

Memorandum

To: Town of Erie
From: Sabrina Williams
Delivery Method: Via Email
Subject: Baseline Air Quality Sample Results Adjacent to Waste Connections Well Site

Date: May 1, 2017
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Pinyon Project #: 11769502

Introduction

The Town of Erie (Town) has contracted with Pinyon Environmental (Pinyon) to perform air quality monitoring near the Crestone Peak Resources (Crestone) Waste Connections well site. Pinyon collected two 24-hour baseline air samples at the residential sampling location (Sampling Site 2) located to the west of Vista Parkway on April 15th 2017 and April 21st 2017. A health screening evaluation from these samples was conducted to identify baseline exposures for citizens in the area. Crestone began deploying vehicles and equipment to the Waste Connections well site at approximately 7:00 AM on April 15, 2017. However, drilling operations had not commenced during either sample collection period. The details of the evaluation are provided below.

A summary of the data follows:

- The air samples detected 8 of 67 substances analyzed.
- All substances detected were well below levels at which health symptoms are expected to occur.
- Based on the sampling data, there is a very low potential for short or long term health effects due to these exposures.
- These conclusions are based on two samples collected for a short period of time. The samples may not have captured all the substances or amounts of substances in the air during times when residents are experiencing exposures.

Methods

24-hour Summa Canister Air Samples

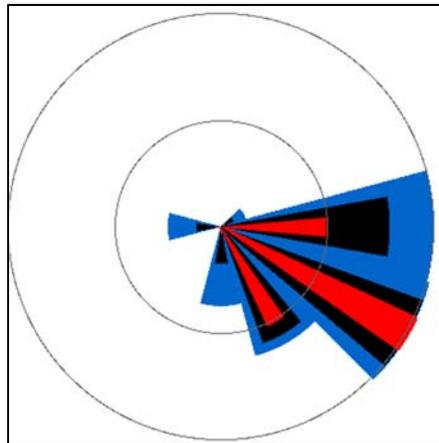
Pinyon utilized 6-liter Summa Canisters to collect the air quality samples. A Summa canister is a spherical stainless steel container that has had the internal surfaces specially passivated using a “Summa” process. The canister is prepared for sampling by evacuating the contents to a vacuum of approximately 29.9 inches of mercury (in Hg). Opening the stainless-steel bellows valve allows the air sample to enter the canister. A 24-hour flow controller was utilized to restrict the flow and allow for collection at the desired flow rate. After a 24-hour sample collection period, the valves were closed and Pinyon returned the canisters to the laboratory for analysis. Summa Canister analysis was conducted by ESC Lab Sciences in accordance with EPA method TO-15 (TO-15). TO-15 is appropriate for use when a subset of 67 Volatile Organic Compounds (VOCs) constitute the target list. Typical situations involve ambient air testing associated with the potential exposures from emission sources, including oil and gas operations. In this case sampling and analysis of VOCs was performed to determine the potential exposures of dispersing source emissions in the surrounding area.

- Baseline Air Quality Sample 1
 - Start Date: April 15th 2017 at 2:00 PM
 - End Date: April 16th 2017 at 2:00 PM
 - Initial Canister Pressure: -26.0 in HG
 - Final Canister Pressure: -1.5 in Hg
- Baseline Air Quality Sample 2
 - Start Date: April 22nd 2017 at 3:45 PM
 - End date: April 23rd 2017 at 3:45 PM
 - Initial Canister Pressure: -24.1 in HG
 - Final Canister Pressure: 0.0 in Hg

Meteorology

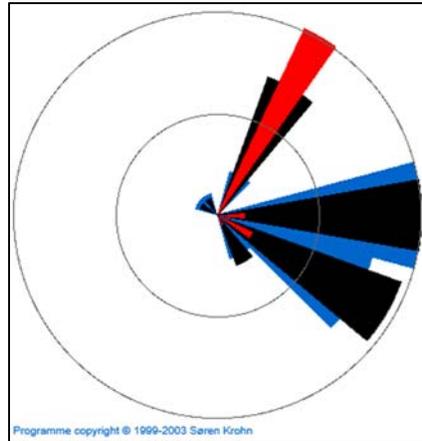
Meteorological data is collected by the National Weather Service (NWS) from the Erie Municipal Airport in 20-minute intervals. The NWS data coinciding with the sampling periods was evaluated to determine prevailing wind speed and wind direction during collection. Using the NWS data, a wind rose plot for each sampling period was generated by Pinyon as shown in Figures 1 and 2. A wind rose plot is a graphical display of the frequency of wind direction and intensity of wind speed and can be used to determine whether the sample was collected downwind of the well site and how wind conditions during the sample collection period may affect sample results.

