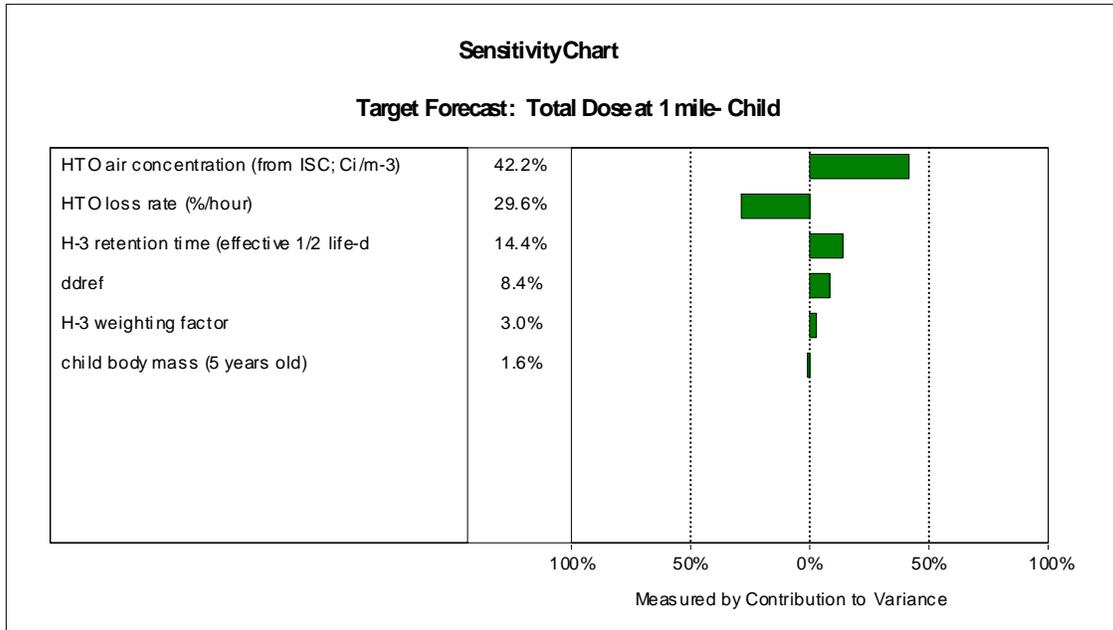


Crystal Ball Report of Tritium Dose Simulations for a Maximally Exposed Child

Crystal Ball Report

Simulation started on 4/21/03 at 9:25:07

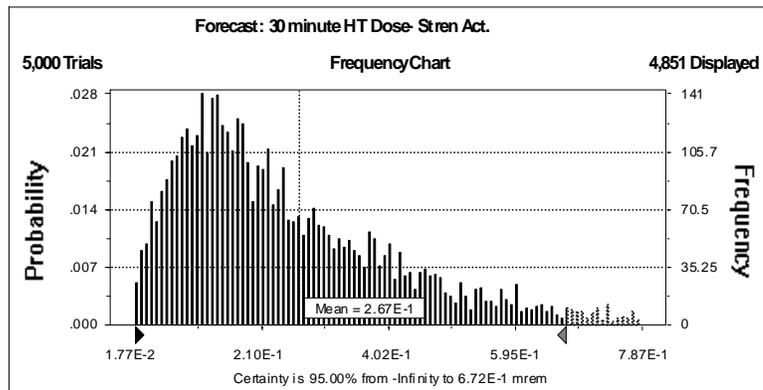
Simulation stopped on 4/21/03 at 9:26:20



Forecast: 30 minute HT Dose- Stren Act.

Summary:

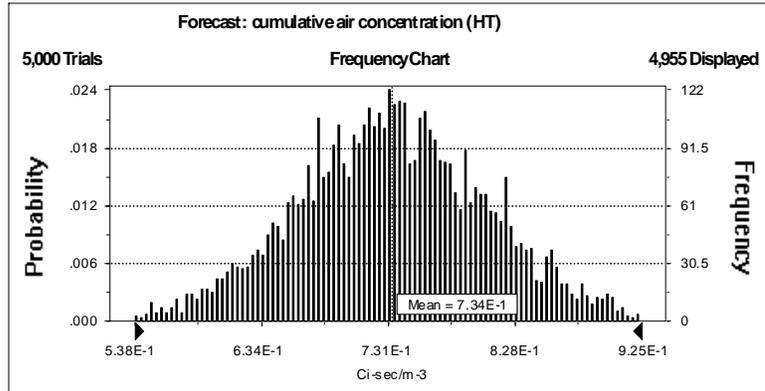
- Certainty Level is 95.00%
- Certainty Range is from -Infinity to 6.72E-1 mrem
- Display Range is from 1.77E-2 to 7.87E-1 mrem
- Entire Range is from 7.66E-3 to 1.72E+0 mrem
- After 5,000 Trials, the Std. Error of the Mean is 2.88E-3



