

# Evaluation of Contaminants in Indoor Air

Department of Environmental Quality Piedmont Office

HENRICO, VIRGINIA

## Letter Health Consultation

October 6, 2014

Virginia Department of Health  
Division of Environmental Epidemiology  
109 Governor Street  
Richmond, Virginia 23219



# COMMONWEALTH of VIRGINIA

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Charles Turner  
Director, Air Quality Monitoring  
Department of Environmental Quality  
629 E. Main Street  
Richmond, VA 23219

Dear Mr. Turner,

Thanks for the opportunity to review the air samples results collected at Virginia Department of Environmental Quality (DEQ) Piedmont Office you provided September 30, 2014 for public health implications. The Virginia Department of Health (VDH) concludes that short-term exposure to the contaminants in air is not a health risk.

## BACKGROUND

VDH received an email from a concerned resident from Henrico County on September 30, 2014 expressing concern about a chemical spill that occurred on September 26, 2014 at the DEQ Piedmont Office at 4949-A Cox Road. The resident indicated that the parking lot was closed due to Henrico Police and Fire, and was concerned her health symptoms (nose/throat burning) were related to the event. The resident also expressed concern that employees who work near this facility may be impacted by the spill.

Subsequently, VDH contacted DEQ and Henrico Fire Department, and verified that the site was evacuated due to a chemical release thought to be the result of broken test tubes. VDH learned that the fire department collected two sets of indoor air samples for DEQ (Table 1): one set before the building was vented and another set three hours after the venting process occurred. These samples were analyzed for volatile organic compounds by Virginia Department of Consolidated Laboratory Services (DCLS) in Richmond, VA. A third set of samples (Table 2) was collected Monday, September 29, 2014 by an independent contractor, Cardno MM&A, and analyzed by Air Water & Soil Laboratories in Richmond, VA. VDH also learned that the building is occupied by another company that has storage space, but none of its employees were present during the incident. Air sampling methodology was not provided for review.

## DISCUSSION

The comparison of environmental data with Agency for Toxic Substances and Disease Registry (ATSDR) comparison values (CVs) is one of the first steps in the public health assessment process. The results of this screening step give health assessors an understanding of the priority contaminants at a site. When a contaminant is detected at a concentration less than its respective CVs, exposure is not expected to result in health effects and it is not considered further as part of the public health assessment process. **It should be noted that contaminants detected at concentrations that exceed their respective CVs, do not necessarily represent a health threat.** Instead, the results of the CV screening identify those contaminants that warrant a more detailed, site-specific evaluation to determine whether health effects are possible. CVs are not intended to be used as environmental clean-up levels.

CVs are chemical and media-specific concentrations in air, soil, and drinking water that are used by VDH to identify environmental contaminants at hazardous waste sites that require further evaluation. CVs incorporate assumptions of daily exposure to the chemical and, in the case of soil and water, a standard amount that someone may likely take into their body each day. CVs are non-site specific. They are based on health guidelines with uncertainty or safety factors applied to ensure that they are adequately protective of public health.

CVs used to screen the contaminant indoor air concentration follow and are listed in order of priority when available: ATSDR's minimal risk levels (MRLs), The U.S. Environmental Protection Agency's (EPA) reference concentration (RfC), the Occupational Safety and Health Administration's (OSHA) permissible exposure levels (PEL), the National Institute of Occupational Safety's (NIOSH) recommended exposure limit (REL), and the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV). Each CV is described below.

- MRLs are derived by ATSDR and are an estimate of the daily human exposure to a substance that is likely to be without appreciable risk of adverse health effects during a specified duration of exposure. MRLs are based only on non-carcinogenic effects. MRLs are derived for acute (1-14 days), intermediate (15-364 days), and chronic (365 days and longer) durations for the oral and inhalation routes of exposure. Acute MRLs were used for this evaluation when available.
- RfCs are derived by EPA and are an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure of a chemical to the human population through inhalation (including sensitive subpopulations), that is likely to be without risk of deleterious non-cancer effects during a lifetime.
- PELs are derived by OSHA and are permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-hour workday or a 40-hour workweek.

- RELs are NIOSH's recommended exposure limit for a 10-hour workday during a 40-hour workweek.
- TLV's are ACGIHs threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.

Because the exposure was less than one working day (representing an acute exposure), acute CVs were selected for comparison when available. It is acceptable in this exposure scenario to screen contaminant concentrations with an intermediate or chronic CV when an acute CV is not available. Lastly, contaminant air concentrations were not compared to cancer risk CVs because exposure was less than one day.

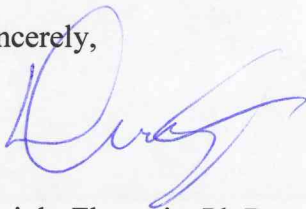
None of the contaminant concentrations in air samples collected immediately following the incident or three days later exceeded their respective CVs, and therefore did not present a health concern for a short duration exposure. Therefore, there is no need to take additional steps to characterize risk to public health.

### CONCLUSION

Virginia Department of Health concludes that the contaminants concentrations in the indoor air at Department of Environmental Quality Piedmont Office on September 26<sup>th</sup> and 29<sup>th</sup> are not expected to harm people's health over a short duration of exposure because the concentrations of contaminants are below their respective health-based comparison values.

