

# **Alton Coal Development, LLC.**

## **Summary of PM<sub>10</sub> Data**

**Collected at Coal Hollow Mine, Utah**

**Annual Report, 2018**

**DAQ-2018-018721**

**Submitted to:**

Utah Division of Environmental Quality

Division of Air Quality

195 North 1950 West

Salt Lake City, Utah

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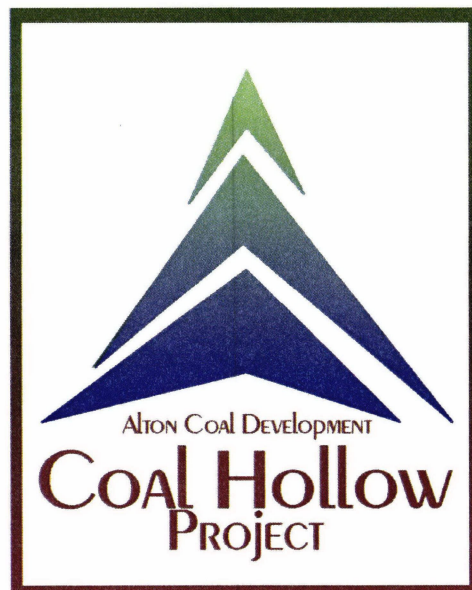
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## Contents

|            |  |          |
|------------|--|----------|
| <b>1.0</b> | <b>Introduction.....</b>                         | <b>2</b> |
| <b>2.0</b> | <b>Site Location .....</b>                       | <b>2</b> |
| <b>3.0</b> | <b>AIR QUALITY DATA SUMMARIES .....</b>          | <b>4</b> |
| <b>4.0</b> | <b>DATA RECOVERY AND QUALITY ASSURANCE.....</b>  | <b>7</b> |
| 4.1        | Data Recovery .....                              | 7        |
| 4.2        | Quality Assurance .....                          | 9        |
| 4.2.1      | Precision of PM <sub>10</sub> Measurements ..... | 9        |
| 4.2.2      | Audit Results.....                               | 10       |
| 4.2.3      | Zero and Single Point Flow Rate Checks .....     | 11       |

### List of Tables

|   |    |
|---|----|
| Table I - Summary of Measured PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> ) .....  | 5  |
| Table II - Summary of Measured PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> ).....  | 6  |
| Table III - Summary of Measured PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> )..... | 6  |
| Table IV - Summary of Measured PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> ) ..... | 6  |
| Table V - Summary of Measured PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> ) .....  | 6  |
| Table VI - Summary of Data Recovery .....   | 9  |
| Table VII - Audit Summary .....   | 10 |

### List of Figures

|  |   |
|--|---|
| Figure 1 - Site Location Map .....                     | 3 |
| Figure 2 - Satellite View of Monitoring Locations..... | 4 |

### List of Appendices

#### APPENDIX A

Windrose

#### APPENDIX B

Summary of PM<sub>10</sub> Concentrations with Pollution Trend Graphs

#### APPENDIX C

Precision and Single-Point Flow Rate Checks

#### APPENDIX D

Field Data Sheets

#### APPENDIX E

Alton Coal Development, Inc

PM<sub>10</sub> Data, Annual, 2018

February 6, 2019

Page 1

## Independent PM<sub>10</sub> Sampler Performance Audit Report

### 1.0 INTRODUCTION

This report summarizes measurements of Particulate Matter less than 10 microns nominal aerodynamic diameter (PM<sub>10</sub>) collected and processed by Alton Coal Development, LLC, from the five monitoring stations located at the Coal Hollow Mine Facility in Alton, Utah. Monitoring for PM<sub>10</sub> is a condition of the mines operating permit.

PM<sub>10</sub> monitoring at the site consists of five BGI PQ200 PM<sub>10</sub> monitors run by solar power. Figure 2 of this report shows the approximate locations of the monitoring locations. The BGI PQ200 monitors are EPA Reference Method monitors and are operated on the National Particulate 1-in-6 Monitoring Schedule. The data summarized herein covers the data collected during the year of 2018.

### 2.0 SITE LOCATION

The Coal Hollow Mine is located in Kane County, Utah, approximately three miles southeast of the town of Alton, Utah. Figure I on the following page gives an overview of the site location. Specifically the Coal Hollow Mine is located in Sections 19, 20, 29, and 30 of Township 39S, Range 5W; with an approximate facility location of:

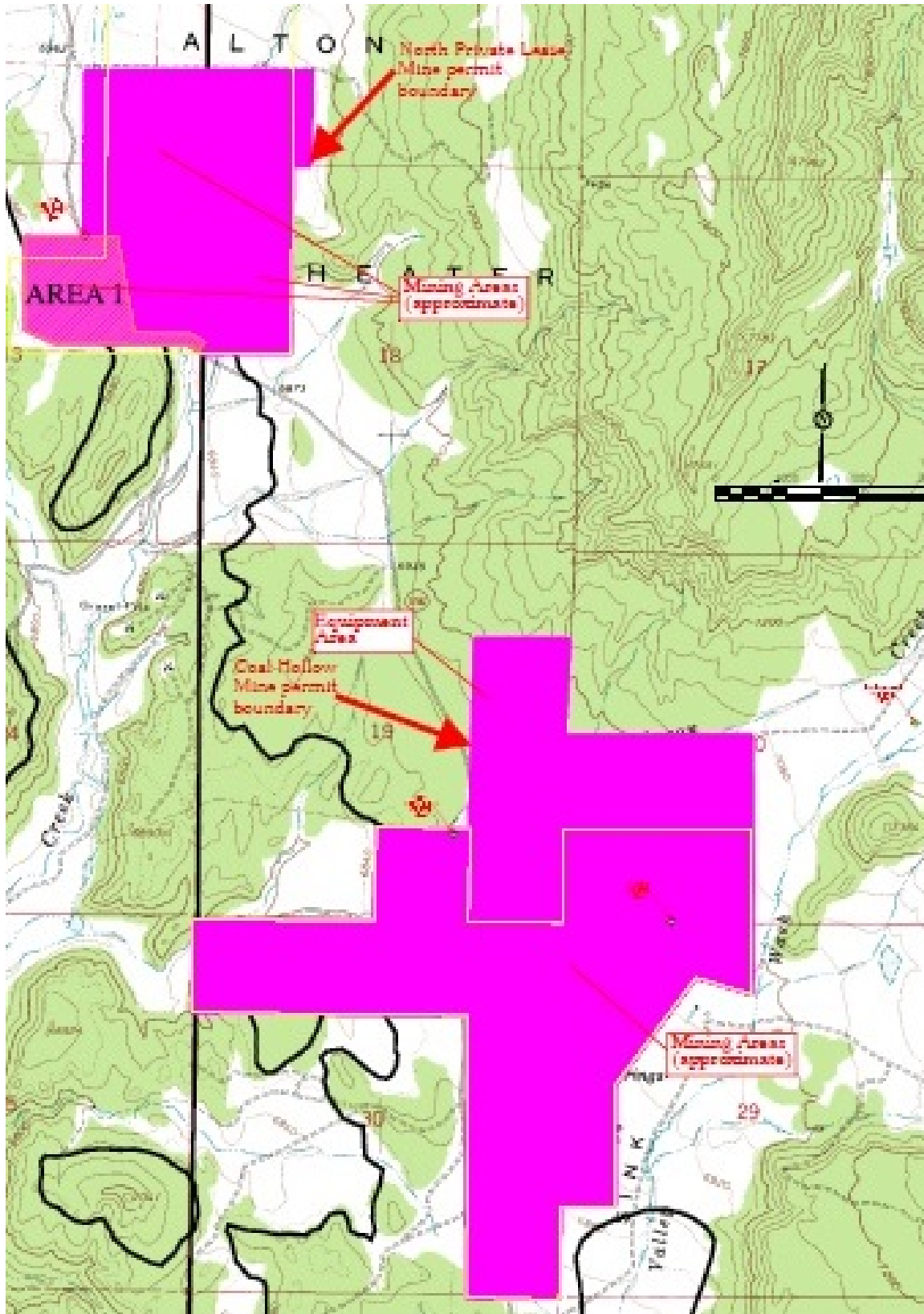
Northing: 41401699 meters

Easting: 371534 meters

Universal Transverse Mercator (UTM) Datum NAD27, Zone 12

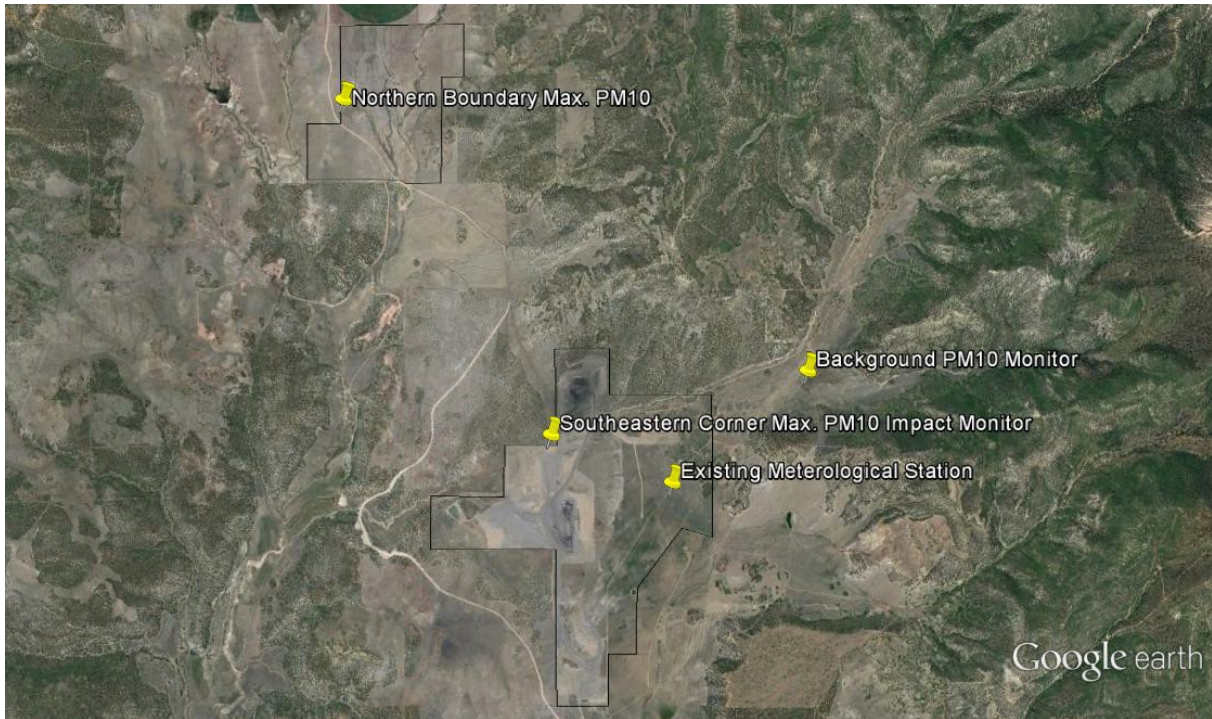
The three monitoring locations as depicted in Figure 2, are located in positions to collect both background and maximum PM<sub>10</sub> concentrations. The background monitor has a manufactures serial #962, therefore this monitor will be referred as monitor 962A. The compliance monitor for the Coal Hollow Mine (CHM) has a manufactures serial #963, therefore this monitor will be referred as monitor 963B. The co-located monitor has a manufactures serial #964, therefore this monitor will be referred as monitor 964C. The background monitor coordinates are Northing: 4140856, Easting 373119, (UTM) Datum NAD27, Zone 12. The CHM compliance monitor and the co-located monitor coordinates are Northing: 4140396, Easting 371147, (UTM) Datum NAD27, Zone 12. The compliance monitor for the North Private Lease (NPL) has a manufactures serial #2366, therefore this monitor will be referred as monitor 2366D. The co-located monitor has a manufactures serial #2398, therefore this monitor will be referred as monitor 2398E. The NPL compliance monitor and the co-located monitor coordinates are Northing: 4141570, Easting 370928, (UTM) Datum NAD27, Zone 12.

Figure 1 - Site Location Map





**Figure 2 - Satellite View of Monitoring Locations**



### **3.0 AIR QUALITY DATA SUMMARIES**

A summary of the measured PM<sub>10</sub> concentrations for the year are presented in Appendix B, and Field Data Sheets generated during the collection of each sample are presented in Appendix D. Measurements were collected during a 24-hour period and represent the average PM<sub>10</sub> concentration during the midnight to midnight data collection cycle. As required by the operating permit for the CHM, duplicate measurements were made with Sampler #963B (designated as a compliance monitor) and Sampler #964C (designated as a co-located sampler) to the extent possible. The quarterly mean PM<sub>10</sub> concentration and the comparison of measured concentrations to standards are based on measurements from the primary Sampler #963B. If a measurement from Sampler #963B was missing or invalid, the measurement from the secondary Sampler #964C would be used. Also, required by the operating permit for the NPL, duplicate measurements were made with Sampler #2366D (designated as a compliance monitor) and Sampler #2398E (designated as a co-located sampler) to the extent possible. The quarterly mean PM<sub>10</sub> concentration and the comparison of measured concentrations to standards are based on measurements from the primary Sampler #2366D. If a measurement from Sampler #2366D was missing or invalid, the measurement from the secondary Sampler #2398E would be used.

The highest 24-hour mean PM<sub>10</sub> concentrations measured during the quarter from the three monitoring locations are summarized in Table I, Table II, Table III, Table IV and Table V. The

three highest concentrations, # of valid samples, and the arithmetic mean concentrations from each of the sites are listed. Six measured PM<sub>10</sub> concentrations exceeded the 24-hour National Ambient Air Quality Standard (NAAQS) of 150 µg/m<sup>3</sup>. For the June 6<sup>th</sup>, June 19<sup>th</sup> and July 13<sup>th</sup> run, both the 2366D and 2398E monitor exceeded the NAAQS. For the August 6<sup>th</sup> run, the 2366D monitor and on August 30<sup>th</sup> run, the 2398E monitor exceeded the NAAQS. For the November 28<sup>th</sup> run, both the 2366D and 2398E monitor exceeded the NAAQS. UDOGM requested removal of topsoil from an area of Prime Farmland (44 acres) to be removed and stockpiled all at the same time rather than pit by pit as is typical for ADC. This not only increased the area of disturbance at the NPL, but concentrated traffic near the location of the NPL monitors as several of the stockpiles are in close vicinity of the monitors. The stockpile, where complete and seeded to stabilize from future wind and water erosion.

At this time no changes for future monitoring are recommended for the Coal Hollow Mine. The location of the compliance and collocated monitors (962A, 963B and 964 C) are and will remain in the area of highest PM<sub>10</sub> concentrations for the next year of mining. There are no changes for future monitoring recommended for the North Private Lease. The location of the collocated monitors (2366D and 2398E) are and will remain in the area of highest PM<sub>10</sub> concentrations for the next year of mining.

**Table I - Summary of Measured PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)**  
**Background Monitor - 962A**

| RANK                    | DATE                                  | PM <sub>10</sub> CONCENTRATION |
|-------------------------|---------------------------------------|--------------------------------|
| Highest                 | 7/31/2018                             | 23.1                           |
| 2 <sup>nd</sup> Highest | 9/29/2018                             | 23.0                           |
| Annual Mean             | 1/1/18-12/31/18<br>(61 valid samples) | 7.4                            |

**Table II - Summary of Measured PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)**  
**Compliance Monitor - 963B**

| RANK                    | DATE                                  | PM <sub>10</sub> CONCENTRATION |
|-------------------------|---------------------------------------|--------------------------------|
| Highest                 | 6/7/2018                              | 81.1                           |
| 2 <sup>nd</sup> Highest | 6/13/2018                             | 64.0                           |
| Annual Mean             | 1/1/18-12/31/18<br>(51 valid samples) | 17.4                           |

**Table III - Summary of Measured PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)**  
**Compliance Monitor – 964C**

| RANK                    | DATE                                  | PM <sub>10</sub> CONCENTRATION |
|-------------------------|---------------------------------------|--------------------------------|
| Highest                 | 6/13/2018                             | 52.0                           |
| 2 <sup>nd</sup> Highest | 5/8/2018                              | 51.1                           |
| Annual Mean             | 1/1/18-12/31/18<br>(44 valid samples) | 17.9                           |

**Table IV - Summary of Measured PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)**  
**Compliance Monitor – 2366D**

| RANK                    | DATE                                  | PM <sub>10</sub> CONCENTRATION |
|-------------------------|---------------------------------------|--------------------------------|
| Highest                 | 6/13/2018                             | 410.1                          |
| 2 <sup>nd</sup> Highest | 7/13/2018                             | 310.8                          |
| Annual Mean             | 1/1/18-12/31/18<br>(58 valid samples) | 56.4                           |

**Table V - Summary of Measured PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)**  
**Compliance Monitor – 2398E**

| RANK                    | DATE                                  | PM <sub>10</sub> CONCENTRATION |
|-------------------------|---------------------------------------|--------------------------------|
| Highest                 | 6/13/2018                             | 402.6                          |
| 2 <sup>nd</sup> Highest | 7/13/2018                             | 276.3                          |
| Annual Mean             | 1/1/18-12/31/18<br>(58 valid samples) | 55.9                           |

**Table VI – Mean Annual Wind Speed**

|                          |             |
|--------------------------|-------------|
|                          | Annual 2018 |
| Mean<br>Wind Speed (m/s) | 3.10        |

## **4.0 DATA RECOVERY AND QUALITY ASSURANCE**

### **4.1 Data Recovery**

#### Monitor 962A

Monitor 962A collected 61 of the 61 samples during the year. The percent recovery for this quarter is 100%.