Forecast: cumulative air concentration (HT)

Summary:

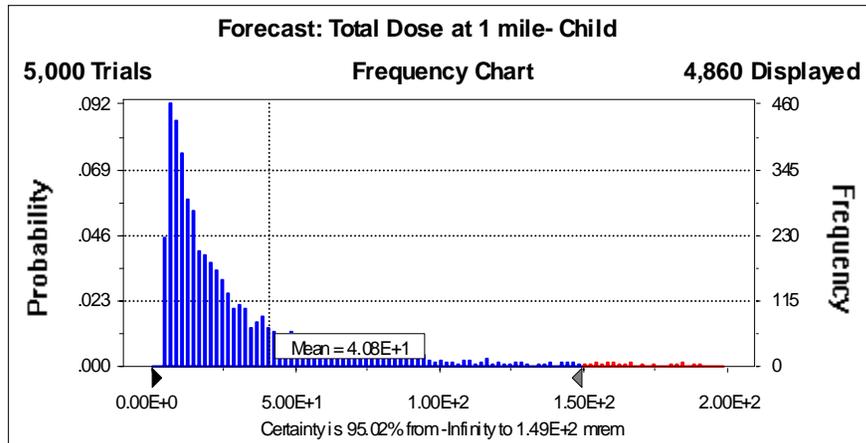
Display Range is from 5.38E-1 to 9.25E-1 Ci-sec/m-3
Entire Range is from 4.70E-1 to 9.86E-1 Ci-sec/m-3
After 5,000 Trials, the Std. Error of the Mean is 1.05E-3



Forecast: Total Dose at 1 mile- Child

Summary:

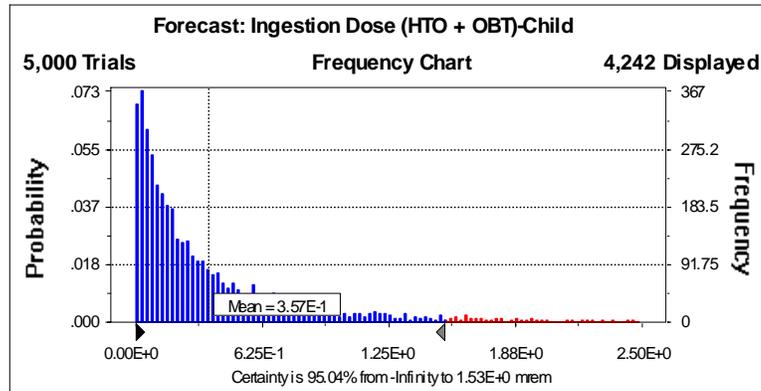
Certainty Level is 95.00%
Certainty Range is from -Infinity to 1.49E+2 mrem
Display Range is from 0.00E+0 to 2.00E+2 mrem
Entire Range is from -1.73E+3 to 2.41E+3 mrem
After 5,000 Trials, the Std. Error of the Mean is 1.25E+0



Forecast: Ingestion Dose (HTO + OBT)-Child

Summary:

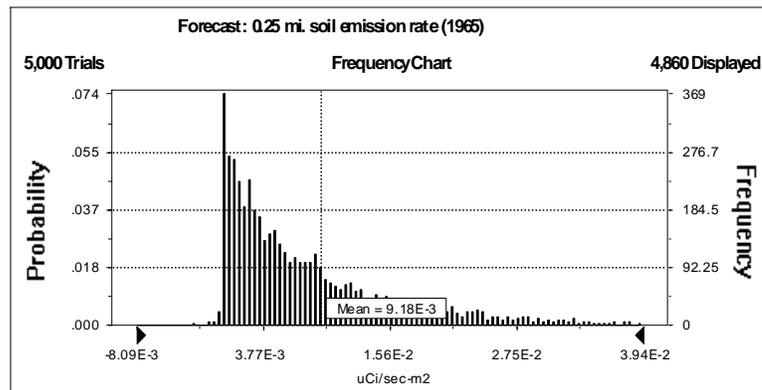
Certainty Level is 95.04%
Certainty Range is from -Infinity to 1.48E+0 mrem
Display Range is from 0.00E+0 to 2.50E+0 mrem
Entire Range is from -2.46E+2 to 8.80E+0 mrem
After 5,000 Trials, the Std. Error of the Mean is 5.02E-2



