

November 2, 2017

Air Monitoring Adjacent to the Pratt Well Site and Completions Pad

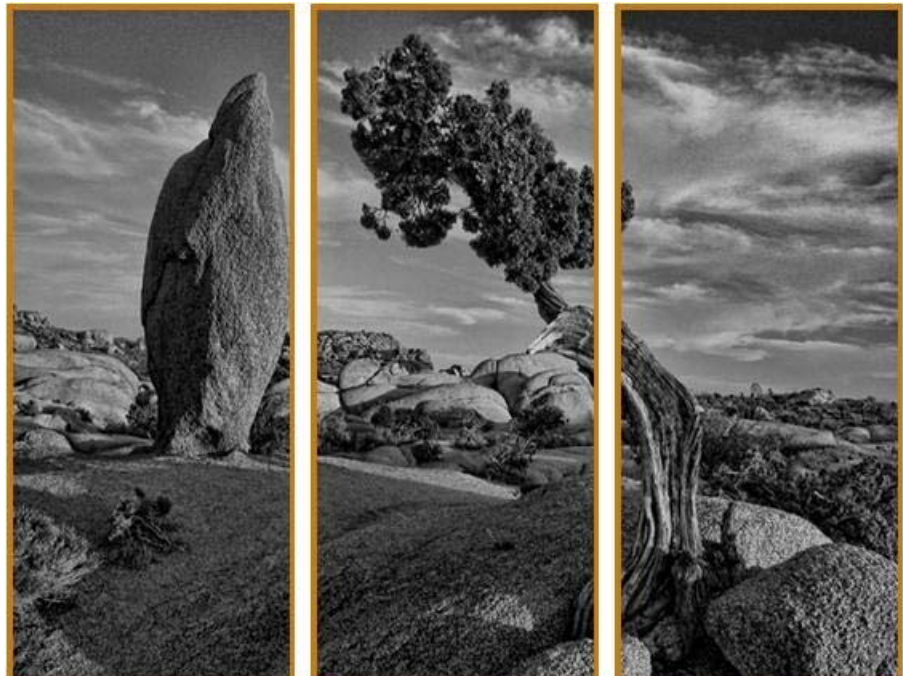
Air Monitoring of Crestone Peak Resources Operations Erie, Colorado

Prepared For:

Town of Erie
645 Holbrook Street
Erie, Colorado 80516

Pinyon Project No.:

1/17-695-02.1200



November 2, 2017

Air Monitoring Adjacent to the Pratt Well Site and Completions Pad

Air Monitoring of Crestone Peak Resources Operations Erie, Colorado

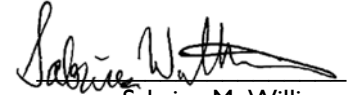
Prepared For:

Town of Erie
645 Holbrook Street
Erie, Colorado 80516

Pinyon Project No.:

1/17-695-02.1200

Prepared by:


Sabrina M. Williams
Air Quality Specialist

Reviewed by:



Brian Partington
Principal

Table of Contents

1.	Introduction.....	1
1.1	Pratt Well Site Sampling Locations	1
1.2	Completions Pad Site Information	3
2.	Methodology.....	5
2.1	24-hour Summa Canister Air Samples	5
2.2	Meteorology.....	5
2.3	Screening Level Health Evaluation.....	5
2.4	Trends in Detected Substances	6
3.	Meteorology	7
4.	Air Sampling Results	9
4.1	Pratt Well Site Air Sampling	9
4.2	Completions Pad Air Sampling.....	11
5.	Trends in Detected Substances	16
5.1	Pratt Site 1	16
5.2	Pratt Site 2.....	17
5.3	Waste Connections Site 2.....	17
5.4	Completions Pad Site 1	18
5.5	Completions Pad Site 2.....	19
6.	Conclusions	20

Figures

Tables

Table 3-1	Meteorological Data as Measured from the Erie Municipal Airport.....	8
Table 4-1	Air Sampling Results September 5, 2017 at the Pratt Well Site	10
Table 4-2	Air Sampling Results September 9, 2017 through September 24, 2017 at Pratt Site 2	12
Table 4-3	Air Sampling Results September 9, 2017 to September 29, 2017 at Completions Pad Site 1	13
Table 4-4	Air Sampling Results September 5, 2017 through September 29, 2017 at Waste Connections Site 2.....	14
Table 4-5	Air Sample Results September 29, 2017 at Completions Pad Site 1	15
Table 5-1	R-value and p-value of Detected Substances at Pratt Site 1	16
Table 5-2	R-value and p-value of Detected Substances at Pratt Site 2	17

Table of Contents (continued)

Table 5-3 R-value and p-value of Detected Substances at Waste Connections Site 2	18
Table 5-4 R-value and p-value of Detected Substances at Completions Pad Site 1	19

I. Introduction

The Town of Erie (Town) has contracted with Pinyon Environmental, Inc., (Pinyon), to perform air quality monitoring near the Crestone Peak Resources (Crestone) Pratt well site, hereafter referred to as the Pratt well site, as well as the Common Completions Pad for the Pratt and Waste Connections well sites, hereafter referred to as the Completions Pad. Pinyon captured 24-hour air samples every five days at five sampling locations from September 5, 2017 to September 29, 2017.

