



Radon Assessment:

Determination of radon progeny concentration in the workplace

The high incidence of lung cancers found among Ontario non-uranium miners have been partly attributed to radon progeny.

Epidemiological studies show that miners exposed to elevated levels of radon progeny have an increased risk of developing lung cancer. Thus, radon is considered a significant contaminant that affects air quality in underground mines.

As early as the 1960s, it was known that some non-uranium mines in Ontario had elevated levels of radon progeny. Based on the “Study of Mortality of Ontario Miners 1955-1977”, Part I of the report noted significant increase of lung cancer among gold miners.

Part II of the study implicated radon progeny as well as arsenic as causes in the significant increase of the disease. In 1982, the Mining Health and Safety Branch of the Ontario Ministry of Labour, Training and Skills Development started a program to sample all non-uranium mines for radon progeny.

It is important that the radon progeny concentrations of non-uranium mines must be known in order to control the exposure of workers. The air in the underground workings of mines must be sampled and results should be available to workers.

To eliminate the risk of developing lung cancer, the assessment of radon progeny concentration in the workplace must be a priority.

Workplace Safety North conducts radon assessments for a fee to determine radon progeny concentrations of the current underground mining operations.

Most assessments can be completed in one day. A written report will prepared following the visit to include recommendations and observations of any areas out of compliance.

Operations requiring assessment

Section 289 (2) of Regulation 854 (Mines and Mining Plants) states that the air to which workers may be exposed in an underground mine must be tested:

- (a) before work begins in a mine that is being reopened; and
- (b) within six months after the commencement of excavation of a new mine.

Section 289 (3) of Regulation 854 states that the air to which workers may be exposed in an underground mine must be retested:

- (a) at least monthly, if the radon progeny concentration in a sample exceeds 0.1 working level (WL); and
- (b) at least quarterly, if the radon progeny concentration in a sample is greater than 0.06 WL up to and including 0.1 WL.

Section 289 (4) of Regulation 854 also states that “if the concentration of radon progeny in a sample is less than or equal to 0.06 WL, a competent person shall assess once a year whether to retest the air in the work area in the underground mine and in making the assessment shall consider previous test results and changes in the mine or its operations.”

The assessment process

Sampling will be carried out in accordance with the Ministry’s Health and Safety Guideline R.S. 289, Radon Progeny - Sampling. Sampling will be taken at areas where the highest radon progeny concentrations are expected and where worker exposure may be an issue. Such locations may include:

- Sumps (radon gas can be carried into the mine with the water)
- Unventilated areas (to detect if gas is emanating from the host rock)
- Active headings and old workings being re-opened
- Exhaust airway (to determine if any gas is being produced in areas not otherwise tested).
- Other locations that may be determined while on site.

Sampling measurements, computation information, and radon progeny concentrations are summarized in a Table (see sample table below).

The assessment is a service provided by WSN with a fee to cover cost of consumables, travel, hotel accommodation and meals. Travel time and associated costs are estimated from Sudbury.



Company:
 Date of Survey: 10-Aug-10
 Surveyed by: Philip Dirige, WSN Mining Sector

TABLE 1. RESULTS OF SAMPLING FOR RADON PROGENY Company Rep.

Sample Number and location	Sample Volume (V) (Litres) (flow rate x time)	Flow Rate (l/min)	Sample time (min)	Sampling End Time	Mid point time counting	Elapsed time to mid point counting	Kusnetz Factor (K)	Count Rate (CPM)	Counter Efficiency, % (C)	Radon Progeny Concentration (WL)= (CPM)/(V * C * K)
300 L 300-0-017 Heading (vent tube is about 150 ft back)	24.5	3.5	7	9:10	10:10	60	110.0	21	44.10%	0.018
300 L Main sump	24.5	3.5	7	9:25	10:33	68	94.0	35	44.10%	0.034
300 L 300-0-17 W Raise for secondary scapeway	24.5	3.5	7	9:37	10:42	65	100.0	32	44.10%	0.030

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