#### Monitor 963B

Monitor 963B collected 51 of the 61 samples during the year. The percent recovery for this quarter is 84%. For the sample date March 15th, the monitor failed to run due to a programing error in the end date. For the sample date April 8th, the monitor over ran the programed sampling time. For the sample date July 31<sup>st</sup>, the monitor did not run the programed sampling time. For the sample date September 11<sup>th</sup>, the monitor had a flow excursion > than 5 minutes which terminated the run. For the sample date October 5<sup>th</sup>, 11<sup>th</sup>, 17<sup>th</sup>, 23<sup>rd</sup>, November 16<sup>th</sup>, and 22<sup>nd</sup> the monitor did not run the programed sampling time. After changing several components on the monitor, it was determined that the pump motor needed replaced.

#### Monitor 964C

Monitor 964C collected 44 of the 61 samples during the year. The percent recovery for this quarter is 72%. For the sample date January 8th, the monitor failed to run due to a flow rate excursion  $> \pm 5\%$  for  $> 5$  minutes that caused the monitor to shut down. For the sample date May 2nd, the monitor failed to run due to a flow rate excursion  $> \pm 5\%$  for  $> 5$  minutes that caused the monitor to shut down. For the sample date May 20th, the monitor failed to run due to a flow rate excursion  $> \pm 5\%$  for  $> 5$  minutes that caused the monitor to shut down. For the sample date May 26th, the monitor failed to run due to a flow rate excursion  $> \pm 5\%$  for  $> 5$  minutes that caused the monitor to shut down. For the sample date July 7th, the monitor failed to collect from Midnight to Midnight, recorded data for run sample period is incorrect. For the sample dates of July 13th, 19<sup>th</sup>, 25<sup>th</sup> & 31<sup>st</sup>, September 17<sup>th</sup>, 23<sup>rd</sup> and 29 the monitor failed to run due to a flow rate excursion  $> \pm 5\%$  for  $> 5$  minutes that caused the monitor to shut down. The flow controller was replaced. For the sample dates of November 16<sup>th</sup>, 22<sup>nd</sup>, 28<sup>th</sup>, and December 4<sup>th</sup>, and 10<sup>th</sup> the monitor failed to run due to a flow rate excursion  $> \pm 5\%$  for  $> 5$  minutes that caused the monitor to shut down. After changing several components on the monitor, it was pump motor quit and was replaced. For the sample date of December 28<sup>th</sup>, the monitor failed to run due to a flow rate excursion  $> \pm 5\%$  for  $> 5$  minutes again that caused the monitor to shut down.

#### Monitor 2366D

Monitor 2366D collected 58 of the 61 samples during the year. The percent recovery for this quarter is 95%. For the sample date June 25th, the monitor over ran the sample period due to operator error in programing. For the sample date August 18th, the monitor had incorrect data for the sampling period. For the sample date October 23<sup>rd</sup>, the monitor had an incomplete run and the data file was corrupt.

#### Monitor 2398E

Monitor 2398E collected 58 of the 61 samples during the year. The percent recovery for this quarter is 95%. For the sample date July 13th, the monitor although programmed correctly, did not run for the sampling period. For the sample date August 18th, the monitor shut down after 1.5 minutes run. For the sample date October 29<sup>th</sup>, the monitor although programmed correctly, did not run for the sampling period and shut down after 13 hrs. and 29 minutes.

The PM<sub>10</sub> data recoveries for the three monitoring stations are presented below:

**Table VI - Summary of Data Recovery**

| SAMPLER | POSSIBLE SAMPLES | VALID SAMPLES | PERCENT DATA RECOVERY |
|---------|------------------|---------------|-----------------------|
| 962A    | 61               | 61            | 100%                  |
| 963B    | 61               | 51            | 84%                   |
| 964C    | 61               | 44            | 72%                   |
| 2366D   | 61               | 58            | 95%                   |
| 2398E   | 61               | 58            | 95%                   |

## **4.2 Quality Assurance**

Quality assurance procedures utilized to verify the integrity of the measured PM<sub>10</sub> data included the following:

1. Review of PM<sub>10</sub> precision measurements based upon duplicate, collocated measurements.
2. Independent quarterly audits of the PM<sub>10</sub> samplers.
3. Monthly zero and single point flow rate checks of the PM<sub>10</sub> samplers.

### **4.2.1 Precision of PM<sub>10</sub> Measurements**

The precision of the PM<sub>10</sub> measurements was determined from the duplicate samples collected from the collocated BGI PQ200 Monitors 963B and 964C at the Coal Hollow Mine and 2366D and 2398E at the North Private Lease. As recommended in *40 CFR, Part 58, Appendix A, Section 5.3.1*, PM<sub>10</sub> precision checks are reported for instances when the concentrations for duplicate samples both exceed 3 µg/m<sup>3</sup>. Duplicate samples that did not meet this condition were omitted for the purposes of the precision checks. Appendix C, of this report summarizes precision calculations between the compliance monitor and the co-located monitor. Monthly flow rate verification data is also summarized in Appendix C.

Precision calculations at the Coal Hollow Mine were developed based on 35 valid pairs of co-located monitoring data during the quarter. Single point precision based on *40 CFR, Part 58*,

Appendix A Equation 2 results were -128.4% to 86.3%. The aggregate coefficient of variability (CV) calculated in accordance with *40 CFR, Part 58, Appendix A Equation 11* is 30.0%. This value is not within the 10% goal for aggregate CV.

Precision calculations at the North Private Lease were developed based on 40 valid pairs of co-located monitoring data during the quarter. Single point precision based on *40 CFR, Part 58, Appendix A Equation 2* results were -128.4% to 86.8%. The aggregate coefficient of variability (CV) calculated in accordance with *40 CFR, Part 58, Appendix A Equation 11* is 23.5%. This value is not within the 10% goal for aggregate CV.

#### 4.2.2 Audit Results

The accuracy of the PM<sub>10</sub> sampler flows for each Quarter was verified by performance audits conducted by Air Resource Specialist on March 29, 2018, June 28, 2018, September 13, 2018 and November 19, 2018. A copy of the audit reports are presented in Appendix E and are summarized in Table VI. With the exception of the November 19<sup>th</sup> audit of the 963B Sampler the audit results indicate that the five samplers were operating properly throughout the year. Sampler 963 B the pump motor would not power up at the time of the audit, replacement of the motor occurred later.

**Table VII - Audit Summary**

|                                   | SAMPLER | AUDIT<br>%<br>DIFFERENCE | LIMIT* | DESIGN<br>%<br>DIFFERENCE | LIMIT* |
|-----------------------------------|---------|--------------------------|--------|---------------------------|--------|
| <b>1<sup>st</sup><br/>Quarter</b> | 962A    | -2.0                     | ±4%    | 2.2                       | ± 5%   |
|                                   | 963B    | -0.8                     | ±4%    | 0.9                       | ± 5%   |
|                                   | 964C    | 35.8                     | ±4%    | -26.3                     | ± 5%   |
|                                   | 2366D   | -0.2                     | ±4%    | 0.2                       | ± 5%   |
|                                   | 2398E   | -0.5                     | ±4%    | 0.5                       | ± 5%   |
| <b>2<sup>nd</sup><br/>Quarter</b> | 962A    | -1.8                     | ±4%    | 1.8                       | ± 5%   |
|                                   | 963B    | -1.5                     | ±4%    | 1.5                       | ± 5%   |
|                                   | 964C    | -2.0                     | ±4%    | 0.1                       | ± 5%   |
|                                   | 2366D   | 0.4                      | ±4%    | -0.4                      | ± 5%   |

|   |       |      |     |      |      |
|---|-------|------|-----|------|------|
|   | 2398E | -0.9 | ±4% | 0.7  | ± 5% |
| <b>3<sup>rd</sup><br/>Quarter</b>   | 962A  | -1.4 | ±4% | 1.4  | ± 5% |
|   | 963B  | 0.1  | ±4% | -0.9 | ± 5% |
|   | 964C  | 1.2  | ±4% | -1.2 | ± 5% |
|   | 2366D | 0.0  | ±4% | 0.0  | ± 5% |
|   | 2398E | 0.4  | ±4% | -0.4 | ± 5% |
| <b>4<sup>th</sup><br/>Quarter</b>   | 962A  | -2.7 | ±4% | 2.6  | ± 5% |
|   | 963B  | N/A  | ±4% | N/A  | ± 5% |
|   | 964C  | -1.2 | ±4% | 1.3  | ± 5% |
|   | 2366D | 1.4  | ±4% | 0.1  | ± 5% |
|   | 2398E | -1.0 | ±4% | 1.0  | ± 5% |
| *Values between ± 7% and ± 10% require recalibration but no data are invalidated. |       |      |     |      |      |

#### 4.2.3 Zero and Single Point Flow Rate Checks

Zero and single-point flow rate verifications are performed by a site technician on a monthly basis. The data was then input into a statistical calculator to calculate percent difference and bias between each of the monitors and the monthly single point flow rate measured by a NIST traceable calibration orifice. The calculator used is called the “Data Assessment Statistical Calculator” DASC Tool. DASC was developed for the data user community and can be found in the Precision and Accuracy Reporting System within the Quality Assurance section of EPA’s Ambient Monitoring Technology Information System. This data is presented in Appendix C of this report.