A health screening evaluation of compounds detected in the samples collected from September 5, 2017 through September 29, 2017, was conducted to identify exposure for citizens in the area. A statistical analysis of trends in concentrations detected was also completed.

A summary of the data follows:

- On September 5, 2017, 10 of the 67 target substances analyzed were detected at Pratt Site 1.
- From September 5, 2017, through September 24, 2017, 13 of the 67 target substances analyzed were detected at Pratt Site 2.
- From September 5, 2017, through September 29, 2017, 16 of the 67 target substances analyzed were detected at Waste Connections Site 2.
- From September 9, 2017, to September 29, 2017, 21 of the 67 target substances analyzed were detected at Completions Site 1.
- On September 29, 2017, 13 of the 67 target substances analyzed were detected at Completions Site 2.
- Based on the sampling data, there is a low potential for short- or long-term health effects due to exposure to these substances.

These conclusions are based on six samples collected at the five sampling sites. Samples were 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. These conclusions are therefore based on limited sampling, conducted during a limited investigation. Concentrations of constituents can be highly variable, and detections may be dependent on a variety of environmental conditions (e.g., date, operations, wind bearings, actual emissions from operations). This sampling may, therefore, not be representative of, or account for, all variables that could be present during all phases of oil and gas operations within the Town.

I.1 Pratt Well Site Sampling Locations

Pinyon collected air samples from three locations adjacent to the Pratt well site (Figure I-1). Pratt Site 1 is located 500 feet to the south of the Pratt well site. This location was selected by the Town to evaluate maximum concentrations adjacent to the well site. Pratt Site 2 is located 830 feet to the southeast of the Pratt well site in a residential neighborhood. Waste Connections Site 2 is located 5,100 feet to the southwest of the Pratt well site in a residential neighborhood. Pratt Site 2 and Waste Connections Site 2 were selected by the Town to evaluate potential exposures to residents located closest to the well site. Crestone began drilling operations at the Pratt well site on July 21, 2017. Prior to the start of drilling, Pinyon also collected two baseline samples on July 18, 2017, and July 20, 2017, that are used to assess how ambient air levels may change during Crestone's activities during this reporting period.

Figure I-1 Pratt Well Site Air Sampling Locations



Document Path: Z:\PROJECTS\2017\11769502_Erie Air and Noise Monitoring\Figures\ArcMap\MXDs\Erie_Pratt Air Monitoring Locations w WC.mxd

1.2 Completions Pad Site Information

Upon conclusion of drilling activities at the Pratt well site, Crestone began well completion activities for the Waste Connections and Pratt well sites at the Common Completions Pad (Completions Pad). Pinyon captured 24-hour air samples every five days at four sampling locations from September 9, 2017 through September 29, 2017 (Figure 1-2). Completions Site 1 is located approximately 350 feet to the south/southeast of the Completions Pad and was selected by the Town to evaluate maximum concentrations adjacent to the well site. Pratt Site 2 is located near a residential neighborhood approximately 3,600 feet to the southeast of the Completions Pad. Waste Connections Site 2 is located near a residential neighborhood approximately 3,475 feet to the southwest of the Completions Pad. Pratt Site 2 and Waste Connections Site 2 were selected by the Town to evaluate potential exposures to residents located adjacent to the Completions Pad. Completions Site 2 is located near a residential neighborhood approximately 2,430 feet to the south southeast of the Completions Pad and was selected by the Town to evaluate potential exposures to residents located closest to the Completions Pad and replaced air sampling at Pratt Site 2 on September 29, 2017.

Figure I-2 Completions Pad Air Sampling Locations



2. Methodology

2.1 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 over a period of 24 hours. 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 and Origins Laboratory, Inc., in accordance with EPA method TO-15 (EPA, 1999). EPA method TO-15 (TO-15) is appropriate for use when sampling a subset of 67 Volatile Organic Compounds (VOCs) which constitute the target analyte 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 evaluate the potential exposure of dispersing source emissions in the surrounding area. Pinyon collected one 24-hour sample every five days.

