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# $^{222}$Rn EMANATION FROM MATERIALS

J. BIGU AND D. HALLMAN

Emanation of $^{222}$Rn from three materials has been measured recently in the laboratory. Radon-222 flux density measurements have been conducted at level 6800 in the Creighton mine (Inco,Sudbury) in an area where a layer of shotcrete had been applied to the rock (Norite) wall face. In addition, measurements of the concentrations of $^{222}$Rn, $^{220}$Rn, and their short-lived decay products, were also carried out at the above underground location.

Radon-222, $^{220}$Rn and their progeny were determined by the two-filter method. Flux density measurements were carried out by two methods, namely, the accumulator (closed-loop, continuous monitoring) method, and the "open-loop" method. In the first case, $^{222}$Rn concentration was determined using a scintillation cell in a continuous fashion. In the second case, the $^{222}$Rn concentration was measured by means of electrets. The results of the measurements described above are given below:

## $^{222}$Rn, $^{220}$Rn, and Progeny Concentration

PAEC (Rn) = 0.223 $\pm$ 0.020 $\mu Jm^{-3}$

PAEC (Tn) = 0.117 $\pm$ 0.008 $\mu Jm^{-3}$

PAEC(Tn)/PAEC(Rn)=0.52

[$^{222}$Rn] = 99.2 $\pm$ 22.4 $Bqm^{-3}$

[$^{220}$Rn] = 237.7 $\pm$ 54.8 $Bqm^{-3}$

T = 29.6 - 30°C

RH = 64.4 - 67%

P ~ 115 kPa

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## EMANATION STUDIES IN THE LABORATORY

| Material | Emanation Rate | Surface Area* |
|---|---|---|
| Polyurethane (201-15FR) | 3.9± 1.7 atom $m^{-2}h^{-1}$ | 2.49 $m^2$ |
| MIRADRAIN (GRAY) | 2.4 ± 2.3 | 1.00$m^2$ |
| GEOTEXTILE | 0.1 ± 1.0 | 1.50$m^2$ |

* In all the cases shown above, the surface area has been counted only once, per sheet, even for the case of the MIRADRAIN sample which was made up of one layer of extruded material glued together to a smooth layer of the same material. It should be noted that the geotextile material was removed from the MIRADRAIN. Furthermore, the surface area of the extruded layer is much larger than the area corresponding to the smooth layer. The surface area of the latter has been taken, and given in the above table.

## FLUX DENSITY MEASUREMENTS

The values obtained for the $^{222}Rn$ flux density were as follows:

Accumulator method (continuous monitoring)

$J(Rn) = 7.92 \times 10^{2}$ atoms $m^{-2}s^{-1}$

$= 1.67 \times 10^{-3}$ Bq $m^{-2}s^{-1}$

$= 4.50 \times 10^{-2}$ pCi $m^{-2}s^{-1}$

Open-Loop/electret method

$J(Rn) = 2.1 \times 10^{3}$ atoms $m^{-2}s^{-1}$

$= 4.4 \times 10^{-3}$ Bq $m^{-2}s^{-1}$

$= 0.12$ pCi $m^{-2}s^{-1}$

NOTES: The two methods differ by a factor of about 2.7. Measurements are subject to large uncertainties because of the roughness of the wall surface, which makes sealing of the containers to the wall very difficult. We cannot ensure that measurements were conducted under leakfree conditions.