

Evaluation of Snow Melting Operations Impact on Public Health

Bluemont Park
ARLINGTON, VA

Letter Health Consultation

February 8, 2018

Virginia Department of Health
Division of Environmental Epidemiology
Richmond, Virginia 23219



COMMONWEALTH of VIRGINIA

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February 8, 2018

Ms. Darcy Trick
325 N Manchester Street
Arlington, VA

Dear Ms. Trick,

Thank you for contacting the Virginia Department of Health (VDH) with your concerns about exposure to diesel exhaust from the snow melting operations at Bluemont Park, nearby your neighborhood. This letter health consultation is to address your concerns regarding potential health effects to individuals in your community regarding this exposure.

BACKGROUND AND STATEMENT OF ISSUES

In February 2016 Arlington County experienced more snow than what is routinely observed in a winter. During that event, snow removal in the city of Arlington included hauling snow to Bluemont Park where the snow was melted using a snowmelter. Bluemont Park is adjacent to the Boulevard Manor community. Community representatives contacted VDH with concerns that this method of snow melting is a hazard to their health due to the constant exposure to diesel exhaust from the snowmelter and trucks driving through the neighborhood. The following is a brief summary of what has transpired since snow removal operations began in 2016.

In response to health concerns, ECS Mid-Atlantic collected air samples to test for the presence of volatile organic compounds (VOCs) at your residence. On February 23, 2016 ECS used a photoionization detector (PID) to measure VOCs, which were 0.0 ppm or not detectable, in the home. On that same day, ECS Mid-Atlantic set up two Summa canisters in the home to collect air samples, one set for 7 minutes and the other for 24-hours. Additionally, a Summa canister was set to collect a 7-minute sample from within five feet of the snowmelter to measure the exhaust. An independent laboratory conducted analysis on the air samples submitted by ECS

Mid-Atlantic.¹ The opinion of ECS Mid-Atlantic was that the exhaust of the snowmelter impacted the air quality within the residence.

After the snow melting event, the Boulevard Manor Civic Association (BMCA) requested Arlington County conduct snow melting operations elsewhere for future snow events. BMCA engaged in multiple correspondences with Arlington County Department of Environmental Services regarding the County's snow melting process. The BMCA wrote a petition to Arlington County with the same request, which received signatures from approximately 125 families in Boulevard Manor. Several residents who self-identify as sensitive to diesel exhaust have requested that future snow melting operations not take place at Bluemont Park. Your symptoms include sore throat and lightheadedness at the time of the snow melting operation in 2016 and a persistent cough with a diagnosis of Reactive Airways Dysfunction Syndrome that continues through the present.² Residents are concerned that snow melting operation may impact the health of those with compromised health in the neighborhood which include a woman with COPD, an infant with heart problems, a woman with Chronic Fatigue Disease, several elderly individuals, and children attending a day care (one of which has cystic fibrosis).³

In December 2017 you contacted VDH to look at the air sampling report following sampling in your home. VDH shared these concerns with the Arlington Health Department and Regional Department of Environmental Quality. In follow-up communications with you and other members of the Boulevard Manor community, VDH has received photos of the snowmelting operation from 2016 and copies of correspondence between BMCA and Arlington County.

In January 2018 you sent VDH a copy of your physician's letter describing the ongoing effects to your health from exposure to diesel exhaust during the 2016 snow melting event.

DISCUSSION

As explained by State Public Health Toxicologist⁴ during a phone conversation, VDH and the Agency for Toxic Substances and Disease Registry does not share the same opinion as ECS Mid-Atlantic regarding its interpretation of the sample results. Reasons include:

- we would expect concentrations at the source (exhaust) to be much higher than inside the home
- the indoor air concentrations are similar to those found in studies of homes

¹ Letter for Air Sampling, Arlington County. ECS Project No. 47: 1510. February 20, 2016. ECS Mid-Atlantic, LLC

² Letter from Darcy Trick's physician, January 3, 2018.

³ Personal Communication with Darcy Trick (email), December 28, 2017.

⁴ Personal Communication with Darcy Trick December 28, 2017.

This does not mean that you were not exposed to other chemicals generated by diesel engines such as carbon monoxide, nitrous oxide, and particulate matter, which were not measured in those samples.

To determine potential health effects of the chemicals measured in your home, concentrations of chemicals in the air are compared to comparison values (CVs). CVs are derived based on data drawn from the epidemiologic and toxicologic literature with many uncertainty or safety factors applied to ensure that they are amply protective of human health. The Agency for Toxic Substances and Disease Registry (ATSDR) and the U.S. Environmental Protection Agency's (EPA's) values are widely used by VDH in the public health assessment screening process. CVs are used to assess voluminous data sets in an efficient and consistent manner during the screening analysis. They enable VDH to identify substances that are not expected to result in adverse health effects (i.e., substances detected below comparison values) and substances requiring further evaluation (i.e., substances detected above comparison values). For this exposure scenario, the following CVs were used to evaluate air concentrations of chemicals:

- ATSDR's Acute environmental media evaluation guides (EMEGs)

EMEGs are estimated contaminant concentrations that are not expected to result in adverse non-carcinogenic health effects based on ATSDR evaluation. EMEGs are based on ATSDR MRLs and conservative assumptions about exposure, such as intake rate, exposure frequency and duration, and body weight.

- EPA's Regional Screening Levels (RSLs)

RSLs are risk-based concentrations that combine exposure assumptions and toxicity data to yield environment contaminant levels that are considered protective for humans over a lifetime.