2.2 Meteorology

Meteorological data is collected by the National Weather Service (NWS) at the Erie Municipal Airport in 20-minute intervals. The NWS data coinciding with the sampling periods were used to evaluate prevailing wind speed and wind direction during collection. Using the NWS data, a wind rose plot for each sampling location, corresponding to the specific sampling period, was generated by Pinyon. A wind rose plot is a graphical display of the frequency of wind direction and intensity of wind speed, and can be used to identify whether the sample was collected downwind of the well site, and how wind conditions during the sample collection period may affect sample results. A wind rose plots demonstrates the fraction of the observation period where wind speeds are greater than zero and does not illustrate to what extent calm winds are observed during the sampling period. Wind rose plots were used to evaluate the frequency at which the sampling sites were downwind of the well site and to assess whether periods of high winds were observed. Calm winds and low wind speeds are ideal for the collection of ambient air samples, as under these conditions substances will not rapidly disperse from the sampling location. During periods of recorded high wind speeds or periods when the sampling location is not downwind of the well, the sample may underestimate ambient concentrations.

2.3 Screening Level Health Evaluation

A screening level health evaluation was performed by comparing the concentrations of 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 sampling completed for this investigation represents 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. A generally accepted method for conducting this type of health evaluation is to conduct a two-step screening process:

- I. Compare the results of the short-term sample with long-term health screening levels.
 - a) 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. A short-term exposure is considered exposure of 24 hours a day, for up to one year, to that pollutant.

- b) If the sample result is above the long-term health screening level, then move on to step two. A long-term exposure is considered a minimum of one year of exposure.
2. Compare the results of the short-term sample (substance identified in step one) with short-term health screening levels.
 - a) 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.

Pinyon utilized health screening levels established by the following agencies in the evaluation:

- Environmental Protection Administration Integrated Risk Information System (IRIS)
- ATSDR MRL (US Agency for Toxic Substances and Disease Registry Minimal Risk Level)
- TCEQ AMCV (Texas Commission on Environmental Quality Air Monitoring Comparison Values)

2.4 Trends in Detected Substances

If a substance was detected above the reporting detection limit (RDL) in one or more samples, Pinyon performed statistical analysis of the data to evaluate trends in concentrations over time. If the substance was not detected by the lab on a specific sampling date, for the statistical analysis Pinyon used a concentration of one-half of the RDL in the graphical display. This approach is supported by the Environmental Protection Agency (EPA) for risk assessments and recognizes that values between the RDL and zero could be present, and that the average value could be as high as half of the RDL (EPA, 1991). Pinyon calculated the Pearson correlation coefficient (R-value) for each detected substance and then determined the p-value to assess whether the trend was statistically significant. The R-value is a statistical variable that is commonly utilized to assess trends in concentrations over time (Davis, 2002). The R-value ranges from -1.0 to 1.0 with an R-value of 1.0 representing a linear increase in measured concentration levels over time and -1.0 representing a linear decrease in measured concentration levels over the reporting period. The closer the R-value is to zero, the less linear the trend in concentration levels over the reporting period. To assess the level of confidence in the calculated R-value, a p-value is calculated. The p-value is based on the magnitude of the R-value and the total number of samples (n) collected in the reporting period. A p-value of less than or equal to 0.05 means that there is a 95% confidence level that the trend is statistically significant.

3. Meteorology

Pinyon utilized the meteorological data as measured in 20-minute intervals from the Erie Municipal Airport to assess the prevailing wind direction and the percent of time the sampling sites were downwind of the well site and the percent of time calm winds were recorded during the sample collection periods. This data is summarized in Table 3-1 below, and the wind rose corresponding to the sample collection periods is shown in Figure 3-1. Except for the sampling that occurred at Completions Pad Site 1 on September 19, 2017, the sampling locations were not downwind of Crestone’s operations for prolonged periods of time. Although the sampling sites were not downwind of the well site for prolonged periods when wind speeds were recorded, calm winds were recorded for a significant portion of the sampling period. The significant presence of calm winds indicates that during sample collection periods, the meteorological conditions were likely to be adequate in representing ambient conditions at the sampling locations.

Figure 3-1 Wind Rose for the September 5, 2017 through September 29, 2017 Sample Collection Periods