Figure 1 Wind Rose for 2:00pm April 15th through 2:00pm April 16th



Weather conditions observed during the April 15th-16th 2017 sample collection period were sometimes breezy with wind speeds varying from 0-12mph. The prevailing wind directions were easterly and south southeasterly. During these periods the sampling location was not downwind of the well site. However, winds were calm for the majority (54.5%) of the sampling period. Calm winds are ideal for the collection of ambient air samples as under this condition substances will not rapidly disperse from the sampling location. Therefore, the sample collected on April 15th-16th 2017 is likely to be representative of ambient conditions.

Figure 2 Wind Rose for 2:45pm April 22nd through 2:45pm April 23rd



Weather conditions observed during the April 22nd – April 23rd 2017 sampling period were often windy with speeds ranging from 0-20mph and gusts as high as 29mph. The prevailing wind directions were easterly and east-southeasterly. During this period the sampling location was not downwind of the well site. Calm winds were periodically observed overnight for a total 18.1% of the sampling period. Wind speeds of this intensity can cause substances to rapidly disperse from the sampling location and may underestimate ambient concentrations under other meteorological conditions.

Screening Level Health Evaluation

A screening level health evaluation was performed by comparing the detectable substances in the air sample with short-term and long-term health limit levels established by federal and state agencies for each detected substance. The health limit levels represent the concentrations at or below which no appreciable health effects are likely to occur to individuals (including sensitive individuals) for a certain exposure period. Concentrations at or below this level can be considered a “safe” level of exposure. The collected samples represent a “snapshot” of the air concentrations in the area during the time of collection and may not be representative of the potential exposures over a longer period of time. Because the samples were collected prior to Crestone beginning operations at the Waste Connections Well Site, these samples represent baseline exposures to residents without influence of oil and gas operations. A generally accepted method for conducting this type of health evaluation is to conduct a two-step screening process:

1. Compare the results of the short-term sample with long-term health screening levels.
 - If the substance result is below the long-term health screening level, it is very unlikely that short-term exposure will result in short or long-term negative health consequences.
 - If the sample result is above the long-term health screening level, then move on the step two.
2. Compare the results of the short-term sample (substance identified in step one) with short-term health screening levels.
 - If the sample result is below the short-term health screening level, it is unlikely that short-term exposure to this substance will result in negative health consequences.

Results

A total of 8 of the 67 substances analyzed were detected in the two samples. Ethanol was not evaluated in the health assessment since it is of very low health risk and therefore, does not have a health screening level. The concentrations of all detected substances were below short and long-term health screening levels (Table 1).

Table I Comparison of sample concentrations to short and long-term health screening levels.

Substance	Concentration (ppb)		Short-Term Health Screening Level (ppb)	Long-Term Health Screening Level (ppb)
	04/15-04/16	04/22-04/23		
Acetone	6.01	1.44	26,000 ^A	13,000 ^A
Chloromethane	0.589	0.490	200 ^A	50 ^A
Ethanol	4.9	1.04	NA	NA
Trichlorofluoromethane	0.72	0.227	10,000 ^T	1,000 ^T
Dichlorofluoromethane	0.387	0.283	10,000 ^T	1,000 ^T
n-Hexane	1.24	ND	1,800 ^I	198 ^I
Tetrachloroethylene	0.406	ND	1,000 ^T	10 ^T
Toluene	1.55	ND	2,000 ^I	1,327 ^I

I IRIS (Environmental Protection Agency Integrated Risk Information System)

A ATDSR MRL (US Agency for Toxic Substances and Disease Registry Minimal Risk Level)

T TCEQ AMCV (Texas Commission on Environmental Quality Air Monitoring Comparison Value)

NA no health value available

ND substance not detected

Limitations

The following limitations must be considered before definitive conclusions can be made:

- Samples collected for a short amount of time may not accurately represent continuous exposure or the ranges of potential exposures.
- These samples reflect exposures in that area for a period of time and are not intended to identify the source of exposures. The substances identified in the sample could come from multiple different sources.
- Samples collected during other phases of operations and difference weather conditions may have very different results.
- The samples were only analyzed for a limited set of substances that could be present in the air.

Summary

Based on the results from the baseline air sampling data, it is unlikely that short-term or long-term baseline exposures have resulted in negative health effects. Pinyon will continue to perform air sampling at Sampling Site 2 and will compare future sampling events to established health screening levels and evaluate trends in ambient concentrations throughout all phases of Crestone's operations at this location.