According to the air sample analysis, only six VOCs were detected in the samples collected in both the house and from nearby the exhaust pipe of the snowmelter: acetone, chloromethane, dichlorofluoromethane, ethyl acetate, methyl ethyl ketone, and toluene (Table 1). All of these chemicals were far below their respective CV.

Table 1: Results of the six VOCs that were detected in air samples and appropriate comparison values.

Compound	Units	Comparison Value	Exhaust (7-minute)	House (7-minute)	House (24-hour)
Acetone	µg/m ³	62,000*	19.6	nd	16.1
Chloromethane	µg/m ³	1,000*	0.83	0.76	0.72
Dichlorodifluoromethane	µg/m ³	100**	1.53	1.53	1.53
Ethyl acetate	µg/m ³	60**	nd	2.96	2.20
Methyl ethyl ketone (2-butanone)	µg/m ³	5,000**	nd	0.86	0.77
Toluene	µg/m ³	7,500*	1.13	1.39	1.62

* Acute environmental media evaluation guides.

** Regional Screening Levels.

Chemical-specific Information

Diesel exhaust is composed of hundreds of chemicals, both gas and particulate. These chemicals include carbon dioxide (CO₂), carbon monoxide (CO), nitric oxide (NO), nitrogen dioxide (NO₂), methanol, benzene, pyrene, anthracene, naphthalene, and particulate matter.⁵ Particulate matter includes fine particles (<2.5 µm diameter) and ultrafine particles (<0.1 µm diameter), which can be problematic for respiratory health because they can reach deep into the lung. In fact, measuring diesel particulate matter mass is often used to measure exposure to diesel exhaust.⁵

Short-term (acute) exposures to diesel exhaust can cause irritation to the eyes and throat, lightheadedness and nausea, and respiratory symptoms such as cough. It has also known to exacerbate allergenic responses and asthma-like symptoms.⁶ Many local governments and government agencies have begun to promote awareness of the issue through anti-idling campaigns and laws in order to address concerns regarding diesel exhaust associated health effects.⁷

Most information on the health effects of diesel exhaust are either high-level acute exposures or chronic exposures. It is therefore difficult to extrapolate the potential effects of diesel exhaust on human health from an acute low-level exposure, such as the one that took place in February 2016.

Odor as a cause for health effects

Recent research has shown that exposure to odors can cause health symptoms at concentrations lower than those known to cause damaging health effects based on the toxicity of the chemical. This is sometimes due to a chemical being an irritant, separate from its toxic effects, and at a lower level than may cause health effects. Furthermore, if the odor threshold is

⁵ EPA Master List of Compounds Emitted by Mobile Sources. 2006. Accessed 12/29/17.

<https://nepis.epa.gov/Exe/ZyPDF.cgi/P1004KHZ.PDF?Dockkey=P1004KHZ.PDF>

⁶ EPA Health Assessment Document for Diesel Engine Exhaust. EPA/600/8-90/057F. May 2002.

⁷ EPA Compilation of State, County, and Local Anti-Idling Regulations. EPA420-06-004. April 2006. Accessed 1/22/18. <https://www.epa.gov/sites/production/files/documents/CompilationofStateIdlingRegulations.pdf>

close to (but lower than) the irritation threshold, then the odor itself can also cause irritation symptoms due to previous associations a person has made with the chemical. Symptoms will go away once exposure to the odor has ceased in these cases. Additionally, presence of an odor that is unpleasant can cause health effects because they effect breathing patterns, impair mood, or induce stress, which can all cause or exacerbate illness separate from other factors. It is known, however, that there is variability among individuals at what level odors can be detected, and at what level those odors cause nuisance effects.⁸ VDH cannot speculate about these potential health effects.

LIMITATIONS

Due to the paucity of environmental data, we cannot assess exposures from chemical constituents not included in the analysis but could contribute to adverse impacts. These chemicals include: particulate matter (PM), carbon dioxide (CO₂), carbon monoxide (CO), nitric oxide (NO) and nitrogen dioxide (NO₂), methanol, and more complex molecules such as benzene, naphthalene, pyrene, and anthracene.⁹ Sulfur oxides might be included as well unless low sulfur diesel is used. Also, adverse effects from diesel exhaust odor could not be evaluated.

CONCLUSION

Based on the concentrations of chemicals collected inside your home in February 2016, VDH concludes there is no health hazard because they are below health-based comparison values.

RECOMMENDATIONS

Residents should avoid out-door activities where snowmelting activities are taking place.

Snow melting operations with the potential for public exposure to diesel exhaust for extended periods of time should be conducted as far as possible from communities.

When monitoring the impact of diesel exhaust on public health, particulate matter, carbon dioxide (CO₂), carbon monoxide (CO), nitric oxide (NO) and nitrogen dioxide (NO₂), methanol, and certain PAHs should be included.

Diesel exhaust odor should be evaluated and, if necessary, controlled using best available control technology if potential for public exposure exists.

⁸ Schiffman, S. and Williams, C. 2005. Science of Odor as a Potential Health Issue. *Journal of Environmental Quality*. 34:129-138.

⁹ EPA Master List of Compounds Emitted by Mobile Sources. 2006. Accessed 12/29/17.
<https://nepis.epa.gov/Exe/ZyPDF.cgi/P1004KHZ.PDF?Dockey=P1004KHZ.PDF>

Should you have any additional questions please contact Rachel Ellick, at (804) 864-8194 or at rachel.ellick@vdh.virginia.gov or Dwight Flammia, Ph.D., at (804)-864-8127 or at dwight.flammia@vdh.virginia.gov.

Sincerely,



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