.26 | 15 | Turnout 16 Panel 3 |
| 50 | 3170 | 3171 | 24 | 97 | -5.25 | 15 | Turnout 17 Panel 3 |
| 51 | 3180 | 3181 | 24 | 97 | -5.24 | 15 | Turnout 18 Panel 3 |
| 52 | 3190 | 3191 | 24 | 97 | -5.24 | 15 | Turnout 19 Panel 3 |
| 53 | 3200 | 3201 | 24 | 97 | -5.24 | 15 | Turnout 20 Panel 3 |
| 54 | 3210 | 3211 | 24 | 97 | -5.24 | 15 | Turnout 21 Panel 3 |
| 55 | 3220 | 3221 | 24 | 97 | -5.22 | 15 | Turnout 22 Panel 3 |
| 56 | 3015 | 3016 | 24 | 123 | -5.63 | 15 | Turnout 1 Panel 3 |
| 57 | 3025 | 3026 | 24 | 123 | -5.59 | 15 | Turnout 2 Panel 3 |
| 58 | 3035 | 3036 | 24 | 123 | -5.55 | 15 | Turnout 3 Panel 3 |
| 59 | 3045 | 3046 | 24 | 123 | -5.61 | 15 | Turnout 4 Panel 3 |
| 60 | 3055 | 3056 | 24 | 123 | -5.65 | 15 | Turnout 5 Panel 3 |
| 61 | 3065 | 3066 | 24 | 120 | -5.68 | 15 | Turnout 6 Panel 3 |
| 62 | 3075 | 3076 | 24 | 97 | -5.70 | 15 | Turnout 7 Panel 3 |
| 63 | 3085 | 3086 | 24 | 97 | -5.72 | 15 | Turnout 8 Panel 3 |
| 64 | 3095 | 3096 | 24 | 97 | -5.74 | 15 | Turnout 9 Panel 3 |
| 65 | 3105 | 3106 | 24 | 97 | -5.75 | 15 | Turnout 10 Panel 3 |
| 66 | 3115 | 3116 | 24 | 97 | -5.76 | 15 | Turnout 11 Panel 3 |
| 67 | 3125 | 3126 | 24 | 97 | -5.77 | 15 | Turnout 12 Panel 3 |
| 68 | 3135 | 3136 | 24 | 97 | -5.78 | 15 | Turnout 13 Panel 3 |
| 69 | 3145 | 3146 | 24 | 97 | -5.79 | 15 | Turnout 14 Panel 3 |
| 70 | 3155 | 3156 | 24 | 97 | -5.82 | 15 | Turnout 15 Panel 3 |
| 71 | 3165 | 3166 | 24 | 97 | -5.85 | 15 | Turnout 16 Panel 3 |
| 72 | 3175 | 3176 | 24 | 97 | -5.90 | 15 | Turnout 17 Panel 3 |
| 73 | 3185 | 3186 | 24 | 97 | -5.95 | 15 | Turnout 18 Panel 3 |
| 74 | 3195 | 3196 | 24 | 97 | -5.98 | 15 | Turnout 19 Panel 3 |
| 75 | 3011 | 3012 | 28 | 617 | -8.22 | 15 | Empl Drift 1 Panel 3 |
| 76 | 3021 | 3022 | 28 | 617 | -7.99 | 15 | Empl Drift 2 Panel 3 |
| 77 | 3031 | 3032 | 28 | 617 | -7.84 | 15 | Empl Drift 3 Panel 3 |
| 78 | 3041 | 3042 | 28 | 617 | -7.74 | 15 | Empl Drift 4 Panel 3 |
| 79 | 3051 | 3052 | 28 | 617 | -7.69 | 15 | Empl Drift 5 Panel 3 |
| 80 | 3061 | 3062 | 28 | 617 | -7.67 | 15 | Empl Drift 6 Panel 3 |
| 81 | 3071 | 3072 | 28 | 617 | -7.66 | 15 | Empl Drift 7 Panel 3 |
| 82 | 3081 | 3082 | 28 | 617 | -7.66 | 15 | Empl Drift 8 Panel 3 |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 83 | 3091 | 3092 | 28 | 620 | -7.67 | 15 | Empl Drift 9 Panel 3 |
| 84 | 3101 | 3102 | 28 | 622 | -7.70 | 15 | Empl Drift 10 Panel 3 |
| 85 | 3111 | 3112 | 28 | 622 | -7.72 | 15 | Empl Drift 11 Panel 3 |
| 86 | 3121 | 3122 | 28 | 622 | -7.74 | 15 | Empl Drift 12 Panel 3 |
| 87 | 3131 | 3132 | 28 | 622 | -7.77 | 15 | Empl Drift 13 Panel 3 |
| 88 | 3141 | 3142 | 28 | 622 | -7.77 | 15 | Empl Drift 14 Panel 3 |
| 89 | 3151 | 3152 | 28 | 622 | -7.76 | 15 | Empl Drift 15 Panel 3 |
| 90 | 3161 | 3162 | 28 | 622 | -7.75 | 15 | Empl Drift 16 Panel 3 |
| 91 | 3171 | 3172 | 28 | 622 | -7.74 | 15 | Empl Drift 17 Panel 3 |
| 92 | 3181 | 3182 | 28 | 622 | -7.74 | 15 | Empl Drift 18 Panel 3 |
| 93 | 3191 | 3192 | 28 | 622 | -7.74 | 15 | Empl Drift 19 Panel 3 |
| 94 | 3201 | 3202 | 28 | 622 | -7.74 | 15 | Empl Drift 20 Panel 3 |
| 95 | 3211 | 3212 | 28 | 622 | -7.75 | 15 | Empl Drift 21 Panel 3 |
| 96 | 3221 | 3222 | 28 | 622 | -7.76 | 15 | Empl Drift 22 Panel 3 |
| 97 | 3016 | 3017 | 28 | 757 | -8.97 | 15 | Empl Drift 1 Panel 3 |
| 98 | 3026 | 3027 | 28 | 799 | -8.87 | 15 | Empl Drift 2 Panel 3 |
| 99 | 3036 | 3037 | 28 | 810 | -8.80 | 15 | Empl Drift 3 Panel 3 |
| 100 | 3046 | 3047 | 28 | 794 | -8.75 | 15 | Empl Drift 4 Panel 3 |
| 101 | 3056 | 3057 | 28 | 787 | -8.72 | 15 | Empl Drift 5 Panel 3 |
| 102 | 3066 | 3067 | 28 | 782 | -8.70 | 15 | Empl Drift 6 Panel 3 |
| 103 | 3076 | 3077 | 28 | 764 | -8.69 | 15 | Empl Drift 7 Panel 3 |
| 104 | 3086 | 3087 | 28 | 714 | -8.70 | 15 | Empl Drift 8 Panel 3 |
| 105 | 3096 | 3097 | 28 | 664 | -8.70 | 15 | Empl Drift 9 Panel 3 |
| 106 | 3106 | 3107 | 28 | 615 | -8.71 | 15 | Empl Drift 10 Panel 3 |
| 107 | 3116 | 3117 | 28 | 565 | -8.72 | 15 | Empl Drift 11 Panel 3 |
| 108 | 3126 | 3127 | 28 | 515 | -8.74 | 15 | Empl Drift 12 Panel 3 |
| 109 | 3136 | 3137 | 28 | 479 | -8.77 | 15 | Empl Drift 13 Panel 3 |
| 110 | 3146 | 3147 | 28 | 464 | -8.81 | 15 | Empl Drift 14 Panel 3 |
| 111 | 3156 | 3157 | 28 | 448 | -8.86 | 15 | Empl Drift 15 Panel 3 |
| 112 | 3166 | 3167 | 28 | 432 | -8.94 | 15 | Empl Drift 16 Panel 3 |
| 113 | 3176 | 3177 | 28 | 417 | -9.04 | 15 | Empl Drift 17 Panel 3 |
| 114 | 3186 | 3187 | 28 | 401 | -9.17 | 15 | Empl Drift 18 Panel 3 |
| 115 | 3196 | 3197 | 28 | 385 | -9.28 | 15 | Empl Drift 19Panel 3 |
| 116 | 7128 | 7127 | 29 | 24 | -7.88 | 91 | 8x8.5 exhaust connection |
| 117 | 7124 | 7125 | 29 | 24 | -7.88 | 92 | 8x8.5 exhaust connection |
| 118 | 4010 | 4011 | 24 | 123 | -6.19 | 15 | Turnout 1 Panel 4 |
| 119 | 4020 | 4021 | 24 | 123 | -6.11 | 15 | Turnout 2 Panel 4 |
| 120 | 4030 | 4031 | 24 | 123 | -6.07 | 15 | Turnout 3 Panel 4 |
| 121 | 4040 | 4041 | 24 | 123 | -6.04 | 15 | Turnout 4 Panel 4 |
| 122 | 4050 | 4051 | 24 | 123 | -6.04 | 15 | Turnout 5 Panel 4 |
| 123 | 4060 | 4061 | 24 | 123 | -6.04 | 15 | Turnout 6 Panel 4 |
| 124 | 4070 | 4071 | 24 | 123 | -6.05 | 15 | Turnout 7 Panel 4 |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 125 | 4080 | 4081 | 24 | 123 | -6.06 | 15 | Turnout 8 Panel 4 |
| 126 | 4090 | 4091 | 24 | 103 | -6.06 | 15 | Turnout 9 Panel 4 |
| 127 | 4100 | 4101 | 24 | 97 | -6.08 | 15 | Turnout 10 Panel 4 |
| 128 | 4110 | 4111 | 24 | 97 | -6.09 | 15 | Turnout 11 Panel 4 |
| 129 | 4120 | 4121 | 24 | 97 | -6.11 | 15 | Turnout 12 Panel 4 |
| 130 | 4130 | 4131 | 24 | 97 | -6.12 | 15 | Turnout 13 Panel 4 |
| 131 | 4140 | 4141 | 24 | 97 | -6.12 | 15 | Turnout 14 Panel 4 |
| 132 | 4150 | 4151 | 24 | 97 | -6.11 | 15 | Turnout 15 Panel 4 |
| 133 | 4160 | 4161 | 24 | 97 | -6.10 | 15 | Turnout 16 Panel 4 |
| 134 | 4170 | 4171 | 24 | 97 | -6.08 | 15 | Turnout 17 Panel 4 |
| 135 | 4180 | 4181 | 24 | 97 | -6.13 | 15 | Turnout 18 Panel 4 |
| 136 | 4190 | 4191 | 24 | 97 | -6.19 | 15 | Turnout 19 Panel 4 |
| 137 | 4200 | 4201 | 24 | 101 | -6.24 | 15 | Turnout 20 Panel 4 |
| 138 | 4210 | 4211 | 24 | 106 | -6.28 | 15 | Turnout 21 Panel 4 |
| 139 | 4220 | 4221 | 24 | 106 | -6.33 | 15 | Turnout 22 Panel 4 |
| 140 | 4230 | 4231 | 24 | 106 | -6.40 | 15 | Turnout 23 Panel 4 |
| 141 | 4240 | 4241 | 24 | 106 | -6.48 | 15 | Turnout 24 Panel 4 |
| 142 | 4250 | 4251 | 24 | 106 | -6.51 | 15 | Turnout 25 Panel 4 |
| 143 | 4260 | 4261 | 24 | 106 | -6.54 | 15 | Turnout 26 Panel 4 |
| 144 | 4270 | 4271 | 24 | 107 | -6.58 | 15 | Turnout 27 Panel 4 |
| 145 | 4280 | 4281 | 24 | 128 | -6.63 | 15 | Turnout 28 Panel 4 |
| 146 | 4290 | 4291 | 24 | 147 | -6.67 | 15 | Turnout 29 Panel 4 |
| 147 | 4300 | 4301 | 24 | 175 | -6.74 | 15 | Turnout 30 Panel 4 |
| 148 | 4011 | 3012 | 28 | 617 | -8.22 | 15 | Empl Drift 1 Panel 4 |
| 149 | 4021 | 3022 | 28 | 617 | -7.99 | 15 | Empl Drift 2 Panel 4 |
| 150 | 4031 | 3032 | 28 | 617 | -7.84 | 15 | Empl Drift 3 Panel 4 |
| 151 | 4041 | 3042 | 28 | 617 | -7.74 | 15 | Empl Drift 4 Panel 4 |
| 152 | 4051 | 3052 | 28 | 617 | -7.69 | 15 | Empl Drift 5 Panel 4 |
| 153 | 4061 | 3062 | 28 | 617 | -7.67 | 15 | Empl Drift 6 Panel 4 |
| 154 | 4071 | 3072 | 28 | 617 | -7.66 | 15 | Empl Drift 7 Panel 4 |
| 155 | 4081 | 3082 | 28 | 617 | -7.66 | 15 | Empl Drift 8 Panel 4 |
| 156 | 4091 | 3092 | 28 | 634 | -7.67 | 15 | Empl Drift 9 Panel 4 |
| 157 | 4101 | 4102 | 28 | 605 | -7.70 | 15 | Empl Drift 10 Panel 4 |
| 158 | 4111 | 4112 | 28 | 605 | -7.73 | 15 | Empl Drift 11 Panel 4 |
| 159 | 4121 | 4122 | 28 | 605 | -7.75 | 15 | Empl Drift 12 Panel 4 |
| 160 | 4131 | 4132 | 28 | 605 | -7.79 | 15 | Empl Drift 13 Panel 4 |
| 161 | 4141 | 4142 | 28 | 605 | -7.79 | 15 | Empl Drift 14 Panel 4 |
| 162 | 4151 | 4152 | 28 | 605 | -7.77 | 15 | Empl Drift 15 Panel 4 |
| 163 | 4161 | 4162 | 28 | 605 | -7.75 | 15 | Empl Drift 16 Panel 4 |
| 164 | 4171 | 4172 | 28 | 605 | -7.75 | 15 | Empl Drift 17 Panel 4 |
| 165 | 4181 | 4182 | 28 | 605 | -7.74 | 15 | Empl Drift 18 Panel 4 |
| 166 | 4191 | 4192 | 28 | 605 | -7.74 | 15 | Empl Drift 19 Panel 4 |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 167 | 4201 | 4202 | 28 | 605 | -7.74 | 15 | Empl Drift 20 Panel 4 |
| 168 | 4211 | 4212 | 28 | 594 | -7.75 | 15 | Empl Drift 21 Panel 4 |
| 169 | 4221 | 4222 | 28 | 584 | -7.77 | 15 | Empl Drift 22 Panel 4 |
| 170 | 4231 | 4232 | 28 | 593 | -7.87 | 15 | Empl Drift 23 Panel 4 |
| 171 | 4241 | 4242 | 28 | 581 | -7.98 | 15 | Empl Drift 24 Panel 4 |
| 172 | 4251 | 4252 | 28 | 569 | -8.00 | 15 | Empl Drift 25 Panel 4 |
| 173 | 4261 | 4262 | 28 | 556 | -8.05 | 15 | Empl Drift 26 Panel 4 |
| 174 | 4271 | 4272 | 28 | 544 | -8.11 | 15 | Empl Drift 27 Panel 4 |
| 175 | 4281 | 4282 | 28 | 526 | -8.19 | 15 | Empl Drift 28 Panel 4 |
| 176 | 4291 | 4292 | 28 | 496 | -8.27 | 15 | Empl Drift 29 Panel 4 |
| 177 | 4301 | 4302 | 28 | 406 | -8.39 | 15 | Empl Drift 30 Panel 4 |
| 178 | 7227 | 7226 | 24 | 30 | -8.51 | 120 | lead in drift |
| 179 | 7312 | 7311 | 29 | 109 | -1.81 | 406 | 8x8.5 shaft acc |
| 180 | 7014 | 7012 | 29 | 91 | -8.85 | 243 | 8x8.5 shaft acc. ECRB |
| 181 | 7322 | 7320 | 25 | 292 | -14.28 | 343 | Exhaust Shaft #3 |
| 182 | 7321 | 7322 | 29 | 20 | -13.57 | 343 | 8x8.5 shaft acc |
| 183 | 7310 | 7312 | 26 | 248 | -0.81 | 406 | Intake shaft #3 |
| 184 | 7623 | 7624 | 17 | 127 | -9.34 | 185 | 5x5 shaft access ex #2 |
| 185 | 7624 | 7625 | 14 | 279 | -5.11 | 185 | Exhaust Raise #2 |
| 186 | 2010 | 2011 | 24 | 97 | -5.32 | 15 | Turnout 1 Panel 2 |
| 187 | 2020 | 2021 | 24 | 97 | -5.32 | 15 | Turnout 2 Panel 2 |
| 188 | 2030 | 2031 | 24 | 97 | -5.28 | 15 | Turnout 3 Panel 2 |
| 189 | 2040 | 2041 | 24 | 97 | -5.27 | 15 | Turnout 4 Panel 2 |
| 190 | 2050 | 2051 | 24 | 97 | -5.29 | 15 | Turnout 5 Panel 2 |
| 191 | 2060 | 2061 | 24 | 97 | -5.33 | 15 | Turnout 6 Panel 2 |
| 192 | 2070 | 2071 | 24 | 97 | -5.37 | 15 | Turnout 7 Panel 2 |
| 193 | 2080 | 2081 | 24 | 97 | -5.40 | 15 | Turnout 8 Panel 2 |
| 194 | 2090 | 2091 | 24 | 97 | -5.43 | 15 | Turnout 9 Panel 2 |
| 195 | 2100 | 2101 | 24 | 97 | -5.45 | 15 | Turnout 10 Panel 2 |
| 196 | 2110 | 2111 | 24 | 97 | -5.47 | 15 | Turnout 11 Panel 2 |
| 197 | 2120 | 2121 | 24 | 97 | -5.50 | 15 | Turnout 12 Panel 2 |
| 198 | 2130 | 2131 | 24 | 97 | -5.52 | 15 | Turnout 13 Panel 2 |
| 199 | 2140 | 2141 | 24 | 97 | -5.56 | 15 | Turnout 14 Panel 2 |
| 200 | 2150 | 2151 | 24 | 97 | -5.60 | 15 | Turnout 15 Panel 2 |
| 201 | 2160 | 2161 | 24 | 97 | -5.65 | 15 | Turnout 16 Panel 2 |
| 202 | 2170 | 2171 | 24 | 97 | -5.72 | 15 | Turnout 17 Panel 2 |
| 203 | 2180 | 2181 | 24 | 97 | -5.80 | 15 | Turnout 18 Panel 2 |
| 204 | 2190 | 2191 | 24 | 97 | -5.90 | 15 | Turnout 19 Panel 2 |
| 205 | 2200 | 2201 | 24 | 97 | -6.02 | 15 | Turnout 20 Panel 2 |
| 206 | 2210 | 2211 | 24 | 97 | -6.15 | 15 | Turnout 21 Panel 2 |
| 207 | 2220 | 2221 | 24 | 97 | -6.31 | 15 | Turnout 22 Panel 2 |
| 208 | 2230 | 2231 | 24 | 97 | -6.49 | 15 | Turnout 23 Panel 2 |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 209 | 2240 | 2241 | 24 | 97 | -6.68 | 15 | Turnout 24 Panel 2 |
| 210 | 2250 | 2251 | 24 | 97 | -6.90 | 15 | Turnout 25 Panel 2 |
| 211 | 2260 | 2261 | 24 | 97 | -7.16 | 15 | Turnout 26 Panel 2 |
| 212 | 2270 | 2271 | 24 | 97 | -7.47 | 15 | Turnout 27 Panel 2 |
| 213 | 2011 | 2012 | 28 | 753 | -8.48 | 15 | Empl Drift 1 Panel 2 |
| 214 | 2021 | 2022 | 28 | 779 | -8.59 | 15 | Empl Drift 2 Panel 2 |
| 215 | 2031 | 2032 | 28 | 779 | -8.63 | 15 | Empl Drift 3 Panel 2 |
| 216 | 2041 | 2042 | 28 | 775 | -8.60 | 15 | Empl Drift 4 Panel 2 |
| 217 | 2051 | 2052 | 28 | 772 | -8.58 | 15 | Empl Drift 5 Panel 2 |
| 218 | 2061 | 2062 | 28 | 769 | -8.58 | 15 | Empl Drift 6 Panel 2 |
| 219 | 2071 | 2072 | 28 | 766 | -8.57 | 15 | Empl Drift 7 Panel 2 |
| 220 | 2081 | 2082 | 28 | 763 | -8.57 | 15 | Empl Drift 8 Panel 2 |
| 221 | 2091 | 2092 | 28 | 759 | -8.58 | 15 | Empl Drift 9 Panel 2 |
