

Are Short-Term Spot Readings Effective In Determining Indoor Air Quality In Large Office Buildings?

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Certain environmental parameters are often good indicators of indoor air quality and human comfort. Volatile Organic Compounds (VOCs), Carbon Dioxide (CO₂), Carbon Monoxide (CO), Temperature, Relative Humidity (RH), Particulate Levels and Airborne Microorganisms are all parameters which should be considered in assessing indoor air quality. An office tower located in downtown Toronto was used to establish whether short-term spot readings are adequate in determining indoor air quality. This study was based on assessments performed over a period of seven years ranging from 2000-2006.

During our investigation, short-term spot readings for the following indoor air quality parameters were taken: Carbon Dioxide, Carbon Monoxide, Temperature, Relative Humidity, and Particulate Levels. A visual inspection of the HVAC units was performed and microbial swab samples and water samples were taken from the interior of the HVAC units and active samples for viable airborne microorganisms were also collected throughout the occupied areas of the office tower. Only the short-term spot readings were considered in this study. Another alternative to taking spot readings is to perform continuous monitoring throughout the building over a set period of time. We will discuss the feasibility and effectiveness of performing spot readings compared to continuous monitoring.

Carbon Dioxide, Carbon Monoxide, Temperature and Relative Humidity readings were all taken using the KD451 Indoor Air Quality Monitor or AirBoxx Indoor Air Quality Monitor. Particle counts were taken using a Met One Laser Particle Counter Model 237. Carbon Dioxide and Carbon Monoxide, Temperature, Relative Humidity and Particle Count readings were taken in one location on each occupied floor. There were a total of 31 floors that were monitored in the morning and in the afternoon.

Indoor air quality in the building would change slightly from year to year as a result of changes in building occupancy levels, outside metrological conditions, building renovations and changes to the HVAC units. The test results from the short-term spot readings in the selected locations indicated that the indoor air quality levels in the building were reasonable for an indoor office environment. The short-term spot readings were relatively consistent throughout the years with slight variations due to some of the changes mentioned above.

The average Carbon Dioxide level in the building ranged from 489 to 737 ppm during the monitoring period. Carbon Monoxide readings were within acceptable indoor levels and its average ranged from 0.0 to 0.6 ppm. The average Temperature in the building ranged from 22.2 to 23.1 °C. The average Relative Humidity readings ranged from 28.5 to 47.2 %. Particle Counts were generally good and were below the recommended level of 150,000 counts per cubic foot of air at $\geq 0.5\mu\text{m}$ particle diameter.

Short-term spot readings are effective both in terms of time, cost, as well as for establishing the general indoor air quality in a building.