

radon, as coarser tills tend to have higher permeability relative to clay-rich tills. On-going analysis of the permeability readings with respect to HRM's four major till types (granite, metasandstone, and slate facies of the Beaver River Till, and the Lawrencetown Till) may solidify an important relationship between radon soil gas, and overlying till within HRM. The soil radon potential index (SRP) has been used to correlate the soil gas and permeability readings with the indoor radon potential, and will be applied to data collected this field season. This study should be beneficial in understanding radon soil gas in HRM where over 40% of Nova Scotia's population resides.

Radon soil gas in Halifax Regional Municipality

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Naturally occurring radon is located in measurable quantities in soil gas across Nova Scotia. All soil types contain variable amounts of uranium, the decay of which produces radon (which has a half-life of 3.8 days) and other radiogenic daughter products. Next to smoking, radon exposure is the leading cause of lung cancer. Several tested buildings within Halifax Regional Municipality (HRM) contained elevated indoor radon gas, and research elsewhere has established a positive correlation between radon soil gas and indoor radon gas concentrations. While the production of radon is an important precondition for its presence in surficial soils, the permeability and rate of transport are important controls on the surface expression of radon. The objective of this study is to identify relationships between the permeability of the soils through which radon passes, the composition of the overlying surficial soils, and the geology of the respective bedrock types within HRM. Over 200 radon soil gas samples from 40 sites were collected and analyzed during the 2009 field season using protocols developed for the North American Soil Geochemical Landscapes Project. Radon soil gas concentrations were determined on site with the RM-2 portable soil radon monitoring system. The study focused on soil developed over the three major bedrock types in HRM: the Cambrian-Ordovician Goldenville and Halifax groups, and granite of the Devonian-Carboniferous South Mountain Batholith. The granite was further subdivided, based on its cooling history, into the primitive monzogranite, the middle stage coarse-grained leucomonzogranite, and the evolved fine-grained leucomonzogranite bodies. All of the soils sampled contained radon soil gas. The average values range from 19.1 kBq/m³ in metasandstone of the Goldenville Group, to 36.1 kBq/m³ in the Halifax Group slate, and 44.3 kBq/m³, 50.2 kBq/m³, and 51.0 kBq/m³ respectively for the primitive, middle, and evolved granites. The highest concentrations are associated with the granite, then slate, and the lowest in the metasandstone. The permeability of the surficial soils also plays an important role in the surface expression of