United States
Environmental Protection
Agency

Region 5
77 W Jackson Blvd.
Chicago, Illinois 60604

Union Station Air Monitoring Study

Summary of $PM_{2.5}$ Data

Preliminary Air Monitoring Study at Union Station
In response to concerns about air quality on Union Station's train platforms, EPA conducted a limited air quality study to characterize fine particulate matter ($PM_{2.5}$) in and around Union Station. EPA will use the results of the study to determine the need for further investigation and to evaluate what measures can be implemented to improve air quality.

Between June 15, 2015 and July 2, 2015, EPA scientists used portable air monitors on train platforms at Union Station in Chicago to measure concentrations of $PM_{2.5}$ in the air. EPA conducted the sampling for various hours throughout the workday. EPA took similar measurements at street level in the vicinity of Union Station.

The monitoring data shows elevated concentrations of $PM_{2.5}$ on the train platforms at Union Station as compared to street level. Specifically, EPA's data indicates:

- Higher concentrations on train platforms than background concentrations measured on the street (*see Figure 1, below*).
- Highest concentrations on the platforms during rush hour periods (*see Figure 2, below*).
- Higher average concentrations on the south platform than the north platform (*see Figure 1, below*).
- Short-term localized peak concentrations near the locomotives.

What is $PM_{2.5}$?
$PM_{2.5}$ is particulate matter that is 2.5 micrometers (μm) in diameter and smaller. $PM_{2.5}$ is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of particles is directly linked to their potential for causing health problems. EPA is concerned about particles that are 2.5 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles may affect the heart and lungs and cause serious health effects. The particulate matter measured in this study is primarily from diesel exhaust. In addition to contributing to particulate matter, diesel exhaust contains many other harmful pollutants, including carbon monoxide, benzene, formaldehyde, and nitrogen oxides.

Design
EPA measured $PM_{2.5}$ concentrations on the Union Station platforms for 14 days. EPA collected samples using three TSI SidePak™ Personal Aerosol Monitors, Model AM510. This type of air sensor is a portable, lightweight, battery-operated laser photometer that measures real-time airborne particulate matter concentrations. By using portable sensors rather than stationary monitors, EPA scientists were able to traverse the train platforms and measure at locations that stationary monitors would not be able to distinguish. These sensors are effective for determining relative concentrations of particulate pollution and identifying areas where more refined evaluations may be necessary.

Data collected during this study were short term measurements of one-minute and hourly average $PM_{2.5}$ concentrations. Hourly average concentrations were used to identify specific hours of the day that had the highest concentrations, and one-minute averages were used to identify specific locations on the platform where concentrations were highest. EPA regulatory standards for ambient air are based on longer term measurements.

Each day of monitoring included one to two periods of monitoring background concentrations (measured on a four to five block stretch of Jackson Boulevard to Union Station), and two to six platform tests per day, each at least 45 minutes long. EPA scientists conducted 64 platform tests and 35 background tests over 14 days.

Results and Discussion

Monitored readings indicated peak concentrations at 7am and 5pm, with higher concentrations generally monitored on the south platform.

Concentrations on the platforms were 23-96% higher than those recorded on nearby streets on the same day. Monitors also showed peak values when the sensors were close to locomotive engines.