Forecast: 0.25 mi. soil emission rate (1965)

Summary:

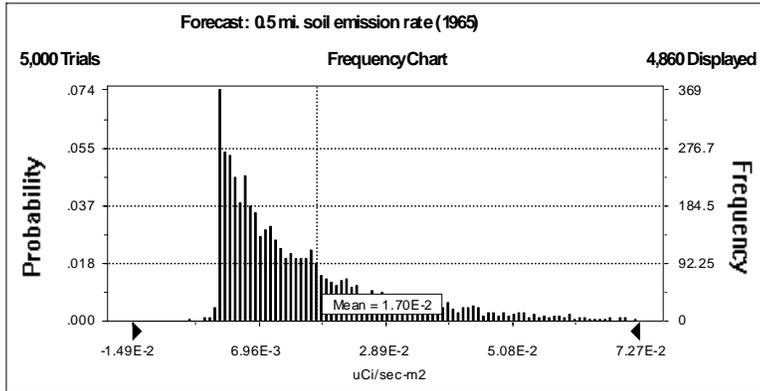
Display Range is from -8.09E-3 to 3.94E-2 uCi/sec-m2
Entire Range is from -9.46E-3 to 1.20E-1 uCi/sec-m2
After 5,000 Trials, the Std. Error of the Mean is 1.57E-4



Forecast: 0.5 mi. soil emission rate (1965)

Summary:

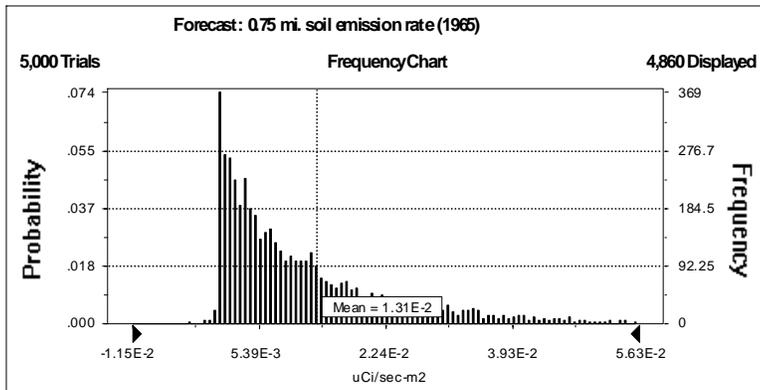
Display Range is from $-1.49E-2$ to $7.27E-2$ uCi/sec-m²
Entire Range is from $-1.75E-2$ to $2.23E-1$ uCi/sec-m²
After 5,000 Trials, the Std. Error of the Mean is $2.90E-4$



Forecast: 0.75 mi. soil emission rate (1965)

Summary:

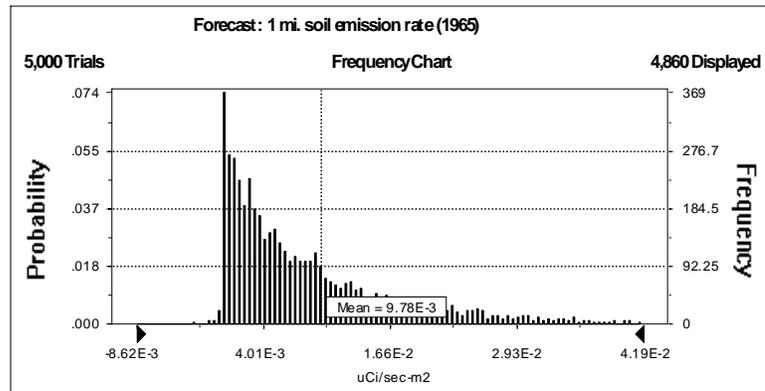
Display Range is from $-1.15E-2$ to $5.63E-2$ uCi/sec-m²
Entire Range is from $-1.35E-2$ to $1.73E-1$ uCi/sec-m²
After 5,000 Trials, the Std. Error of the Mean is $2.24E-4$