| 222 | 2101 | 2102 | 28 | 756 | -8.58 | 15 | Empl Drift 10 Panel 2 |
| 223 | 2111 | 2112 | 28 | 750 | -8.60 | 15 | Empl Drift 11 Panel 2 |
| 224 | 2121 | 2122 | 28 | 744 | -8.62 | 15 | Empl Drift 12 Panel 2 |
| 225 | 2131 | 2132 | 28 | 737 | -8.66 | 15 | Empl Drift 13 Panel 2 |
| 226 | 2141 | 2142 | 28 | 731 | -8.72 | 15 | Empl Drift 14 Panel 2 |
| 227 | 2151 | 2152 | 28 | 725 | -8.80 | 15 | Empl Drift 15 Panel 2 |
| 228 | 2161 | 2162 | 28 | 718 | -8.90 | 15 | Empl Drift 16 Panel 2 |
| 229 | 2171 | 2172 | 28 | 712 | -9.04 | 15 | Empl Drift 17 Panel 2 |
| 230 | 2181 | 2182 | 28 | 706 | -9.20 | 15 | Empl Drift 18 Panel 2 |
| 231 | 2191 | 2192 | 28 | 699 | -9.40 | 15 | Empl Drift 19 Panel 2 |
| 232 | 2201 | 2202 | 28 | 693 | -9.64 | 15 | Empl Drift 20 Panel 2 |
| 233 | 2211 | 2212 | 28 | 687 | -9.92 | 15 | Empl Drift 21 Panel 2 |
| 234 | 2221 | 2222 | 28 | 680 | -10.25 | 15 | Empl Drift 22 Panel 2 |
| 235 | 2231 | 2232 | 28 | 674 | -10.62 | 15 | Empl Drift 23 Panel 2 |
| 236 | 2241 | 2244 | 28 | 668 | -11.05 | 15 | Empl Drift 24 Panel 2 |
| 237 | 2251 | 2252 | 28 | 655 | -11.53 | 15 | Empl Drift 25 Panel 2 |
| 238 | 2261 | 2262 | 28 | 583 | -12.08 | 15 | Empl Drift 26 Panel 2 |
| 239 | 2271 | 2272 | 28 | 485 | -12.70 | 15 | Empl Drift 27 Panel 2 |
| 240 | 2020 | 2010 | 24 | 83 | -2.22 | 175 | Main Drift |
| 241 | 2030 | 2020 | 24 | 83 | -2.11 | 190 | Main Drift |
| 242 | 7311 | 2030 | 24 | 41 | -2.02 | 205 | Main Drift |
| 243 | 7311 | 2040 | 24 | 42 | -2.02 | 201 | Main Drift |
| 244 | 2040 | 2050 | 24 | 42 | -2.09 | 186 | Main Drift |
| 245 | 2050 | 2060 | 24 | 83 | -2.16 | 170 | Main Drift |
| 246 | 2060 | 2070 | 24 | 83 | -2.25 | 155 | Main Drift |
| 247 | 2070 | 2080 | 24 | 83 | -2.32 | 140 | Main Drift |
| 248 | 2080 | 2090 | 24 | 83 | -2.38 | 125 | Main Drift |
| 249 | 2090 | 2100 | 24 | 83 | -2.42 | 110 | Main Drift |
| 250 | 2100 | 2110 | 24 | 83 | -2.46 | 95 | Main Drift |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 251 | 2110 | 2120 | 24 | 83 | -2.48 | 80 | Main Drift |
| 252 | 2120 | 2130 | 24 | 83 | -2.50 | 65 | Main Drift |
| 253 | 2130 | 2140 | 24 | 83 | -2.51 | 50 | Main Drift |
| 254 | 2140 | 2150 | 24 | 83 | -2.51 | 35 | Main Drift |
| 255 | 2150 | 2160 | 24 | 83 | -2.52 | 19 | Main Drift |
| 256 | 2160 | 2170 | 24 | 83 | -2.52 | 4 | Main Drift |
| 257 | 2180 | 2170 | 24 | 83 | -2.52 | 11 | Main Drift |
| 258 | 2190 | 2180 | 24 | 83 | -2.52 | 26 | Main Drift |
| 259 | 2200 | 2190 | 24 | 83 | -2.51 | 41 | Main Drift |
| 260 | 2210 | 2200 | 24 | 83 | -2.50 | 56 | Main Drift |
| 261 | 2220 | 2210 | 24 | 83 | -2.49 | 71 | Main Drift |
| 262 | 2230 | 2220 | 24 | 83 | -2.47 | 86 | Main Drift |
| 263 | 2240 | 2230 | 24 | 83 | -2.44 | 101 | Main Drift |
| 264 | 2250 | 2240 | 24 | 83 | -2.40 | 116 | Main Drift |
| 265 | 2260 | 2250 | 22 | 83 | -2.35 | 132 | Main Drift |
| 266 | 2270 | 2260 | 22 | 83 | -2.32 | 58 | Main Drift |
| 267 | 2262 | 2272 | 22 | 83 | -7.24 | 319 | Main Drift |
| 268 | 2252 | 2262 | 22 | 83 | -11.91 | 302 | Main Drift |
| 269 | 2244 | 2252 | 22 | 83 | -11.39 | 285 | Main Drift |
| 270 | 2232 | 2244 | 22 | 83 | -10.94 | 268 | Main Drift |
| 271 | 2222 | 2232 | 22 | 83 | -10.54 | 251 | Main Drift |
| 272 | 2212 | 2222 | 22 | 83 | -10.19 | 234 | Main Drift |
| 273 | 2202 | 2212 | 22 | 83 | -9.89 | 217 | Main Drift |
| 274 | 2192 | 2202 | 22 | 83 | -9.63 | 200 | Main Drift |
| 275 | 2182 | 2192 | 22 | 83 | -9.41 | 183 | Main Drift |
| 276 | 2172 | 2182 | 22 | 83 | -9.23 | 166 | Main Drift |
| 277 | 2162 | 2172 | 22 | 83 | -9.08 | 149 | Main Drift |
| 278 | 2152 | 2162 | 22 | 83 | -8.97 | 132 | Main Drift |
| 279 | 2142 | 2152 | 22 | 83 | -8.88 | 115 | Main Drift |
| 280 | 2132 | 2142 | 22 | 83 | -8.81 | 98 | Main Drift |
| 281 | 2122 | 2132 | 22 | 83 | -8.76 | 81 | Main Drift |
| 282 | 2112 | 2122 | 22 | 83 | -8.73 | 64 | Main Drift |
| 283 | 2102 | 2112 | 22 | 83 | -8.71 | 47 | Main Drift |
| 284 | 2092 | 2102 | 22 | 83 | -8.70 | 30 | Main Drift |
| 285 | 2082 | 2092 | 22 | 83 | -8.70 | 13 | Main Drift |
| 286 | 2082 | 2072 | 22 | 83 | -8.70 | 4 | Main Drift |
| 287 | 2072 | 2062 | 22 | 83 | -8.70 | 21 | Main Drift |
| 288 | 2062 | 2052 | 22 | 83 | -8.70 | 38 | Main Drift |
| 289 | 2052 | 2042 | 22 | 83 | -8.72 | 55 | Main Drift |
| 290 | 2042 | 2032 | 22 | 83 | -8.74 | 72 | Main Drift |
| 291 | 2032 | 7014 | 22 | 61 | -8.77 | 89 | Main Drift |
| 292 | 2022 | 7014 | 22 | 21 | -8.75 | 154 | Main Drift |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 293 | 2012 | 2022 | 22 | 83 | -8.66 | 137 | Main Drift |
| 294 | 7226 | 2012 | 22 | 83 | -8.56 | 120 | Main Drift |
| 295 | 4290 | 4300 | 22 | 82 | -6.84 | 19 | Main Drift |
| 296 | 4280 | 4290 | 22 | 82 | -5.15 | 34 | Main Drift |
| 297 | 4270 | 4280 | 22 | 82 | -5.14 | 49 | Main Drift |
| 298 | 4260 | 4270 | 22 | 82 | -5.13 | 64 | Main Drift |
| 299 | 4250 | 4260 | 22 | 82 | -5.11 | 79 | Main Drift |
| 300 | 4240 | 4250 | 22 | 82 | -5.09 | 94 | Main Drift |
| 301 | 4230 | 4240 | 22 | 82 | -5.05 | 109 | Main Drift |
| 302 | 4220 | 4230 | 22 | 82 | -5.00 | 124 | Main Drift |
| 303 | 4210 | 4220 | 22 | 82 | -4.94 | 140 | Main Drift |
| 304 | 4200 | 4210 | 22 | 82 | -4.87 | 155 | Main Drift |
| 305 | 4190 | 4200 | 22 | 82 | -4.78 | 170 | Main Drift |
| 306 | 4180 | 4190 | 22 | 82 | -4.67 | 185 | Main Drift |
| 307 | 6414 | 4180 | 22 | 61 | -4.56 | 200 | Main Drift |
| 308 | 6414 | 4170 | 22 | 21 | -4.51 | 91 | Main Drift |
| 309 | 4170 | 4160 | 22 | 82 | -4.52 | 76 | Main Drift |
| 310 | 4160 | 4150 | 22 | 82 | -4.54 | 61 | Main Drift |
| 311 | 4150 | 4140 | 22 | 82 | -4.55 | 46 | Main Drift |
| 312 | 4140 | 4130 | 22 | 82 | -4.56 | 30 | Main Drift |
| 313 | 4130 | 4120 | 22 | 82 | -4.56 | 15 | Main Drift |
| 314 | 4120 | 4110 | 22 | 82 | -4.56 | 0 | Main Drift |
| 315 | 4100 | 4110 | 22 | 82 | -4.56 | 15 | Main Drift |
| 316 | 4090 | 4100 | 22 | 82 | -4.56 | 30 | Main Drift |
| 317 | 4080 | 4090 | 22 | 82 | -4.55 | 45 | Main Drift |
| 318 | 4070 | 4080 | 22 | 82 | -4.54 | 60 | Main Drift |
| 319 | 4060 | 4070 | 22 | 82 | -4.52 | 75 | Main Drift |
| 320 | 4050 | 4060 | 22 | 82 | -4.50 | 90 | Main Drift |
| 321 | 4040 | 4050 | 22 | 82 | -4.47 | 105 | Main Drift |
| 322 | 4030 | 4040 | 22 | 82 | -4.42 | 121 | Main Drift |
| 323 | 4020 | 4030 | 22 | 82 | -4.37 | 136 | Main Drift |
| 324 | 4010 | 4020 | 22 | 82 | -4.29 | 151 | Main Drift |
| 325 | 3012 | 6316 | 22 | 82 | -6.29 | 230 | Main Drift |
| 326 | 3022 | 3012 | 22 | 82 | -8.20 | 196 | Main Drift |
| 327 | 3032 | 3022 | 22 | 82 | -8.01 | 162 | Main Drift |
| 328 | 3042 | 3032 | 22 | 82 | -7.89 | 128 | Main Drift |
| 329 | 3052 | 3042 | 22 | 82 | -7.81 | 94 | Main Drift |
| 330 | 3062 | 3052 | 22 | 82 | -7.78 | 60 | Main Drift |
| 331 | 3072 | 3062 | 22 | 82 | -7.76 | 26 | Main Drift |
| 332 | 3072 | 3082 | 22 | 82 | -7.76 | 8 | Main Drift |
| 333 | 3082 | 3092 | 22 | 82 | -7.77 | 42 | Main Drift |
| 334 | 3092 | 7229 | 22 | 41 | -7.78 | 76 | Main Drift |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 335 | 7229 | 3102 | 22 | 41 | -7.80 | 32 | Main Drift |
| 336 | 3102 | 3112 | 22 | 82 | -7.81 | 51 | Main Drift |
| 337 | 3112 | 3122 | 22 | 82 | -7.83 | 68 | Main Drift |
| 338 | 3132 | 7128 | 22 | 41 | -7.87 | 6 | Main Drift |
| 339 | 3122 | 7128 | 22 | 41 | -7.86 | 85 | Main Drift |
| 340 | 3132 | 3142 | 22 | 82 | -7.87 | 11 | Main Drift |
| 341 | 3142 | 7124 | 22 | 41 | -7.88 | 28 | Main Drift |
| 342 | 3152 | 7124 | 22 | 41 | -7.87 | 64 | Main Drift |
| 343 | 3162 | 3152 | 22 | 82 | -7.85 | 47 | Main Drift |
| 344 | 3172 | 3162 | 22 | 82 | -7.84 | 30 | Main Drift |
| 345 | 3182 | 3172 | 22 | 82 | -7.84 | 13 | Main Drift |
| 346 | 3182 | 3192 | 22 | 82 | -7.84 | 4 | Main Drift |
| 347 | 3192 | 3202 | 22 | 82 | -7.84 | 21 | Main Drift |
| 348 | 3202 | 3212 | 22 | 82 | -7.85 | 38 | Main Drift |
| 349 | 3222 | 7228 | 22 | 41 | -7.87 | 72 | Main Drift |
| 350 | 7228 | 4232 | 22 | 41 | -7.92 | 137 | Main Drift |
| 351 | 4232 | 7622 | 22 | 41 | -8.01 | 154 | Main Drift |
| 352 | 7622 | 4242 | 22 | 41 | -8.07 | 48 | Main Drift |
| 353 | 4242 | 4252 | 22 | 82 | -8.08 | 65 | Main Drift |
| 354 | 4252 | 4262 | 22 | 82 | -8.12 | 82 | Main Drift |
| 355 | 4262 | 4272 | 22 | 82 | -8.16 | 99 | Main Drift |
| 356 | 4272 | 4282 | 22 | 82 | -8.23 | 116 | Main Drift |
| 357 | 4282 | 4292 | 22 | 41 | -8.31 | 133 | Main Drift |
| 358 | 4292 | 6113 | 22 | 41 | -8.40 | 150 | Main Drift |
| 359 | 6113 | 4302 | 22 | 82 | -8.45 | 43 | Main Drift |
| 360 | 4102 | 4112 | 22 | 82 | -7.81 | 61 | Main Drift |
| 361 | 4112 | 4122 | 22 | 41 | -7.84 | 78 | Main Drift |
| 362 | 4132 | 7127 | 22 | 41 | -7.89 | 5 | Main Drift |
| 363 | 4122 | 7127 | 22 | 41 | -7.87 | 95 | Main Drift |
| 364 | 4132 | 4142 | 22 | 82 | -7.89 | 12 | Main Drift |
| 365 | 4142 | 7125 | 22 | 41 | -7.89 | 29 | Main Drift |
| 366 | 4152 | 7125 | 22 | 41 | -7.88 | 71 | Main Drift |
| 367 | 4162 | 4152 | 22 | 82 | -7.86 | 54 | Main Drift |
| 368 | 4172 | 4162 | 22 | 82 | -7.85 | 37 | Main Drift |
| 369 | 4182 | 4172 | 22 | 82 | -7.84 | 20 | Main Drift |
| 370 | 4192 | 4182 | 22 | 82 | -7.84 | 3 | Main Drift |
| 371 | 4192 | 4202 | 22 | 82 | -7.84 | 14 | Main Drift |
| 372 | 4202 | 4212 | 22 | 82 | -7.84 | 31 | Main Drift |
| 373 | 4212 | 4222 | 22 | 82 | -7.85 | 48 | Main Drift |
| 374 | 4222 | 7228 | 22 | 75 | -7.87 | 65 | Main Drift |
| 375 | 3027 | 3017 | 22 | 82 | -9.05 | 126 | Main Drift |
| 376 | 3037 | 3027 | 22 | 82 | -8.96 | 109 | Main Drift |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 377 | 3047 | 3037 | 22 | 82 | -8.90 | 92 | Main Drift |
| 378 | 3057 | 3047 | 22 | 82 | -8.86 | 75 | Main Drift |
| 379 | 3067 | 3057 | 22 | 82 | -8.83 | 58 | Main Drift |
| 380 | 3077 | 3067 | 22 | 82 | -8.82 | 41 | Main Drift |
| 381 | 3087 | 3077 | 22 | 82 | -8.81 | 24 | Main Drift |
| 382 | 3097 | 3087 | 22 | 82 | -8.81 | 7 | Main Drift |
| 383 | 3097 | 3107 | 22 | 82 | -8.81 | 10 | Main Drift |
| 384 | 3107 | 3117 | 22 | 82 | -8.81 | 27 | Main Drift |
| 385 | 3117 | 3127 | 22 | 82 | -8.82 | 44 | Main Drift |
| 386 | 3127 | 3137 | 22 | 82 | -8.84 | 61 | Main Drift |
| 387 | 3137 | 3147 | 22 | 82 | -8.86 | 78 | Main Drift |
| 388 | 3147 | 3157 | 22 | 82 | -8.91 | 95 | Main Drift |
| 389 | 3157 | 3167 | 22 | 82 | -8.97 | 112 | Main Drift |
| 390 | 3167 | 3177 | 22 | 82 | -9.06 | 129 | Main Drift |
| 391 | 3177 | 3187 | 22 | 82 | -9.17 | 146 | Main Drift |
| 392 | 3197 | 7623 | 22 | 41 | -9.34 | 22 | Main Drift |
| 393 | 3187 | 7623 | 22 | 41 | -9.29 | 163 | Main Drift |
| 394 | 6116 | 3197 | 0 | 0 | -5.95 | 5 | Main Drift |
| 395 | 3010 | 7223 | 22 | 59 | -2.32 | 43 | Main Drift |
| 396 | 3020 | 3010 | 22 | 82 | -2.32 | 58 | Main Drift |
| 397 | 3020 | 3030 | 22 | 82 | -2.34 | 120 | Main Drift |
| 398 | 3030 | 3040 | 22 | 82 | -2.38 | 105 | Main Drift |
| 399 | 3040 | 3015 | 22 | 61 | -2.41 | 90 | Main Drift |
| 400 | 3015 | 3050 | 22 | 21 | -2.42 | 75 | Main Drift |
| 401 | 3050 | 3025 | 22 | 61 | -2.43 | 60 | Main Drift |
| 402 | 3025 | 3060 | 22 | 21 | -2.44 | 45 | Main Drift |
| 403 | 3060 | 3035 | 22 | 27 | -2.44 | 30 | Main Drift |
| 404 | 7214 | 3070 | 22 | 27 | -2.46 | 220 | Main Drift |
| 405 | 3035 | 7214 | 22 | 27 | -2.44 | 15 | Main Drift |
| 406 | 3070 | 3045 | 22 | 61 | -2.55 | 205 | Main Drift |
| 407 | 3045 | 3080 | 22 | 21 | -2.62 | 190 | Main Drift |
| 408 | 3080 | 3055 | 22 | 61 | -2.67 | 175 | Main Drift |
| 409 | 3055 | 3090 | 22 | 21 | -2.72 | 160 | Main Drift |
| 410 | 3090 | 3065 | 22 | 61 | -2.76 | 145 | Main Drift |
| 411 | 3065 | 3100 | 22 | 21 | -2.79 | 130 | Main Drift |
| 412 | 3100 | 3075 | 22 | 61 | -2.82 | 114 | Main Drift |
| 413 | 3075 | 3110 | 22 | 21 | -2.84 | 99 | Main Drift |
| 414 | 3110 | 3085 | 22 | 61 | -2.85 | 84 | Main Drift |
| 415 | 3085 | 3120 | 22 | 21 | -2.87 | 69 | Main Drift |
| 416 | 3120 | 3095 | 22 | 61 | -2.87 | 54 | Main Drift |
| 417 | 3095 | 3130 | 22 | 21 | -2.88 | 39 | Main Drift |
