



21 Griffin Road North
Windsor, CT 06095

860.298.9692 PHONE
860.298.6399 FAX

www.TRCSolutions.com

November 10, 2017

Mr. Thomas Diviny
Town Board Member
Town of Orangetown
26 W. Orangeburg Rd
Orangeburg, NY 10962

*Submitted via e-mail
tdiviny@orangetown.com*

Re: Review and human health risk assessment of TRC Air Monitoring Results for Volatile Organic Compounds (VOCs)

Dear Tom;

I reviewed the results of the Phase I VOC air sampling, documented in TRC's *Air Quality Monitoring Report. Phase I: VOC Air Sampling & Meteorological Monitoring*, as well as the results from the resident VOC samples obtained September 15th – October 23rd.

The results from the Phase I VOC air sampling showed that concentrations of Acrolein, Benzene, Carbon Tetrachloride and Hexachlorobutadiene exceeded New York State Department of Environmental Conservation's respective short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs). Additionally, concentrations of acrolein and benzene exceeded the respective AGCs in the resident samples, however, TRC does not believe that exposure to these measured concentrations would result in negative health effects as these are short-term concentrations (one to two hour sampling event) and not annual concentrations.

The SGCs and AGCs were developed to evaluate the potential for offsite fence line concentrations of toxic air pollutants emitted by a facility by using an USEPA approved air dispersion model. The model calculates worst-case air concentrations at specific receptor locations using measured stack emissions data, stack input data (height, flow rate and temperature) and local meteorology. The SGCs and AGCs do not take into account any background concentrations or additional sources that may be present in ambient air. As stated in the report, stack testing was conducted at the API stack outlets on June 28-29, 2017. Results from that testing and subsequent air dispersion modeling of the maximum short-term and maximum annual average ground concentrations indicated the stack emissions from API do not exceed the corresponding SGCs or AGCs or the Odor Thresholds for any of the pollutants measured, including Acrolein.

Additionally, as stated in the report, the SGC is for comparison against a modeled maximum 1-hour concentration, while the AGC is for comparison against a modeled maximum annual average air concentration and the Phase I samples were taken over a 24-hour period, while the resident samples were collected over a one to two-hour period. Therefore, the direct comparison of the measured concentrations from the 24-hour, and resident samples to the AGCs (annual guideline concentrations) are not comparable as it is a comparison of a short-term sample to a long-term average. Although the 24-hour sample is collected over a longer time period than the 1-hour short-term SGC, it is still a short-term sample and therefore, a comparison can be made. Additionally, the Center for Disease Control's (CDC's) Agency for Toxic Substances and Disease Registry (ATSDR) has developed minimal risk levels (MRLs) for those chemicals for which there is an adequate toxicological database. MRLs are developed for short-term (14 days or less), intermediate (15 days – 364 days) and long-term (more than 365 days) exposures. The short-term MRL would be an appropriate comparison value for the 24-hour samples.

A. Acrolein was detected in concentrations above the SGC and the AGC in the Phase I VOC sampling. Acrolein is commonly found in car exhaust, cigarette smoke, and is also released from burning wood, other plant material and burning oil (e.g., home heating oil) (ATSDR Toxicological Profile for Acrolein, 2007). Measurements of Acrolein in smokers' homes have ranged from 1.6-3.6 ug/m³ (Nazaroff and Singer 2004, as cited in ATSDR Toxicological Profile for Acrolein, 2007). Irritation of the eyes and nose is the primary effect associated with short-term exposures to Acrolein. Eye irritation has been noticed at levels as low as 137 ug/m³ in human volunteers in a laboratory setting. The SGC of 2.5 ug/m³ is calculated by dividing the lowest observable adverse effect level (137 ug/m³) by a health protective uncertainty factor of 60 which takes into account protection of susceptible children.

The ATSDR has developed a short-term MRL for Acrolein of 0.003 parts per million (equivalent to 6.87 ug/m³) for exposures of 14 days or less (ATSDR Toxicological Profile for Acrolein 2007). The maximum concentration measured during the 24-hour sampling was 5.4 ug/m³ which is ~2.2 times higher than the SGC, but lower than ATSDR's minimal risk level. Additionally, as cited by the ATSDR, the average air concentration of Acrolein, in the United States, ranges from 1.145 to 7.3 ug/m³ (ATSDR Toxicological Profile for Acrolein 2007). All detected concentrations from the Orangetown samples were within this background range. As stated previously, modeled maximum 1-hour and maximum average annual concentrations of Acrolein directly attributable to API, did not exceed the SGCs or AGCs at the facility fence-line.

The resident VOC samples, which were taken over a period of 1 to 2 hours, showed concentrations of Acrolein ranging from non-detect to 5.95 ug/m³, which are comparable to the 24-hour monitoring samples obtained by TRC. Five of ten samples exceeded the SGC of 2.5 ug/m³ but were below the MRL of 6.87 ug/m³ and were within U.S. background concentrations.



Since the measured concentrations of Acrolein are only slightly above the SGC (less than 3 fold), below the ATSDR's MRL and within measured U.S. background concentrations, it is not expected that exposure would cause adverse health effects.

B. Benzene was detected above its AGC in the 24-hour samples. However, as noted above, since the sample obtained was a 24-hour sample, it is not comparable to the long-term AGC benchmark value. The SGC value for Benzene is 1300 ug/m³. Benzene is a component of gasoline and is emitted in the exhaust and through evaporation. In 2013, the USEPA Air Quality System (AQS) measurements of average concentrations of benzene from across New York State ranged from 0.33 to 0.91 ug/m³ (ATSDR Toxicological Profile for Benzene, Addendum 2015). All detected concentrations from the Orangetown samples were either below or within this background range.