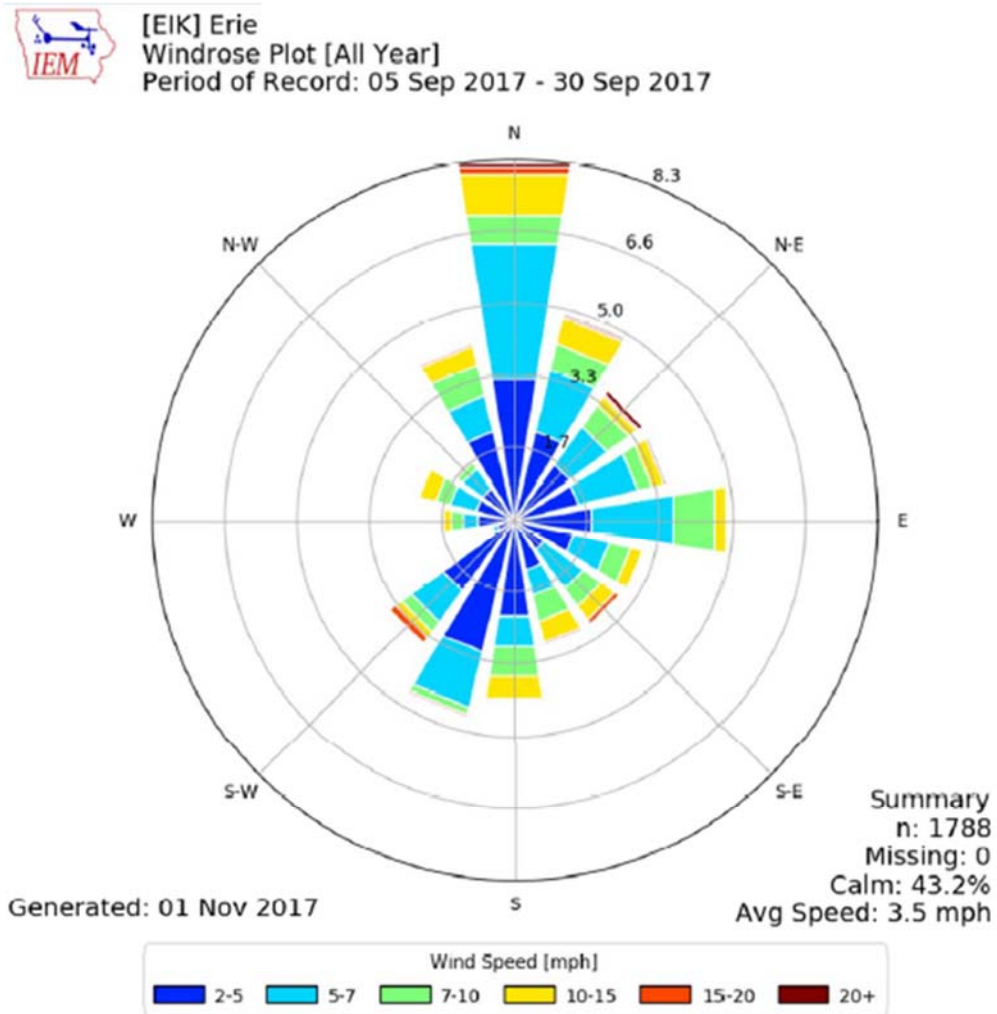


Table 3-1 Meteorological Data as Measured from the Erie Municipal Airport

Sample Start Date	Prevailing Wind Direction	Pratt Site 1 Downwind (%) ¹	Pratt Site 2 Downwind (%) ²	Completions Pad 1 Downwind (%) ³	Completions Pad 2 Downwind (%) ⁴	Waste Connections 2 Downwind (%)	Calm (%)
9/05/2017	East northeast, East	1.39	0.00	NA	NA	1.39	63.89
9/09/2017	South southwest, Southwest	NA	4.17	0.00	NA	5.56	45.83
9/14/2017	South, Southwest	NA	1.39	2.78	NA	11.11	34.72
9/19/2017	South southeast	NA	13.89	23.61	NA	1.39	22.22
9/24/2017	North, East northeast	NA	0.00	0.00	NA	0.00	20.83
9/29/2017	North	NA	NA	1.39	1.39	1.39	56.94

1 Pratt Site 1 sampling was discontinued on September 6, 2017

2 Pratt Site 2 sampling was discontinued on September 25, 2017

3 Completions Pad 1 sampling began on September 9, 2017

4 Completions Pad 2 sampling began on September 29, 2017

4. Air Sampling Results

4.1 Pratt Well Site Air Sampling

Ten of the 67 compounds analyzed by the lab were detected in the September 5, 2017 air sample collected by Pinyon at the three Pratt well site sampling locations (Table 4-1). The concentrations of all detected substances were below short and long-term health screening levels (Tables 4-1).

