

# Traffic Related Particulate Pollution: A Serious Occupational Hazard for Public Safety Personnel

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Public safety personnel that operate on busy urban highways, may be at risk from more than just traditional vehicular traffic. Although roadway, atmospheric, and population density may all play a roll—traffic-related particulate pollution is one of those “unknowns” to which police, fire and emergency medical personnel may not be aware of as a true occupational hazard.

America’s urban roadways have been decaying now for decades—crumbling and rusting. If you were to examine the side of most urban roads—or look along the base of a center divider / Jersey barrier, one would see small piles of debris and dirt.

This “dirt” contains sand, soil, salt, silica, residual asbestos (from brakes, clutches and heat seals) broken down concrete particulates including cement, asphalt, and other matter. Further, a roadside sampling of particulates will exhibit miniscule traces of rubber, rusted metal shavings, and tiny pieces of flaked and broken glass.

During normal vehicle operations, various chemicals, fuel components, acid, and soot are released during operation. Metals such as platinum which originates in the catalytic converters of vehicles are also expelled from the vehicle. Those roadside piles of traffic-related particulates,

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include a build-up of heavy metals.<sup>2</sup> <sup>3</sup>The most common metals include lead, copper, cadmium and zinc which emanate from burning fuel, as well as the platinum group elements (PGE)—platinum, palladium, iridium, osmium, rhodium and ruthenium. Valued for specific unique properties, the latter metals are used in the electronics, medical and vehicular production industries. While all of these metals serve a constructive purpose, inadvertent inhalation of these metals and other substances, can be toxic.

## “Inadvertent inhalation of these metals and other substances, can be toxic.”

The friction of tires causes roadside debris to become airborne. Operating at the scene of a collision or roll-over, an extrication or other extended-period action, puts the public safety worker in an environment where traffic-related particulate matter will be inhaled; a roll-over accident will certainly kick up a heavy cloud of particulates, and often the dust will not resolve for some time. The spectrum of illness which may follow from inhalation may be a dust pneumonia (immediately), or pulmonary cancer (many years later).

The literature clearly demonstrates that traffic-related particulate matter is completely unhealthy and dangerous. An environmental study conducted in 2007, demonstrated that risks:

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<sup>2</sup> See: TheCodyReeder. “Mining Platinum from the Road Part One.” YouTube, 28 May 2016. 17 April 2017.

[youtube.com/watch?v=v5GPWJPLcHg&ab\\_channel=Cody%27sLab](https://www.youtube.com/watch?v=v5GPWJPLcHg&ab_channel=Cody%27sLab) for an excellent example of such roadside debris. Also, see: “Implications of Platinum-Group Element Accumulation along U.S. Roads from Catalytic-Converter Attrition.” James C. Ely, Clive R. Neal, Charles F. Kulpa, Mark A. Schneegurt, James A. Seidler, and, and Jinesh C. Jain. *Environmental Science & Technology*. 2001 35 (19), 3816-3822.

<sup>3</sup> Kana, Suk Fun; Tanner, Peter A. “Determination of platinum in roadside dust samples by dynamic reaction cell-inductively coupled plasma-mass spectrometry.” *Journal of Analytical Atomic Spectrometry*. Issue 5, 2004.

Associated with the inhalation of platinum group elements [from] emissions from vehicle exhaust catalyts has been investigated by extracting road dust and...from the toxicological perspective, the results demonstrate potential health risks [which have] well-known toxic and allergenic effects on human beings and living organisms.”<sup>4</sup>

Another study asserts, “Many studies on animals have confirmed the association of acute toxic effects with the metallic platinum”<sup>5</sup>

While the topic of indoor workplace exposure has had extensive toxicological research conducted on it, there is very little in regard to outdoor exposure to the same.

One of the very few studies on this topic, alarmingly demonstrated a connection from roadway particulates exposure to illness, indicating, “A large population of highway workers is at risk of developing silicosis

“Even a severe, single exposure to a hazardous agent can damage the lungs”

from exposure to crystalline silica<sup>6</sup> a naturally occurring chemical compound classified as a human lung carcinogen. Statistics from the rescue and recovery workers of 9/11, demonstrate over 5,000 cases of cancer (malignant neoplasms of the lungs, pleura, within the respiratory system, intrathoracic organs, etc.) have come about, primarily from inhalation during of the post-collapse atmosphere which included

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<sup>4</sup> Colombo C, Monhemius AJ, Plant JA. Platinum, palladium and rhodium release from vehicle exhaust catalyts and road dust exposed to simulated lung fluids. *Ecotoxicol Environ Saf.* 2008;71(3):722-30.

<sup>5</sup> Apostoli, Pietro. Elemental speciation in human health risk assessment. Geneva, World Health Organization, 2006.

<sup>6</sup> Valiante DJ, Schill DP, Rosenman KD, Socie E. Highway repair: a new silicosis threat. *Am J Public Health.* 2004;94(5):876-80.

tremendous amounts of lead, asbestos, cement and drywall particulates (gypsum),<sup>7</sup> being in the air.

John Hopkins Medical Center reports: “Most occupational lung diseases are caused by repeated, long-term exposure, but even a severe, single exposure to a hazardous agent can damage the lungs.”<sup>8</sup> Even though it may take many years, exposure to traffic-related particulate pollution can cause inhalation illnesses. Consequently, it seems it would be judicious for there to be some sort of study focusing on traffic-related particulate pollution and the incidence of illness among public safety workers who regularly operate on the highway.

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<sup>7</sup> Soffritti M, Falcioni L, Bua L, Tibaldi E, Manservigi M, Belpoggi F. Potential carcinogenic effects of world trade center dust after intratracheal instillation to Sprague-Dawley rats: first observation. *Am J Ind Med.* 2013;56(2):155-62. doi: 10.1002/ajim.22109

<sup>8</sup> “Occupational Lung Diseases.” *Occupational Lung Diseases.* Johns Hopkins Medicine Health Library, n.d. Web. 17 Apr. 2017.