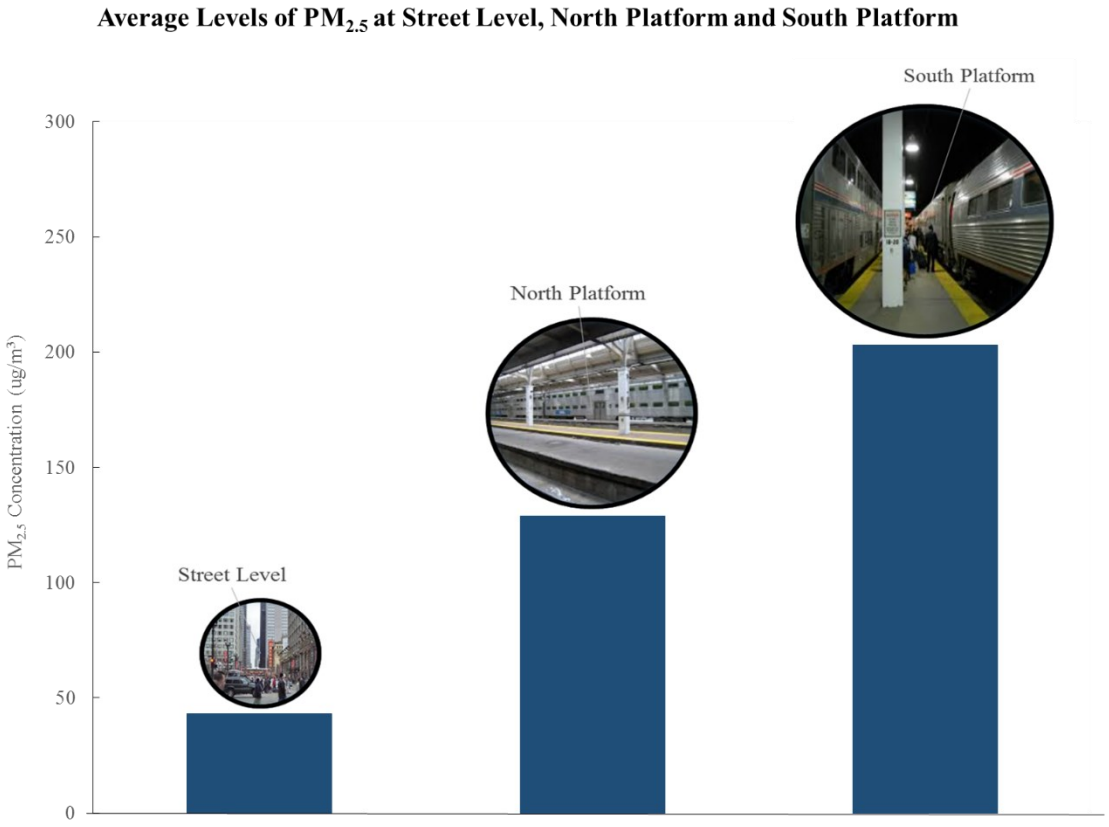

Figure 1. $PM_{2.5}$ concentrations on the south platform (average 203 $\mu g/m^3$) were higher than those on the north platform (average 129 $\mu g/m^3$). $PM_{2.5}$ concentrations on both platforms were higher than street level concentrations (average 43 $\mu g/m^3$).

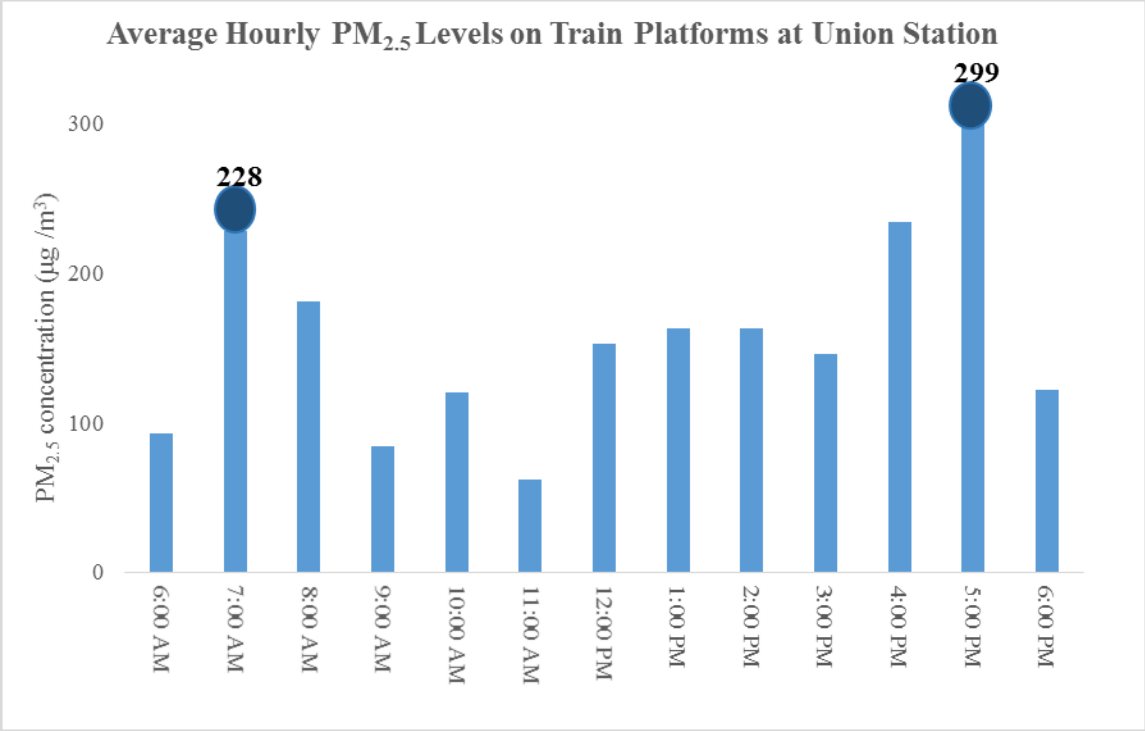

Figure 2. Highest average hourly concentrations were observed during rush hour, with the two highest hours being 7 am (228 µg /m^3) and 5 pm (299 µg /m^3).