

**Air Quality Surveys at Beaver Run Reservoir  
near the Mamont Compressor Station and  
the vicinity of the Shaw Pad**

**Covering the Period from 2/7/2019 – 2/10/2019**

Submitted by

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## **1. Introduction and Scope of Report**

The Municipal Authority of Westmoreland County (MAWC) contracts with the Indiana University of Pennsylvania (IUP) for quarterly air quality monitoring at four fracking pads and the Mamont compressor station at Beaver Run Reservoir. The Principal Investigator of the contract is Dr. John Bradshaw.

On 6 February, Mr. Mark Stoner informed Dr. Bradshaw of the situation at the Shaw pad and requested that air quality surveys be conducted as soon as possible at the compressor station, around the Shaw pad, at flaring sites around the Shaw pad and at nearby conventional well heads. This report details the results of these surveys conducted on 7 and 10 February 2019.

## **2. Locations and Dates Surveyed**

Air quality surveys were made on 7 and 10 February 2019. On 7 February, six Lascar Electronics<sup>1</sup> carbon monoxide (CO) data loggers were placed at three positions around the Mamont compressor station. The positions of the data loggers are shown in Figure 1 below. Two data loggers were placed at the each of the three positions labeled P1, P3 and P7 in Figure 1. These positions were previously determined to be the best placements for monitoring CO emissions from the compressor. Data loggers were previously in these positions earlier in January but removed on 13 January in anticipation of frigid temperatures below the minimum operating temperature of the loggers.

All of the aerial views shown in this section of the report are taken from Google Maps and do not represent the vegetation or construction in the area on the date of the samples, but instead are intended to show the locations relative to landmarks around the Mamont compressor station and the Shaw pad at Beaver Run Reservoir.

Also on 7 February, walking surveys for methane and sulfur dioxide at the Mamont compressor station were conducted. An Aeroqual Series 500 air quality monitor<sup>2</sup> was used to monitor methane and sulfur dioxide concentrations in the air. The approximate paths for the walking surveys are shown in the red (methane) and blue (sulfur dioxide) paths in Figure 1. The results of these surveys are reported in section 3.

A picture in the direction of the Shaw pad from a position near P1 in Figure 1 is shown in Figure 2. Some construction and drilling equipment on the Shaw pad can be seen in the upper right of the picture. Flares from positions immediately east and south of the Shaw pad can be seen at the left and near the top center of the picture, respectively.

Walking surveys for methane and sulfur dioxide were also conducted on 7 February in the vicinity of the two flares shown in Figure 2. Figure 3 shows an aerial view of the

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<sup>1</sup> <https://www.lascarelectronics.com/easylog-data-logger-el-usb-co300/>

<sup>2</sup> <https://www.aeroqual.com/product/series-500-portable-air-pollution-monitor>



Figure 1. Aerial image of the Mamont compressor station. The red circles labeled P1, P2 and P7 mark the locations of carbon monoxide data logger placements. The red and blue lines show approximate paths of walking surveys for methane and sulfur dioxide surveys, respectively. The aerial image is from Google Maps.



Figure 2. A picture in the direction of the Shaw pad from the Mamont compressor station. Some construction and drilling equipment on the Shaw pad can be seen in the upper right of the picture. Flares from positions immediately east and south of the Shaw pad can be seen at the left and near the top center of the picture, respectively.

Shaw pad and surroundings. A walking survey on 7 February for methane and sulfur dioxide followed the approximate path shown in red in Figure 3 to the east of the Shaw pad. A walking survey on 10 February for methane and carbon dioxide followed the approximate path shown in blue in Figure 3 to the west of the Shaw pad. The results of these surveys are reported in section 4. Methane measurements at three shallow well heads labeled WH #1, WH #2 and WH #3 in Figure 3 were made on 10 February. The results of these measurements are discussed in section 5.

Finally, methane and carbon monoxide measurements were made at a third flare site on directly off of route 380, approximately 2480 feet east of Beaver Run Road. The results of these measurements are reported in section 6.



Figure 3. Aerial image of the Shaw pad and surroundings. Walking surveys for methane, sulfur dioxide and carbon monoxide were conducted on the red and blue paths on 7 and 10 February, respectively. Methane surveys at the well heads labeled WH#1, WH#2 and WH#3 were conducted on 10 February.