Table 4-1 Air Sampling Results September 5, 2017 at the Pratt Well Site

Analyte	Sample Concentration (ppb)			Health Screening Level (ppb)	
	Waste Connections Site 2	Pratt Site 1	Pratt Site 2	Short Term	Long Term
Acetone	5.42	2.97	5.87	26,000 ^A	13,000 ^A
Benzene	0.261	3.07	0.265	9,000 ^I	9 ^I
Chloromethane	0.558	0.551	0.536	200 ^A	50 ^A
Cyclohexane	< 0.200	0.244	<0.200	1,000 ^I	1,743 ^I
Ethanol	7.26	9.65	9.52	NA	NA
Trichlorofluoromethane	0.268	0.268	0.276	10,000 ^T	1,000 ^T
Dichlorodifluoromethane	0.345	0.374	0.334	10,000 ^T	1,000 ^T
Heptane	0.215	0.347	0.223	850 ^I	85 ^I
n-Hexane	0.561	0.745	0.53	1,800 ^I	198 ^I
Toluene	0.433	0.496	0.433	2,000 ^A	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

ppb parts per billion

4.2 Completions Pad Air Sampling

Eleven of the 67 compounds analyzed by the lab were detected in the four air samples collected by Pinyon at Pratt Site 2 (Table 4-2). Twenty-one of the 67 compounds analyzed by the lab were detected in the five air samples collected by Pinyon at Completions Pad Site 1 (Table 4-3). Sixteen of the 67 substances analyzed by the lab were detected in the six air samples collected by Pinyon at Waste Connections Site 2 (Table 4-4). Twelve of the 67 compounds analyzed by the lab were detected in the September 29, 2017 air sample collected by Pinyon at Completions Pad Site 2 (Table 4-5). The concentrations of all detected substances were below short and long-term health screening levels (Tables 4-2, 4-3, 4-4 and 4-5).

Table 4-2 Air Sampling Results September 9, 2017 through September 24, 2017 at Pratt Site 2

Analyte	Sample Concentration (ppb)				Health Screening Level (ppb)	
	9/09/2017	9/14/2017	9/19/2017	9/24/2017	Short Term	Long Term
Acetone	7.7	3.93	3.07	2.09	26,000 ^A	13,000 ^A
Benzene	0.207	<0.200	<0.200	<0.200	9,000 ^I	9 ^I
Chloromethane	0.666	0.634	0.427	0.425	200 ^A	50 ^A
Cyclohexane	0.628	0.200	<0.200	<0.200	1,000 ^I	1,743 ^I
Ethanol	12.6	6.60	4.24	1.92	NA	NA
Trichlorofluoromethane	0.293	0.247	0.240	0.238	10,000 ^T	1,000 ^T
Dichlorodifluoromethane	0.347	0.446	0.348	0.257	10,000 ^T	1,000 ^T
Heptane	0.314	<0.200	<0.200	<0.200	850 ^I	85 ^I
n-Hexane	0.918	0.530	<0.200	0.225	1,800 ^I	198 ^I
2-Propanol	<1.25	<1.25	3.64	<1.25	NA	NA
Toluene	0.604	0.550	0.229	<0.200	2,000 ^A	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

ppb parts per billion

Table 4-3 Air Sampling Results September 9, 2017 to September 29, 2017 at Completions Pad Site I

Analyte	Sample Concentration (ppb)					Health Screening Level (ppb)	
	9/09/2017	9/14/2017	9/19/2017	9/24/2017	9/29/2017	Short Term	Long Term
Acetone	6.18	3.31	2.46	2.07	6.77	26,000 ^A	13,000 ^A
Benzene	0.337	<0.200	<0.200	<0.200	0.266	9,000 ^I	9 ^I
Chloromethane	0.628	0.585	0.47	0.449	0.471	200 ^A	50 ^A
Cyclohexane	0.444	0.217	<0.200	<0.200	0.428	1,000 ^I	1,743 ^I
Ethanol	8.34	5.39	2.7	1.67	32.5	NA	NA
Ethylbenzene	<0.200	<0.200	<0.200	<0.200	0.344	33,000 ^I	2301 ^I
Trichlorofluoromethane	0.307	0.28	0.22	0.212	0.241	10,000 ^T	1,000 ^T
Dichlorodifluoromethane	0.39	0.402	0.39	0.267	0.318	10,000 ^T	1,000 ^T
Heptane	0.609	0.421	<0.200	<0.200	0.245	850 ^I	85 ^I
n-Hexane	1.33	0.478	<0.200	0.205	0.684	1,800 ^I	198 ^I
Methylene Chloride	<0.200	<0.200	<0.200	<0.200	0.661	600 ^A	100 ^T
2-Butanone (MEK)	<1.25	<1.25	<1.25	<1.25	2.69	200,000 ^A	200,000 ^A
2-Propanol	<1.25	<1.25	<1.25	<1.25	5.7	NA	NA
Styrene	<0.200	<0.200	<0.200	<0.200	0.239	5,000 ^A	200 ^A
Tetrachloroethylene	<0.200	0.265	<0.200	<0.200	1.17	1,000 ^T	10 ^T
Tetrahydrofuran	<0.200	<0.200	<0.200	<0.200	3.11	680 ^I	680 ^I
Toluene	0.705	0.491	<0.200	<0.200	3.39	2,000 ^A	1,327 ^I
1,1,1-Trichloroethane	<0.200	<0.200	<0.200	<0.200	0.203	250 ^T	25 ^T
Trichloroethylene	<0.200	<0.200	<0.200	<0.200	0.355	250 ^T	25 ^T
m&p-Xylene	0.4	<0.400	<0.400	<0.400	1.05	2,000 ^A	23 ^I
o-Xylene	<0.200	<0.200	<0.200	<0.200	0.336	2,000 ^A	23 ^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

ppb parts per billion

Table 4-4 Air Sampling Results September 5, 2017 through September 29, 2017 at Waste Connections Site 2

