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Modelling of radon control and air cleaning requirements in underground uranium mines

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As a part of a comprehensive study concerned with control workplace short-lived radon daughter concentration in underground uranium mines to safe levels, a computer program has been developed and verified, to calculate ventilation parameters e.g. local pressures, flow rates and radon daughter concentration levels. The computer program is composed of two parts, one part for mine ventilation and the other part for radon daughter levels calculations. This program has been validated in an actual case study to calculate radon concentration levels, pressure and flow rates required to maintain acceptable levels of radon concentrations in each point of the mine. The required fan static pressure and the approximate energy consumption were also estimated. The results of the calculations have been evaluated and compared with similar investigation. It was found that the calculated values are in good agreement with the corresponding values obtained using "REDES" standard ventilation modelling software. The developed computer model can be used as an available tool to help in the evaluation of ventilation systems proposed by mining authority, to assist the uranium mining industry in maintaining the health and safety of the workers underground while efficiently achieving economic production targets. It could be used also for regulatory inspection and radiation protection assessments of workers in the underground mining. Also with using this model, one can effectively design, assess and manage underground mine ventilation systems. Values of radon decay products concentration in units of working level, pressures drop and flow rates required to reach the acceptable radon concentration relative to the recommended levels, at different extraction points in the mine and fan static pressure could be estimated which are not available using other software.

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