COLORADO
Department of Public Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Matt Blakely
Town of Timnath
4800 Goodman Street
Timnath, CO 80547

April 29, 2019

The Town of Timnath requested assistance from the Toxicology and Risk Assessment Program at the Colorado Department of Public Health and Environment (department) to evaluate the potential for health risks associated with air emissions from industrial operations within the town. In response to this request, the department conducted a screening health assessment from air monitoring data collected at this location during two separate years. This letter summarizes the results of this evaluation.

Background
Residents have issued multiple complaints to the Town regarding odors and fumes generated by Alpine Cabinets business in Timnath, Colorado. All certified odor tests conducted by the Town's Code Enforcement Officer were below the official thresholds for emissions and odors.

Figure 1. Air samples were taken within the study area surrounding the cabinet facility and is described as "an area centered along Main Street in Timnath approx. ¼ mile either side of, between Buss Grove/CR40 on the north and Harmony Road/CR38E on the south."

The sampling site is located within Weld County, Colorado. Using the EPA Environmental Justice Screening Tool and the U.S. Census, the total population in the town census tract is approximately 2,947 individuals. The population of minorities in this area is 13% and the low income population is 15. A total of 7% of the population is under age 5, and 16% is over age 64.

Environmental data

Colorado State University conducted air quality sampling of volatile organic compounds (VOCs) within and around the study area in March-April 2016. Additional sampling was collected in October-November 2018 to measure VOCs during an experimental lacquer process initiated by Alpine Cabinets. Datasets were obtained from Colorado State University for use in this evaluation.

Table 1. Summary of VOC concentrations (sampling dates: 3/10/16 - 4/26/16). All concentrations are ppb

VOC	Minimum	Mean	Maximum	Sample size	Detection Frequency
Benzene	0.05	0.12	0.22	11	100%
Toluene	0.03	0.96	4.77	11	100%
Ethylbenzene	BDL	1.13	6.97	11	81%
m+p-Xylene	BDL	4.89	31.20	11	81%
o-Xylene	0.00	1.51	9.06	11	100%
Acetone	1.99	29.67	100.69	11	100%
Isopropanol	0.83	21.34	91.68	11	100%
Methyl Ethyl Ketone	0.22	0.98	3.09	11	100%

Table 2. Summary of VOC concentrations (sampling dates: 10/29/18–11/1/18). All concentrations are ppb

VOC	Minimum	Mean	Maximum	Sample size	Detection Frequency
Benzene	0.05	0.16	0.33	10	100%
Toluene	0.04	0.45	2.38	10	100%
Ethylbenzene	BDL	0.05	0.14	10	70%
m+p-Xylene	BDL	0.20	0.71	10	90%
o-Xylene	BDL	0.06	0.23	10	80%
Acetone	BDL	1.93	3.23	10	90%
Isopropanol	BDL	1.60	4.54	10	90%
Methyl Ethyl Ketone	0.05	0.30	0.59	10	100%

NOTE: BDL = below detection limit

Exposure and health effect assessment

The purpose of this assessment is to evaluate whether people living near this site were at risk of harmful health effects from exposures to VOCs in the air. This evaluation compares the measured air concentrations to their respective health-based comparison values (CVs). This step in the screening process enables the department to identify priority chemicals that might need closer evaluation.

Health-based CVs are estimates of daily human exposure to a chemical that is not likely to result in harmful health effects over a specified exposure duration. Health-based CVs and health guidelines, as well as all other health-based screening criteria, are conservative levels of protection—they are not thresholds of toxicity. Although concentrations at or below a CV represent low or no risk, concentrations above a CV are not necessarily harmful. CVs are intentionally designed to protect even the most sensitive populations, such as the 7% of Timnath's population under the age of 5 or its 16% elderly population. The Agency for Toxic Substances and Disease Registry (ATSDR) has developed CVs for specific media (e.g., air, water and soil). ATSDR CVs are generally available for three specified exposure periods: acute (1-14 days), intermediate (15-364 days), and chronic (365 days or longer). Some of the CVs and health guidelines that ATSDR scientists use include ATSDR's cancer risk evaluation guides (CREGs), environmental media evaluation guides (EMEGs) and minimal risk levels (MRLs). If an ATSDR CV is not available for a particular chemical, ATSDR screens those environmental data with CVs developed by other sources, such as U.S. EPA's reference concentrations (RfCs).

Initial screening

To identify contaminants of potential concern (COPCs), the maximum air concentration of each substance was screened against the lowest (most conservative) CV established by ATSDR or other agencies (Table 3). If the maximum concentration of the contaminant was above the CV, the substance was retained for further analysis as a COPC. Exceeding the CV does not indicate that a health hazard exists, only that additional evaluation is warranted. Four substances (benzene, ethylbenzene, m+p-xylene, and isopropanol) were retained as COPS and evaluated in a refined screen.

Table 3. Initial screening of all samples to determine COPCs.

VOC	Maximum ppb 2016	Maximum ppb 2018	CV ppb	CV Source
Benzene	**0.22**	**0.33**	0.04	CREG
Toluene	4.77	2.38	1,000	EMEG
Ethylbenzene	**6.97**	0.14	0.25	RSL
m+p-Xylene	**31.20**	0.71	23	RMEG
o-Xylene	9.06	0.23	23	RMEG
Acetone	100.69	3.23	13,000	EMEG
Isopropanol	**91.68**	4.54	81.37	PPRTV
Methyl Ethyl Ketone	3.09	0.59	1,700	RMEG

Source: CREG= ATSDR cancer risk evaluation guide, EMEG=ATSDR environmental media evaluation guide, RMEG= ATSDR reference dose media evaluation guide, RSL= EPA regional screening level, PPRTV= provisional peer reviewed toxicity value.