### 3. Measurements at the Mamont Compressor Station

#### 3.1 Previous CO data logging and CO data logging of 7-10 February

The Lascar Electronics data loggers are used to continuously monitor the carbon dioxide output from the Mamont compressor station. An example of the data from a logger in the summer months is shown in Figure 4. The data in Figure 4 shows carbon monoxide

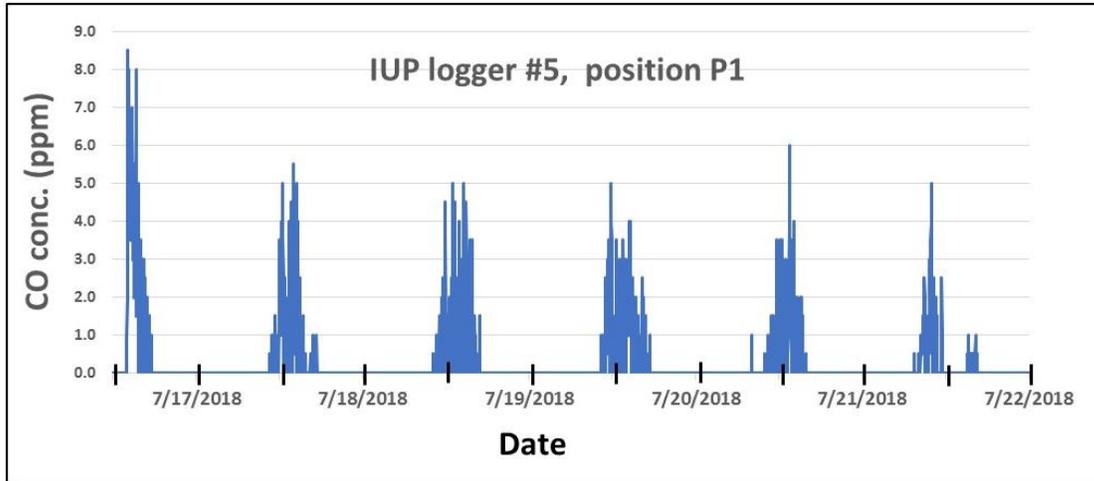


Figure 4. Carbon monoxide concentrations as recoded by the Lascar Electronics data loggers in the summer of 2018. No such exhaust cycling of the compressor was measured between 7 and 10 February.

detected by one logger that was positioned at P1 in Figure 1. When operational, the compressor is usually on in the late night and early morning hours. The data in Figure 4 shows this normal on-off cycle for the compressor. The data loggers were removed from their positions around the Mamont compressor on 13 January in anticipation of frigid temperatures during the next week as they are not rated for operation below 14°F (-10°C).

Six data loggers were replaced at positions P7, P1 and P3 in Figure 1 on 7 February and removed for data download on 10 February. The data showed no carbon monoxide detected and no on-off cycling as shown in Figure 4. One possible explanation is that the entering natural gas pressure is high enough so the that a compression cycle is not necessary.

### 3.2 CH<sub>4</sub> & SO<sub>2</sub> monitoring of 7 February

Walking surveys for methane and sulfur dioxide were conducted at the Mamont compressor on 7 February. The methane readings along the red path in Figure 1 were 0 to 1 ppm. These readings are below the minimum detectable concentration for the detector used and represent a detected concentration indiscernible from atmospheric background.

The results of the sulfur dioxide survey are shown in Figure 5. Sulfur Dioxide concentrations between 0 and 0.14 ppm were recorded along the blue path in figure 1. The minimum detectable level for sulfur dioxide is 0.04 ppm. These trace levels of sulfur dioxide are like due to the nearby flares.

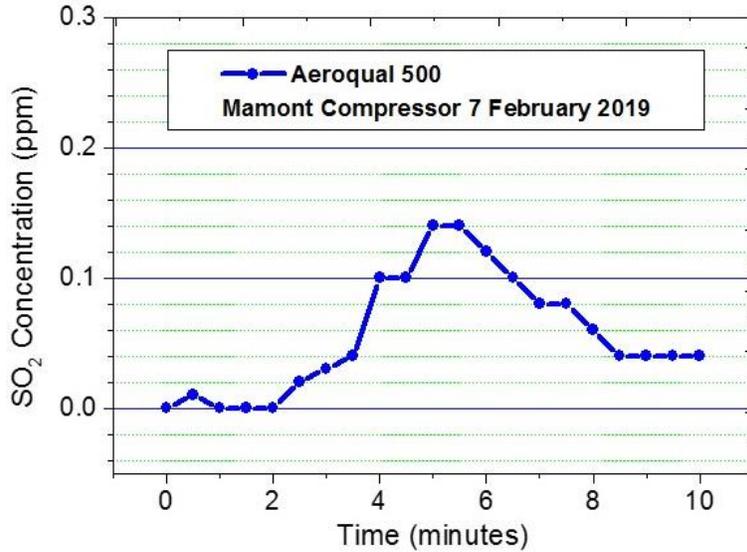


Figure 5. Sulfur Dioxide concentrations as recoded using the Aeroqual detector for the walking survey at the Mamont compressor on 7 February.