The ATSDR has developed a short-term MRL for benzene of 0.009 parts per million (equivalent to 28.71 ug/m³) for exposures of 14 days or less (ATSDR Toxicological Profile for Benzene, 2007). The maximum concentration measured during the sampling was 0.80 ug/m³ which is well below the ATSDR's minimal risk level.

The resident VOC samples, which were taken over a period of 1 to 2 hours, showed concentrations of Benzene ranging from non-detect to 0.925 ug/m³ which are less than the SGC and ATSDR's MRL and within or comparable to the higher background concentrations.

All detected concentrations of Benzene were well below the MRL of 28.71 ug/m³ and the SGC of 1300 ug/m³ and therefore it is not expected that exposure would cause adverse health effects.

C. Carbon Tetrachloride was detected above its AGC. However, as noted above, since the sample obtained was a 24-hour sample, it is not comparable to the long-term AGC benchmark value. The SGC for Carbon Tetrachloride is 1900 ug/m³. Carbon Tetrachloride is an industrial chemical. According to ATSDR, the typical rural ambient air concentration is 1 ug/m³, with somewhat higher concentrations found in urban and industrial areas (ATSDR Toxicological Profile for Carbon Tetrachloride, 2005). All detected concentrations from the Orangetown samples are well below the rural ambient air concentration.

The ATSDR has developed an intermediate-term minimum risk level for carbon tetrachloride of 0.03 parts per million (equivalent to 188.7 ug/m³) for exposures of 15 to 364 days, which is also considered protective of short-term exposures. The maximum concentration measured during the sampling was 0.51 ug/m³ which well below the ATSDR's MRL.

All detected samples were well below the SGC of 1900 ug/m³ and the MRL of 188.7 ug/m³ and therefore it is not expected that exposure would cause adverse health



effects. Additionally, the resident VOC samples showed no detected concentrations of Carbon Tetrachloride.

D. Hexachlorobutadiene was detected in one out of 12 24-hour samples, and that detected concentration was above its AGC. However, as noted above, since the sample obtained was a 24-hour sample, it is not comparable to the long-term AGC benchmark value. Hexachlorobutadiene is an industrial chemical. According to ATSDR, the background ambient air concentration ranges from 0.02 to 0.12 ug/m³ (ATSDR Toxicological Profile for Hexachlorobutadiene, 1994). The measured concentration of hexachlorobutadiene exceeds the maximum background concentration by approximately 4 fold. Hexachlorobutadiene does not have a SGC. The detected concentration of Hexachlorobutadiene would not be expected to cause health effects.

The results of the resident VOC samples showed no detected concentrations of Hexachlorobutadiene.

Since these chemicals are often present at low levels in ambient air, TRC will collect background samples during the next phase of sampling to determine the impact of local conditions on ambient air and to determine whether alternative sources are present.

Very Truly Yours,

TRC Environmental Corporation



Karen M. Vetrano, Ph.D
Manager, Risk Assessment and Toxicology



Orangetown Air Quality Sampling Program - Resident Sampling
 TO-15 (VOC) Results - Detected Compounds Only

Lab ID	Sample Location	Sample Date	Sample Time	VOCs	Acetone	Acrolein	Benzene	2-Butanone (MEX)	Chloroform	Chloroethane	Dichlorodifluoromethane (Freon 12)	Ethanol	Ethyl Acetate	Heptane	Hexane	2-Hexanone (MBK)	Isopropyl Alcohol	Methyl tert-Butyl Ether (MTBE)	Methylene Chloride	4-Methyl-2-pentanone (MIBK)	Naphthalene	Propene	Toluene	Trichlorofluoromethane (Freon 11)	
171023-01	End of Murphy Ct.	15-Sep-17	10:03 - 11:59	ppbv	27	8	1.2	<2.8	<1.2	<0.13	<0.41	4	<2.8	<2.8	<1.2	<0.13	<0.41	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
171024-01	65 Hays Ct.	15-Sep-17	09:15 - 11:10	ppbv	23	19	9.8	<2.8	<1.2	<0.13	<0.41	4	<2.8	<2.8	<1.2	<0.13	<0.41	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
171025-01	8 Murphy Ct.	17-Sep-17	18:53 - 20:48	ppbv	59	13	1.5	5.4	5.4	0.43	0.14	12	2.4	2.4	1.2	0.81	0.81	<0.36	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
171025-02	8 Murphy Ct.	18-Sep-17	19:45 - 21:36	ppbv	31	23	1.5	6	6	0.92	0.11	14	3.3	3.3	1.2	0.81	0.81	<0.36	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
1711164-01	Library Rail Trail Near Blauvelt	18-Sep-17	19:26 - 20:26	ppbv	97	36	9.7	36	36	0.98	0.41	28	9.7	9.7	1.2	0.81	0.81	<0.36	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
171025-03	8 Murphy Ct.	25-Sep-17	19:07 - 21:02	ppbv	15	22	1.5	3.4	3.4	0.57	0.17	11	2.2	2.2	1.2	0.81	0.81	<0.36	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
171025-04	10 Murphy Ct.	26-Sep-17	19:19 - 21:19	ppbv	22	13	7.1	5.2	5.2	0.94	0.19	13	7.1	7.1	1.2	0.81	0.81	<0.36	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
171532-01	31 Arthur St., Blauvelt	23-Oct-17	16:30 - 18:35	ppbv	12	4	1.7	1.7	1.7	0.69	0.27	7.3	1.7	1.7	1.2	0.81	0.81	<0.36	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71
171532-02	44 S. Molson Blauvelt	23-Oct-17	16:35 - 18:36	ppbv	14	2.3	4.2	2.1	2.1	0.51	0.14	14	2.3	2.3	1.2	0.81	0.81	<0.36	<0.71	<0.15	<0.71	<0.15	<0.71	<0.15	<0.71