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RECENT RESULTS OF AIRBORNE RADON CONCENTRATION MONITORING IN THE PRAGUE METRO

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We are all exposed to radiation from naturally occurring sources in daily life. In general, natural radiation sources may be divided into three groups: ^{40}K, ^{232}Th and ^{238}U and their decay products in soil, rocks, and building materials; airborne radioactive sources consisting primarily of ^{222}Rn and its progeny; and cosmic rays, which produce a variety of penetrating particles in our atmosphere. About 85% of the total effective dose is due to these sources. In the Czech Republic, the individual average annual effective dose from natural radiation is estimated to be 3 mSv, of which more than 1.5 mSv comes from exposure to radon and especially to its short-lived decay products. Natural radioactive gas ^{222}Rn comes from ^{226}Ra which is one of the radionuclides in the uranium series. Radon concentrations outdoors are very low, typically between 2 to 10 $Bq\,m^{-3}$. Radon can, however, seep into enclosed spaces such as mines, tunnels and houses, where it can build up to very high concentrations, depending upon geology, atmospheric conditions, and ventilation. Thus places such as metro lines would be expected to show enormous variations in radon concentrations.

The present work is a continuation of a previous survey[1] carried out in 1994 in selected stations on all three lines of the Prague Metro. At that time radon concentrations were found to be relatively low (about 20-30 $Bq\,m^{-3}$) but they showed considerable fluctuation. These time variations can especially be attributed for the most parts to changes in air ventilation which may differ not only from line to line but also from station to station on the same line. Moreover, in some stations the flow of circulating air shows a different mode in summer comparing to that during winter. This is why it is important to monitor radon over a longer period in order to obtain more reliable results which can be used to assess the radon-related exposure incurred by passengers and employees (drivers, platform officers and maintenance workers).

Radon surveillance was carried out using a digital monitor based on a pulse ionization chamber (AlphaGUARD)[2] which, besides radon concentration, also continuously measures and records three other parameters, namely ambient temperature, atmospheric air pressure and relative humidity.

The results of this monitoring are summarized in Fig. 1, where the ranges of radon concentrations in selected metro stations of all three lines are given. The ranges of fluctuations shown are reflecting both statistical nature of radioactive decay and local as well as time variations in the air exchange.

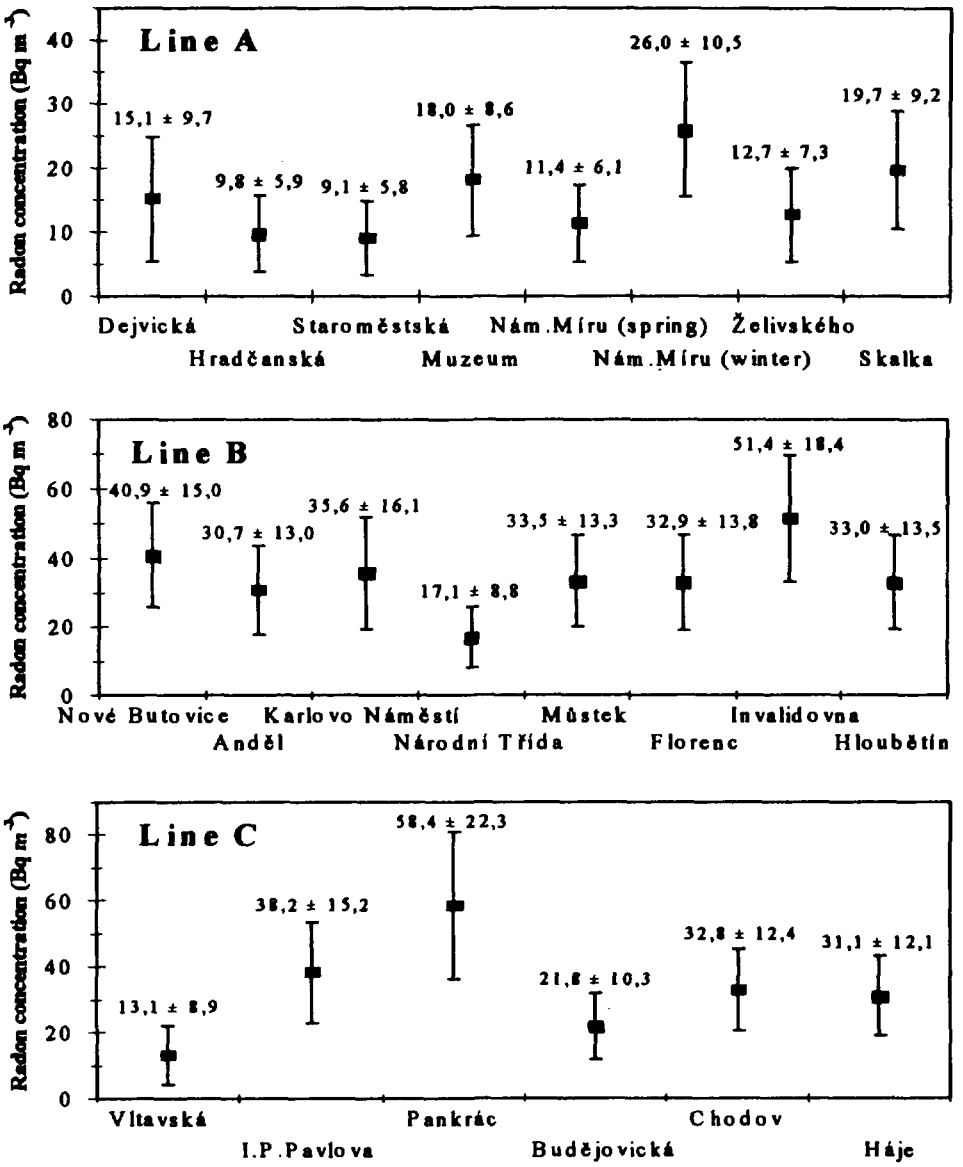

Fig. 1: The ranges of airborne radon concentrations in air at various stations in all three lines of Prague Metro.

References:

[1] SABOL, J. – VOJTKO, J.: *Evaluation of Radon Concentrations in the Prague Metro.* Conference "Nukleonika 95" (Czech Technical University), Prague, June 20–21, 1995.

[2] ALPHAGUARD: *Multiparameter Radon Monitor, Hardware and Software Description.* Genitron Instruments, Frankfurt/M, 1994.

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