### 3.3 CO monitoring of 10 February

A walking survey from point P7 to point P1 in Figure 1 was conducted on 10 February using the Aeroqual monitor with a carbon monoxide detector. The results are shown in Figure 6. The minimum detection limit of the detector is 0.5 ppm. These trace levels are likely due to the combustion products from the nearby flares.

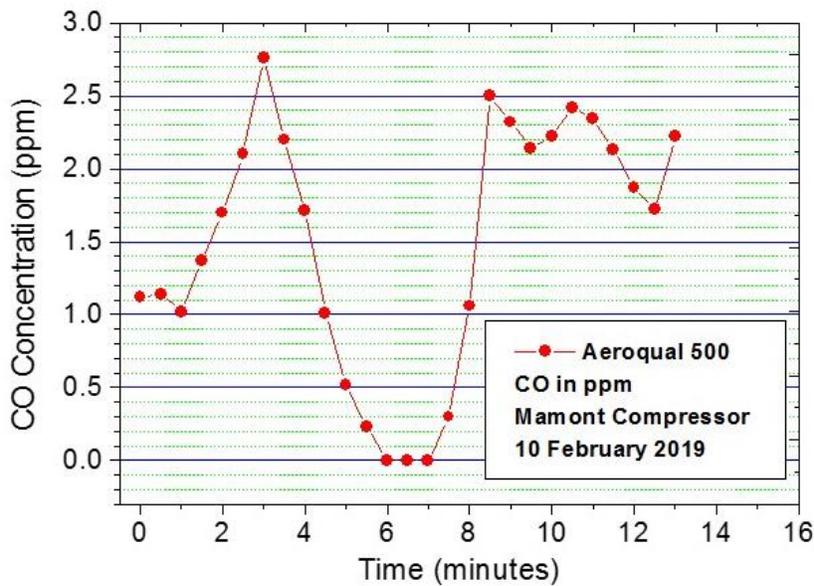


Figure 6. Carbon Monoxide concentrations as recoded using the Aeroqual detector for the walking survey at the Mamont compressor on 10 February.

## 4. Measurements at Flare #1 and Flare #2 near Shaw Pad

### 4.1 SO<sub>2</sub> and CH<sub>4</sub> data of 7 February

A walking survey of the air quality from flares #1 and #2, east and south of Shaw pad were conducted on 7 February along the east path shown in red in Figure 3. The survey used the Aeroqual monitor with the sulfur dioxide detector on the way in, and the methane detector on the way out. The results for the sulfur dioxide concentrations are shown in Figure 7. The results show an increasing concentration of sulfur dioxide within the wooded areas that reduced to smaller levels as the cleared areas of the flares were approached. Decreasing concentrations were observed when approaching point P1-F1 and P1-F2. Each time the concentrations reduced on approaching the open cleared areas for each flare.

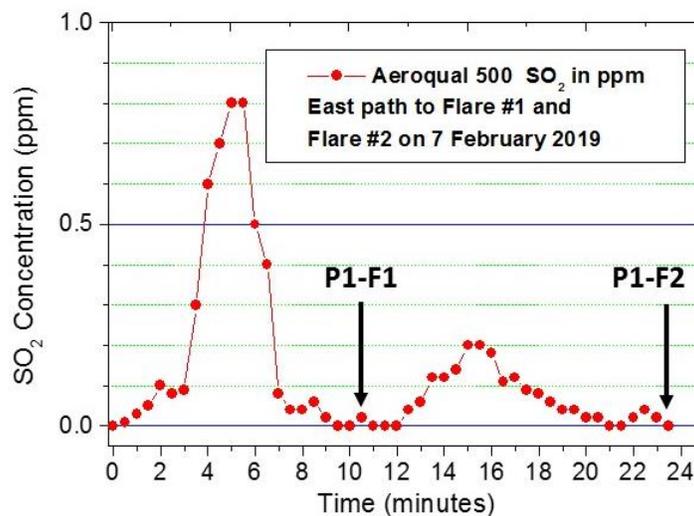


Figure 7. Sulfur Dioxide concentrations as recorded using the Aeroqual monitor for the walking survey to flares #1 and #2 along the eastern pathway shown in red in Figure 3. The labels P1-F1 and P1-F2 mark the concentrations recorded from the woods closest to the flares. These positions are also marked in Figure 3.

