



INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS®

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Assessment of Diesel Exhaust Sampling in Dunedin, Florida IAFF Local 2327

The air sampling procedures for diesel particulate performed by Air Quality Consulting in July 2011 and September 2011 at three Dunedin, FL fire stations followed NIOSH Method 5040 to measure and analyze concentrations of elemental carbon; however their results were incorrectly compared to the OSHA PEL and ACGIH TLV concentrations for carbon black. There is a different air sampling and analysis method used for carbon black, which is NIOSH method 5000ⁱ. Therefore, their conclusion that the airborne diesel exhaust concentrations measured in the fire stations are within applicable OSHA exposure limit is incorrect.

Carbon black is not the same as diesel particulate. Carbon black is a powdery form of carbon created by the incomplete combustion of fuels, such as gasoline, diesel, or coal. Both the OSHA PEL and the ACGIH TLV for carbon black are 3.5 mg/m³ⁱⁱ. The World Health Organization's International Agency for Research on Cancer (IARC) classifies carbon black as Group 2B, meaning it is a possible human carcinogen.ⁱⁱⁱ

Diesel exhaust is a mixture of both gaseous and particulate substances. Diesel exhaust particulates are primarily composed of organic and elemental carbon, condensed hydrocarbons, and sulfate. Elemental carbon is the most reliable measure of exposure for diesel exhaust because it is the primarily component of diesel particulate matter, it acts a carrier of suspected carcinogens, and it can be easily measured and quantified by analytical methods.^{iv} Currently, there is no PEL or TLV for diesel exhaust. In 2002, the ACGIH proposed a TLV of 0.02 mg/m³ for diesel exhaust particulate of respirable size, as measured by elemental carbon. However, due the publication of new research surrounding the health effects of diesel exhaust, this proposed value was withdrawn to allow for further revisions.^v In June of 2012, the IARC classified diesel exhaust as a Group 1 carcinogen, meaning there is sufficient evidence that it causes cancer in humans.^{vi}

NIOSH recommends that occupational exposures to known human carcinogens be kept to the lowest feasible concentration; therefore they currently do not have Recommended Exposure Limits (REL) for diesel exhaust.^{vii} This is based on the belief that there is no safe level of exposure to a known carcinogen.

The IAFF, in concert with NIOSH, recommends the use of localized ventilation controls, such as source capture systems, to reduce fire fighter exposures to diesel exhaust to the lowest feasible concentration. General, or dilution, ventilation systems that use exhaust fans and make up air intakes are not effective at reducing airborne exposures to diesel exhaust. Dilution ventilation systems allow for the spread of diesel exhaust throughout the fire station bay before exhausting

it to the outdoors. Source capture systems attach directly to the tailpipe of fire apparatus and captures diesel exhaust before it enters the room air. A source capture system should be installed in Fire Stations #60, #61, and #62 and the Fleet Services building in order to reduce fire fighter exposure to diesel exhaust.

ⁱ NIOSH Manual of Analytical Methods, 4th Edition. Carbon Black: Method 5000.
<http://www.cdc.gov/niosh/docs/2003-154/pdfs/5000.pdf>. Accessed 27 June 2012.

ⁱⁱ U.S. Occupational Health and Safety Administration. Carbon Black.
http://www.osha.gov/dts/chemicalsampling/data/CH_225300.html. Accessed 27 June 2012.

ⁱⁱⁱ International Agency for Research on Cancer Monographs. Volume 93: Carbon Black.
<http://monographs.iarc.fr/ENG/Monographs/PDFs/93-carbonblack.pdf>. Accessed 27 June 2012.

^{iv} Health Effects Institute Diesel Epidemiology Working Group. Research Directions to Improve Estimates of Human Exposure and Risk from Diesel Exhaust.
<http://www.epa.gov/ncer/science/pm/hei/DieselSpecialReport02.pdf>. Accessed 26 June 2010.

^v American Conference of Governmental Industrial Hygienists. Frequently Asked Questions.
<http://www.acgih.org/faqs.htm>. Accessed 26 Jun 2010.

^{vi} International Agency for Research on Cancer. Press Release No. 213: Diesel Engine Exhaust Carcinogenic. http://press.iarc.fr/pr213_E.pdf. Accessed 27 June 2012.

^{vii} National Insutite for Occupational Safety and Health. NIOSH Evaluation of its Cancer and REL Policies.
<http://www.cdc.gov/niosh/topics/cancer/policy.html>. Accessed 27 June 2012.