

November 3, 2017

**Air Monitoring Adjacent to the Pratt Well Site  
Reporting Period: August 1, 2017, to August 31, 2017**

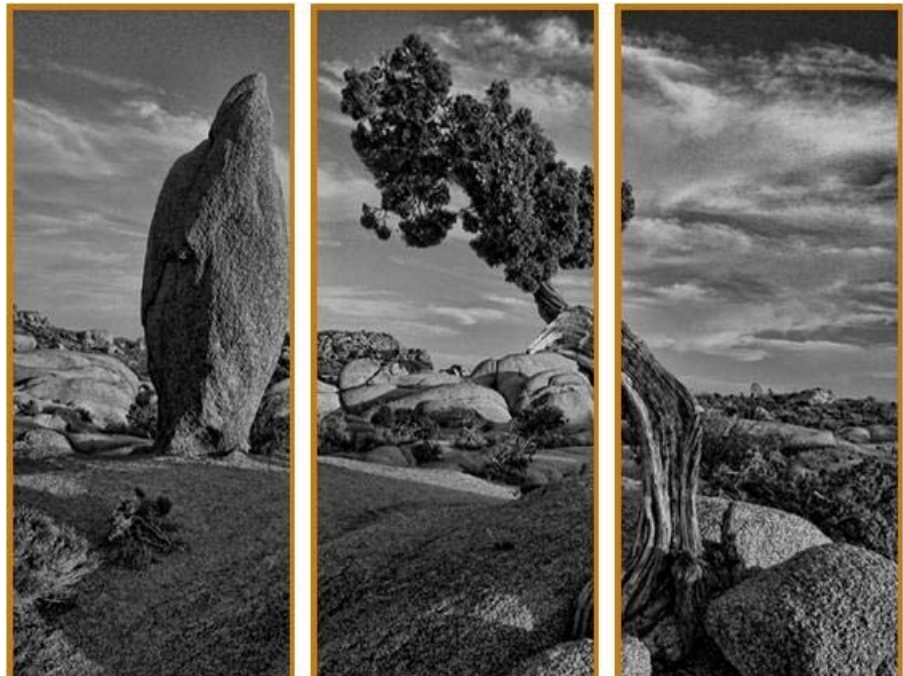
**Air Monitoring of Crestone Peak Resources Operations  
Erie, Colorado**

**Prepared For:**

Town of Erie  
645 Holbrook Street  
Erie, Colorado 80516

**Pinyon Project No.:**

1/17-695-02.1300



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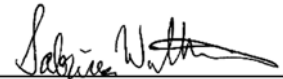
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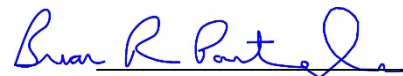
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## Table of Contents

1.	Introduction.....	1
2.	Methodology.....	3
2.1	24-hour Summa Canister Air Samples .....	3
2.2	Meteorology.....	4
2.3	Screening Level Health Evaluation.....	4
2.4	Trends in Detected Substances .....	5
3.	Meteorology .....	6
4.	Air Sampling Results .....	8
5.	Trends in Detected Substances .....	12
5.1	Pratt Site 1.....	12
5.2	Pratt Site 2.....	13
5.3	Waste Connections Site 2.....	13
6.	Conclusions .....	15

## Figures

### Tables

Table 2-1	August 5, 2017, to August 30, 2017 Pratt Site 1 Collection Dates.....	3
Table 2-2	August 5, 2017, to August 30, 2017 Pratt Site 2 Collection Dates.....	3
Table 2-3	August 5, 2017, to August 30, 2017 Waste Connections Site 2 Collections Dates.....	4
Table 3-1	Meteorological Data as Measured from the Erie Municipal Airport.....	6
Table 4-1	Air Sampling Results August 5, 2017, to August 30, 2017 at Pratt Site 1 .....	9
Table 4-2	Air Sampling Results August 5, 2017, to August 30, 2017 at Pratt Site 2.....	10
Table 4-3	Air Sampling Results August 5, 2017 to August 30, 2017 at Waste Connections Site 2.....	11
Table 5-1	R-value and p-value of Detected Substances at Pratt Site 1 .....	12
Table 5-2	R-value and p-value of Detected Substances at Pratt Site 2 .....	13
Table 5-3	R-value and p-value of Detected Substances at Waste Connections Site 2 .....	14

## 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. Pinyon captured 24-hour air samples every five days at three sampling locations (Figure I-1). Sampling 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 near 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. Pinyon collected air samples from August 5, 2017, through August 30, 2017. Crestone began drilling operations at the Pratt well site on July 21, 2017, and continued activities at this location throughout the reporting period. 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.