## **APPENDIX A**

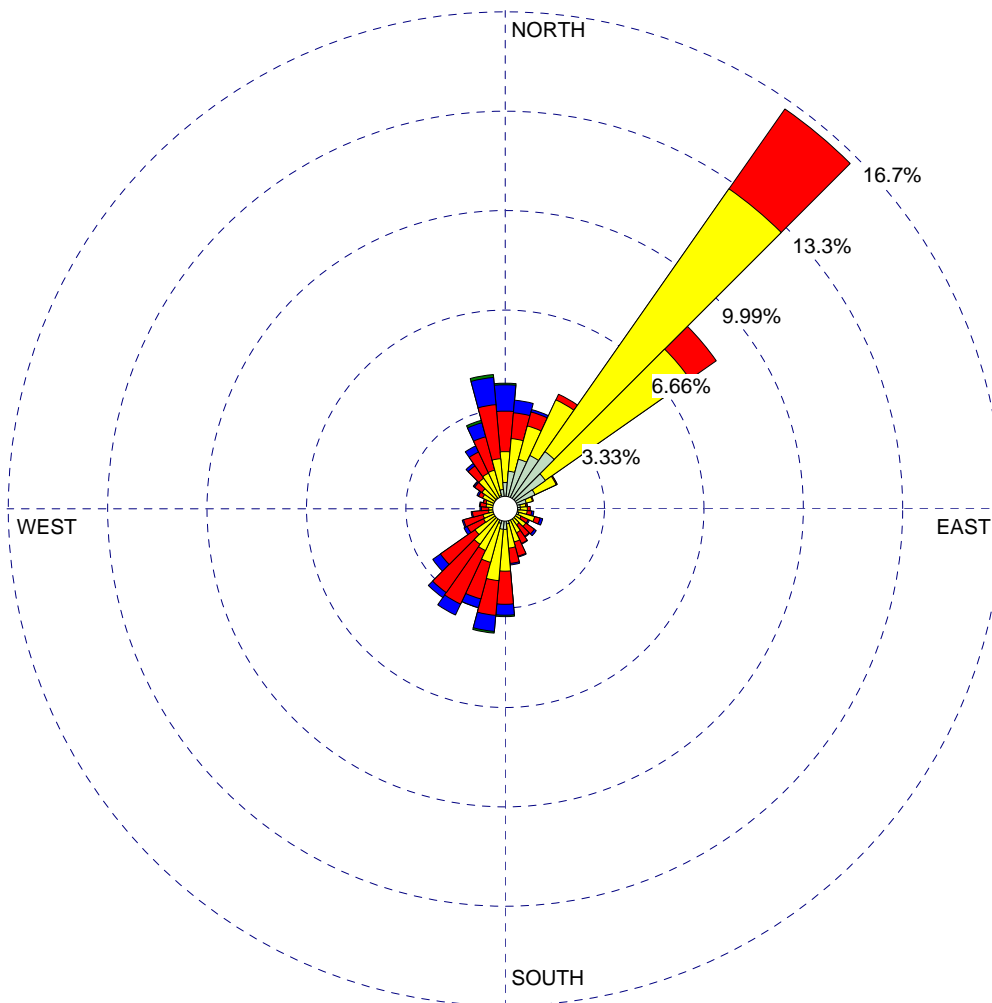
### **Windrose**

WIND ROSE PLOT:

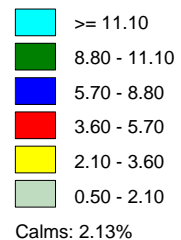
**Alton Coal Development, LLC , Alton, Utah**  
**2018 Annual**

DISPLAY:

**Wind Speed**  
**Direction (blowing from)**



WIND SPEED  
(m/s)



COMMENTS:

DATA PERIOD:

**Start Date: 1/1/2018 - 00:00**  
**End Date: 12/31/2018 - 23:00**

COMPANY NAME:

**Alton Coal Development, LLC - Coal Hollow Mine**

MODELER:

**B. Kirk Nicholes**

CALM WINDS:

**2.13%**

TOTAL COUNT:

**8760 hrs.**

AVG. WIND SPEED:

**3.10 m/s**

DATE:

**2/4/2019**

PROJECT NO.:



Station ID: 1  
 Start Date: 1/1/2018 - 00:00  
 End Date: 12/31/2018 - 23:00

Run ID:

Frequency Distribution  
 (Count)

Wind Direction (Blowing From) / Wind Speed (m/s)

|         | 0.50 - 2.10 | 2.10 - 3.60 | 3.60 - 5.70 | 5.70 - 8.80 | 8.80 - 11.10 | >= 11.10 | Total |
|---------|-------------|-------------|-------------|-------------|--------------|----------|-------|
| 355-5   | 77          | 90          | 119         | 77          | 5            | 0        | 368   |
| 5-15    | 110         | 96          | 76          | 37          | 0            | 0        | 319   |
| 15-25   | 150         | 101         | 42          | 8           | 0            | 0        | 301   |
| 25-35   | 172         | 180         | 18          | 0           | 0            | 0        | 370   |
| 35-45   | 204         | 939         | 286         | 0           | 0            | 0        | 1429  |
| 45-55   | 144         | 517         | 94          | 0           | 0            | 0        | 755   |
| 55-65   | 97          | 68          | 3           | 1           | 0            | 0        | 169   |
| 65-75   | 64          | 19          | 3           | 0           | 0            | 0        | 86    |
| 75-85   | 45          | 16          | 4           | 1           | 0            | 0        | 66    |
| 85-95   | 45          | 20          | 9           | 0           | 0            | 0        | 74    |
| 95-105  | 38          | 27          | 13          | 7           | 0            | 0        | 85    |
| 105-115 | 42          | 48          | 16          | 8           | 0            | 0        | 114   |
| 115-125 | 16          | 36          | 23          | 4           | 0            | 0        | 79    |
| 125-135 | 22          | 52          | 31          | 7           | 0            | 0        | 112   |
| 135-145 | 27          | 31          | 42          | 2           | 0            | 0        | 102   |
| 145-155 | 33          | 45          | 35          | 2           | 0            | 0        | 115   |
| 155-165 | 37          | 64          | 43          | 3           | 0            | 0        | 147   |
| 165-175 | 45          | 71          | 45          | 5           | 0            | 0        | 166   |
| 175-185 | 61          | 122         | 97          | 32          | 4            | 0        | 316   |
| 185-195 | 61          | 151         | 102         | 47          | 5            | 0        | 366   |
| 195-205 | 45          | 118         | 111         | 26          | 1            | 0        | 301   |
| 205-215 | 35          | 101         | 173         | 35          | 0            | 0        | 344   |
| 215-225 | 32          | 96          | 172         | 18          | 0            | 0        | 318   |
| 225-235 | 31          | 77          | 123         | 28          | 0            | 0        | 259   |
| 235-245 | 26          | 44          | 53          | 10          | 0            | 0        | 133   |
| 245-255 | 26          | 41          | 59          | 4           | 0            | 0        | 130   |
| 255-265 | 23          | 26          | 47          | 4           | 0            | 0        | 100   |
| 265-275 | 23          | 25          | 22          | 4           | 0            | 0        | 74    |
| 275-285 | 28          | 28          | 17          | 3           | 0            | 0        | 76    |
| 285-295 | 33          | 25          | 8           | 1           | 0            | 0        | 67    |
| 295-305 | 35          | 38          | 13          | 5           | 0            | 0        | 91    |
| 305-315 | 36          | 47          | 26          | 4           | 1            | 0        | 114   |
| 315-325 | 38          | 71          | 44          | 9           | 0            | 0        | 162   |
| 325-335 | 33          | 82          | 68          | 20          | 0            | 0        | 203   |
| 335-345 | 40          | 77          | 101         | 43          | 7            | 0        | 268   |
| 345-355 | 57          | 90          | 159         | 80          | 8            | 0        | 394   |
| Total   | 2031        | 3679        | 2297        | 535         | 31           | 0        | 8760  |

