

Appendix

Calibration tables for the thoron progeny evaluation of RDM

The Tables are calculated by exactly the same algorithm as the Radon Daughter Monitor uses.

The parameters of the calculations are typical for the instrument:

Sampling air flow rate:	120 liters per hour
Detector efficiency:	0.15
Potential alpha energy concentration:	0.01 Working Level = 1300 MeV/liter
Counting time interval:	120 min
Ratio of Pb-212 and Bi-212 concentrations:	0.0 , 0.5 , 1.0

The instrument uses the actual measured flow rate, the individual efficiency, the user selected counting interval, and a concentration ratio of 0.0

For evaluation of the Potential Alpha Energy Concentration the alpha counts in the column "Po-212" are used.

Table 5

 CALIBRATION TABLE FOR THORON-EVALUATION

Bi-212/Pb-212 = 0.50000

AIR ACTIVITY CONCENTRATION (In Bq/Liter):

Pb-212: 0.0029 Bi-212: 0.0014

Pot.Energ.Conc = 1.300E+03 MeV/l = 0.010 WL

AIRFLOW = 3.333E-02 l/sec = 120. l/h

Det.Efficiency = 0.150

Time (min)	Filter Activity (Bq)		integral Counts			Sum Bi+Po
	Pb-212	Bi-212	Pb-212	Bi-212	Po-212	
120.00	0.65	0.49	358.	88.	157.	245.
240.00	1.22	1.06	1014.	301.	535.	837.
360.00	1.72	1.60	1590.	518.	921.	1439.
480.00	2.15	2.08	2096.	716.	1273.	1989.
600.00	2.54	2.50	2539.	892.	1586.	2477.
720.00	2.88	2.87	2928.	1047.	1861.	2907.
840.00	3.17	3.20	3269.	1182.	2102.	3284.
960.00	3.43	3.49	3569.	1301.	2314.	3615.
1080.00	3.66	3.74	3832.	1406.	2500.	3906.
1200.00	3.86	3.96	4063.	1498.	2663.	4161.
1320.00	4.04	4.16	4265.	1579.	2806.	4385.
1440.00	4.19	4.32	4443.	1649.	2932.	4581.
1560.00	4.33	4.47	4600.	1711.	3042.	4753.
1680.00	4.45	4.61	4738.	1766.	3139.	4905.
1800.00	4.55	4.72	4860.	1814.	3225.	5039.
1920.00	4.64	4.83	4967.	1857.	3301.	5158.
2040.00	4.73	4.92	5061.	1894.	3367.	5261.
2160.00	4.80	4.99	5144.	1927.	3426.	5352.
2280.00	4.86	5.06	5216.	1956.	3477.	5432.
2400.00	4.92	5.12	5280.	1981.	3522.	5503.
2520.00	4.96	5.18	5336.	2003.	3561.	5564.
2640.00	5.01	5.23	5385.	2023.	3596.	5618.
2760.00	5.04	5.27	5428.	2040.	3626.	5666.
2880.00	5.08	5.30	5465.	2055.	3653.	5708.
3000.00	5.11	5.33	5499.	2068.	3676.	5744.
3120.00	5.13	5.36	5528.	2079.	3697.	5776.
3240.00	5.40	5.38	5818.	2087.	3710.	5797.
3360.00	5.42	5.40	5841.	2096.	3727.	5823.
3480.00	5.44	5.42	5862.	2105.	3741.	5846.
3600.00	5.45	5.44	5880.	2112.	3754.	5866.
3720.00	5.47	5.45	5896.	2118.	3765.	5883.
3840.00	5.48	5.47	5910.	2123.	3775.	5898.
3960.00	5.49	5.48	5922.	2128.	3783.	5912.
4080.00	5.50	5.49	5933.	2132.	3791.	5923.
4200.00	5.51	5.50	5942.	2136.	3798.	5934.
4320.00	5.51	5.51	5950.	2139.	3803.	5942.
4440.00	5.52	5.51	5958.	2142.	3808.	5950.
4560.00	5.52	5.52	5965.	2145.	3813.	5958.
4680.00	5.53	5.52	5969.	2147.	3817.	5965.
4800.00	5.53	5.53	5973.	2149.	3820.	5969.
4920.00	5.54	5.53	5977.	2150.	3823.	5973.
5040.00	5.54	5.54	5981.	2152.	3825.	5976.
5160.00	5.54	5.54	5984.	2153.	3827.	5980.
5280.00	5.55	5.54	5989.	2154.	3830.	5984.
5400.00	5.55	5.55	5993.	2156.	3833.	5988.
5520.00	5.55	5.55	5994.	2157.	3835.	5992.
5640.00	5.55	5.55	5994.	2158.	3836.	5994.
5760.00	5.55	5.55	5994.	2158.	3836.	5994.
5880.00	5.55	5.55	5994.	2158.	3836.	5994.
6000.00	5.55	5.55	5722.	2157.	3834.	5991.