On the way out, the Aeroqual monitor was used with the methane detector. The recorded values were zero or 1ppm all the way back from point P1-F2 to the starting point on Tower Hill Road.

### 4.2 CO and CH<sub>4</sub> data of 10 February

On 10 February, Flare #1 to the east of the Shaw pad was extinguished. A walking survey of the air quality from flare #2, south of Shaw pad was conducted on 10 February along the western path shown in blue in Figure 3. The survey started at P2-F2 on Tower Hill road. The dirt roadway walked rises in elevation until it is about 162 feet above flare #2 elevation at point P3-F2 and about 200 feet above the flare #2 elevation at P4-F2. From

P4-F2 there is a steep wooded downhill to P5-F2, which is about 20 feet below the flare.<sup>3</sup> The survey used the Aeroqual monitor with the carbon monoxide detector on the way in and out. The results for the carbon monoxide concentrations are shown in Figure 8. The carbon monoxide concentration started at 6.99 ppm at point P2-F2 just off Tower Hill Road. The concentration steadily rose with elevation to point P3-F2, where it was

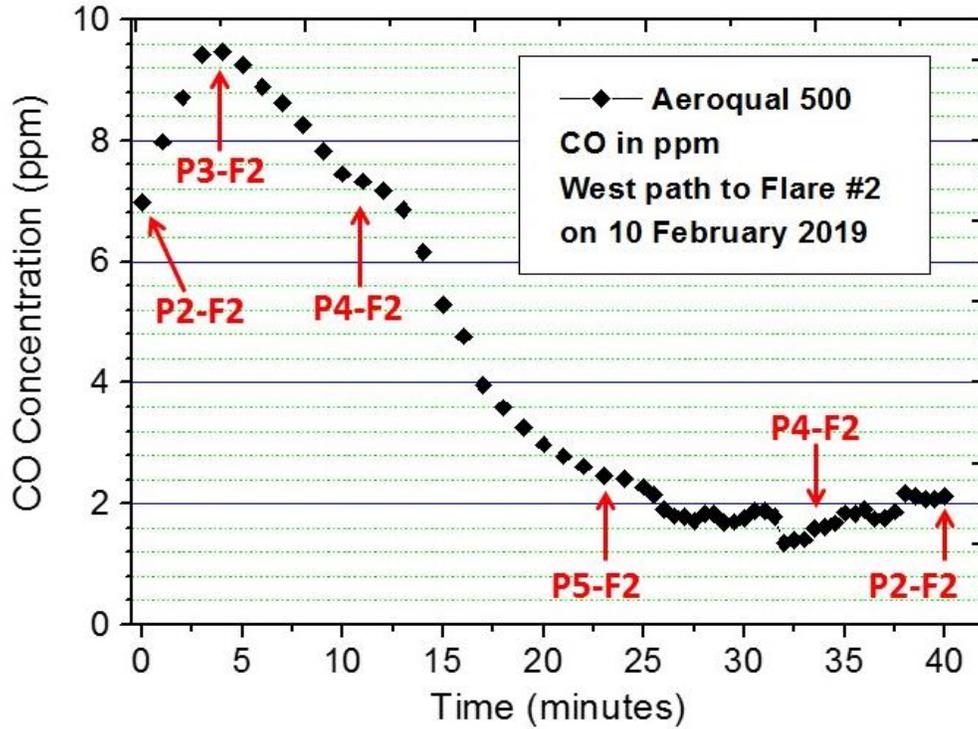


Figure 8. Carbon Monoxide concentrations as recorded using the Aeroqual monitor for the walking survey to flare #2 along the western pathway shown in blue in Figure 3. The labels P2-F2 through P5-F2 mark the concentrations recorded at various point on the path that are marked in Figure3.

measured to be 9.47 ppm. At point P4-F2 the concentration was 8.27 ppm. The CO concentration reduced steadily throughout the downhill portion of the path between P4-F2 and P5-F2. At P5-F2 the concentration was 2.41 ppm. On the back up to P4-F2, the concentrations remained at low levels as well as when going back down the hill to the starting point at P2-F2.