A health screening evaluation of compounds detected in the samples collected from August 5, 2017, through August 30, 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:

- From August 5, 2017, through August 30, 2017, 22 of the 67 substances analyzed were detected at Pratt Site 1.
- From August 5, 2017, through August 30, 2017, 17 of the 67 substances analyzed were detected at Pratt Site 2.
- From August 5, 2017, through August 30, 2017, 23 of the 67 substances analyzed were detected at Waste Connections Site 2.
- Based on the sampling data, there is a very 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 three 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, and changing emissions from operations, or other undetermined emission sources). 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.

**Figure I-1 Air Monitoring 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. Table 2-1, Table 2-2 and Table 2-3 show the sample collection date and times for the sampling locations.

**Table 2-1 August 5, 2017, to August 30, 2017 Pratt Site 1 Collection Dates**

Sample Start Date	Sample Start Time	Sample End Date	Sample End Time
8/5/2017	7:30 AM	8/6/2017	7:00 AM
8/10/2017	2:45 PM	8/11/2017	2:30 PM
8/15/2017	9:25 AM	8/16/2017	9:00 AM
8/21/2017	3:00 PM	8/22/2017	3:00 PM
8/25/2017	7:55 AM	8/26/2017	7:30 AM
8/30/2017	8:00 AM	8/31/2017	7:55 AM

**Table 2-2 August 5, 2017, to August 30, 2017 Pratt Site 2 Collection Dates**

Sample Start Date	Sample Start Time	Sample End Date	Sample End Time
8/5/2017	7:40 AM	8/6/2017	7:15 AM
8/10/2017	2:55 PM	8/11/2017	2:45 PM
8/15/2017	9:30 AM	8/16/2017	9:15 AM
8/21/2017	5:45 PM	8/22/2017	3:30 PM
8/25/2017	8:15 AM	8/26/2017	8:00 AM
8/30/2017	8:10 AM	8/31/2017	8:00 AM

**Table 2-3 August 5, 2017, to August 30, 2017 Waste Connections Site 2 Collections Dates**

Sample Start Date	Sample Start Time	Sample End Date	Sample End Time
8/5/2017	8:20 AM	8/6/2017	8:00 AM
8/10/2017	2:30 PM	8/11/2017	2:15 PM
8/15/2017	9:10 AM	8/16/2017	9:00 AM
8/21/2017	2:30 PM	8/22/2017	2:15 PM
8/25/2017	7:40 AM	8/26/2017	7:30 AM
8/30/2017	7:45 AM	8/31/2017	7:30 AM