Analyte	Sample Concentration (ppb)						Health Screening Level (ppb)	
	9/5/2017	9/9/2017	9/14/2017	9/19/2017	9/24/2017	9/29/2017	Short Term	Long Term
Acetone	5.42	6.22	10.3	1.92	1.8	<6.25	26,000 ^A	13,000 ^A
Benzene	0.261	0.359	<0.200	<0.200	<0.200	<1.00	9,000 ^I	9 ^I
Chloromethane	0.558	0.651	0.753	0.307	0.409	<1.00	200 ^A	50 ^A
Cyclohexane	< 0.200	0.442	<0.200	<0.200	<0.200	<1.00	1,000 ^I	1,743 ^I
Ethanol	7.26	9.53	6.48	2.58	1.67	4.41	NA	NA
Trichlorofluoromethane	0.268	0.29	<0.200	<0.200	0.206	<1.00	10,000 ^T	1,000 ^T
Dichlorodifluoromethane	0.345	0.39	0.451	0.286	0.320	<1.00	10,000 ^T	1,000 ^T
Heptane	0.215	0.618	0.232	<0.200	<0.200	<1.00	850 ^I	85 ^I
n-Hexane	0.561	1.27	0.421	<0.200	0.217	<1.00	1,800 ^I	198 ^I
2-Butanone (MEK)	<1.25	<1.25	4.19	<1.25	<1.25	<6.25	200,000 ^A	200,000 ^A
Methyl methacrylate	<0.200	<0.200	0.305	<0.200	<0.200	<1.00	171 ^I	100 ^I
2-Propanol	<1.25	<1.25	1.56	<1.25	<1.25	<6.25	NA	NA
Tetrahydrofuran	<0.200	<0.200	0.986	<0.200	<0.200	<1.00	680 ^I	680 ^I
Toluene	0.433	0.829	0.459	<0.200	<0.200	<1.00	2,000 ^A	1,327 ^I
2,2,4-Trimethylbenzene	<0.200	<0.200	0.780	<0.200	<0.200	<1.00	75 ^T	750 ^T
m&p-Xylene	<0.400	0.287	<0.400	<0.400	<0.400	<2.00	2,000 ^A	23 ^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

ppb parts per billion

Table 4-5 Air Sample Results September 29, 2017 at Completions Pad Site I

Analyte	Sample Concentration (ppb)	Health Screening Level (ppb)	
	9/29/2017	Short Term	Long Term
Acetone	8.83	26,000 ^A	13,000 ^A
Benzene	<0.200	9,000 ^I	9 ^I
Chloromethane	0.425	200 ^A	50 ^A
Cyclohexane	<0.200	1,000 ^I	1,743 ^I
Ethanol	5.00	NA	NA
Trichlorofluoromethane	0.239	10,000 ^T	1,000 ^T
Dichlorodifluoromethane	0.387	10,000 ^T	1,000 ^T
Heptane	<0.200	850 ^I	85 ^I
n-Hexane	0.487	1,800 ^I	198 ^I
2-Butanone (MEK)	8.48	200,000 ^A	200,000 ^A
Tetrahydrofuran	6.84	680 ^I	680 ^I
Toluene	0.364	2,000 ^A	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

ppb parts per billion

5. Trends in Detected Substances

5.1 Pratt Site I

Pinyon calculated the R-value and p-value for all substances detected from July 18, 2017, through September 5, 2017 at Pratt Site I (Table 5-1). The p-value was greater than 0.05 for all substances, which indicates that any trends are not statistically significant during this reporting period except for acetone and chloromethane. The calculated R-value for acetone is -0.76 and the p-value is 0.007. The calculated R-value for chloromethane is -0.74 and the p-value is 0.01. This implies that measured concentrations of acetone and chloromethane have decreased over time since sampling began at this location. The sampling period at Pratt Site I constituted a relatively small sample size (n=11), and it is possible that if additional sampling events at this location had occurred, it could have resulted in additional confirmed statistically significant trends in detected substances over time.