| 418 | 3130 | 3105 | 22 | 61 | -2.88 | 24 | Main Drift |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 419 | 3105 | 3140 | 22 | 21 | -2.88 | 9 | Main Drift |
| 420 | 3115 | 3140 | 22 | 61 | -2.88 | 6 | Main Drift |
| 421 | 3150 | 3115 | 22 | 21 | -2.88 | 21 | Main Drift |
| 422 | 3125 | 3150 | 22 | 61 | -2.88 | 37 | Main Drift |
| 423 | 3160 | 3125 | 22 | 21 | -2.87 | 52 | Main Drift |
| 424 | 3135 | 3160 | 22 | 61 | -2.87 | 67 | Main Drift |
| 425 | 7113 | 3170 | 22 | 27 | -2.85 | 97 | Main Drift |
| 426 | 3170 | 3135 | 22 | 27 | -2.86 | 82 | Main Drift |
| 427 | 7113 | 3145 | 22 | 27 | -2.84 | 22 | Main Drift |
| 428 | 3145 | 3180 | 22 | 21 | -2.84 | 7 | Main Drift |
| 429 | 3155 | 3180 | 22 | 61 | -2.84 | 8 | Main Drift |
| 430 | 3190 | 3155 | 22 | 21 | -2.84 | 23 | Main Drift |
| 431 | 3165 | 3190 | 22 | 61 | -2.84 | 38 | Main Drift |
| 432 | 3200 | 3165 | 22 | 21 | -2.84 | 53 | Main Drift |
| 433 | 3175 | 3200 | 22 | 61 | -2.83 | 68 | Main Drift |
| 434 | 3210 | 3175 | 22 | 21 | -2.82 | 83 | Main Drift |
| 435 | 3185 | 3210 | 22 | 61 | -2.80 | 99 | Main Drift |
| 436 | 3220 | 3185 | 22 | 21 | -2.79 | 114 | Main Drift |
| 437 | 3195 | 3220 | 22 | 61 | -2.76 | 129 | Main Drift |
| 438 | 1010 | 3195 | 22 | 21 | -2.73 | 144 | Main Drift |
| 439 | 1020 | 1010 | 22 | 82 | -2.68 | 159 | Main Drift |
| 440 | 6112 | 1020 | 22 | 30 | -2.61 | 174 | Main Drift |
| 441 | 1030 | 6112 | 24 | 52 | -2.59 | 45 | Main Drift |
| 442 | 6100 | 1030 | 24 | 71 | -2.59 | 60 | Main Drift |
| 443 | 1040 | 6100 | 24 | 11 | -2.58 | 80 | Main Drift |
| 444 | 1050 | 1040 | 24 | 82 | -2.56 | 95 | Main Drift |
| 445 | 1060 | 1050 | 24 | 82 | -2.53 | 110 | Main Drift |
| 446 | 1070 | 1060 | 24 | 82 | -2.49 | 125 | Main Drift |
| 447 | 1080 | 1070 | 24 | 82 | -2.43 | 140 | Main Drift |
| 448 | 6017 | 1022 | 15 | 61 | -8.10 | 47 | Main Drift Panel 1 Exhaust |
| 449 | 1032 | 6017 | 15 | 21 | -8.07 | 27 | Main Drift Panel 1 Exhaust |
| 450 | 1042 | 1032 | 15 | 82 | -8.06 | 10 | Main Drift Panel 1 Exhaust |
| 451 | 1042 | 1052 | 15 | 82 | -8.06 | 7 | Main Drift Panel 1 Exhaust |
| 452 | 1052 | 1062 | 15 | 82 | -8.07 | 24 | Main Drift Panel 1 Exhaust |
| 453 | 1062 | 1072 | 15 | 82 | -8.11 | 41 | Main Drift Panel 1 Exhaust |
| 454 | 1072 | 1082 | 15 | 82 | -8.21 | 58 | Main Drift Panel 1 Exhaust |
| 455 | 6230 | 6231 | 22 | 372 | -2.22 | 80 | Main Drift |
| 456 | 6230 | 2260 | 22 | 460 | -2.25 | 89 | Main Drift |
| 457 | 6220 | 6230 | 24 | 1783 | -1.09 | 169 | South Ramp |
| 458 | 6231 | 2270 | 22 | 219 | -2.29 | 73 | Panel 2 Main Drift |
| 459 | 6231 | 7321 | 0 | 0 | -7.89 | 7 | Main Drift |
| 460 | 2272 | 7321 | 22 | 140 | -13.15 | 336 | Panel 2 Main Drift |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 461 | 7012 | 7011 | 25 | 33 | -8.99 | 243 | ECRB Exhaust Shaft |
| 462 | 6114 | 7011 | 24 | 662 | -8.80 | 150 | 7x7 ECRB Main Drift |
| 463 | 6115 | 6114 | 24 | 58 | -8.52 | 42 | 7x7 ECRB Main Drift |
| 464 | 7017 | 6115 | 24 | 1000 | -5.27 | 20 | 7x7 ECRB Main Drift |
| 465 | 6111 | 7017 | 24 | 244 | -2.03 | 20 | 7x7 ECRB Main Drift |
| 466 | 6110 | 6111 | 24 | 1996 | -1.01 | 154 | North Portal Ramp |
| 467 | 1090 | 1091 | 24 | 97 | -2.36 | 5 | Panel 1 Lead In |
| 468 | 1091 | 1092 | 0 | 0 | -5.39 | 5 | Panel 1 Main Drift 7x7 |
| 469 | 1093 | 1092 | 15 | 143 | -8.37 | 52 | Panel 1 Main Drift 5m dia |
| 470 | 1082 | 1093 | 15 | 30 | -8.30 | 75 | Panel 1 Main Drift 5m dia |
| 471 | 1022 | 1012 | 15 | 29 | -8.13 | 64 | Panel 1 Main Drift 5m dia |
| 472 | 1013 | 1012 | 15 | 134 | -8.15 | 15 | Panel 1 Main Drift 5m dia |
| 473 | 1090 | 1080 | 24 | 41 | -2.38 | 155 | Panel 1 Main Drift 7.62m |
| 474 | 2010 | 1090 | 24 | 82 | -2.31 | 160 | Panel 1 Main Drift 7.62m |
| 475 | 1092 | 7227 | 22 | 597 | -8.46 | 57 | Panel 2 Main Drift 7.62 m |
| 476 | 7013 | 7227 | 22 | 155 | -8.49 | 63 | Panel 2 Main Drift 7.62 m |
| 477 | 4300 | 7013 | 0 | 0 | -6.81 | 4 | Panel 4 Main Drift 7.62 m |
| 478 | 4302 | 7013 | 22 | 189 | -8.46 | 60 | Panel 4 Main Drift 7.62 m |
| 479 | 1093 | 6115 | 7 | 29 | -8.42 | 23 | ECRB-Panel 1 Raise 2 m |
| 480 | 6113 | 6114 | 24 | 205 | -8.48 | 107 | 7x7 ECRB-Panel 4 connect |
| 481 | 6016 | 6017 | 15 | 182 | -5.37 | 20 | Observation Drift 5 m dia |
| 482 | 6015 | 6016 | 15 | 507 | -2.64 | 20 | Observation Drift 5 m dia |
| 483 | 6014 | 6015 | 15 | 59 | -2.61 | 20 | Observation Drift 5 m dia |
| 484 | 6013 | 6014 | 15 | 61 | -2.60 | 20 | Observation Drift 5 m dia |
| 485 | 6011 | 6013 | 15 | 32 | -2.60 | 20 | Observation Drift 5 m dia |
| 486 | 6100 | 6011 | 15 | 129 | -2.59 | 20 | Observation Drift 5 m dia |
| 487 | 7111 | 7113 | 22 | 827 | -2.60 | 119 | Int Shft 1 Acc 7.65 m dia |
| 488 | 7111 | 6414 | 22 | 557 | -3.43 | 291 | int shft 1 acc 7.65 m dia |
| 489 | 6316 | 7224 | 22 | 457 | -9.17 | 234 | Main Drifts |
| 490 | 7224 | 7225 | 22 | 98 | -9.72 | 43 | Main Drifts |
| 491 | 3017 | 7225 | 22 | 716 | -9.41 | 143 | Main Drifts |
| 492 | 6314 | 6315 | 22 | 701 | -2.78 | 171 | Main Drifts |
| 493 | 6315 | 4010 | 22 | 905 | -3.73 | 166 | Main Drifts |
| 494 | 6315 | 6316 | 0 | 0 | -5.92 | 5 | int to exh Main Drifts |
| 495 | 7223 | 6314 | 22 | 293 | -2.33 | 37 | Main Drifts |
| 496 | 6313 | 6314 | 22 | 158 | -2.28 | 133 | Main Drifts |
| 497 | 6312 | 6313 | 22 | 66 | -2.17 | 133 | Main Drifts |
| 498 | 6311 | 6312 | 22 | 2720 | -1.11 | 133 | Main Drifts |
| 499 | 6310 | 6311 | 24 | 18 | -0.05 | 133 | 7x7 lead in |
| 500 | 6111 | 6116 | 24 | 732 | -2.29 | 135 | Main drift 7.62 m dia |
| 501 | 6116 | 6112 | 24 | 61 | -2.57 | 129 | Main drift 7.62 m dia |
| 502 | 3212 | 3222 | 22 | 83 | -7.86 | 55 | Main Drifts |
| 503 | 7221 | 7222 | 25 | 10 | -10.01 | 377 | Lower Exhaust Shaft #2 |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 504 | 7320 | 9320 | 0 | 0 | -7.46 | 345 | Exhaust Shaft #3 Fan |
| 505 | 7010 | 9020 | 0 | 0 | -5.65 | 394 | ECRB Shaft Exhaust Fan |
| 506 | 7620 | 9620 | 0 | 0 | -6.83 | 186 | Exhaust Raise #1 Fan |
| 507 | 7120 | 9120 | 0 | 0 | -5.17 | 385 | Exhaust Shaft #1 Fan |
| 508 | 7220 | 9220 | 0 | 0 | -6.24 | 385 | Exhaust Shaft #2 Fan |
| 509 | 7625 | 9622 | 0 | 0 | 0.21 | 186 | Exhaust Raise #2 Fan |
| 510 | 9321 | 7320 | 0 | 0 | -7.46 | 1.7 | Fan Housing Leakage |
| 511 | 9021 | 7010 | 0 | 0 | -5.65 | 1.5 | Fan Housing Leakage |
| 512 | 9621 | 7620 | 0 | 0 | -6.83 | 1.6 | Fan Housing Leakage |
| 513 | 9121 | 7120 | 0 | 0 | -5.17 | 1.4 | Fan Housing Leakage |
| 514 | 9221 | 7220 | 0 | 0 | -6.24 | 1.5 | Fan Housing Leakage |
| 515 | 9623 | 7625 | 0 | 0 | 0.21 | 1.7 | Fan Housing Leakage exr 2 |
| 516 | 9997 | 6220 | 0 | 0 | 0.00 | 169 | Atmospheric Reference |
| 517 | 9320 | 9997 | 0 | 0 | 0.00 | 345 | Atmospheric Reference |
| 518 | 9020 | 9997 | 0 | 0 | 0.00 | 394 | Atmospheric Reference |
| 519 | 9620 | 9997 | 0 | 0 | 0.00 | 186 | Atmospheric Reference |
| 520 | 9997 | 7110 | 0 | 0 | 0.00 | 410 | Atmospheric Reference |
| 521 | 9120 | 9997 | 0 | 0 | 0.00 | 385 | Atmospheric Reference |
| 522 | 9997 | 6310 | 0 | 0 | 0.00 | 133 | Atmospheric Reference |
| 523 | 9220 | 9997 | 0 | 0 | 0.00 | 385 | Atmospheric Reference |
| 524 | 9997 | 7210 | 0 | 0 | 0.00 | 399 | Atmospheric Reference |
| 525 | 9997 | 6110 | 0 | 0 | 0.00 | 154 | Atmospheric Reference |
| 526 | 9997 | 7310 | 0 | 0 | 0.00 | 406 | Atmospheric Reference |
| 527 | 9997 | 9623 | 0 | 0 | 0.00 | 1.7 | Atmospheric Reference |
| 528 | 9997 | 9321 | 0 | 0 | 0.00 | 1.7 | Fan Housing Atmospheric |
| 529 | 9997 | 9021 | 0 | 0 | 0.00 | 1.5 | Fan Housing Atmospheric |
| 530 | 9997 | 9621 | 0 | 0 | 0.00 | 1.6 | Fan Housing Atmospheric |
| 531 | 9997 | 9121 | 0 | 0 | 0.00 | 1.4 | Fan Housing Atmospheric |
| 532 | 9997 | 9221 | 0 | 0 | 0.00 | 1.5 | Fan Housing Atmospheric |
| 533 | 9622 | 9997 | 0 | 0 | 0.00 | 186 | Fan Housing Atmospheric |
| 534 | 9997 | 2272 | 0 | 0 | -6.39 | 1.9 | inject branch/expansion |
| 535 | 9997 | 2262 | 0 | 0 | -6.09 | 1.9 | inject branch/expansion |
| 536 | 9997 | 2252 | 0 | 0 | -5.82 | 1.9 | inject branch/expansion |
| 537 | 9997 | 2244 | 0 | 0 | -5.58 | 1.9 | inject branch/expansion |
| 538 | 9997 | 2232 | 0 | 0 | -5.36 | 1.9 | inject branch/expansion |
| 539 | 9997 | 2222 | 0 | 0 | -5.18 | 1.9 | inject branch/expansion |
| 540 | 9997 | 2212 | 0 | 0 | -5.01 | 1.9 | inject branch/expansion |
| 541 | 9997 | 2202 | 0 | 0 | -4.87 | 1.9 | inject branch/expansion |
| 542 | 9997 | 2192 | 0 | 0 | -4.76 | 1.9 | inject branch/expansion |
| 543 | 9997 | 2182 | 0 | 0 | -4.66 | 1.9 | inject branch/expansion |
| 544 | 9997 | 2172 | 0 | 0 | -4.58 | 1.9 | inject branch/expansion |
| 545 | 9997 | 2162 | 0 | 0 | -4.51 | 1.9 | inject branch/expansion |
| 546 | 9997 | 2152 | 0 | 0 | -4.46 | 1.9 | inject branch/expansion |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3/s$) | Description |
|---|---|---|---|---|---|---|---|
| 547 | 9997 | 2142 | 0 | 0 | -4.42 | 1.9 | inject branch/expansion |
| 548 | 9997 | 2132 | 0 | 0 | -4.39 | 1.9 | inject branch/expansion |
| 549 | 9997 | 2122 | 0 | 0 | -4.37 | 1.9 | inject branch/expansion |
| 550 | 9997 | 2112 | 0 | 0 | -4.36 | 1.9 | inject branch/expansion |
| 551 | 9997 | 2102 | 0 | 0 | -4.35 | 1.9 | inject branch/expansion |
| 552 | 9997 | 2092 | 0 | 0 | -4.35 | 1.9 | inject branch/expansion |
| 553 | 9997 | 2082 | 0 | 0 | -4.35 | 1.9 | inject branch/expansion |
| 554 | 9997 | 2072 | 0 | 0 | -4.35 | 1.9 | inject branch/expansion |
| 555 | 9997 | 2062 | 0 | 0 | -4.35 | 1.9 | inject branch/expansion |
| 556 | 9997 | 2052 | 0 | 0 | -4.35 | 1.9 | inject branch/expansion |
| 557 | 9997 | 2042 | 0 | 0 | -4.36 | 1.9 | inject branch/expansion |
| 558 | 9997 | 2032 | 0 | 0 | -4.38 | 1.9 | inject branch/expansion |
| 559 | 9997 | 2022 | 0 | 0 | -4.36 | 1.9 | inject branch/expansion |
| 560 | 9997 | 2012 | 0 | 0 | -4.30 | 1.9 | inject branch/expansion |
| 561 | 9997 | 1082 | 0 | 0 | -4.14 | 1.9 | inject branch/expansion |
| 562 | 9997 | 1072 | 0 | 0 | -4.07 | 1.9 | inject branch/expansion |
| 563 | 9997 | 1062 | 0 | 0 | -4.04 | 1.9 | inject branch/expansion |
| 564 | 9997 | 1052 | 0 | 0 | -4.03 | 1.9 | inject branch/expansion |
| 565 | 9997 | 1042 | 0 | 0 | -4.03 | 1.9 | inject branch/expansion |
| 566 | 9997 | 1032 | 0 | 0 | -4.03 | 1.9 | inject branch/expansion |
| 567 | 9997 | 1022 | 0 | 0 | -4.06 | 1.9 | inject branch/expansion |
| 568 | 9997 | 3197 | 0 | 0 | -4.67 | 1.9 | inject branch/expansion |
| 569 | 9997 | 3187 | 0 | 0 | -4.62 | 1.9 | inject branch/expansion |
| 570 | 9997 | 3177 | 0 | 0 | -4.55 | 1.9 | inject branch/expansion |
| 571 | 9997 | 3167 | 0 | 0 | -4.50 | 1.9 | inject branch/expansion |
| 572 | 9997 | 3157 | 0 | 0 | -4.47 | 1.9 | inject branch/expansion |
| 573 | 9997 | 3147 | 0 | 0 | -4.44 | 1.9 | inject branch/expansion |
| 574 | 9997 | 3137 | 0 | 0 | -4.42 | 1.9 | inject branch/expansion |
| 575 | 9997 | 3127 | 0 | 0 | -4.41 | 1.9 | inject branch/expansion |
| 576 | 9997 | 3117 | 0 | 0 | -4.41 | 1.9 | inject branch/expansion |
| 577 | 9997 | 3107 | 0 | 0 | -4.40 | 1.9 | inject branch/expansion |
| 578 | 9997 | 3097 | 0 | 0 | -4.40 | 1.9 | inject branch/expansion |
| 579 | 9997 | 3087 | 0 | 0 | -4.40 | 1.9 | inject branch/expansion |
| 580 | 9997 | 3077 | 0 | 0 | -4.41 | 1.9 | inject branch/expansion |
| 581 | 9997 | 3067 | 0 | 0 | -4.41 | 1.9 | inject branch/expansion |
| 582 | 9997 | 3057 | 0 | 0 | -4.42 | 1.9 | inject branch/expansion |
| 583 | 9997 | 3047 | 0 | 0 | -4.44 | 1.9 | inject branch/expansion |
| 584 | 9997 | 3037 | 0 | 0 | -4.46 | 1.9 | inject branch/expansion |
| 585 | 9997 | 3027 | 0 | 0 | -4.50 | 1.9 | inject branch/expansion |
| 586 | 9997 | 3017 | 0 | 0 | -4.55 | 1.9 | inject branch/expansion |
| 587 | 9997 | 3012 | 0 | 0 | -4.16 | 3.8 | inject branch/expansion |
| 588 | 9997 | 3022 | 0 | 0 | -4.04 | 3.8 | inject branch/expansion |
| 589 | 9997 | 3032 | 0 | 0 | -3.97 | 3.8 | inject branch/expansion |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