## 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:

1. 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

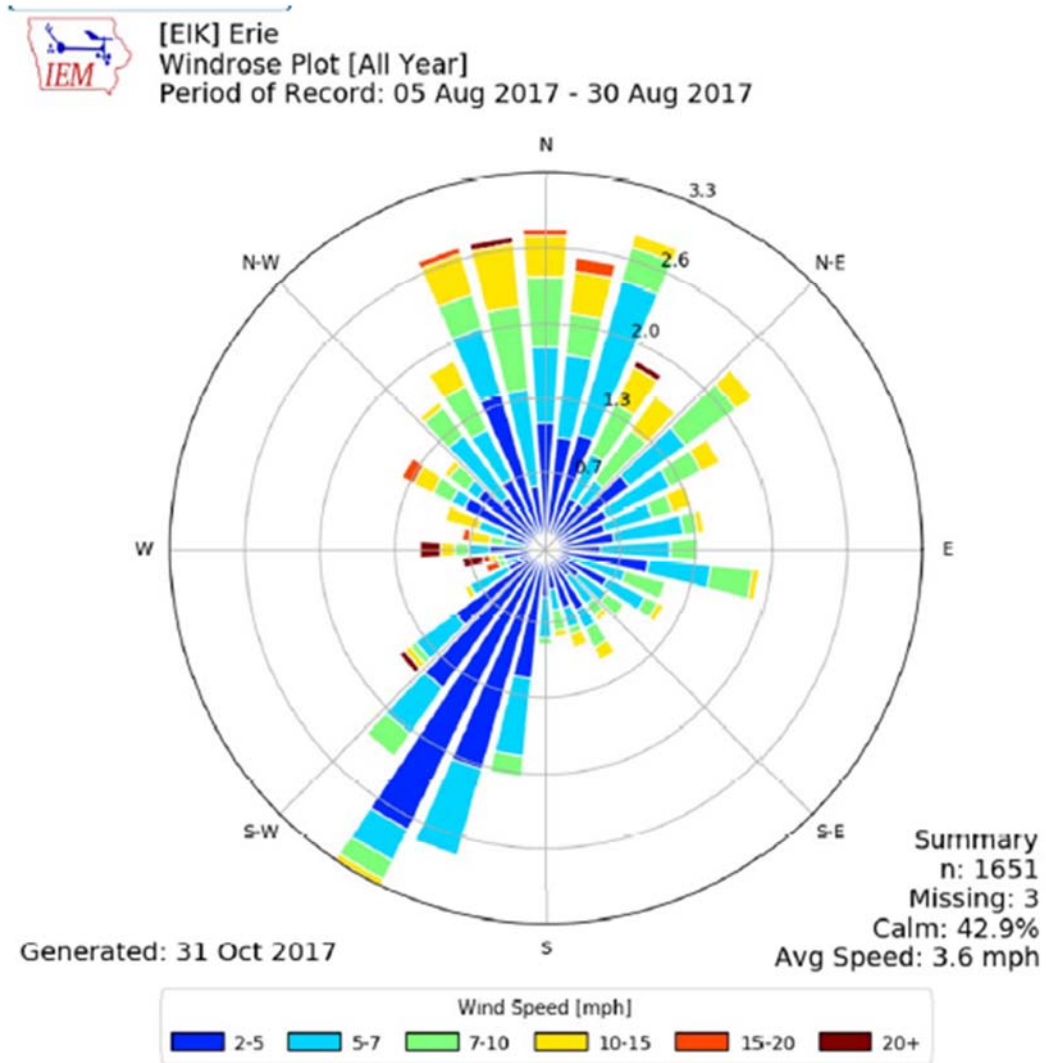
Pinyon utilized the meteorological data as measured in 20-minute intervals from the Erie Municipal Airport to assess the prevailing wind direction and the percent of time the sampling sites were downwind of the well site and the percent of time calm winds were recorded during the sample collection periods. 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. 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. During the August 10, 2017 to August 11, 2017 sample collection period, no wind data was collected at the Erie Municipal Airport; therefore, it is not possible to assess meteorological conditions associated with this sample. During the remaining sample collection periods, the meteorological conditions were likely to be adequate in representing ambient conditions at the sampling locations.

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

Sample Start Date	Prevailing Wind Direction	Pratt Site 1 Downwind (%)	Pratt Site 2 Downwind (%)	Waste Connections Site 2 Downwind (%)	Calm Winds (%)
8/5/2017	East	1.4	4.23	0.00	40.9
8/10/2017 <sup>1</sup>	NA	NA	NA	NA	NA
8/15/2017	South, North northwest	8.33	1.39	4.17	36.1
8/21/2017	East northeast	0.00	0.00	0.00	46.5
8/25/2017	South southwest	7.0	0.00	1.39	40.3
8/30/2017	North, South	11.1	1.96	1.67	39.7

<sup>1</sup> No data collected from the Erie Municipal Airport during this collection period

**Figure 3-1 Wind Rose for August 5, 2017, to August 30, 2017**



#### **4. Air Sampling Results**

Twenty-two of the 67 compounds analyzed by the lab were detected in the six air samples collected by Pinyon at Pratt Site 1 (Table 4-1). Seventeen of the 67 compounds analyzed by the lab were detected in the six air samples collected by Pinyon at Pratt Site 2 (Table 4-1). Twenty-three of the 67 compounds analyzed by the lab were detected in the six air samples collected by Pinyon at Waste Connections Site 2 (Table 4-3). The concentrations of all detected substances were below short- and long-term health screening levels (Tables 4-1, 4-2 and 4-3).