Table 5-1 R-value and p-value of Detected Substances at Pratt Site I

Substance	R-value	p-value
Acetone	-0.76	0.007
Benzene	-0.50	0.12
Carbon disulfide	-0.28	0.40
Chloroethane	0.00	1.00
Chloromethane	-0.74	0.01
Cyclohexane	-0.18	0.62
1,4-Dichlorobenzene	-0.31	0.35
cis-1,2,-dichloroethane	-0.22	0.46
Ethanol	-0.26	0.44
Ethylbenzene	-0.54	0.09
4-Ethyltoluene	-0.10	0.77
Trichlorofluoromethane	-0.13	0.72
Dichlorodifluoromethane	0.01	0.98
Heptane	-0.20	0.56
n-Hexane	0.00	1.00
Methylene Chloride	-0.19	0.58
2-Butanone (MEK)	-0.33	0.35
2-Propanol	-0.27	0.45
Styrene	-0.32	0.34
Tetrachloroethylene	-0.49	0.13
Tetrahydrofuran	-0.07	0.84
Toluene	-0.40	0.22
Trichloroethene	-0.23	0.50
1,1,2-Trichloroethane	-0.40	0.22
1,2,4-Trimethylbenzene	-0.45	0.16
1,3,5-Trimethylbenzene	-0.10	0.77
Vinyl acetate	-0.34	0.31
m&p-Xylene	-0.28	0.40
o-Xylene	-0.32	0.34

5.2 Pratt Site 2

Pinyon calculated the R-value and p-value for all substances detected from July 18, 2017, through September 24, 2017 at Pratt Site 1 (Table 5-2). The p-value was greater than 0.05 for all substances, which indicates that any trends are not statistically significant during this reporting period except for acetone and chloromethane. The calculated R-value for acetone is -0.55 and the p-value is 0.03. The calculated R-value for chloromethane is -0.64 and the p-value is 0.01. This implies that measured concentrations of acetone and chloromethane have decreased over time since sampling began at this location. The sampling period at Pratt Site 2 constituted a relatively small sample size (n=16), and it is possible that if additional sampling events at this location had occurred, it could have resulted in additional confirmed statistically significant trends in detected substances over time.

Table 5-2 R-value and p-value of Detected Substances at Pratt Site 2

Substance	R-value	p-value
Acetone	-0.55	0.03
Benzene	-0.08	0.77
Chloromethane	-0.64	0.01
Cyclohexane	0.06	0.83
Ethanol	-0.36	0.17
Ethylbenzene	-0.38	0.15
Trichlorofluoromethane	0.34	0.20
Dichlorodifluoromethane	0.35	0.18
Heptane	-0.21	0.44
n-Hexane	-0.14	0.61
Methylene Chloride	-0.43	0.10
Naphthalene	-0.14	0.61
2-Butanone (MEK)	0.40	0.14
2-Propanol	0.09	0.75
Tetrahydrofuran	0.35	0.18
Toluene	-0.47	0.07
Trichloroethene	-0.32	0.23
1,2,4-Trimethylbenzene	-0.20	0.46
2,2,4-Trimethylpentane	-0.08	0.77
m&p-Xylene	-0.46	0.07
o-Xylene	-0.39	0.14

5.3 Waste Connections Site 2

Pinyon calculated the R-value and p-value for all substances detected from April 15, 2017, through September 29, 2017 at Waste Connections Site 2 (Table 5-3). The p-value was greater than 0.05 for all substances detected during this period except for benzene, cyclohexane, dichlorodifluoromethane, heptane and tetrachloroethylene. The calculated R-value for benzene was 0.40 and the p-value was 0.02. The calculated R-value for cyclohexane was 0.38 and the p-value was 0.03. The calculated R-value for dichlorodifluoromethane was 0.35 and the p-value was 0.04. The calculated R-value for heptane was 0.43 and the p-value was 0.01. The calculated R-value for tetrachloroethylene was 0.78 and the p-value was 0.0001. This implies that measured concentrations of benzene, cyclohexane, dichlorodifluoromethane, heptane and tetrachloroethylene have increased over time since sampling began at this location. Although measured levels of these substances are

increasing over time, their detected concentrations have remained below short-term and long-term health screening levels (Section 4). The sampling period at Waste Connections Site 2 represents a fairly robust sample size (n=35) and it is likely that this is adequate for confirming statistically significant trends in detected substances over time at this location.