Table 3. Repository Layout Input Parameters (Continued)

| Line No. | Inlet Node | Outlet Node | Perimeter (m) | Length (m) | Pres. Drop (mbar) | Flow ($m^3$/s) | Description |
|---|---|---|---|---|---|---|---|
| 590 | 9997 | 3042 | 0 | 0 | -3.92 | 3.8 | inject branch/expansion |
| 591 | 9997 | 3052 | 0 | 0 | -3.89 | 3.8 | inject branch/expansion |
| 592 | 9997 | 3062 | 0 | 0 | -3.88 | 3.8 | inject branch/expansion |
| 593 | 9997 | 3072 | 0 | 0 | -3.88 | 3.8 | inject branch/expansion |
| 594 | 9997 | 3082 | 0 | 0 | -3.88 | 3.8 | inject branch/expansion |
| 595 | 9997 | 3092 | 0 | 0 | -3.89 | 3.8 | inject branch/expansion |
| 596 | 9997 | 3102 | 0 | 0 | -3.90 | 3.8 | inject branch/expansion |
| 597 | 9997 | 3112 | 0 | 0 | -3.91 | 1.9 | inject branch/expansion |
| 598 | 9997 | 3122 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 599 | 9997 | 3132 | 0 | 0 | -3.94 | 1.9 | inject branch/expansion |
| 600 | 9997 | 3142 | 0 | 0 | -3.94 | 1.9 | inject branch/expansion |
| 601 | 9997 | 3152 | 0 | 0 | -3.93 | 1.9 | inject branch/expansion |
| 602 | 9997 | 3162 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 603 | 9997 | 3172 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 604 | 9997 | 3182 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 605 | 9997 | 3192 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 606 | 9997 | 3202 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 607 | 9997 | 3212 | 0 | 0 | -3.93 | 1.9 | inject branch/expansion |
| 608 | 9997 | 3222 | 0 | 0 | -3.93 | 1.9 | inject branch/expansion |
| 609 | 9997 | 4232 | 0 | 0 | -3.98 | 1.9 | inject branch/expansion |
| 610 | 9997 | 4242 | 0 | 0 | -4.04 | 1.9 | inject branch/expansion |
| 611 | 9997 | 4252 | 0 | 0 | -4.05 | 1.9 | inject branch/expansion |
| 612 | 9997 | 4262 | 0 | 0 | -4.07 | 1.9 | inject branch/expansion |
| 613 | 9997 | 4272 | 0 | 0 | -4.10 | 1.9 | inject branch/expansion |
| 614 | 9997 | 4282 | 0 | 0 | -4.14 | 1.9 | inject branch/expansion |
| 615 | 9997 | 4292 | 0 | 0 | -4.17 | 1.9 | inject branch/expansion |
| 616 | 9997 | 4302 | 0 | 0 | -4.23 | 1.9 | inject branch/expansion |
| 617 | 9997 | 4222 | 0 | 0 | -3.93 | 1.9 | inject branch/expansion |
| 618 | 9997 | 4212 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 619 | 9997 | 4202 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 620 | 9997 | 4192 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 621 | 9997 | 4182 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 622 | 9997 | 4172 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 623 | 9997 | 4162 | 0 | 0 | -3.93 | 1.9 | inject branch/expansion |
| 624 | 9997 | 4152 | 0 | 0 | -3.93 | 1.9 | inject branch/expansion |
| 625 | 9997 | 4142 | 0 | 0 | -3.94 | 1.9 | inject branch/expansion |
| 626 | 9997 | 4132 | 0 | 0 | -3.94 | 1.9 | inject branch/expansion |
| 627 | 9997 | 4122 | 0 | 0 | -3.92 | 1.9 | inject branch/expansion |
| 628 | 9997 | 4112 | 0 | 0 | -3.91 | 1.9 | inject branch/expansion |
| 629 | 9997 | 4102 | 0 | 0 | -3.90 | 1.9 | inject branch/expansion |