**Table 4-1 Air Sampling Results August 5, 2017, to August 30, 2017 at Pratt Site I**

Analyte	Sample Concentration (ppb)						Health Screening Level (ppb)	
	8/05/2017	8/10/2017	8/15/2017	8/21/2017	8/25/2017	8/30/2017	Short Term	Long Term
Acetone	4.52	7.83	3.60	5.43	4.51	5.40	26,000 <sup>A</sup>	13,000 <sup>A</sup>
Benzene	0.654	0.242	<0.200	<0.200	<0.200	<0.200	9,000 <sup>I</sup>	9 <sup>I</sup>
Chloroethane	<0.200	1.68	<0.200	<0.200	<0.200	<0.200	3,788 <sup>I</sup>	15 <sup>A</sup>
Chloromethane	0.565	0.421	0.458	0.402	0.563	0.398	200 <sup>A</sup>	50 <sup>A</sup>
Cyclohexane	1.45	0.372	0.206	<0.200	0.238	<0.200	1,000 <sup>I</sup>	1,743 <sup>I</sup>
Ethanol	5.30	9.28	4.98	12.1	11.1	5.36	NA	NA
Ethylbenzene	0.276	0.319	<0.200	<0.200	<0.200	<0.200	33,000 <sup>I</sup>	230 <sup>I</sup>
4-Ethyltoluene	0.467	<0.200	<0.200	<0.200	<0.200	<0.200	250 <sup>T</sup>	25 <sup>T</sup>
Trichlorofluoromethane	0.263	0.235	0.208	0.228	0.329	<0.200	10,000 <sup>T</sup>	1,000 <sup>T</sup>
Dichlorodifluoromethane	0.395	0.303	0.336	0.286	0.380	0.291	10,000 <sup>T</sup>	1,000 <sup>T</sup>
Heptane	2.55	0.505	0.263	0.218	0.371	0.205	850 <sup>I</sup>	85 <sup>I</sup>
n-Hexane	2.88	0.801	0.532	0.874	0.579	1.01	1,800 <sup>I</sup>	198 <sup>I</sup>
Methylene Chloride	<0.200	<0.200	0.365	1.29	<0.200	3.68	600 <sup>A</sup>	100 <sup>T</sup>
2-Butanone (MEK)	<1.25	2.11	<1.25	<1.25	<1.25	<1.25	200,000 <sup>A</sup>	200,000 <sup>A</sup>
2-Propanol	<1.25	<1.25	<1.25	<1.25	1.41	<1.25	NA	NA
Styrene	<0.200	0.222	<0.200	<0.200	<0.200	<0.200	5,000 <sup>A</sup>	200 <sup>A</sup>
Tetrahydrofuran	<0.200	23.3	<0.200	<0.200	<0.200	<0.200	680 <sup>I</sup>	680 <sup>I</sup>
Toluene	2.06	1.78	0.389	0.337	0.556	0.330	2,000 <sup>A</sup>	1,327 <sup>I</sup>
1,2,4-Trimethylbenzene	<0.200	0.353	<0.200	<0.200	<0.200	<0.200	250 <sup>T</sup>	25 <sup>T</sup>
1,3,5-Trimethylbenzene	2.74	<0.200	<0.200	<0.200	<0.200	<0.200	250 <sup>T</sup>	25 <sup>T</sup>
m&p-Xylene	8.25	1.27	<0.400	<0.400	0.479	<0.400	2,000 <sup>A</sup>	23 <sup>I</sup>
o-Xylene	2.78	0.475	<0.200	<0.200	<0.200	<0.200	2,000 <sup>A</sup>	23 <sup>I</sup>

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

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Air Monitoring of Crestone Peak Resources Operations  
Erie, Colorado