I trust that the above information will be of help to you. Should you have any additional questions or concerns please contact me via email at [dwight.flammia@vdh.virginia.gov](mailto:dwight.flammia@vdh.virginia.gov) or by phone at (804) 864-8127.

Sincerely,



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*This report was supported by funds from a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services. This document has not been reviewed and cleared by ATSDR.*

## Attachment

**Table 1.** Concentration of contaminants in air sampled September 26, 2014 and their comparison values

Contaminant	Initial Sampling Event (ppb)				Later Sampling Event (ppb)				Comparison Value (ppb)	Source of Comparison Value <sup>1</sup>
	T1	T2	T3	T4	T5	T6	T7	T8		
1,1,1-Trichloroethane	0.33	0.23	0.18	0.18	0.05	0.05	0.05	0.06	2,000	ATSDR
1,2 - Dichloroethane	0.03	0.04	0.06	0.04	0.01	0.06			600	ATSDR Chronic
1,2,4-Trimethylbenzene	0.21				0.09				25,000	NIOSH
1,3,5-Trimethylbenzene	0.04	0.04	0.03	0.03	0.02	0.01	0.01		25,000	NIOSH
1,4-Dichlorobenzene	0.02	0.03	0.04	0.02	0.01	0.02	0.03	0.02	2,000	ATSDR
4-Ethyltoluene	0.12	0.05	0.04	0.08	0.05	0.02	0.02	0.04		
Benzene	0.26	0.26	0.24	0.27	0.14	0.13	0.16	0.15	9	ATSDR
Carbon Tetrachloride	0.06	0.05	0.06	0.05	0.06	0.06	0.05	0.05	30	ATSDR Intermediate
Cyclohexane	0.08	1.11	0.18	0.12	0.03	0.03	0.03	1.02	200	EPA
Dichlorodifluoromethane	0.45	0.52	0.52	0.53	0.48	0.5	0.52	0.52	1,000,000	OSHA
Ethylbenzene	0.13	0.11	0.09	0.08	0.06	0.04	0.05	0.05	5,000	ATSDR
Freon 11	0.24	0.33	0.33	0.33	0.22	0.23	0.24	0.27	1,000,000	OSHA
Hexane	1	1.03	0.69	0.6	0.3	0.17	0.17	0.34	600	ATSDR Chronic
<i>m&amp;p</i> -Xylene	0.48	0.41	0.32	0.28	0.19	0.12	0.15	0.18	2,000	ATSDR <sup>2</sup>
Methylene chloride	0.23	0.15	0.15	0.12	0.07	0.08	0.09	0.09	600	ATSDR
<i>o</i> -Xylene	0.16	0.15	0.12	0.11	0.07	0.04	0.06	0.06	2,000	ATSDR <sup>2</sup>
Tetrachloroethylene	0.01	0.02	0.02	0.01		0.01	0.02	0.01	200	ATSDR
Toluene	0.74	0.78	0.58	0.5	0.29	0.21	0.22	0.31	1,000	ATSDR
Trichloromethane	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02	100	ATSDR
Styrene	0.03	0.09	0.06	0.06	0.02	0.02		0.04	500	ATSDR

(Source: *DEQ*) Shaded boxes = not reported or available. <sup>1</sup>ATSDR value is an acute MRL value unless otherwise noted.

<sup>2</sup>Total xylenes comparison value used

**Table 2.** Concentration of contaminants in air sampled September 29, 2014 and their comparison values

Contaminant	Sample ID 1410469-##					Comparison value (ppb)	Source of Comparison Value <sup>1</sup>
	-01	-02	-03	-04	-05		
	Contaminant concentrations (ppb)						
1,1,1-Trichloroethane			5.11			2,000	ATSDR
1,2,4-Trimethylbenzene			2.83			25,000	NIOSH
1,3,5-Trimethylbenzene			0.75			25,000	NIOSH
2-Butanone	0.81		1.46	0.65	0.64	1,700	EPA
Acrolein	0.70		0.66	0.53	0.52	3	ATSDR
Benzene			2.22			9	ATSDR
Chloromethane	0.70	0.67	0.75	0.70	0.73	500	ATSDR
Cyclohexane	2.90		0.57			200	EPA
Dichlorodifluoromethane	0.75	0.61	0.69	0.68	0.75	1,000,000	OSHA
Ethylbenzene			2.15			5,000	ATSDR
Heptane	1.50		2.83		0.57	500,000	OSHA
Hexane	0.95		6.96	0.57	0.58	600	ATSDR chronic
Isopropylbenzene			0.91			50,000	OSHA
<i>m&amp;p</i> -Xylenes			7.25			2,000	ATSDR <sup>2</sup>
Methylene chloride	1.35	1.76	1.5	1.15	1.19	600	ATSDR
<i>o</i> -Xylene			2.60			2,000	ATSDR <sup>2</sup>
Propylene	0.87					500,000	ACGIH
Tetrahydrofuran	0.90			0.50	0.63	680	EPA
Toluene	1.52		10.7	1.12	1.16	1,000	ATSDR
Trichlorofluoromethane	0.54		1.21			1,000,000	OSHA

(Source: *DEQ*) Shaded boxes = not reported or available. <sup>1</sup>ATSDR value is an acute MRL value unless otherwise noted. <sup>2</sup>Total xylenes comparison value used