

Underground air quality monitoring in subway stations in Bucharest city

Abstract

As a result of the urban development in the cities, the underground transport has become a priority transit route used by the population, due to the fact that it is a faster route and also due to the need to reduce the road traffic from the surface in order to improve the quality of the air (especially degraded from traffic emissions). Given the large flow of passengers, especially during peak hours, studying the quality of ambient air in underground spaces has become a necessity. Therefore, this paper presents the results of the particulate matter (PM₁₀) measurements, in 4 subway stations in Bucharest, selected according to the flow of people passing through the areas, choosing 2 stations with low flow and 2 very congested (which are intersection railway nodes). Also, in order to identify the influence of the atmospheric air quality on the underground air and the most vulnerable areas prone to lower air quality status, the results of the air pollutant dispersion scenarios realized with the Breeze AERMO software were taken into account. In addition to high level of PM₁₀ concentrations (above the limit permitted by the national law for surface air quality), there were performed laboratory tests in order to identify metal concentration levels (lead, cadmium, manganese, copper and iron). Thus, it has been found that PM₁₀ derives both from the erosion of the rails and the walls of the tunnels and also from the braking system of the subway trains. Furthermore, a connection was observed between the atmospheric air quality measured near the intake ventilation system and the quality of the underground air.