**Table 4-2 Air Sampling Results August 5, 2017, to August 30, 2017 at Pratt Site 2**

Analyte	Sample Concentration (ppb)						Health Screening Level (ppb)	
	8/05/2017	8/10/2017	8/15/2017	8/21/2017	8/25/2017	8/30/17	Short Term	Long Term
Acetone	6.62	4.60	4.17	5.64	4.61	4.68	26,000 <sup>A</sup>	13,000 <sup>A</sup>
Benzene	0.322	<0.200	0.899	0.241	<0.200	<0.200	9,000 <sup>I</sup>	9 <sup>I</sup>
Chloromethane	0.856	0.446	0.458	0.417	0.561	0.436	200 <sup>A</sup>	50 <sup>A</sup>
Cyclohexane	0.475	0.205	<0.200	0.304	<0.200	<0.200	1,000 <sup>I</sup>	1,743 <sup>I</sup>
Ethanol	10.0	19.6	5.99	8.99	9.08	5.21	NA	NA
Trichlorofluoromethane	0.267	0.238	0.212	0.257	0.312	0.203	10,000 <sup>T</sup>	1,000 <sup>T</sup>
Dichlorodifluoromethane	0.406	0.316	0.341	0.363	0.345	0.284	10,000 <sup>T</sup>	1,000 <sup>T</sup>
Heptane	0.750	0.241	0.252	0.378	0.238	0.214	850 <sup>I</sup>	85 <sup>I</sup>
n-Hexane	1.12	0.545	0.600	0.851	0.463	0.446	1,800 <sup>I</sup>	198 <sup>I</sup>
Methylene Chloride	<0.200	<0.200	<0.200	<0.200	0.204	<0.200	600 <sup>A</sup>	100 <sup>T</sup>
Naphthalene	<0.630	0.815	<0.630	<0.630	<0.630	<0.630	189 <sup>I</sup>	7 <sup>A</sup>
2-Propanol	<1.25	<1.25	4.13	<1.25	<1.25	<1.25	NA	NA
Toluene	0.865	0.503	1.39	0.547	0.449	0.348	2,000 <sup>A</sup>	1,327 <sup>I</sup>
1,2,4-Trimethylbenzene	0.263	<0.200	<0.200	<0.200	<0.200	<0.200	250 <sup>T</sup>	25 <sup>T</sup>
2,2,4-Trimethylpentane	<0.200	<0.200	0.297	<0.200	<0.200	<0.200	75 <sup>T</sup>	750 <sup>T</sup>
m&p-Xylene	0.639	<0.400	0.556	<0.400	<0.400	<0.400	2,000 <sup>A</sup>	23 <sup>I</sup>
o-Xylene	0.211	<0.200	0.236	<0.200	<0.200	<0.200	2,000 <sup>A</sup>	23 <sup>I</sup>

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 August 5, 2017 to August 30, 2017 at Waste Connections Site 2**