Forecast: 1 mi. soil emission rate (1965)

Summary:

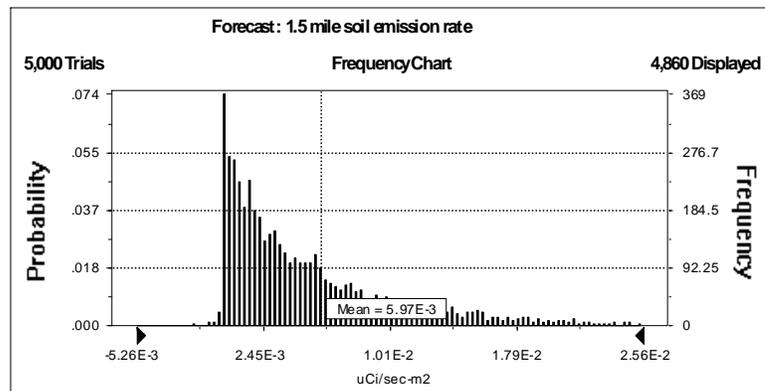
Display Range is from $-8.62E-3$ to $4.19E-2$ uCi/sec-m²
Entire Range is from $-1.00E-2$ to $1.29E-1$ uCi/sec-m²
After 5,000 Trials, the Std. Error of the Mean is $1.67E-4$



Forecast: 1.5 mile soil emission rate

Summary:

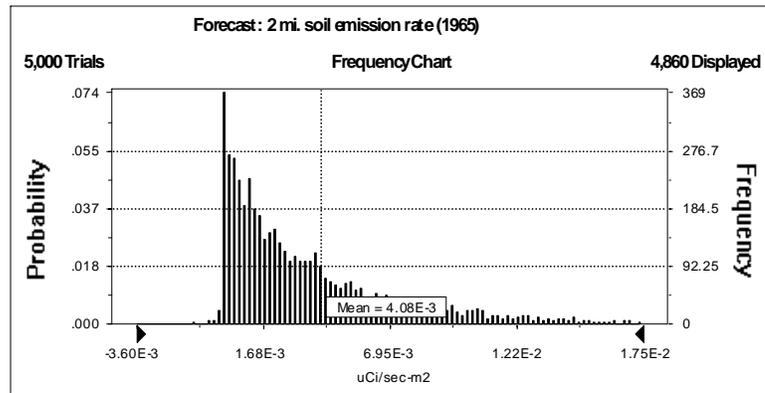
Display Range is from $-5.26E-3$ to $2.56E-2$ uCi/sec-m²
Entire Range is from $-6.15E-3$ to $7.86E-2$ uCi/sec-m²
After 5,000 Trials, the Std. Error of the Mean is $1.02E-4$



Forecast: 2 mi. soil emission rate (1965)

Summary:

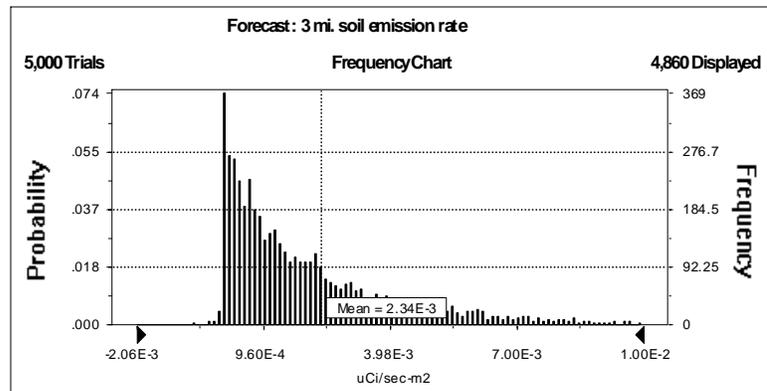
Display Range is from $-3.60E-3$ to $1.75E-2$ uCi/sec-m²
Entire Range is from $-4.21E-3$ to $5.38E-2$ uCi/sec-m²
After 5,000 Trials, the Std. Error of the Mean is $6.97E-5$



Forecast: 3 mi. soil emission rate

Summary:

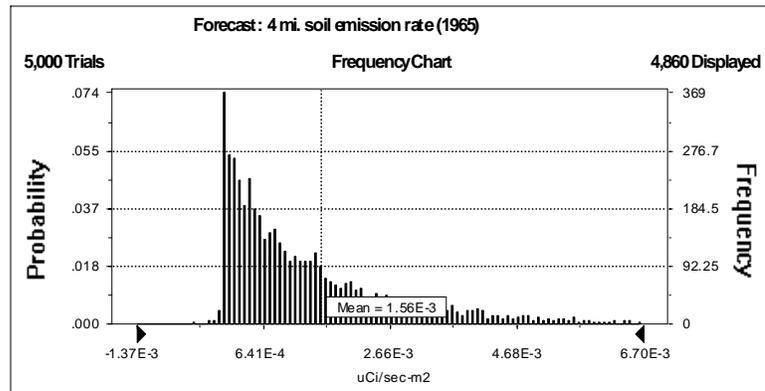
Display Range is from $-2.06E-3$ to $1.00E-2$ uCi/sec-m²
Entire Range is from $-2.41E-3$ to $3.08E-2$ uCi/sec-m²
After 5,000 Trials, the Std. Error of the Mean is $3.99E-5$



Forecast: 4 mi. soil emission rate (1965)

Summary:

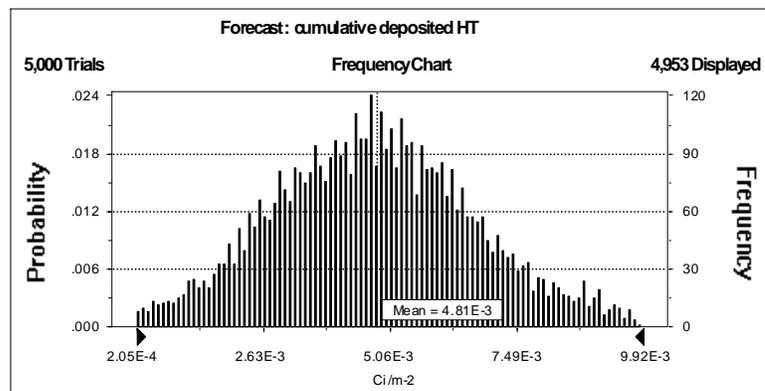
Display Range is from $-1.37\text{E-}3$ to $6.70\text{E-}3$ uCi/sec-m²
Entire Range is from $-1.61\text{E-}3$ to $2.06\text{E-}2$ uCi/sec-m²
After 5,000 Trials, the Std. Error of the Mean is $2.67\text{E-}5$



Forecast: cumulative deposited HT

Summary:

Display Range is from $2.05\text{E-}4$ to $9.92\text{E-}3$ Ci/m²
Entire Range is from $2.51\text{E-}5$ to $1.27\text{E-}2$ Ci/m²
After 5,000 Trials, the Std. Error of the Mean is $2.80\text{E-}5$

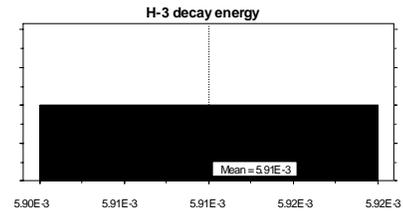


Assumptions

Assumption: H-3 decay energy (MeV)

Uniform distribution with parameters:

Minimum	5.90E-03
Maximum	5.92E-03



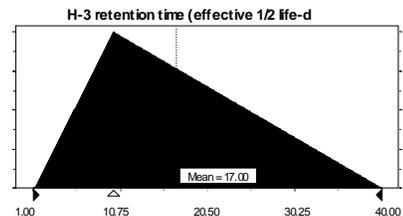
This is the average decay energy of the tritium beta.

Assumption: Effective Half Life (days)

Triangular distribution with parameters:

Minimum	1.00
Likeliest	10.00
Maximum	40.00

Selected range is from 1.00 to 40.00



This assumption is the biological half life of tritium. According to the ICRP model 97% of HTO leaves the body within 10 days with another 3% retained for 40 days. The fractions for OBT are 50% for 10 days and 50% for 40 days (from ATSDR 2002).

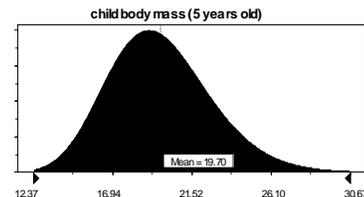
Assumption: child body mass (5 years old)

Lognormal distribution with parameters:

Mean	19.70
Standard Dev.	3.00

Selected range is from 0.00 to +Infinity

Child and adult body weights assume a lognormal distribution based on comments (Appendix 1).