Table 5-3 R-value and p-value of Detected Substances at Waste Connections Site 2

Substance	R-value	p-value
Acetone	-0.04	0.82
Benzene	0.40	0.02
Carbon disulfide	0.18	0.30
Carbon tetrachloride	0.25	0.15
Chloroethane	0.14	0.42
Chloromethane	0.23	0.18
Cyclohexane	0.38	0.03
cis-1,2,-dichloroethane	0.16	0.36
1,4-Dioxane	0.01	0.95
Ethanol	0.02	0.91
Ethylbenzene	0.21	0.23
4-Ethyltoluene	0.07	0.69
Trichlorofluoromethane	0.30	0.08
Dichlorodifluoromethane	0.35	0.04
Heptane	0.43	0.01
n-Hexane	0.31	0.07
Isopropylbenzene	0.05	0.76
Methylene Chloride	0.22	0.20
2-Butanone (MEK)	0.05	0.76
Naphthalene	0.06	0.73
Methyl methacrylate	0.17	0.33
2-Propanol	0.06	0.73
Propene	0.10	0.57
Styrene	0.14	0.42
Tetrachloroethylene	0.78	0.0001
Tetrahydrofuran	0.02	0.91
Toluene	0.15	0.39
Trichloroethylene	0.06	0.73
1,1,2-Trichloroethane	0.15	0.40
1,2,4-Trimethylbenzene	0.07	0.69
1,3,5-Trimethylbenzene	0.07	0.69
2,2,4-Trimethylpentane	0.22	0.21
m&p-Xylene	0.06	0.73
o-Xylene	0.06	0.73

5.4 Completions Pad Site I

Pinyon calculated the R-value and p-value for all substances detected from September 9, 2017, through September 29, 2017 at Completions Pad Site I (Table 5-3). The p-value was greater than 0.05 for all substances, which indicates that any trends are not statistically significant during this reporting period. This reporting period

constituted a small sample size (n=5), and it is possible that as subsequent samples are collected at Completions Pad Site 1, additional statistically significant trends in detected substances over time could be confirmed.

Table 5-4 R-value and p-value of Detected Substances at Completions Pad Site 1

Substance	R-value	p-value
Acetone	0.00	1.00
Benzene	-0.20	0.75
Chloromethane	0.47	0.42
Cyclohexane	-0.14	0.82
Ethanol	0.55	0.34
Ethylbenzene	0.71	0.18
Trichlorofluoromethane	-0.78	0.12
Dichlorodifluoromethane	-0.75	0.14
Heptane	-0.76	0.14
n-Hexane	-0.51	0.38
Methylene Chloride	0.71	0.18
2-Butanone (MEK)	0.71	0.18
2-Propanol	0.71	0.18
Styrene	0.71	0.18
Tetrachloroethylene	0.67	0.22
Tetrahydrofuran	0.71	0.18
Toluene	0.57	0.32
1,1,1-Trichloroethylene	0.71	0.18
Trichloroethylene	0.71	0.18
m&p-Xylene	0.56	0.33
o-Xylene	0.71	0.18

5.5 Completions Pad Site 2

Only one sample was collected at the Completions Pad Site 2 location during this reporting period. Therefore, it is not possible to evaluate whether measured levels of detected substances are increasing or decreasing over time at this location. Future reporting periods will evaluate whether statistically significant trends can be implied at the Completions Pad Site 2 sampling location.

6. Conclusions

Pinyon collected 24-hour air samples every five days at Pratt Site 1 from July 18, 2017 to September 5, 2017 and 24-hour air samples were collected at Pratt Site 2 from July 18, 2017, to September 24, 2017. Pinyon collected 24-hour air samples at Completions Pad Site 1 from September 9, 2017 to September 29, 2017. In addition to the samples collected at Pratt Site 1 and Pratt Site 2, Pinyon began collecting 24-hour air samples every five days at Waste Connections Site 2 on April 15, 2017. Finally, Pinyon also collected a 24-hour air sample on September 29, 2017 at Completions Pad Site 2. This reporting period presented the results of the air samples collected from September 5, 2017, to September 29, 2017, as well as calculated trends in detected substances from the sampling locations start date through September 29, 2017. The air sample measurements collected reflect well drilling and well completion activities at two unique sites in Erie, Colorado. 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 sources.
- Samples collected during other phases of operations and different weather conditions may have different results.
- The samples were analyzed for a limited set of substances that could be present in the air.

Based on the results from the air sampling data collected adjacent to the Pratt well site, it is unlikely that short-term or long-term exposures would result in negative health effects. There were no exceedances of short-term or long-term health screening levels at any sampling location during this reporting period.

The air monitoring data provided in this report provides a general understanding of ambient concentrations of select pollutants adjacent to the Pratt well site during the drilling phase of Crestone's activities, as well as ambient concentrations adjacent to the Completions Pad during Crestone's well completion activities. Based on meteorology data collected at the Erie Municipal Airport, the air sampling locations are generally representative of ambient conditions.

These conclusions are based on limited sampling, conducted during a limited investigation. Concentrations of constituents can be highly variable, and detections may be dependent on a variety of environmental conditions (e.g., date, operations, wind bearings, actual emissions from operations). This sampling may, therefore, not be representative of, or account for all variables that could be present during oil and gas operations within Erie and should not be considered conclusive of future operations.