Analyte	Sample Concentration (ppb)						Health Screening Level (ppb)	
	8/05/2017	8/10/17	8/15/2017	8/21/2017	8/25/2017	8/30/2017	Short Term	Long Term
Acetone	27.5	7.97	6.92	7.80	28.7	13.0	26,000 <sup>A</sup>	13,000 <sup>A</sup>
Benzene	1.13	<0.200	<0.200	0.776	1.39	0.734	9,000 <sup>I</sup>	9 <sup>I</sup>
Chloroethane	2.42	<0.200	<0.200	<0.200	<0.200	<0.200	3,788 <sup>I</sup>	15 <sup>A</sup>
Chloromethane	1.19	0.757	0.932	1.06	1.23	0.877	200 <sup>A</sup>	50 <sup>A</sup>
Cyclohexane	1.05	0.856	<0.200	0.736	1.53	1.21	1,000 <sup>I</sup>	1,743 <sup>I</sup>
Ethanol	40.0	8.60	5.98	15.4	72.4	14.2	NA	NA
Ethylbenzene	2.69	<0.200	<0.200	<0.200	1.44	<0.200	33,000 <sup>I</sup>	2301 <sup>I</sup>
4-Ethyltoluene	<0.200	<0.200	<0.200	<0.200	1.67	<0.200	250 <sup>T</sup>	25 <sup>T</sup>
Trichlorofluoromethane	1.46	1.18	1.17	1.27	1.52	<0.200	10,000 <sup>T</sup>	1,000 <sup>T</sup>
Dichlorodifluoromethane	2.20	1.61	1.48	1.43	3.21	1.43	10,000 <sup>T</sup>	1,000 <sup>T</sup>
Heptane	1.70	1.51	0.876	1.05	2.45	1.06	850 <sup>I</sup>	85 <sup>I</sup>
n-Hexane	2.19	3.59	1.73	2.16	13.8	4.83	1,800 <sup>I</sup>	198 <sup>I</sup>
Methylene Chloride	<0.200	<0.200	<0.200	0.783	<0.200	8.11	600 <sup>A</sup>	100 <sup>T</sup>
2-Butanone (MEK)	7.26	<1.25	<1.25	4.00	4.56	<1.25	200,000 <sup>A</sup>	200,000 <sup>A</sup>
Methyl methacrylate	2.30	<0.200	<0.200	<0.200	<0.200	<0.200	171 <sup>I</sup>	100 <sup>I</sup>
2-Propanol	17.2	<1.25	<1.25	<1.25	<1.25	<1.25	NA	NA
Styrene	1.90	<0.200	<0.200	<0.200	<0.200	<0.200	5,000 <sup>A</sup>	200 <sup>A</sup>
Tetrahydrofuran	8.19	<0.200	<0.200	1.49	<0.200	1.67	680 <sup>I</sup>	680 <sup>I</sup>
Toluene	16.0	1.57	1.13	2.09	5.80	1.68	2,000 <sup>A</sup>	1,327 <sup>I</sup>
1,2,4-Trimethylbenzene	1.91	<0.200	<0.200	<0.200	2.37	<0.200	250 <sup>T</sup>	25 <sup>T</sup>
2,2,4-Trimethylpentane	<0.200	1.60	<0.200	<0.200	<0.200	<0.200	75 <sup>T</sup>	750 <sup>T</sup>
m&p-Xylene	8.13	<0.400	<0.400	<0.400	5.87	<0.400	2,000 <sup>A</sup>	23 <sup>I</sup>
o-Xylene	3.27	<0.200	<0.200	<0.200	1.98	<0.200	2,000 <sup>A</sup>	23 <sup>I</sup>

I IRIS (Environmental Protection Agency Integrated Risk Information System), A ATDSR MRL (US Agency for Toxic Substances and Disease Registry Minimal Risk Level)

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## 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 August 30, 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 chloroethane. The calculated R-value for chloroethane is 0.82 and the p-value is 0.004. This implies that measured concentrations of chloroethane are increasing over time at greater than the 95% confidence level. This reporting period constituted a relatively small sample size (n=10), and it is possible that as subsequent samples are collected at Pratt Site I, additional statistically significant trends in detected substances over time could be confirmed.

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

Substance	R-value	p-value
Acetone	-0.56	0.09
Benzene	-0.25	0.49
Carbon disulfide	-0.06	0.87
<b>Chloroethane</b>	<b>0.82</b>	<b>.004</b>
Chloromethane	-0.15	0.68
Cyclohexane	-0.29	0.45
1,4-Dichlorobenzene	-0.19	0.60
cis-1,2,-dichloroethane	-0.30	0.40
Ethanol	-0.54	0.11
Ethylbenzene	-0.06	0.87
4-Ethyltoluene	-0.16	0.66
Trichlorofluoromethane	-0.01	0.98
Dichlorodifluoromethane	0.17	0.66
Heptane	-0.17	0.64
n-Hexane	0.05	0.89
Methylene Chloride	-0.12	0.74
2-Butanone (MEK)	-0.30	0.43
2-Propanol	-0.25	0.52
Styrene	-0.29	0.40
Tetrachloroethylene	-0.50	0.14
Tetrahydrofuran	0.01	0.98
Toluene	-0.37	0.29
Trichloroethene	-0.21	0.56
1,1,2-Trichloroethane	-0.38	0.28
1,2,4-Trimethylbenzene	-0.42	0.23
1,3,5-Trimethylbenzene	-0.06	0.87
Vinyl acetate	-0.32	0.37
m&p-Xylene	-0.23	0.52
o-Xylene	-0.27	0.45

## 5.2 Pratt Site 2

Pinyon calculated the R-value and p-value for all substances detected from July 18, 2017, through August 30, 2017, at Pratt Site 2 (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 tetrahydrofuran. The calculated R-value for acetone is -0.73 and the p-value is 0.02. The calculated R-value for tetrahydrofuran is -0.68 and the p-value is 0.03. This implies that measured concentrations of acetone and tetrahydrofuran are decreasing over time at greater than the 95% confidence level. This reporting period constituted a relatively small sample size (n=10), and it is possible that as subsequent samples are collected at Pratt Site 2, additional statistically significant trends in detected substances over time could be confirmed.