Frequency of Calm Winds: 187  
 Average Wind Speed: 3.10 m/s

Station ID: 1  
 Start Date: 1/1/2018 - 00:00  
 End Date: 12/31/2018 - 23:00

Run ID:

Frequency Distribution  
 (Normalized)

Wind Direction (Blowing From) / Wind Speed (m/s)

|         | 0.50 - 2.10 | 2.10 - 3.60 | 3.60 - 5.70 | 5.70 - 8.80 | 8.80 - 11.10 | >= 11.10 | Total           |
|---------|-------------|-------------|-------------|-------------|--------------|----------|-----------------|
| 355-5   | 0.008790    | 0.010274    | 0.013584    | 0.008790    | 0.000571     | 0.000000 | <b>0.042009</b> |
| 5-15    | 0.012557    | 0.010959    | 0.008676    | 0.004224    | 0.000000     | 0.000000 | <b>0.036416</b> |
| 15-25   | 0.017123    | 0.011530    | 0.004795    | 0.000913    | 0.000000     | 0.000000 | <b>0.034361</b> |
| 25-35   | 0.019635    | 0.020548    | 0.002055    | 0.000000    | 0.000000     | 0.000000 | <b>0.042237</b> |
| 35-45   | 0.023288    | 0.107192    | 0.032648    | 0.000000    | 0.000000     | 0.000000 | <b>0.163128</b> |
| 45-55   | 0.016438    | 0.059018    | 0.010731    | 0.000000    | 0.000000     | 0.000000 | <b>0.086187</b> |
| 55-65   | 0.011073    | 0.007763    | 0.000342    | 0.000114    | 0.000000     | 0.000000 | <b>0.019292</b> |
| 65-75   | 0.007306    | 0.002169    | 0.000342    | 0.000000    | 0.000000     | 0.000000 | <b>0.009817</b> |
| 75-85   | 0.005137    | 0.001826    | 0.000457    | 0.000114    | 0.000000     | 0.000000 | <b>0.007534</b> |
| 85-95   | 0.005137    | 0.002283    | 0.001027    | 0.000000    | 0.000000     | 0.000000 | <b>0.008447</b> |
| 95-105  | 0.004338    | 0.003082    | 0.001484    | 0.000799    | 0.000000     | 0.000000 | <b>0.009703</b> |
| 105-115 | 0.004795    | 0.005479    | 0.001826    | 0.000913    | 0.000000     | 0.000000 | <b>0.013014</b> |
| 115-125 | 0.001826    | 0.004110    | 0.002626    | 0.000457    | 0.000000     | 0.000000 | <b>0.009018</b> |
| 125-135 | 0.002511    | 0.005936    | 0.003539    | 0.000799    | 0.000000     | 0.000000 | <b>0.012785</b> |
| 135-145 | 0.003082    | 0.003539    | 0.004795    | 0.000228    | 0.000000     | 0.000000 | <b>0.011644</b> |
| 145-155 | 0.003767    | 0.005137    | 0.003995    | 0.000228    | 0.000000     | 0.000000 | <b>0.013128</b> |
| 155-165 | 0.004224    | 0.007306    | 0.004909    | 0.000342    | 0.000000     | 0.000000 | <b>0.016781</b> |
| 165-175 | 0.005137    | 0.008105    | 0.005137    | 0.000571    | 0.000000     | 0.000000 | <b>0.018950</b> |
| 175-185 | 0.006963    | 0.013927    | 0.011073    | 0.003653    | 0.000457     | 0.000000 | <b>0.036073</b> |
| 185-195 | 0.006963    | 0.017237    | 0.011644    | 0.005365    | 0.000571     | 0.000000 | <b>0.041781</b> |
| 195-205 | 0.005137    | 0.013470    | 0.012671    | 0.002968    | 0.000114     | 0.000000 | <b>0.034361</b> |
| 205-215 | 0.003995    | 0.011530    | 0.019749    | 0.003995    | 0.000000     | 0.000000 | <b>0.039269</b> |
| 215-225 | 0.003653    | 0.010959    | 0.019635    | 0.002055    | 0.000000     | 0.000000 | <b>0.036301</b> |
| 225-235 | 0.003539    | 0.008790    | 0.014041    | 0.003196    | 0.000000     | 0.000000 | <b>0.029566</b> |
| 235-245 | 0.002968    | 0.005023    | 0.006050    | 0.001142    | 0.000000     | 0.000000 | <b>0.015183</b> |
| 245-255 | 0.002968    | 0.004680    | 0.006735    | 0.000457    | 0.000000     | 0.000000 | <b>0.014840</b> |
| 255-265 | 0.002626    | 0.002968    | 0.005365    | 0.000457    | 0.000000     | 0.000000 | <b>0.011416</b> |
| 265-275 | 0.002626    | 0.002854    | 0.002511    | 0.000457    | 0.000000     | 0.000000 | <b>0.008447</b> |
| 275-285 | 0.003196    | 0.003196    | 0.001941    | 0.000342    | 0.000000     | 0.000000 | <b>0.008676</b> |
| 285-295 | 0.003767    | 0.002854    | 0.000913    | 0.000114    | 0.000000     | 0.000000 | <b>0.007648</b> |
| 295-305 | 0.003995    | 0.004338    | 0.001484    | 0.000571    | 0.000000     | 0.000000 | <b>0.010388</b> |
| 305-315 | 0.004110    | 0.005365    | 0.002968    | 0.000457    | 0.000114     | 0.000000 | <b>0.013014</b> |
| 315-325 | 0.004338    | 0.008105    | 0.005023    | 0.001027    | 0.000000     | 0.000000 | <b>0.018493</b> |
| 325-335 | 0.003767    | 0.009361    | 0.007763    | 0.002283    | 0.000000     | 0.000000 | <b>0.023174</b> |
| 335-345 | 0.004566    | 0.008790    | 0.011530    | 0.004909    | 0.000799     | 0.000000 | <b>0.030594</b> |
| 345-355 | 0.006507    | 0.010274    | 0.018151    | 0.009132    | 0.000913     | 0.000000 | <b>0.044977</b> |
| Total   | 0.231849    | 0.419977    | 0.262215    | 0.061073    | 0.003539     | 0.000000 | 0.978653        |

Frequency of Calm Winds: 2.13%  
 Average Wind Speed: 3.10 m/s

## **APPENDIX B**

### **Listing of PM<sub>10</sub> Concentrations**

## **Background Monitor 962A**

# PM<sub>10</sub> Sampler Summary

January 1, 2017 - December 31, 2017

Network: Alton Coal Development, LLC

Site: Coal Hollow

Sampler ID: Coal Hollow-A

AQS ID:

Sampler Type: BGI FRM Single

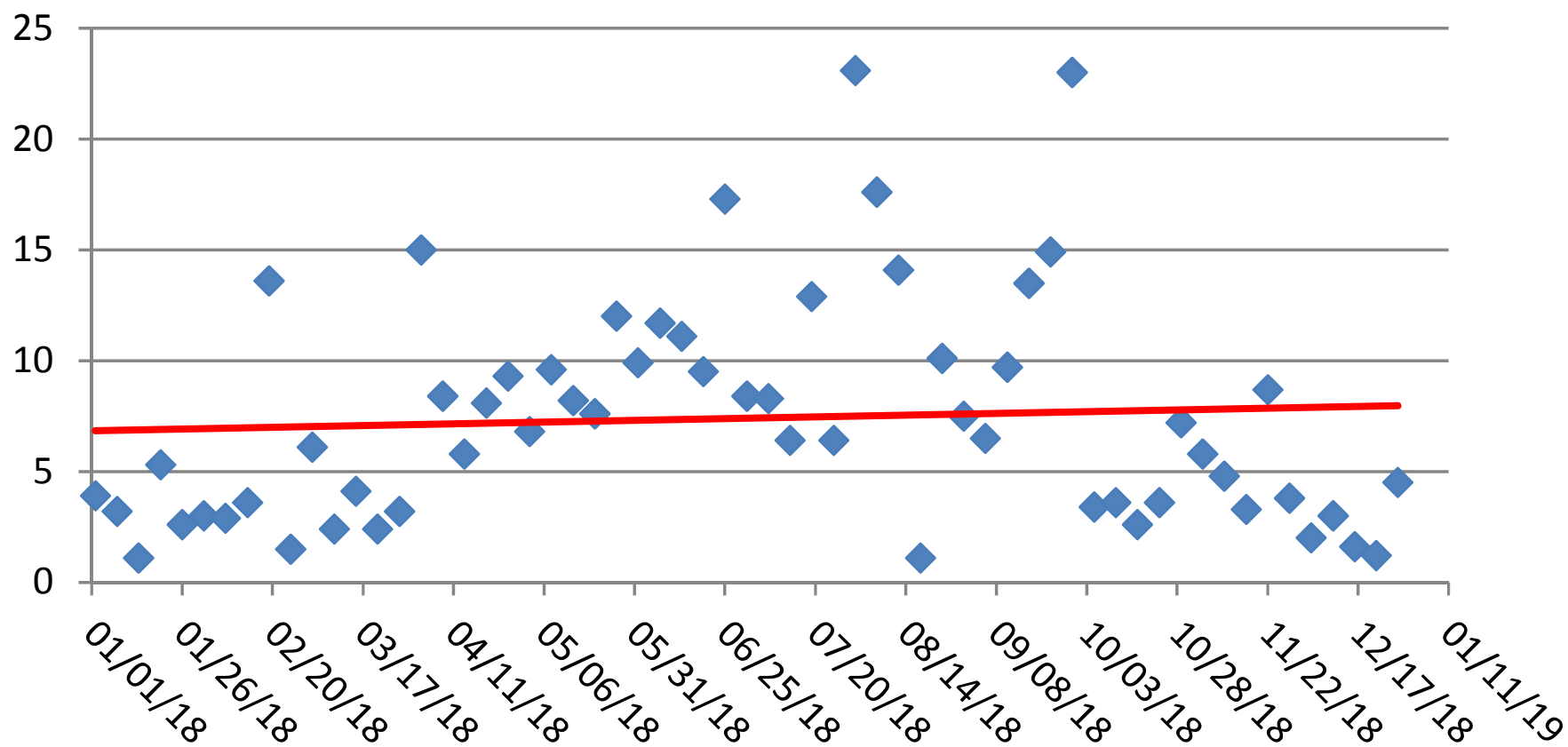
| Date     | Filter ID | Concentration | Concentration | Sample Period (hr:min) | Sample Volume (m3) | Std Volume (m3) | Mass (mg) |          |        | Flag  | Comments |
|----------|-----------|---------------|---------------|------------------------|--------------------|-----------------|-----------|----------|--------|-------|----------|
|          |           | (µg/m3) LTP   | (µg/m3) STP   |                        |                    |                 | Tare      | Gross    | Net    |       |          |
| 01/02/18 | P2945554  | 3.2           | 3.9           | 23:59                  | 24.0               | 20.0            | 373.599   | 373.678  | 0.079  | TD    |          |
| 01/08/18 | P2945560  | 2.7           | 3.2           | 23:59                  | 24.0               | 20.0            | 370.844   | 370.909  | 0.065  |       |          |
| 01/14/18 | P2945745  | 0.9           | 1.1           | 23:59                  | 24.0               | 20.2            | 382.742   | 382.766  | 0.024  |       |          |
| 01/20/18 | P2945750  | 4.4           | 5.3           | 23:59                  | 24.0               | 20.0            | 367.000   | 367.107  | 0.107  |       |          |
| 01/26/18 | P2945755  | 2.2           | 2.6           | 23:59                  | 24.0               | 20.4            | 368.094   | 368.149  | 0.055  |       |          |
| 02/01/18 | P2946012  | 2.5           | 3.0           | 23:59                  | 24.0               | 19.9            | 376.416   | 376.477  | 0.061  |       |          |
| 02/07/18 | P2946017  | 2.4           | 2.9           | 23:59                  | 24.0               | 20.1            | 375.199   | 375.258  | 0.059  |       |          |
| 02/13/18 | P2946206  | 3.0           | 3.6           | 23:59                  | 24.0               | 20.2            | 364.753   | 364.826  | 0.073  |       |          |
| 02/19/18 | P2946211  | 11.3          | 13.6          | 23:59                  | 24.0               | 20.0            | 368.648   | 368.922  | 0.274  | HT    |          |
| 02/25/18 | P2946403  | 1.2           | 1.5           | 23:59                  | 24.0               | 20.7            | 375.455   | 375.486  | 0.031  |       |          |
| 03/03/18 | P2946408  | 5.0           | 6.1           | 23:59                  | 24.0               | 19.8            | 366.714   | 366.835  | 0.121  |       |          |
| 03/09/18 | P2946413  | 2.0           | 2.4           | 23:59                  | 24.0               | 19.8            | 374.731   | 374.780  | 0.049  |       |          |
| 03/15/18 | P2946643  | 3.4           | 4.1           | 23:59                  | 24.0               | 20.0            | 372.210   | 372.293  | 0.083  |       |          |
| 03/21/18 | P2946649  | 2.0           | 2.4           | 23:59                  | 24.0               | 19.7            | 385.294   | 385.343  | 0.049  |       |          |
| 03/27/18 | P2946883  | 2.7           | 3.2           | 23:59                  | 24.0               | 20.1            | 374.169   | 374.234  | 0.065  |       |          |
| 04/02/18 | P2946888  | 12.1          | 15.0          | 23:59                  | 24.0               | 19.4            | 377.389   | 377.682  | 0.293  | HT    |          |
| 04/08/18 | P2947088  | 6.8           | 8.4           | 23:59                  | 24.0               | 19.5            | 370.141   | 370.306  | 0.165  | HT    |          |
| 04/14/18 | P2947093  | 4.8           | 5.8           | 23:59                  | 24.0               | 19.8            | 365.078   | 365.194  | 0.116  |       |          |
| 04/20/18 | P2947098  | 6.7           | 8.1           | 23:59                  | 24.0               | 20.0            | 375.336   | 375.499  | 0.163  |       |          |
| 04/26/18 | P2947323  | 7.4           | 9.3           | 23:59                  | 24.0               | 19.2            | 372.989   | 373.168  | 0.179  |       |          |
| 05/02/18 | P2947329  | 5.6           | 6.8           | 23:59                  | 24.0               | 20.0            | 375.054   | 375.191  | 0.137  | HT    |          |
| 05/08/18 | P2947557  | 7.6           | 9.6           | 23:59                  | 24.0               | 19.0            | 365.064   | 365.247  | 0.183  |       |          |
| 05/14/18 | P2947563  | 6.6           | 8.2           | 23:59                  | 24.0               | 19.4            | 373.866   | 374.026  | 0.160  |       |          |
| 05/20/18 | P2947769  | 6.0           | 7.6           | 23:59                  | 24.0               | 19.2            | 371.007   | 371.153  | 0.146  |       |          |
| 05/26/18 | P2947774  | 9.6           | 12.0          | 23:59                  | 24.0               | 19.1            | 372.731   | 372.962  | 0.231  |       |          |
| 06/01/18 | P2947779  | 7.9           | 9.9           | 23:59                  | 24.0               | 19.1            | 383.763   | 383.953  | 0.190  | TD    |          |
| 06/07/18 | P2948031  | 9.3           | 11.7          | 23:59                  | 24.0               | 19.0            | 372.046   | 372.270  | 0.224  |       |          |
| 06/13/18 | P2948037  | 8.6           | 11.1          | 23:59                  | 24.0               | 18.8            | 377.774   | 377.983  | 0.209  |       |          |
| 06/19/18 | P2948230  | 7.5           | 9.5           | 23:59                  | 24.0               | 19.0            | 377.464   | 377.645  | 0.181  | TD    |          |
| 06/25/18 | P2948236  | 13.5          | 17.3          | 23:59                  | 24.0               | 18.8            | 365.015   | 365.340  | 0.325  | TD    |          |
| 07/01/18 | P2948704  | 6.5           | 8.4           | 24:00                  | 24.0               | 18.8            | 391.0540  | 391.2123 | 0.1583 | TD    |          |