Table 5

 CALIBRATION TABLE FOR THORON-EVALUATION

Bi-212/Pb-212 = 1.00000

AIR ACTIVITY CONCENTRATION (In Bq/Liter):

Pb-212: 0.0028 Bi-212: 0.0028

Pot.Energ.Conc = 1.300E+03 MeV/l = 0.010 WL

AIRFLOW = 3.333E-02 l/sec = 120. l/h

Det.Efficiency = 0.150

Time (min)	Filter Activity (Bq)		integral Counts			Sum Bi+Po
	Pb-212	Bi-212	Pb-212	Bi-212	Po-212	
120.00	0.62	0.65	342.	127.	226.	353.
240.00	1.16	1.24	970.	369.	656.	1024.
360.00	1.64	1.76	1521.	586.	1042.	1627.
480.00	2.06	2.23	2004.	778.	1383.	2160.
600.00	2.43	2.63	2429.	946.	1683.	2629.
720.00	2.75	2.99	2801.	1095.	1946.	3041.
840.00	3.04	3.30	3128.	1225.	2177.	3402.
960.00	3.28	3.58	3416.	1339.	2380.	3719.
1080.00	3.50	3.82	3668.	1439.	2559.	3998.
1200.00	3.69	4.03	3889.	1527.	2715.	4242.
1320.00	3.86	4.22	4083.	1604.	2852.	4457.
1440.00	4.01	4.38	4254.	1672.	2973.	4646.
1560.00	4.14	4.53	4403.	1732.	3080.	4812.
1680.00	4.25	4.65	4535.	1785.	3173.	4957.
1800.00	4.36	4.76	4651.	1831.	3254.	5085.
1920.00	4.45	4.86	4754.	1871.	3327.	5198.
2040.00	4.52	4.95	4844.	1907.	3390.	5298.
2160.00	4.59	5.02	4924.	1939.	3447.	5385.
2280.00	4.65	5.09	4993.	1966.	3496.	5462.
2400.00	4.71	5.15	5054.	1991.	3539.	5530.
2520.00	4.75	5.20	5108.	2012.	3577.	5589.
2640.00	4.79	5.25	5155.	2031.	3610.	5641.
2760.00	4.83	5.28	5197.	2047.	3640.	5687.
2880.00	4.86	5.32	5233.	2062.	3665.	5727.
3000.00	4.89	5.35	5265.	2074.	3688.	5762.
3120.00	4.91	5.38	5293.	2085.	3707.	5793.
3240.00	4.93	5.40	5317.	2095.	3725.	5820.
3360.00	4.95	5.42	5339.	2104.	3740.	5844.
3480.00	4.97	5.44	5358.	2111.	3753.	5864.
3600.00	4.98	5.45	5374.	2118.	3765.	5883.
3720.00	5.00	5.47	5389.	2123.	3775.	5898.
3840.00	5.01	5.48	5401.	2129.	3784.	5913.
3960.00	5.02	5.49	5413.	2133.	3792.	5925.
4080.00	5.02	5.50	5423.	2137.	3799.	5936.
4200.00	5.51	5.50	5942.	2136.	3798.	5934.
4320.00	5.51	5.51	5950.	2139.	3803.	5942.
4440.00	5.52	5.51	5958.	2142.	3808.	5950.
4560.00	5.52	5.52	5965.	2145.	3813.	5958.
4680.00	5.53	5.52	5969.	2147.	3817.	5965.
4800.00	5.53	5.53	5973.	2149.	3820.	5969.
4920.00	5.54	5.53	5977.	2150.	3823.	5973.
5040.00	5.54	5.54	5981.	2152.	3825.	5976.
5160.00	5.54	5.54	5984.	2153.	3827.	5980.
5280.00	5.55	5.54	5989.	2154.	3830.	5984.
5400.00	5.55	5.55	5993.	2156.	3833.	5988.
5520.00	5.55	5.55	5994.	2157.	3835.	5992.
5640.00	5.55	5.55	5994.	2158.	3836.	5994.
5760.00	5.55	5.55	5994.	2158.	3836.	5994.
5880.00	5.55	5.55	5994.	2158.	3836.	5994.
6000.00	5.55	5.55	5479.	2160.	3839.	5999.