Refined screening of COPCs

For the four substances retained for the refined screening step, the maximum measured concentration was compared to the short-term CV, and the mean concentration was compared to the long-term CV. This refined screening assessment uses the air monitoring data that more accurately represents the amount of

the VOC that would be inhaled by a person living in the area, and includes the length of time that a person would inhale the given VOC. Short-term exposures represent intermittent exposures that could occur repeatedly for a few hours to a few days. Often, the CVs for short-term exposures are much higher than long-term exposures. For this refined evaluation, short-term exposure assumes a worst case scenario that a person breathes the maximum measured air for a few hours to a few days. Long-term exposure assumes a person is breathing the outdoor air continuously (24 hours per day, 365 days per year) for a lifetime and assumes the measured concentrations of the VOCs in the air remain constant over the entire exposure period.

Table 4. Refined screening of COPCs in 2016 air sampling.

VOC	Maximum	Short-term CV	Mean	Long-term CV
Benzene	0.22	9[A]	0.12	0.04[C]
Ethylbenzene	6.97	5,000[A]	**1.13**	**0.25[ER]**
m+p-Xylene	31.20	2,000[A]	4.89	23[R]
Isopropanol	91.68	2,847[P*]	21.34	81.37[P]

Table 5. Refined screening of COPCs in 2018 air sampling.

VOC	Maximum	Short-term CV	Mean	Long-term CV
Benzene	0.33	9[A]	0.16	0.04[C]
Ethylbenzene	0.14	5,000[A]	0.05	0.25[ER]
m+p-Xylene	0.71	2,000[A]	0.20	23[R]
Isopropanol	4.54	2,847[P*]	1.60	81.37[P]

NOTE: A=ATSDR MRL, C= ATSDR CREG , ER= EPA RSL, R= ATSDR RMEG, P= PPRTV; *No acute RfC was available for this substance, the subchronic RfC was used in place.

Public Health Implications

Whether or not a person experiences symptoms to substances or odors in the air depends on many individual and environmental factors including:

- The concentration (how much) of the chemical a person is exposed to
- Amount of time (how long) the person was exposed
- Route by which the person was exposed (breathing the chemical)
- Individual sensitivities and lifestyle factors (occupation and personal habits)
- Individual characteristics such as age, gender, nutritional status, overall health and genetic constitution.
- In sensitive individuals, low levels of some chemicals in the air may worsen respiratory symptoms. Sensitive persons includes those with preexisting respiratory conditions or those with allergic reactions. Other factors that may affect respiratory health include cold and warm, humid air, or increased air pollution from urban areas. In general, when air pollution levels are worse than usual, those with respiratory sensitivities are advised to stay indoors.

Short-term exposure risk

- Benzene, ethylbenzene, m+p-xylene and isopropanol did not reach levels associated with adverse health effects from short-term, acute, exposures.

- There was no short-term CV available for isopropanol, therefore, a subchronic/intermediate value was used in place. Further evaluation indicated that isopropanol only exceeded the CV in one of the samples and therefore does not likely represent ongoing conditions.
- Maximum measured values collected in 2018 during the experimental laquer process were generally lower for these three substances than in 2016.

Long-term exposure risk

Ethylbenzene was the only VOC, on average, to exceed the chronic screening CV of 0.25ppb in the 2016 sampling period. Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is naturally found in coal tar and petroleum, or in manufactured products such as inks, pesticides and paints. It is often used as a solvent. This VOC has been classified by the International Agency for Research on Cancer as a possible human carcinogen. The excess cancer risk was determined for this substance using CalEPA inhalation unit risk (IUR) of $2.5x10^{-6}$. The excess cancer risk is $1.2x10^{-5}$ and falls below the upper limit of the US EPA "acceptable" risk range of 100 in a million excess cancer cases (Table 6).

Table 6. Excess cancer risk estimate for ethylbenzene.

VOC	Mean (ppb)	Mean (ug/m3)	IUR (ug/m3)	Excess cancer risk
Ethylbenzene	1.13	4.91	$2.5x10^{-6}$	$1.2x10^{-5}$

NOTE: The mean value is multiplied by the IUR to determine excess cancer risk

Benzene, m+p-xylene and isopropanol did not reach levels associated with adverse health effects from long-term, chronic exposures. On average, all substances measured were detected at lower levels in the 2018 experimental laquer process than collected in 2016.

Limitations

In general, the uncertainties associated with any risk-based evaluation are likely to over- or underestimate environmental exposures and the associated health hazards because all aspects of the actual exposure are typically unknown. The following major assumptions and limitations are specific to this evaluation and result in uncertainty:

- This air sampling represents VOC concentrations from all sources in the area.
- Other VOCs that were not sampled for in the study may result in exposures and additional health risk.
- The samples were collected over a short period of time (1.5 months in 2016 and 4 days in 2018) and may not represent the actual air concentrations over the course of a year or many years.

Conclusions

The evaluation of both the 2016 and 2018 air sampling indicated a low risk of short- or long-term harmful health effects due to VOC exposures in the vicinity of Alpine Cabinets. The department recommends additional air sampling if odors or health effects continue near this location and we will continue to monitor health concerns in the area.

Sincerely,

Allie Bamber, MS
Environmental Toxicologist
Colorado Department of Public Health and Environment