| 07/07/18 | P2948709  | 6.5           | 8.3           | 23:59                  | 24.0               | 18.8            | 388.9360  | 389.0932 | 0.1572 |       |          |
| 07/13/18 | P2948715  | 5.1           | 6.4           | 23:59                  | 24.0               | 19.0            | 392.5680  | 392.6913 | 0.1233 | TD    |          |
| 07/19/18 | P2948948  | 10.2          | 12.9          | 23:59                  | 24.0               | 19.0            | 410.6231  | 410.8690 | 0.2459 |       |          |
| 07/25/18 | P2948953  | 5.0           | 6.4           | 23:59                  | 24.0               | 18.9            | 393.5954  | 393.7177 | 0.1223 |       |          |
| 07/31/18 | P2949155  | 18.1          | 23.1          | 23:59                  | 24.0               | 18.8            | 392.9473  | 393.3828 | 0.4355 |       |          |
| 08/06/18 | P2949160  | 13.8          | 17.6          | 23:59                  | 24.0               | 18.9            | 393.2147  | 393.5481 | 0.3334 |       |          |
| 08/12/18 | P2949399  | 11.1          | 14.1          | 23:59                  | 24.0               | 19.0            | 391.5743  | 391.8417 | 0.2674 | TD    |          |
| 08/18/18 | P2949404  | 0.9           | 1.1           | 23:59                  | 24.0               | 18.9            | 391.7598  | 391.7817 | 0.0219 |       |          |
| 08/24/18 | P2949409  | 8.0           | 10.1          | 23:59                  | 24.0               | 19.1            | 390.3189  | 390.5126 | 0.1937 | TD,HT |          |
| 08/30/18 | P2949630  | 6.0           | 7.5           | 23:59                  | 24.0               | 19.1            | 401.3590  | 401.5038 | 0.1448 | HT    |          |
| 09/05/18 | P2949635  | 5.2           | 6.5           | 23:59                  | 24.0               | 19.3            | 395.2832  | 395.4103 | 0.1271 |       |          |
| 09/11/18 | P2949882  | 7.7           | 9.7           | 23:59                  | 24.0               | 19.0            | 391.5992  | 391.7851 | 0.1859 |       |          |
| 09/17/18 | P2950114  | 10.7          | 13.5          | 23:59                  | 24.0               | 19.0            | 390.4620  | 390.7201 | 0.2581 |       |          |
| 09/23/18 | P2949888  | 11.8          | 14.9          | 23:59                  | 24.0               | 19.2            | 394.3169  | 394.6023 | 0.2854 |       |          |
| 09/29/18 | P2950113  | 18.2          | 23.0          | 23:59                  | 24.0               | 19.1            | 394.9721  | 395.4119 | 0.4398 |       |          |
| 10/05/18 | P2950123  | 2.8           | 3.4           | 23:59                  | 24.0               | 19.5            | 394.1833  | 394.2507 | 0.0674 |       |          |
| 10/11/18 | P2950417  | 2.9           | 3.6           | 23:59                  | 24.0               | 19.7            | 394.5398  | 394.6116 | 0.0718 |       |          |
| 10/17/18 | P2950422  | 2.2           | 2.6           | 23:59                  | 24.0               | 20.0            | 394.4949  | 394.5481 | 0.0532 |       |          |
| 10/23/18 | P2951628  | 3.0           | 3.6           | 23:59                  | 24.0               | 19.7            | 402.2977  | 402.3699 | 0.0722 |       |          |
| 10/29/18 | P2951633  | 5.8           | 7.2           | 23:59                  | 24.0               | 19.6            | 389.0833  | 389.2247 | 0.1414 |       |          |
| 11/04/18 | P2951916  | 4.8           | 5.8           | 23:59                  | 24.0               | 19.8            | 395.8603  | 395.9760 | 0.1157 |       |          |
| 11/10/18 | P2951921  | 4.0           | 4.8           | 23:59                  | 24.0               | 20.1            | 393.7945  | 393.8927 | 0.0982 |       |          |
| 11/16/18 | P2951926  | 2.7           | 3.3           | 23:59                  | 24.0               | 19.9            | 396.2521  | 396.3179 | 0.0658 | TD    |          |
| 11/22/18 | P2952180  | 7.3           | 8.7           | 23:59                  | 24.0               | 20.0            | 391.2868  | 391.4629 | 0.1761 |       |          |
| 11/28/18 | P2952185  | 3.1           | 3.8           | 23:59                  | 24.0               | 19.9            | 396.4885  | 396.5648 | 0.0763 |       |          |
| 12/04/18 | P2952454  | 1.8           | 2.0           | 23:59                  | 24.0               | 20.9            | 396.4934  | 396.5370 | 0.0436 |       |          |
| 12/10/18 | P2952461  | 2.5           | 3.0           | 23:59                  | 24.0               | 20.3            | 397.5821  | 397.6438 | 0.0617 |       |          |
| 12/16/18 | P2952666  | 1.3           | 1.6           | 24:00                  | 24.0               | 20.1            | 389.9435  | 389.9768 | 0.0333 |       |          |
| 12/22/18 | P2952671  | 1.0           | 1.2           | 23:59                  | 24.0               | 20.2            | 387.4469  | 387.4718 | 0.0249 |       |          |
| 12/28/18 | P2952676  | 3.9           | 4.5           | 23:59                  | 24.0               | 20.6            | 394.9915  | 395.0854 | 0.0939 |       |          |
| 03/16/18 | P2946648  |               | Field Blank   |                        |                    |                 | 390.681   | 390.689  | 0.008  |       |          |
| 04/27/18 | P2947328  |               | Field Blank   |                        |                    |                 | 376.142   | 376.150  | 0.008  |       |          |
| 06/22/18 | P2948235  |               | Field Blank   |                        |                    |                 | 370.529   | 370.535  | 0.006  |       |          |
| 07/16/18 | P2948947  |               | Field Blank   |                        |                    |                 | 411.5897  | 411.6081 | 0.0184 |       |          |