Source: BSC 2003a, Attachment D and Attachment 2 of this document.

### 6.3.1 Calculation Output

The calculation outputs are presented in Table 4 and Attachment II.

Table 4. Concentration Calculation Outputs

| Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 1 | 75 | 64.3 | 0.076 | 36 | 36 | 4.9 | 0.003 |
| 2 | 38 | 10.3 | 0.010 | 37 | 35 | 5.1 | 0.003 |
| 3 | 37 | 10.1 | 0.009 | 38 | 35 | 5.5 | 0.004 |
| 4 | 37 | 5.7 | 0.004 | 39 | 35 | 6.1 | 0.004 |
| 5 | 37 | 5.1 | 0.003 | 40 | 35 | 7.3 | 0.006 |
| 6 | 37 | 4.7 | 0.003 | 41 | 36 | 7.5 | 0.006 |
| 7 | 37 | 4.3 | 0.002 | 42 | 36 | 7.6 | 0.006 |
| 8 | 37 | 4.1 | 0.002 | 43 | 37 | 7.2 | 0.006 |
| 9 | 37 | 3.8 | 0.002 | 44 | 37 | 7.6 | 0.006 |
| 10 | 56 | 38.7 | 0.038 | 45 | 37 | 8.1 | 0.007 |
| 11 | 55 | 43.4 | 0.045 | 46 | 37 | 8.9 | 0.008 |
| 12 | 55 | 38.9 | 0.036 | 47 | 37 | 10.9 | 0.012 |
| 13 | 55 | 38.3 | 0.034 | 48 | 37 | 5.8 | 0.004 |
| 14 | 55 | 37.6 | 0.033 | 49 | 37 | 4.8 | 0.003 |
| 15 | 55 | 35.0 | 0.029 | 50 | 37 | 4.3 | 0.002 |
| 16 | 56 | 30.2 | 0.022 | 51 | 37 | 11.4 | 0.015 |
| 17 | 57 | 25.3 | 0.016 | 52 | 37 | 12.3 | 0.014 |
| 18 | 57 | 55.9 | 0.065 | 53 | 37 | 11.4 | 0.012 |
| 19 | 56 | 68.7 | 0.079 | 54 | 37 | 10.9 | 0.011 |
| 20 | 10 | 0.1 | 0.000 | 55 | 37 | 10.5 | 0.010 |
| 21 | 9 | 0.1 | 0.000 | 56 | 39 | 5.8 | 0.004 |
| 22 | 16 | 0.3 | 0.000 | 57 | 39 | 6.3 | 0.004 |
| 23 | 16 | 0.7 | 0.000 | 58 | 39 | 6.8 | 0.005 |
| 24 | 17 | 0.7 | 0.000 | 59 | 39 | 7.8 | 0.006 |
| 25 | 63 | 71.5 | 0.116 | 60 | 40 | 8.0 | 0.007 |
| 26 | 55 | 65.1 | 0.090 | 61 | 40 | 8.2 | 0.007 |
| 27 | 55 | 74.1 | 0.120 | 62 | 40 | 7.8 | 0.006 |
| 28 | 78 | 83.9 | 0.146 | 63 | 40 | 8.2 | 0.007 |
| 29 | 67 | 72.5 | 0.108 | 64 | 40 | 8.9 | 0.008 |
| 30 | 67 | 94.4 | 0.172 | 65 | 40 | 10.3 | 0.011 |
| 31 | 44 | 2.2 | 0.001 | 66 | 40 | 6.5 | 0.004 |
| 32 | 70 | 78.4 | 0.139 | 67 | 40 | 5.3 | 0.003 |
| 33 | 54 | 73.0 | 0.107 | 68 | 40 | 4.7 | 0.002 |
| 34 | 37 | 5.2 | 0.003 | 69 | 40 | 5.0 | 0.003 |
| 35 | 36 | 4.6 | 0.003 | 70 | 41 | 13.0 | 0.016 |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

Table 4. Concentration Calculation Outputs (Continued)

| Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 71 | 41 | 11.9 | 0.013 | 111 | 61 | 41.5 | 0.043 |
| 72 | 41 | 11.4 | 0.012 | 112 | 62 | 39.7 | 0.039 |
| 73 | 42 | 11.0 | 0.011 | 113 | 62 | 37.6 | 0.034 |
| 74 | 42 | 10.7 | 0.010 | 114 | 63 | 37.6 | 0.034 |
| 75 | 57 | 41.2 | 0.038 | 115 | 64 | 36.7 | 0.032 |
| 76 | 55 | 39.6 | 0.036 | 116 | 55 | 69.5 | 0.100 |
| 77 | 54 | 39.2 | 0.036 | 117 | 55 | 60.6 | 0.078 |
| 78 | 54 | 39.1 | 0.037 | 118 | 43 | 14.1 | 0.019 |
| 79 | 53 | 39.3 | 0.037 | 119 | 43 | 14.8 | 0.020 |
| 80 | 53 | 39.8 | 0.038 | 120 | 42 | 14.8 | 0.020 |
| 81 | 53 | 40.9 | 0.041 | 121 | 42 | 15.3 | 0.021 |
| 82 | 53 | 41.2 | 0.042 | 122 | 42 | 15.8 | 0.022 |
| 83 | 53 | 41.4 | 0.042 | 123 | 42 | 16.4 | 0.024 |
| 84 | 53 | 40.7 | 0.040 | 124 | 42 | 17.2 | 0.025 |
| 85 | 53 | 41.2 | 0.041 | 125 | 42 | 18.2 | 0.028 |
| 86 | 54 | 41.8 | 0.043 | 126 | 42 | 18.8 | 0.029 |
| 87 | 54 | 42.7 | 0.045 | 127 | 42 | 20.5 | 0.033 |
| 88 | 54 | 44.7 | 0.050 | 128 | 43 | 28.0 | 0.075 |
| 89 | 54 | 39.5 | 0.037 | 129 | 43 | 13.4 | 0.014 |
| 90 | 54 | 38.5 | 0.035 | 130 | 43 | 9.6 | 0.007 |
| 91 | 54 | 37.9 | 0.034 | 131 | 43 | 7.7 | 0.005 |
| 92 | 54 | 45.0 | 0.053 | 132 | 43 | 6.5 | 0.004 |
| 93 | 54 | 46.0 | 0.054 | 133 | 43 | 5.5 | 0.003 |
| 94 | 54 | 45.1 | 0.051 | 134 | 42 | 4.7 | 0.002 |
| 95 | 54 | 44.6 | 0.049 | 135 | 43 | 4.8 | 0.002 |
| 96 | 54 | 44.2 | 0.048 | 136 | 43 | 5.2 | 0.003 |
| 97 | 62 | 53.0 | 0.057 | 137 | 44 | 5.7 | 0.003 |
| 98 | 61 | 55.3 | 0.062 | 138 | 44 | 6.3 | 0.004 |
| 99 | 61 | 56.0 | 0.064 | 139 | 44 | 6.8 | 0.004 |
| 100 | 60 | 55.9 | 0.064 | 140 | 45 | 7.3 | 0.005 |
| 101 | 60 | 55.6 | 0.064 | 141 | 45 | 7.9 | 0.005 |
| 102 | 60 | 55.3 | 0.064 | 142 | 45 | 8.6 | 0.006 |
| 103 | 60 | 53.2 | 0.059 | 143 | 46 | 9.5 | 0.007 |
| 104 | 60 | 50.9 | 0.055 | 144 | 46 | 10.5 | 0.008 |
| 105 | 60 | 48.8 | 0.052 | 145 | 46 | 12.7 | 0.012 |
| 106 | 60 | 47.5 | 0.051 | 146 | 46 | 15.3 | 0.016 |
| 107 | 60 | 41.0 | 0.037 | 147 | 47 | 21.0 | 0.027 |
| 108 | 60 | 37.1 | 0.030 | 148 | 57 | 50.7 | 0.063 |
| 109 | 60 | 34.6 | 0.026 | 149 | 55 | 50.1 | 0.063 |
| 110 | 61 | 34.1 | 0.026 | 150 | 54 | 49.9 | 0.064 |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