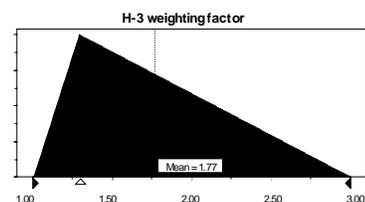
Assumption: Radiation Weight Factor (Tritium)

Triangular distribution with parameters:

Minimum	1.00
Likeliest	1.30
Maximum	3.00

Selected range is from 1.00 to 3.00

This weight or quality factor is greater than the ICRP recommended value of 1 (ATSDR 2002).

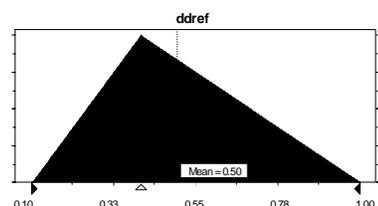


Assumption: DDREF

Triangular distribution with parameters:

Minimum	0.10
Likeliest	0.40
Maximum	1.00

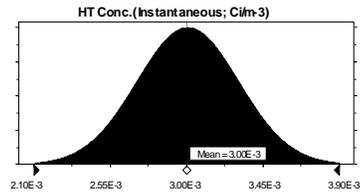
Selected range is from 0.10 to 1.00



Assumption: HT Conc. (Instantaneous; Ci/m-3)

Normal distribution with parameters:

Mean	3.00E-03
Standard Dev.	3.00E-04



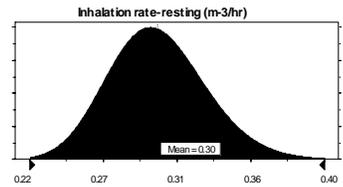
Selected range is from -Infinity to +Infinity

The HT concentration assumes a normal distribution around a mean value derived from the RASCAL dispersion model (Gaussian dispersion). Gaussian models assume that concentration distributions within the plume are normally distributed.

Assumption: Child BR-resting (m-3/hr)

Lognormal distribution with parameters:

5% - tile	0.25
95% - tile	0.35



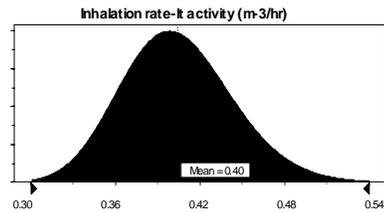
Selected range is from 0.00 to +Infinity

All breathing rates are assumed as lognormal distributions following the lognormal distributions of body weights. Average values for breathing rates are as recommended in the EPA Exposure Factors Handbook (1996).

Assumption: Child BR-lt activity (m-3/hr)

Lognormal distribution with parameters:

5% - tile	0.34
95% - tile	0.47

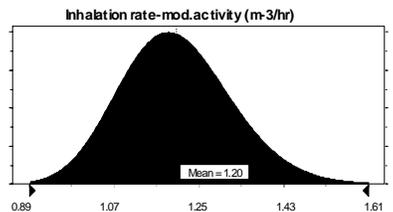


Selected range is from 0.00 to +Infinity

Assumption: Child BR-mod. activity (m-3/hr)

Lognormal distribution with parameters:

5% - tile	1.01
95% - tile	1.41

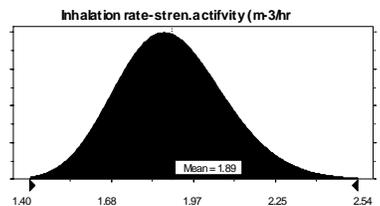


Selected range is from 0.00 to +Infinity

Assumption: Child BR-stren. activity (m-3/hr)

Lognormal distribution with parameters:

5% - tile	1.60
95% - tile	2.22

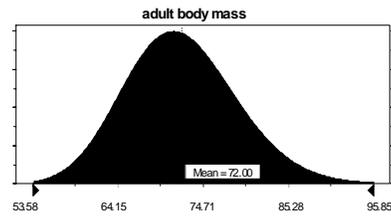


Selected range is from 0.00 to +Infinity

Assumption: adult body mass

Lognormal distribution with parameters:
Mean 72.00
Standard Dev. 7.00

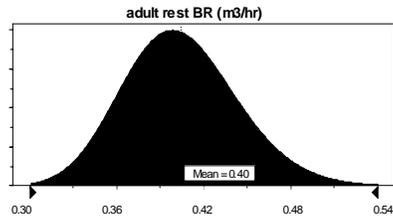
Selected range is from 0.00 to +Infinity



