Characteristic Analysis of Particulate Matter (PM₁₀ and PM_{2.5}) in the Seoul Metropolitan Subway

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Seoul Metropolitan Subway is currently being used by 4 million people since its line 1 opened to the public in 1974 with a one-day average usage of 230 thousand citizens. Also, additional subway constructions are planned for each metropolitan city as well as the capital Seoul. In this way, the subway has become a favorite mode of public transportation for the modern people of Korea.

However, most underground subway stations are sensitive to indoor air pollution and are likely to adversely affect national health. Therefore, in May 2003, the Ministry of Environment of the Republic of Korea enacted the law, "Indoor Air Quality Management of Multi-Use Facilities" to control air pollutants in subways and other such indoor facilities. The target pollutants consist of a total of 10 pollutants including PM_{10} , formaldehyde, and CO_2 .

According to precedent studies, particle concentration significantly affects human health. Among them, the effect of PM_{10} is greater than TSP (Total Suspended Particulates) and the effect of $PM_{2.5}$ greater than PM_{10} on human health. However, the environmental standard for $PM_{2.5}$ has not been legislated yet. Therefore, in this study, we analyzed measured pollution levels and concentration changes at subway platforms, ventilation areas, tunnels and the ambient outdoors by utilizing three source classifications to find a reasonable reduction strategy for $PM_{2.5}$ and its proper environmental standard. The three cases are production of pollutants by passengers, by the influx of particulate matter contained in outside air due to ventilation and by actual train operation.

Also, in this study, we assume the pollution source contribution of $PM_{2.5}$ as well as PM_{10} and suggest specific control measures and reduction strategies for air quality improvement in subway stations. The intermediate results of this study will be presented.

Keywords: subway, indoor air quality, ventilation system, PM₁₀, PM_{2.5}