Table 4. Concentration Calculation Outputs (Continued)

| Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 151 | 54 | 49.9 | 0.065 | 191 | 37 | 3.5 | 0.002 |
| 152 | 53 | 50.3 | 0.066 | 192 | 38 | 3.7 | 0.002 |
| 153 | 53 | 50.8 | 0.068 | 193 | 38 | 4.0 | 0.002 |
| 154 | 53 | 51.6 | 0.070 | 194 | 38 | 4.3 | 0.002 |
| 155 | 53 | 52.6 | 0.073 | 195 | 38 | 4.6 | 0.002 |
| 156 | 53 | 53.4 | 0.075 | 196 | 38 | 5.0 | 0.003 |
| 157 | 53 | 53.6 | 0.078 | 197 | 39 | 5.4 | 0.003 |
| 158 | 53 | 61.2 | 0.123 | 198 | 39 | 6.0 | 0.004 |
| 159 | 54 | 46.7 | 0.053 | 199 | 39 | 6.8 | 0.005 |
| 160 | 54 | 43.1 | 0.044 | 200 | 39 | 5.5 | 0.007 |
| 161 | 54 | 41.2 | 0.040 | 201 | 40 | 9.8 | 0.010 |
| 162 | 54 | 39.8 | 0.037 | 202 | 40 | 16.7 | 0.029 |
| 163 | 54 | 38.8 | 0.035 | 203 | 41 | 12.7 | 0.017 |
| 164 | 54 | 38.0 | 0.034 | 204 | 41 | 11.3 | 0.014 |
| 165 | 54 | 38.1 | 0.034 | 205 | 42 | 10.5 | 0.012 |
| 166 | 54 | 38.5 | 0.035 | 206 | 43 | 9.9 | 0.011 |
| 167 | 54 | 39.1 | 0.036 | 207 | 44 | 9.5 | 0.010 |
| 168 | 54 | 39.4 | 0.036 | 208 | 45 | 9.2 | 0.009 |
| 169 | 54 | 39.5 | 0.036 | 209 | 46 | 8.9 | 0.009 |
| 170 | 54 | 40.9 | 0.039 | 210 | 48 | 8.7 | 0.008 |
| 171 | 55 | 41.4 | 0.039 | 211 | 50 | 8.6 | 0.008 |
| 172 | 55 | 41.6 | 0.040 | 212 | 52 | 9.1 | 0.008 |
| 173 | 56 | 41.9 | 0.040 | 213 | 59 | 47.1 | 0.048 |
| 174 | 56 | 42.6 | 0.042 | 214 | 59 | 48.9 | 0.051 |
| 175 | 57 | 44.9 | 0.047 | 215 | 60 | 48.9 | 0.051 |
| 176 | 57 | 47.0 | 0.053 | 216 | 59 | 48.5 | 0.050 |
| 177 | 58 | 49.3 | 0.064 | 217 | 59 | 48.4 | 0.050 |
| 178 | 59 | 70.4 | 0.126 | 218 | 59 | 48.4 | 0.050 |
| 179 | 14 | 0.2 | 0.000 | 219 | 59 | 48.5 | 0.050 |
| 180 | 61 | 79.4 | 0.130 | 220 | 59 | 48.6 | 0.050 |
| 181 | 97 | 92.6 | 0.139 | 221 | 59 | 48.7 | 0.050 |
| 182 | 93 | 91.5 | 0.134 | 222 | 59 | 48.9 | 0.051 |
| 183 | 7 | 0.1 | 0.000 | 223 | 59 | 49.0 | 0.051 |
| 184 | 64 | 64.0 | 0.085 | 224 | 59 | 49.3 | 0.051 |
| 185 | 36 | 64.8 | 0.088 | 225 | 60 | 49.7 | 0.052 |
| 186 | 37 | 3.5 | 0.002 | 226 | 60 | 50.4 | 0.053 |
| 187 | 37 | 3.4 | 0.002 | 227 | 61 | 51.5 | 0.056 |
| 188 | 37 | 3.2 | 0.001 | 228 | 61 | 53.5 | 0.061 |
| 189 | 37 | 3.2 | 0.001 | 229 | 62 | 60.7 | 0.085 |
| 190 | 37 | 3.3 | 0.002 | 230 | 63 | 57.2 | 0.070 |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

Table 4. Concentration Calculation Outputs (Continued)

| Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 231 | 65 | 56.3 | 0.066 | 271 | 72 | 90.6 | 0.134 |
| 232 | 66 | 56.2 | 0.064 | 272 | 70 | 90.1 | 0.134 |
| 233 | 68 | 56.5 | 0.062 | 273 | 68 | 89.6 | 0.133 |
| 234 | 70 | 57.1 | 0.062 | 274 | 66 | 89.2 | 0.133 |
| 235 | 73 | 58.0 | 0.061 | 275 | 65 | 88.7 | 0.132 |
| 236 | 76 | 59.3 | 0.061 | 276 | 64 | 88.1 | 0.130 |
| 237 | 79 | 60.2 | 0.061 | 277 | 63 | 87.1 | 0.127 |
| 238 | 83 | 57.0 | 0.053 | 278 | 62 | 86.7 | 0.126 |
| 239 | 87 | 52.0 | 0.045 | 279 | 61 | 86.4 | 0.125 |
| 240 | 17 | 0.6 | 0.000 | 280 | 61 | 86.3 | 0.124 |
| 241 | 16 | 0.4 | 0.000 | 281 | 60 | 86.2 | 0.124 |
| 242 | 15 | 0.3 | 0.000 | 282 | 60 | 86.1 | 0.123 |
| 243 | 15 | 0.3 | 0.000 | 283 | 60 | 85.9 | 0.122 |
| 244 | 16 | 0.3 | 0.000 | 284 | 60 | 85.6 | 0.119 |
| 245 | 16 | 0.5 | 0.000 | 285 | 60 | 84.3 | 0.111 |
| 246 | 17 | 0.7 | 0.000 | 286 | 60 | 94.8 | 0.180 |
| 247 | 17 | 0.9 | 0.000 | 287 | 60 | 88.1 | 0.136 |
| 248 | 18 | 1.2 | 0.000 | 288 | 60 | 87.5 | 0.132 |
| 249 | 18 | 1.5 | 0.000 | 289 | 60 | 87.3 | 0.130 |
| 250 | 18 | 1.8 | 0.001 | 290 | 60 | 87.3 | 0.129 |
| 251 | 18 | 2.2 | 0.001 | 291 | 60 | 87.3 | 0.128 |
| 252 | 18 | 2.7 | 0.001 | 292 | 60 | 74.1 | 0.125 |
| 253 | 19 | 3.4 | 0.002 | 293 | 60 | 72.7 | 0.127 |
| 254 | 19 | 4.3 | 0.003 | 294 | 59 | 71.0 | 0.129 |
| 255 | 19 | 5.8 | 0.005 | 295 | 48 | 12.2 | 0.010 |
| 256 | 19 | 10.9 | 0.017 | 296 | 36 | 8.9 | 0.006 |
| 257 | 19 | 11.3 | 0.017 | 297 | 36 | 7.3 | 0.004 |
| 258 | 19 | 8.8 | 0.011 | 298 | 36 | 6.1 | 0.003 |
| 259 | 19 | 7.7 | 0.009 | 299 | 36 | 5.2 | 0.002 |
| 260 | 18 | 6.9 | 0.008 | 300 | 36 | 4.5 | 0.002 |
| 261 | 18 | 6.3 | 0.007 | 301 | 36 | 3.8 | 0.001 |
| 262 | 18 | 5.9 | 0.006 | 302 | 35 | 3.3 | 0.001 |
| 263 | 18 | 5.5 | 0.005 | 303 | 35 | 2.8 | 0.001 |
| 264 | 18 | 5.2 | 0.005 | 304 | 34 | 2.4 | 0.001 |
| 265 | 17 | 4.9 | 0.004 | 305 | 34 | 2.0 | 0.000 |
| 266 | 17 | 5.4 | 0.005 | 306 | 33 | 1.6 | 0.000 |
| 267 | 50 | 92.8 | 0.135 | 307 | 32 | 1.4 | 0.000 |
| 268 | 81 | 92.5 | 0.135 | 308 | 32 | 1.3 | 0.000 |
| 269 | 78 | 91.8 | 0.135 | 309 | 32 | 1.8 | 0.000 |
| 270 | 75 | 91.2 | 0.135 | 310 | 32 | 2.7 | 0.001 |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

Table 4. Concentration Calculation Outputs (Continued)

| Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 311 | 32 | 3.8 | 0.001 | 351 | 55 | 68.4 | 0.077 |
| 312 | 32 | 5.4 | 0.003 | 352 | 56 | 69.1 | 0.081 |
| 313 | 32 | 8.2 | 0.006 | 353 | 56 | 68.7 | 0.083 |
| 314 | 32 | 126.9 | 0.940 | 354 | 56 | 68.7 | 0.085 |
| 315 | 32 | 19.2 | 0.031 | 355 | 56 | 68.7 | 0.087 |
| 316 | 32 | 16.3 | 0.024 | 356 | 57 | 68.7 | 0.088 |
| 317 | 32 | 14.6 | 0.021 | 357 | 57 | 68.7 | 0.089 |
| 318 | 32 | 13.5 | 0.019 | 358 | 58 | 68.6 | 0.089 |
| 319 | 32 | 12.7 | 0.017 | 359 | 58 | 70.0 | 0.096 |
| 320 | 32 | 12.0 | 0.016 | 360 | 54 | 74.9 | 0.115 |
| 321 | 32 | 11.4 | 0.015 | 361 | 54 | 77.1 | 0.127 |
| 322 | 31 | 10.9 | 0.014 | 362 | 55 | 69.6 | 0.094 |
| 323 | 31 | 10.4 | 0.013 | 363 | 54 | 76.0 | 0.122 |
| 324 | 30 | 10.0 | 0.013 | 364 | 55 | 69.3 | 0.092 |
| 325 | 44 | 70.3 | 0.092 | 365 | 55 | 68.3 | 0.089 |
| 326 | 57 | 70.0 | 0.092 | 366 | 55 | 65.8 | 0.084 |
| 327 | 55 | 69.8 | 0.092 | 367 | 54 | 65.6 | 0.084 |
| 328 | 55 | 69.7 | 0.092 | 368 | 54 | 65.0 | 0.081 |
| 329 | 54 | 69.8 | 0.093 | 369 | 54 | 64.1 | 0.076 |
| 330 | 54 | 69.9 | 0.093 | 370 | 54 | 75.5 | 0.141 |
| 331 | 54 | 69.9 | 0.091 | 371 | 54 | 64.4 | 0.076 |
| 332 | 54 | 73.8 | 0.115 | 372 | 54 | 65.9 | 0.084 |
| 333 | 54 | 71.8 | 0.102 | 373 | 54 | 66.3 | 0.028 |
| 334 | 54 | 71.7 | 0.100 | 374 | 54 | 66.3 | 0.046 |
| 335 | 54 | 72.8 | 0.106 | 375 | 62 | 93.0 | 0.141 |
| 336 | 54 | 68.4 | 0.096 | 376 | 62 | 92.5 | 0.141 |
| 337 | 54 | 68.7 | 0.097 | 377 | 61 | 91.8 | 0.139 |
| 338 | 54 | 69.4 | 0.092 | 378 | 61 | 90.9 | 0.137 |
| 339 | 54 | 68.7 | 0.095 | 379 | 61 | 89.8 | 0.135 |
| 340 | 54 | 69.9 | 0.095 | 380 | 61 | 88.0 | 0.131 |
| 341 | 54 | 70.9 | 0.098 | 381 | 61 | 85.8 | 0.127 |
| 342 | 54 | 55.1 | 0.063 | 382 | 61 | 83.5 | 0.126 |
| 343 | 54 | 50.8 | 0.057 | 383 | 61 | 81.7 | 0.115 |
| 344 | 54 | 41.5 | 0.043 | 384 | 61 | 80.0 | 0.115 |
| 345 | 54 | 8.2 | 0.008 | 385 | 61 | 76.4 | 0.107 |
| 346 | 54 | 16.6 | 0.023 | 386 | 61 | 73.2 | 0.101 |
| 347 | 54 | 63.0 | 0.083 | 387 | 61 | 70.5 | 0.095 |
| 348 | 54 | 67.5 | 0.094 | 388 | 61 | 68.6 | 0.092 |
| 349 | 54 | 69.6 | 0.097 | 389 | 62 | 68.2 | 0.092 |
| 350 | 55 | 68.7 | 0.077 | 390 | 62 | 67.6 | 0.091 |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