Assumption: adult rest BR (m3/hr)

Lognormal distribution with parameters:
5% - tile 0.34
95% - tile 0.47

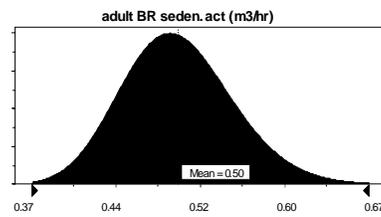
Selected range is from 0.00 to +Infinity



Assumption: adult BR light act (m3/hr)

Lognormal distribution with parameters:
5% - tile 0.42
95% - tile 0.59

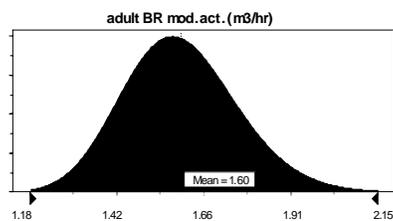
Selected range is from 0.00 to +Infinity



Assumption: adult BR moderate act. (m3/hr)

Lognormal distribution with parameters:
5% - tile 1.35
95% - tile 1.88

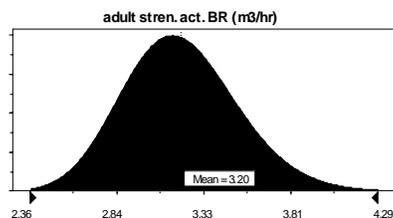
Selected range is from 0.00 to +Infinity



Assumption: adult strenuous act. BR (m3/hr)

Lognormal distribution with parameters:
5% - tile 2.70
95% - tile 3.75

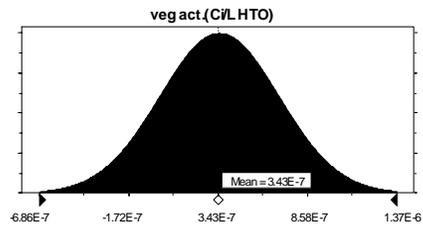
Selected range is from 0.00 to +Infinity



Assumption: veg act.(Ci/L HTO)

Normal distribution with parameters:
Mean 3.43E-07
Standard Dev. 3.43E-07

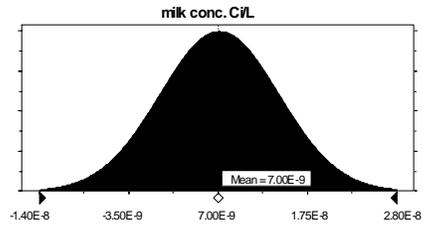
Selected range is from -Infinity to +Infinity



Assumption: milk conc. Ci/L

Normal distribution with parameters:
Mean 7.00E-09
Standard Dev. 7.00E-09

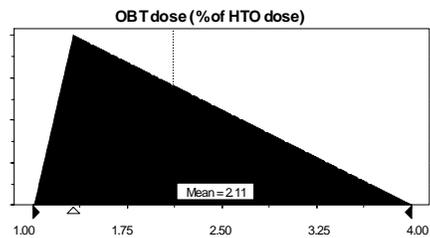
Selected range is from -Infinity to +Infinity



Assumption: OBT dose factor (% of HTO dose)

Triangular distribution with parameters:
Minimum 1.0
Likeliest 1.32
Maximum 4.00

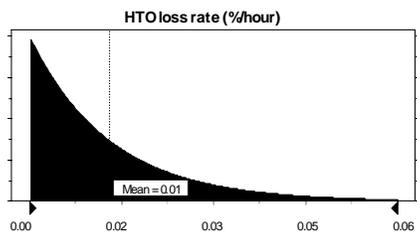
Selected range is from 1.00 to 4.00



Assumption: HTO loss rate (%/hour)

Exponential distribution with parameters:
95% - tile 0.04

Selected range is from 0.00 to +Infinity



Assumption: HT depo velocity (m/sec)

Normal distribution with parameters:
10% - tile 3.00E-04
90% - tile 1.20E-03

Selected range is from -Infinity to +Infinity