The path from P2-F2 to P4-F2 was repeated using the methane detector. The detector read 0 ppm throughout the walking survey.

<sup>3</sup> Elevation data is from Google Earth.

## 5. CH<sub>4</sub> Measurements at three shallow well heads near Shaw pad

The Aeroqual monitor and methane detector were used to survey methane concentrations around three shallow well heads labelled WH#1, WH#2 and WH3 in Figure 3. The methane detector read 0 ppm throughout each survey. No traces of methane were measured at these well heads.

## 6. Measurements at Flare #3 off Route 380, 2480 feet west of Beaver Run Road

Measurements of methane, sulfur dioxide and carbon monoxide were made at the flare just off Route 380, west of the Sweeney Water Treatment Plant and about 2480 feet East of Beaver Run Road. Neither methane nor sulfur dioxide was detected during the survey of 7 February. On 10 February, a survey for carbon monoxide was performed. The results are shown in Figure 9.

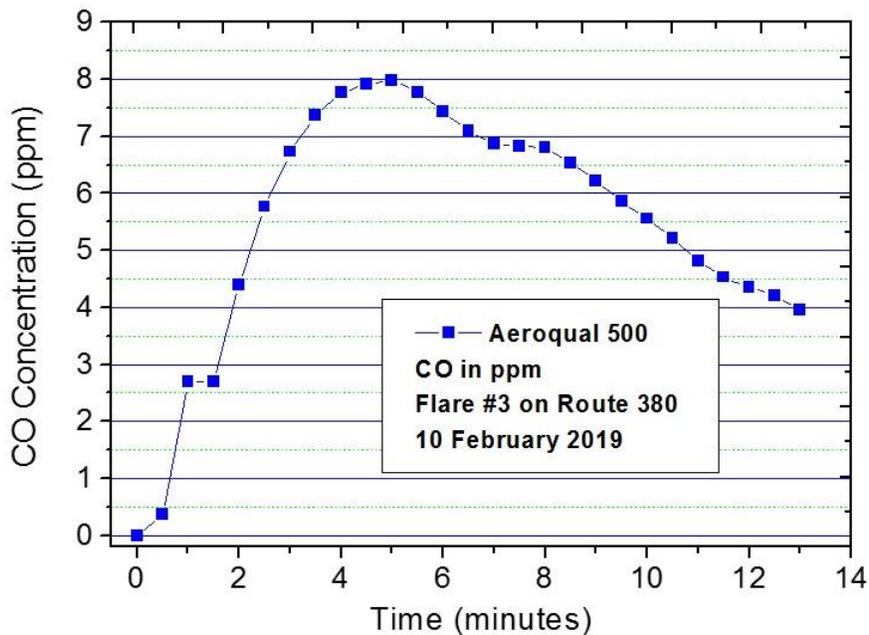


Figure 9. Carbon Monoxide concentrations as recorded using the Aeroqual monitor for flare #3 just off Route 380.

The recorded data indicates a maximum carbon monoxide concentration of 7.98 ppm.

## 7. Summary of Results

The air quality surveys conducted on 7 and 10 February found no methane levels distinguishable from atmospheric background at the Mamont compressor, around the Shaw pad, at three separate flare sites, or three separate shallow well heads. Trace levels of sulfur dioxide were found at the Mamont compressor and in the woods approaching flares #1 and

#2 east and south of the Shaw pad. These levels may be due to the low levels of sulfur dioxide from the natural gas flares.

The Lascar Electronics data loggers did not detect any carbon monoxide levels. This may indicate that the compressor is currently not in operation. Walking surveys for carbon monoxide on 10 February found trace levels near 2-to-3 ppm at the compressor station and levels as high as 8-to 10 ppm at flare #2 south of Shaw pad and flare #3 off of Route 380. However, these represent peak levels. Average carbon monoxide levels were about 5 ppm in the vicinity of flares. These levels fluctuated significantly due to winds. The winds on 10 February were variable from zero to about 5 mph with shifting direction. Note that the average carbon monoxide levels for the survey shown in Figure 8 indicate an average concentration near 8 ppm for the first 10 minutes of the walking survey up the hill, and an average near 2 ppm for the last 6 minutes walking down.