Table 4. Concentration Calculation Outputs (Continued)

| Line No. | Average Flux (pCi/m$^2$/s) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux (pCi/m$^2$/s) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 391 | 63 | 67.0 | 0.090 | 431 | 21 | 9.1 | 0.009 |
| 392 | 64 | 42.9 | 0.040 | 432 | 21 | 8.7 | 0.008 |
| 393 | 64 | 66.2 | 0.088 | 433 | 21 | 8.4 | 0.008 |
| 394 | 42 | 4.8 | 0.004 | 434 | 21 | 8.1 | 0.007 |
| 395 | 17 | 1.9 | 0.001 | 435 | 21 | 7.9 | 0.007 |
| 396 | 17 | 1.4 | 0.000 | 436 | 20 | 7.7 | 0.006 |
| 397 | 17 | 1.3 | 0.000 | 437 | 20 | 7.6 | 0.006 |
| 398 | 18 | 1.5 | 0.000 | 438 | 20 | 7.5 | 0.006 |
| 399 | 18 | 1.8 | 0.001 | 439 | 20 | 7.3 | 0.006 |
| 400 | 18 | 2.0 | 0.001 | 440 | 19 | 7.2 | 0.005 |
| 401 | 18 | 2.3 | 0.001 | 441 | 19 | 3.1 | 0.001 |
| 402 | 18 | 2.6 | 0.001 | 442 | 19 | 2.6 | 0.001 |
| 403 | 18 | 2.8 | 0.001 | 443 | 19 | 2.3 | 0.001 |
| 404 | 18 | 3.8 | 0.002 | 444 | 19 | 2.0 | 0.001 |
| 405 | 18 | 3.4 | 0.002 | 445 | 19 | 1.7 | 0.000 |
| 406 | 19 | 3.9 | 0.002 | 446 | 18 | 1.4 | 0.000 |
| 407 | 19 | 3.9 | 0.002 | 447 | 18 | 1.1 | 0.000 |
| 408 | 20 | 4.0 | 0.003 | 448 | 56 | 46.1 | 0.052 |
| 409 | 20 | 4.1 | 0.003 | 449 | 56 | 64.3 | 0.068 |
| 410 | 20 | 4.3 | 0.003 | 450 | 56 | 64.4 | 0.069 |
| 411 | 20 | 4.4 | 0.003 | 451 | 56 | 66.4 | 0.077 |
| 412 | 21 | 4.6 | 0.003 | 452 | 56 | 64.8 | 0.072 |
| 413 | 21 | 4.7 | 0.003 | 453 | 56 | 62.8 | 0.068 |
| 414 | 21 | 4.9 | 0.004 | 454 | 57 | 59.5 | 0.063 |
| 415 | 21 | 5.2 | 0.004 | 455 | 17 | 3.1 | 0.002 |
| 416 | 21 | 5.5 | 0.004 | 456 | 17 | 3.2 | 0.002 |
| 417 | 21 | 5.9 | 0.005 | 457 | 9 | 1.1 | 0.001 |
| 418 | 21 | 6.6 | 0.006 | 458 | 17 | 4.5 | 0.004 |
| 419 | 21 | 7.7 | 0.008 | 459 | 55 | 4.0 | 0.003 |
| 420 | 21 | 5.6 | 0.005 | 460 | 90 | 92.7 | 0.135 |
| 421 | 21 | 3.1 | 0.001 | 461 | 62 | 79.9 | 0.132 |
| 422 | 21 | 2.5 | 0.001 | 462 | 61 | 70.3 | 0.121 |
| 423 | 21 | 2.1 | 0.001 | 463 | 59 | 55.1 | 0.106 |
| 424 | 21 | 1.8 | 0.000 | 464 | 37 | 29.5 | 0.081 |
| 425 | 21 | 1.3 | 0.000 | 465 | 15 | 4.9 | 0.006 |
| 426 | 21 | 1.5 | 0.000 | 466 | 8 | 1.3 | 0.001 |
| 427 | 21 | 1.5 | 0.000 | 467 | 17 | 5.0 | 0.006 |
| 428 | 21 | 2.5 | 0.001 | 468 | 38 | 9.1 | 0.012 |
| 429 | 21 | 11.6 | 0.015 | 469 | 58 | 56.9 | 0.061 |
| 430 | 21 | 9.7 | 0.010 | 470 | 57 | 55.5 | 0.056 |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

Table 4. Concentration Calculation Outputs (Continued)

| Line No. | Average Flux ($pCi/m^2/s$) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux ($pCi/m^2/s$) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 471 | 56 | 51.9 | 0.058 | 511 | 40 | 0.0 | 0.000 |
| 472 | 56 | 67.9 | 0.076 | 512 | 47 | 0.0 | 0.000 |
| 473 | 18 | 0.9 | 0.000 | 513 | 36 | 0.0 | 0.000 |
| 474 | 17 | 0.7 | 0.000 | 514 | 44 | 0.0 | 0.000 |
| 475 | 58 | 60.6 | 0.090 | 515 | 2 | 0.0 | 0.000 |
| 476 | 59 | 71.3 | 0.121 | 516 | 2 | 0.0 | 0.000 |
| 477 | 47 | 14.5 | 0.013 | 517 | 2 | 0.0 | 0.000 |
| 478 | 58 | 71.0 | 0.107 | 518 | 2 | 79.0 | 0.142 |
| 479 | 58 | 55.9 | 0.057 | 519 | 2 | 64.8 | 0.078 |
| 480 | 59 | 70.2 | 0.097 | 520 | 2 | 0.0 | 0.000 |
| 481 | 38 | 16.7 | 0.021 | 521 | 2 | 72.2 | 0.120 |
| 482 | 19 | 10.2 | 0.011 | 522 | 2 | 0.0 | 0.000 |
| 483 | 19 | 6.0 | 0.004 | 523 | 2 | 84.6 | 0.151 |
| 484 | 19 | 5.1 | 0.003 | 524 | 2 | 0.0 | 0.000 |
| 485 | 19 | 4.4 | 0.002 | 525 | 2 | 0.0 | 0.000 |
| 486 | 19 | 3.2 | 0.001 | 526 | 2 | 0.0 | 0.000 |
| 487 | 19 | 1.7 | 0.001 | 527 | 2 | 0.0 | 0.000 |
| 488 | 25 | 0.7 | 0.000 | 528 | 2 | 0.0 | 0.000 |
| 489 | 63 | 70.6 | 0.098 | 529 | 2 | 0.0 | 0.000 |
| 490 | 67 | 73.5 | 0.113 | 530 | 2 | 0.0 | 0.000 |
| 491 | 65 | 96.0 | 0.160 | 531 | 2 | 0.0 | 0.000 |
| 492 | 20 | 5.7 | 0.006 | 532 | 2 | 0.0 | 0.000 |
| 493 | 27 | 8.3 | 0.010 | 533 | 2 | 64.6 | 0.089 |
| 494 | 41 | 6.7 | 0.008 | 534 | 45 | 0.0 | 0.000 |
| 495 | 17 | 3.7 | 0.003 | 535 | 43 | 0.0 | 0.000 |
| 496 | 17 | 4.5 | 0.005 | 536 | 41 | 0.0 | 0.000 |
| 497 | 16 | 4.2 | 0.005 | 537 | 39 | 0.0 | 0.000 |
| 498 | 9 | 2.1 | 0.002 | 538 | 38 | 0.0 | 0.000 |
| 499 | 2 | 0.0 | 0.000 | 539 | 36 | 0.0 | 0.000 |
| 500 | 17 | 3.7 | 0.003 | 540 | 35 | 0.0 | 0.000 |
| 501 | 19 | 5.0 | 0.005 | 541 | 34 | 0.0 | 0.000 |
| 502 | 54 | 69.2 | 0.097 | 542 | 34 | 0.0 | 0.000 |
| 503 | 69 | 83.9 | 0.143 | 543 | 33 | 0.0 | 0.000 |
| 504 | 52 | 93.2 | 0.143 | 544 | 32 | 0.0 | 0.000 |
| 505 | 40 | 79.0 | 0.142 | 545 | 32 | 0.0 | 0.000 |
| 506 | 47 | 64.8 | 0.078 | 546 | 32 | 0.0 | 0.000 |
| 507 | 36 | 72.2 | 0.120 | 547 | 31 | 0.0 | 0.000 |
| 508 | 44 | 84.6 | 0.151 | 548 | 31 | 0.0 | 0.000 |
| 509 | 2 | 64.6 | 0.089 | 549 | 31 | 0.0 | 0.000 |
| 510 | 52 | 0.0 | 0.000 | 550 | 31 | 0.0 | 0.000 |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

Table 4. Concentration Calculation Outputs (Continued)

| Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL | Line No. | Average Flux (pCi/m²/s) | Average Radon Conc. pCi/L | Average WL[a] |
|---|---|---|---|---|---|---|---|
| 551 | 31 | 0.0 | 0.000 | 591 | 28 | 0.0 | 0.000 |
| 552 | 31 | 0.0 | 0.000 | 592 | 28 | 0.0 | 0.000 |
| 553 | 31 | 0.0 | 0.000 | 593 | 28 | 0.0 | 0.000 |
| 554 | 31 | 0.0 | 0.000 | 594 | 28 | 0.0 | 0.000 |
| 555 | 31 | 0.0 | 0.000 | 595 | 28 | 0.0 | 0.000 |
| 556 | 31 | 0.0 | 0.000 | 596 | 28 | 0.0 | 0.000 |
| 557 | 31 | 0.0 | 0.000 | 597 | 28 | 0.0 | 0.000 |
| 558 | 31 | 0.0 | 0.000 | 598 | 28 | 0.0 | 0.000 |
| 559 | 31 | 0.0 | 0.000 | 599 | 28 | 0.0 | 0.000 |
| 560 | 31 | 0.0 | 0.000 | 600 | 28 | 0.0 | 0.000 |
| 561 | 29 | 0.0 | 0.000 | 601 | 28 | 0.0 | 0.000 |
| 562 | 29 | 0.0 | 0.000 | 602 | 28 | 0.0 | 0.000 |
| 563 | 29 | 0.0 | 0.000 | 603 | 28 | 0.0 | 0.000 |
| 564 | 29 | 0.0 | 0.000 | 604 | 28 | 0.0 | 0.000 |
| 565 | 29 | 0.0 | 0.000 | 605 | 28 | 0.0 | 0.000 |
| 566 | 29 | 0.0 | 0.000 | 606 | 28 | 0.0 | 0.000 |
| 567 | 29 | 0.0 | 0.000 | 607 | 28 | 0.0 | 0.000 |
| 568 | 33 | 0.0 | 0.000 | 608 | 28 | 0.0 | 0.000 |
| 569 | 33 | 0.0 | 0.000 | 609 | 28 | 0.0 | 0.000 |
| 570 | 32 | 0.0 | 0.000 | 610 | 29 | 0.0 | 0.000 |
| 571 | 32 | 0.0 | 0.000 | 611 | 29 | 0.0 | 0.000 |
| 572 | 32 | 0.0 | 0.000 | 612 | 29 | 0.0 | 0.000 |
| 573 | 31 | 0.0 | 0.000 | 613 | 29 | 0.0 | 0.000 |
| 574 | 31 | 0.0 | 0.000 | 614 | 29 | 0.0 | 0.000 |
| 575 | 31 | 0.0 | 0.000 | 615 | 30 | 0.0 | 0.000 |
| 576 | 31 | 0.0 | 0.000 | 616 | 30 | 0.0 | 0.000 |
| 577 | 31 | 0.0 | 0.000 | 617 | 28 | 0.0 | 0.000 |
| 578 | 31 | 0.0 | 0.000 | 618 | 28 | 0.0 | 0.000 |
| 579 | 31 | 0.0 | 0.000 | 619 | 28 | 0.0 | 0.000 |
| 580 | 31 | 0.0 | 0.000 | 620 | 28 | 0.0 | 0.000 |
| 581 | 31 | 0.0 | 0.000 | 621 | 28 | 0.0 | 0.000 |
| 582 | 31 | 0.0 | 0.000 | 622 | 28 | 0.0 | 0.000 |
| 583 | 31 | 0.0 | 0.000 | 623 | 28 | 0.0 | 0.000 |
| 584 | 32 | 0.0 | 0.000 | 624 | 28 | 0.0 | 0.000 |
| 585 | 32 | 0.0 | 0.000 | 625 | 28 | 0.0 | 0.000 |
| 586 | 32 | 0.0 | 0.000 | 626 | 28 | 0.0 | 0.000 |
| 587 | 30 | 0.0 | 0.000 | 627 | 28 | 0.0 | 0.000 |
| 588 | 29 | 0.0 | 0.000 | 628 | 28 | 0.0 | 0.000 |
| 589 | 28 | 0.0 | 0.000 | 629 | 28 | 0.0 | 0.000 |
| 590 | 28 | 0.0 | 0.000 | | | | |

NOTE: [a]0.000 means WL is less than 0.0005 WL.

## 6.4 RELEASE CALCULATION

The annual radon release to the atmosphere from the subsurface repository is determined by summing the radon flow rates from the six exhaust shafts.