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

Substance	R-value	p-value
<b>Acetone</b>	<b>-0.73</b>	<b>0.02</b>
Benzene	0.21	0.56
Chloromethane	-0.77	0.01
Cyclohexane	0.12	0.74
Ethanol	0.15	0.68
Ethylbenzene	-0.46	0.18
Trichlorofluoromethane	0.29	0.45
Dichlorodifluoromethane	0.30	0.43
Heptane	0.25	0.49
n-Hexane	0.26	0.47
Methylene Chloride	-0.43	0.21
Naphthalene	0.06	0.87
2-Butanone (MEK)	0.14	0.70
2-Propanol	0.09	0.80
<b>Tetrahydrofuran</b>	<b>-0.68</b>	<b>0.03</b>
Toluene	0.08	0.83
Trichloroethene	-0.31	0.38
1,2,4-Trimethylbenzene	0.06	0.87
2,2,4-Trimethylpentane	0.17	0.64
m&p-Xylene	0.30	0.40
o-Xylene	0.22	0.54

## 5.3 Waste Connections Site 2

Pinyon calculated the R-value and p-value for all substances detected from April 15, 2017, through August 30, 2017, at Waste Connections Site 2 (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 except for benzene, chloromethane, cyclohexane, trichlorofluoromethane, dichlorofluoromethane, heptane, n-hexane and methylene chloride. This indicates that measured concentrations of these substances are increasing over time at greater than the 95% confidence level. 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). This reporting period constituted a relatively small sample size (n=29). Statistically significant trends may be confirmed through additional sampling.



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

<b>Substance</b>	<b>R-value</b>	<b>p-value</b>
Acetone	0.03	0.88
<b>Benzene</b>	<b>0.58</b>	<b>0.001</b>
Carbon disulfide	-0.19	0.32
Carbon tetrachloride	0.01	0.96
Chloroethane	0.20	0.30
<b>Chloromethane</b>	<b>0.53</b>	<b>0.003</b>
<b>Cyclohexane</b>	<b>0.60</b>	<b>0.0004</b>
cis-1,2,-dichloroethane	-0.28	0.14
1,4-Dioxane	-0.12	0.50
Ethanol	0.06	0.76
Ethylbenzene	0.33	0.08
4-Ethyltoluene	0.02	0.92
<b>Trichlorofluoromethane</b>	<b>0.54</b>	<b>0.002</b>
<b>Dichlorodifluoromethane</b>	<b>0.62</b>	<b>0.0003</b>
<b>Heptane</b>	<b>0.71</b>	<b>0.0001</b>
<b>n-Hexane</b>	<b>0.55</b>	<b>0.002</b>
Isopropylbenzene	0.03	0.88
<b>Methylene Chloride</b>	<b>0.38</b>	<b>0.04</b>
2-Butanone (MEK)	0.08	0.68
Naphthalene	0.03	0.88
Methyl methacrylate	0.21	0.27
2-Propanol	0.13	0.50
Propene	0.30	0.11
Styrene	0.21	0.27
Tetrachloroethylene	0.28	0.14
Tetrahydrofuran	0.08	0.68
Toluene	0.34	0.07
Trichloroethylene	0.16	0.41
1,1,2-Trichloroethane	0.13	0.50
1,2,4-Trimethylbenzene	0.02	0.92
1,3,5-Trimethylbenzene	-0.03	0.88
2,2,4-Trimethylpentane	0.21	0.27
m&p-Xylene	0.01	0.96
o-Xylene	0.01	0.96

## 6. Conclusions

Pinyon collected 24-hour air samples every five days at Pratt Site 1 and Pratt Site 2 from July 18, 2017, to August 30, 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. This reporting period presented the results of the air samples collected from August 5, 2017, to August 30, 2017, as well as calculated trends in detected substances from the sampling locations start date through August 30, 2017. The air sample measurements collected reflect well drilling activities at a unique well site 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 very 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. 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.