Radon release rate = [Exhaust Raise #1] (6.54E+01 pCi/L × 185 $m^3$/s) +

[Exhaust Shaft #1] (7.25E+01 pCi/L × 383 $m^3$/s) +

[Exhaust Shaft #2] (8.49E+01 pCi/L ×383 $m^3$/s) +

[ECRB Exhaust Shaft] (7.93E+01 pCi/L ×393 $m^3$/s) +

[Exhaust Shaft #3] (9.37E+01 pCi/L ×343 $m^3$/s) +

[Exhaust Raise #2] (6.52E+01 pCi/L ×185 $m^3$/s)}

× 1000 L/ $m^3$ × 1.0E-12 Ci/pCi × 365 d/yr × 24 hr/d × 3600 s/hr

= 4700 Ci/Yr.

# 7. RESULTS

## 7.1 RADON AND WORKING LEVEL CENTRATIONS

The results of concentration calculations are summarized in Table 5. The concentration values listed are distance-weighted average radon concentrations and working levels in various types of drifts. The predicted average radon concentrations in various types of drifts are 5.8 pCi/L in main drifts, 47 pCi/L in emplacement drifts, and 72 pCi/L in exhaust main drifts. The corresponding average working levels are 0.012 WL in main drifts, 0.050 WL in emplacement drifts, 0.10 WL in exhaust main drifts.

## 7.2 COMPLIANCE WITH APPLICABLE LIMITS

This section presents an evaluation of compliance with applicable radiation exposure limits imposed by the regulations of the Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.1096 of the U.S. Department of Labor.

In 29 CFR 1910.1096, the limits for radiation exposure for workers are numerically specified according to Table 1 of Appendix B to 10 CFR Part 20 (U.S. Nuclear Regulatory Commission) as maximum annual average air concentrations by nuclide. The limits are for exposure to the concentrations specified for 40 hours in any workweek of 7 consecutive days. The Rn-222 concentration limits in pCi/L and WL are presented in Table 5 along with the annual average concentrations predicted. In potentially occupied areas in the main drifts, the predicted overall average radon concentration is well below the 30 pCi/L limit. The distance-weighted working-level averages of short-lived radon progeny in all types of drifts including the emplacement and exhaust main drifts are all predicted well below the more applicable 0.33 working level (10 CFR Part 20 expresses limits for Rn-222 and working-level concentrations but allows the optional alternative use of either).

The previous results also indicate that the predicted average radon concentrations could be even lower than the values shown in Table 5 during the development/construction of the repository when the ventilation system is operated as a positive pressure system (BSC 2003f, Section 6). This is because the convective radon flux released from the host rock may be suppressed by the positive pressure as shown by Figure 2 (Equation 1). A proposed radon test in the ESF would provide further information to validate the radon flux rate for the positive and negative pressures.

Table 5. Comparison of Predicted Air Concentrations with 29 CFR 1910.1096 Limits

| **Distance-Weighted Average Concentrations for Potentially Occupied Areas** | | |
|---|---|---|
| | **Rn-222 Concentrations (pCi/L)** | **Radon Progeny Concentrations (WL)** |
| Main Drifts [a] | 5.8 | 0.012 |
| Emplacement Drifts | 47 | 0.050 |
| Exhaust Main | 72 | 0.10 |
| **Applicable Concentration Limits** | | |
| 29 CFR 1910.1096( c)(1) Limits [b] | 30 | 0.33 |

NOTES: [a]Potentially occupied areas
[b]Table 1 of Appendix B to 10 CFR Part 20

## 8. REERENCES

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Minwalla, H.J. 2003. *Project Design Criteria Document.* 000-3DR-MGR0-00100-000-001. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20030402.0001.

## 9. ATTACHMENTS

This calculation document includes two attachments as shown in Table 6.

Table 6. List of Attachments

| Attachment Number | Description | pages | Date |
|---|---|---|---|
| I | Description of Calculation Worksheets | 1 | N/A |
| II | Listing of Electronic File in CD Containing Radon Exposure Calculations | 1 and CD 1 of 1 | 10/27/03 |

# ATTACHMENT I. DESCRIPTION OF CALCULATION WORKSHEETS

Table I-1 Input Parameters and Equations Used for Worksheet

Input parameters[a] and equations[b]

| Nuclide | Half-life, $T_{1/2}$ (s)[c] | Decay Constant, $\lambda_n$(1/s) | Ventilation Network Parameters | Branch No. | Branch No. | Branch No. |
|---|---|---|---|---|---|---|
| Rn-222 (n=0) | 3.30E+05 | 2.10E-06 | Drift Length, L (m) | Input | Input | Input |
| Po-218 (n=1) | 1.83E+02 | 3.79E-03 | Drift Diameter, D (m) | Input | Input | Input |
| Pb-214 (n=2) | 1.61E+03 | 4.31E-04 | Drift radius, R (m) | 2A/p[d] | 2A/p[d] | 2A/p[d] |
| Bi-214 (n=3) | 1.19E+03 | 5.80E-04 | Cross-section area, A ($m^2$) | Input | Input | Input |
| | | | Ventilation flow rate, Q ($m^3$/s) | Input | Input | Input |
| | | | Ventilation flow velocity, v (m/s) | Q/A | Q/A | Q/A |
| | | | Pressure drop, $\Delta$P (mbar) | Input | Input | Input |
| | | | Deposition Velocity, $V_d$ (m/s) | Input | Input | Input |
| | | | Flux, F (pCi/$m^2$/s) | Eq.26 | Eq.26 | Eq.26 |
| | | | Inlet Node number 1 (Node 1) | Input | Input | Input |
| | | | Outlet Node number 2 (Node 2) | Input | Input | Input |

NOTES: [a]Section 6.2.
[b]Equation numbers correspond to equations listed in Section 6.1.
[c]Section 6.2.1.
[d]p = perimeter is an input.

Table I-2 Description of Calculation Worksheet

Equations[a]

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment | ID1 | Node No. | Node 1 | | | | | | | | | | |
| Nuclide | $a_n$ (Eq.23) | $d_n$ (Eq.24) | $C_n(x_1)$ Input | n | $A_n$ | $A_{n0}$ | $A_{n1}$ | $A_{n2}$ | $A_{n3}$ | | | | |
| Rn-222 | $a_0$ | $d_0$ | $C_0(x_1)$ | n=0 | Eq. 9 | Eq.11 | | | | | | | |
| Po-218 | $a_1$ | $d_1$ | $C_1(x_1)$ | n=1 | Eq.10 | Eq.12 | Eq.13 | | | | | | |
| Pb-214 | $a_2$ | $d_2$ | $C_2(x_1)$ | n=2 | Eq.14 | Eq.15 | Eq.16 | Eq.17 | | | | | |
| Bi-214 | $a_3$ | $d_3$ | $C_3(x_1)$ | n=3 | Eq.18 | Eq.19 | Eq.20 | Eq.21 | Eq.22 | | | | |
| | Rn-222 | | | Po-218 | | | Pb-214 | | | Bi-214 | | | WL |
| Distance X(m) | h=$d_0$*X | EXP(-h) | $C_0(X)$ (pCi/m$^3$) | h=$d_1$*X | EXP(-h) | $C_1(X)$ (pCi/m$^3$) | h=$d_2$*X | EXP(-h) | $C_2(X)$ (pCi/m$^3$) | h=$d_3$*X | EXP(-h) | $C_3(X)$ (pCi/m$^3$) | WL(X1) Eq.25 |
| 0.1L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.2L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.3L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.4L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.5L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.6L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.7L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.8L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.9L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| Segment | ID2 | Node No. | Node 1 | | | | | | | | | | |
| Nuclide | $a_n$ (Eq.23) | $d_n$ (Eq.24) | $C_n(x_1)$ Input | n | $A_n$ | $A_{n0}$ | $A_{n1}$ | $A_{n2}$ | $A_{n3}$ | | | | |
| Rn-222 | $a_0$ | $d_0$ | $C_0(x_1)$ | n=0 | Eq.9 | Eq.11 | | | | | | | |
| Po-218 | $a_1$ | $d_1$ | $C_1(x_1)$ | n=1 | Eq.10 | Eq.12 | Eq.13 | | | | | | |
| Pb-214 | $a_2$ | $d_2$ | $C_2(x_1)$ | n=2 | Eq.14 | Eq.15 | Eq.16 | Eq.17 | | | | | |
| Bi-214 | $a_3$ | $d_3$ | $C_3(x_1)$ | n=3 | Eq.18 | Eq.19 | Eq.20 | Eq.21 | Eq.22 | | | | |
| | Rn-222 | | | Po-218 | | | Pb-214 | | | Bi-214 | | | WL |
| Dist.(X) | h=$d_0$*X | EXP(-h) | $C_0(X)$ (pCi/m$^3$) | h=$d_1$*X | EXP(-h) | $C_1(X)$ (pCi/m$^3$) | h=$d_2$*X | EXP(-h) | $C_2(X)$ (pCi/m$^3$) | h=$d_3$*X | EXP(-h) | $C_3(X)$ (pCi/m$^3$) | WL(X1) Eq.25 |
| 0.1L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.2L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.3L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.4L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.5L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.6L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.7L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.8L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.9L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| Segment | ID3 | Node No. | Node 1 | | | | | | | | | | |
| Nuclide | $a_n$ (Eq.23) | $d_n$ (Eq.24) | $C_n(x_1)$ Input | n | $A_n$ | $A_{n0}$ | $A_{n1}$ | $A_{n2}$ | $A_{n3}$ | | | | |
| Rn-222 | $a_0$ | $d_0$ | $C_0(x_1)$ | n=0 | Eq.9 | Eq.11 | | | | | | | |
| Po-218 | $a_1$ | $d_1$ | $C_1(x_1)$ | n=1 | Eq.10 | Eq.12 | Eq.13 | | | | | | |
| Pb-214 | $a_2$ | $d_2$ | $C_2(x_1)$ | n=2 | Eq.14 | Eq.15 | Eq.16 | Eq.17 | | | | | |
| Bi-214 | $a_3$ | $d_3$ | $C_3(x_1)$ | n=3 | Eq.18 | Eq.19 | Eq.20 | Eq.21 | Eq.22 | | | | |
| | Rn-222 | | | Po-218 | | | Pb-214 | | | Bi-214 | | | WL |
| Distance X(m) | h=$d_0$*X | EXP(-h) | $C_0(X)$ (pCi/m$^3$) | h=$d_1$*X | EXP(-h) | $C_1(X)$ (pCi/m$^3$) | h=$d_2$*X | EXP(-h) | $C_2(X)$ (pCi/m$^3$) | h=$d_3$*X | EXP(-h) | $C_3(X)$ (pCi/m$^3$) | WL(X1) Eq.25 |
| 0.1L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.2L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.3L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.4L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.5L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.6L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.7L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.8L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| 0.9L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |
| L | $d_0$*X | EXP(-h) | Eq.5 | $d_1$*X | EXP(-h) | Eq.6 | $d_2$*X | EXP(-h) | Eq.7 | $d_3$*X | EXP(-h) | Eq.8 | Eq.25 |

NOTES: [a]Equation numbers correspond to equations listed in Section 6.1.

# ATTACHMENT II. LISTING OF ELECTRONIC FILE IN CD CONTAINING RADON EXPOSURE CALCULATIONS

The electronic file (Microsoft Excel workbook) of radon exposure calculations is provided on a compact disk (CD) as Attachment II. The worksheet file names and properties on the compact disk are listed in Table II-1.

Table II-1. Worksheet Names and Properties in the Attachment II Compact Disk

| Worksheet Name | Description | File Size (Bytes) | Date | Time |
|---|---|---|---|---|
| LA | Concentration calculation Main and Calculation for Segments 1 to 120 | 1,297,408 | 10/28/2003 | 1:12:56 PM |
| LA1 | Concentration Calculation for Segments 121 to 240 | 872,448 | 10/28/2003 | 1:13:40 PM |
| LA2 | Concentration Calculation for Segments 241 to 360 | 877,568 | 10/28/2003 | 1:13:40 PM |
| LA3 | Concentration Calculation for Segments 361 to 480 | 872,960 | 10/28/2003 | 1:14:23 PM |
| LA4 | Concentration Calculation for Segments 481 to 629 | 364,032 | 10/28/2003 | 1:14:20 PM |
| Summary | Concentration Weighted Average Calculations | 924,160 | 10/28/2003 | 1:14:20 PM |
| Ventilation Input | Input parameters | 527,872 | 10/28/2003 | 1:14:20 PM |

The above listed files are contained on a single CD-ROM as an attachment to this document.

**BSC**

# Engineering Change Notice

*Complete only applicable items.*

1. QA: NA
2. Page 1 of 2

800-HYC-VU00-00300-000-00A-ECN1

| 3. Document Identifier: | 4. Rev.: | 5. Title: | 6. ECN: |
|---|---|---|---|
| 800-HYC-VU00-00300-000-00A | 00A | Subsurface Radon Exposure Calculation | 1 |

7. Reason for Change:
Editorial Change:

Page 39: Correct Section 8 Title from "REERENCES" to "REFERENCES", a typo.

This revised page is attached.

| 8. Supersedes Change Document: | ☐ Yes | If, Yes, Change Doc.: ________ | ☒ No |
|---|---|---|---|

9. Change Impact:

| | | | | | |
|---|---|---|---|---|---|
| Inputs Changed: | ☐ Yes | ☒ No | Results Impacted: | ☐ Yes | ☒ No |
| Assumptions Changed: | ☐ Yes | ☒ No | Design Impacted: | ☐ Yes | ☒ No |

10. Description of Change: (Address any "Yes" answers)
The editorial change described in block 7 has been verified as a typo and does not change the calculation input or impact the result.

| | | |
|---|---|---|
| 11. Originator: (Print/Sign/Date) YuChien Yuan | [signature] | 11/17/05 |
| Checker: (Print/Sign/Date) Norman Kahler | [signature] | 11/17/05 |
| Approved: (Print/Sign/Date) Dave Darling | [signature] | 11/17/05 |

## 8. REFERENCES

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29 CFR 1910. Labor: Occupational Safety and Health Standards. Readily Available.

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