# Valid 61 Recovery 100% Average 7.4 St. Dev. 5.2 Max 23.1 Min 1.1

# 962A Background Data-2018

$$y = 0.0031x - 128.02$$
$$R^2 = 0.0042$$

◆ Series1 — Linear (Series1)





## **Compliance Monitor 963B**

# PM<sub>10</sub> Sampler Summary

January 1, 2017 - December 31, 2017

Network: Alton Coal Development, LLC

Site: Coal Hollow

Sampler ID: Coal Hollow-B

AQS ID:

Sampler Type: BGI FRM Single

| Date     | Filter ID | Concentration (µg/m3) | Concentration (µg/m3) | Sample Period (hr:min) | Sample Volume (m3) | Std Volume (m3) | Mass (mg) |          |        | Flag     | Comments     |
|----------|-----------|-----------------------|-----------------------|------------------------|--------------------|-----------------|-----------|----------|--------|----------|--------------|
|          |           | LTP                   | STP                   |                        |                    |                 | Tare      | Gross    | Net    |          |              |
| 01/02/18 | P2945555  | 9.4                   | 11.2                  | 23:59                  | 24.0               | 20.3            | 369.681   | 369.909  | 0.228  |          |              |
| 01/08/18 | P2945561  | 8.2                   | 9.8                   | 23:59                  | 24.0               | 20.3            | 371.974   | 372.173  | 0.199  |          |              |
| 01/14/18 | P2945746  | 1.3                   | 1.5                   | 23:59                  | 24.0               | 20.4            | 380.807   | 380.839  | 0.032  |          |              |
| 01/20/18 | P2945751  | 4.1                   | 4.9                   | 23:59                  | 24.0               | 20.1            | 365.470   | 365.570  | 0.100  |          |              |
| 01/26/18 | P2945756  | 3.4                   | 4.0                   | 23:59                  | 24.0               | 20.6            | 366.254   | 366.337  | 0.083  |          |              |
| 02/01/18 | P2946013  | 15.3                  | 18.3                  | 23:59                  | 24.0               | 20.1            | 367.031   | 367.399  | 0.368  |          |              |
| 02/07/18 | P2946018  | 10.3                  | 12.2                  | 23:59                  | 24.0               | 20.2            | 373.723   | 373.971  | 0.248  |          |              |
| 02/13/18 | P2946207  | 3.8                   | 4.5                   | 23:59                  | 24.0               | 20.4            | 371.973   | 372.066  | 0.093  |          |              |
| 02/19/18 | P2946212  | 7.9                   | 9.4                   | 23:59                  | 24.0               | 20.2            | 366.083   | 366.274  | 0.191  | HT       |              |
| 02/25/18 | P2946404  | 1.4                   | 1.7                   | 23:59                  | 24.0               | 20.9            | 373.348   | 373.384  | 0.036  |          |              |
| 03/03/18 | P2946409  | 3.4                   | 4.1                   | 23:59                  | 24.0               | 20.0            | 385.131   | 385.213  | 0.082  |          |              |
| 03/09/18 | P2946414  | 10.6                  | 12.8                  | 23:59                  | 24.0               | 20.0            | 373.313   | 373.570  | 0.257  |          |              |
| 03/15/18 | P2946644  | Invalid - AG          | Invalid - AG          | 34:12                  | 34.3               | 28.9            | 370.880   | 370.989  | 0.109  | SP,CI    |              |
| 03/21/18 | P2946650  | 3.9                   | 4.7                   | 23:59                  | 24.0               | 19.9            | 362.937   | 363.032  | 0.095  |          |              |
| 03/27/18 | P2946884  | 7.3                   | 8.7                   | 23:59                  | 24.0               | 20.2            | 375.764   | 375.941  | 0.177  |          |              |
| 04/02/18 | P2946889  | 11.0                  | 13.5                  | 23:59                  | 24.0               | 19.5            | 372.974   | 373.239  | 0.265  | HT       |              |
| 04/08/18 | P2947089  | Invalid - AG          | Invalid - AG          | 58:55                  | 59.0               | 48.8            | 370.515   | 372.011  | 1.496  | SP,CI,HT |              |
| 04/14/18 | P2947094  | 6.4                   | 7.7                   | 23:59                  | 24.0               | 20.0            | 369.885   | 370.040  | 0.155  |          |              |
| 04/20/18 | P2947099  | 18.0                  | 21.6                  | 23:59                  | 24.0               | 20.1            | 368.923   | 369.358  | 0.435  |          |              |
| 04/26/18 | P2947324  | 16.8                  | 20.8                  | 23:59                  | 24.0               | 19.4            | 375.763   | 376.167  | 0.404  |          |              |
| 05/02/18 | P2947330  | 6.1                   | 7.3                   | 23:59                  | 24.0               | 20.1            | 373.012   | 373.160  | 0.148  | HT       |              |
| 05/08/18 | P2947558  | 43.9                  | 54.9                  | 23:59                  | 24.0               | 19.2            | 374.886   | 375.941  | 1.055  |          |              |
| 05/14/18 | P2947564  | 36.4                  | 44.9                  | 23:59                  | 24.0               | 19.5            | 373.748   | 374.625  | 0.877  |          |              |
| 05/20/18 | P2947770  | 6.6                   | 8.2                   | 23:59                  | 24.0               | 19.4            | 370.213   | 370.372  | 0.159  |          |              |
| 05/26/18 | P2947775  | 14.0                  | 17.5                  | 23:59                  | 24.0               | 19.3            | 375.230   | 375.568  | 0.338  |          |              |
| 06/01/18 | P2947780  | 19.9                  | 24.9                  | 23:59                  | 24.0               | 19.3            | 369.690   | 370.170  | 0.480  |          |              |
| 06/07/18 | P2948032  | 64.5                  | 81.1                  | 23:59                  | 24.0               | 19.1            | 375.762   | 377.314  | 1.552  |          |              |
| 06/13/18 | P2948038  | 50.4                  | 64.0                  | 23:59                  | 24.0               | 18.9            | 372.610   | 373.821  | 1.211  |          |              |
| 06/19/18 | P2948231  | 32.0                  | 40.1                  | 23:59                  | 24.0               | 19.2            | 371.373   | 372.143  | 0.770  |          |              |
| 06/25/18 | P2948237  | 24.3                  | 30.8                  | 23:59                  | 24.0               | 19.0            | 368.409   | 368.994  | 0.585  |          |              |
| 07/01/18 | P2948705  | 9.2                   | 11.7                  | 24:00                  | 24.0               | 19.0            | 386.4100  | 386.6326 | 0.2226 |          |              |
| 07/07/18 | P2948710  | 8.7                   | 11.0                  | 23:59                  | 24.0               | 18.9            | 391.2630  | 391.4723 | 0.2093 |          |              |
| 07/13/18 | P2948716  | 19.9                  | 24.9                  | 23:59                  | 24.0               | 19.2            | 394.6700  | 395.1499 | 0.4799 |          |              |
| 07/19/18 | P2948949  | 18.3                  | 23.0                  | 23:59                  | 24.0               | 19.1            | 410.2914  | 410.7323 | 0.4409 |          |              |
| 07/25/18 | P2948955  | 13.0                  | 16.4                  | 23:59                  | 24.0               | 19.0            | 395.1783  | 395.4911 | 0.3128 |          |              |
| 07/31/18 | P2949156  | Invalid - AI          | Invalid - AI          |                        |                    |                 | 391.5289  | 392.2269 | 0.6980 | SP,MD    | No data      |
| 08/06/18 | P2949161  | 32.8                  | 41.5                  | 23:59                  | 24.0               | 19.0            | 398.1049  | 398.8930 | 0.7881 |          |              |
| 08/12/18 | P2949400  | 10.6                  | 13.3                  | 23:59                  | 24.0               | 19.1            | 399.5121  | 399.7676 | 0.2555 |          |              |
| 08/18/18 | P2949405  | 11.6                  | 14.7                  | 23:59                  | 24.0               | 19.0            | 394.9971  | 395.2776 | 0.2805 |          |              |
| 08/24/18 | P2949410  | 12.6                  | 15.8                  | 23:59                  | 24.0               | 19.2            | 388.8527  | 389.1576 | 0.3049 | HT       |              |
| 08/30/18 | P2949631  | 7.9                   | 9.9                   | 23:59                  | 24.0               | 19.2            | 399.6083  | 399.7997 | 0.1914 | HT       |              |
| 09/05/18 | P2949636  | 6.2                   | 7.7                   | 23:59                  | 24.0               | 19.5            | 394.6139  | 394.7642 | 0.1503 |          |              |
| 09/11/18 | P2949883  | 31.6                  | 39.7                  | 23:59                  | 24.0               | 19.1            | 394.7780  | 395.5361 | 0.7581 |          |              |
| 09/17/18 | P2950116  | 23.3                  | 29.2                  | 23:59                  | 24.0               | 19.1            | 398.3685  | 398.9293 | 0.5608 |          |              |
| 09/23/18 | P2949889  | Invalid - AN          | Invalid - AN          | 0:03                   |                    |                 | 403.3045  | 403.3164 | 0.0119 | SP,FE    |              |
| 09/29/18 | P2950115  | 19.8                  | 24.8                  | 23:59                  | 24.0               | 19.2            | 394.4354  | 394.9131 | 0.4777 |          |              |
| 10/05/18 | P2950124  | Invalid - AN          | Invalid - AN          | 0:03                   |                    |                 | 393.5072  | 393.5123 | 0.0051 | SP,FE    |              |
| 10/11/18 | P2950418  | Invalid - AN          | Invalid - AN          | 0:03                   |                    |                 | 393.1551  | 393.1640 | 0.0089 | SP,FE    |              |
| 10/17/18 | P2950423  | Invalid - AN          | Invalid - AN          | 6:35                   | 6.6                | 5.4             | 394.1190  | 394.2068 | 0.0878 | SP,CI    | Did not run  |
| 10/23/18 | P2951629  | Invalid - AN          | Invalid - AN          |                        |                    |                 | 395.7624  | 395.7728 | 0.0104 | SP,MD    | No data      |
| 10/29/18 | P2951634  | 15.7                  | 19.2                  | 23:59                  | 24.0               | 19.7            | 391.5482  | 391.9265 | 0.3783 |          |              |
| 11/04/18 | P2951917  | 4.7                   | 5.6                   | 23:59                  | 24.0               | 19.9            | 399.3784  | 399.4914 | 0.1130 |          |              |
| 11/10/18 | P2951922  | 6.8                   | 8.0                   | 23:59                  | 24.0               | 20.2            | 395.7829  | 395.9464 | 0.1635 |          |              |
| 11/16/18 | P2951927  | Invalid - AN          | Invalid - AN          |                        |                    |                 | 396.1102  | 397.4143 | 1.3041 | SP,MD    | Data corrupt |
| 11/22/18 | P2952181  | Invalid - AN          | Invalid - AN          |                        |                    |                 | 389.2870  | 389.3053 | 0.0183 | SP,MD    | Did not run  |
| 11/28/18 | P2952186  | 5.4                   | 6.5                   | 23:59                  | 24.0               | 20.0            | 392.7649  | 392.8968 | 0.1319 |          |              |
| 12/04/18 | P2952455  | 2.1                   | 2.4                   | 23:59                  | 24.0               | 21.1            | 394.0822  | 394.1331 | 0.0509 |          |              |
| 12/10/18 | P2952459  | 6.2                   | 7.3                   | 23:59                  | 24.0               | 20.6            | 397.5245  | 397.6748 | 0.1503 |          |              |
| 12/16/18 | P2952668  | 1.4                   | 1.7                   | 24:00                  | 24.0               | 20.3            | 389.2084  | 389.2441 | 0.0357 |          |              |
| 12/22/18 | P2952672  | 4.9                   | 5.7                   | 23:59                  | 24.0               | 20.3            | 392.7591  | 392.8770 | 0.1179 |          |              |
| 12/28/18 | P2952677  | 3.5                   | 4.1                   | 23:59                  | 24.0               | 20.8            | 395.9679  | 396.0538 | 0.0859 |          |              |
| 03/05/18 | P2946654  |                       | Field Blank           |                        |                    |                 | 372.007   | 372.012  | 0.005  |          |              |
| 05/04/18 | P2947334  |                       | Field Blank           |                        |                    |                 | 373.610   | 373.616  | 0.006  |          |              |
| 07/20/18 | P2948954  |                       | Field Blank           |                        |                    |                 | 394.3051  | 394.3312 | 0.0261 |          |              |

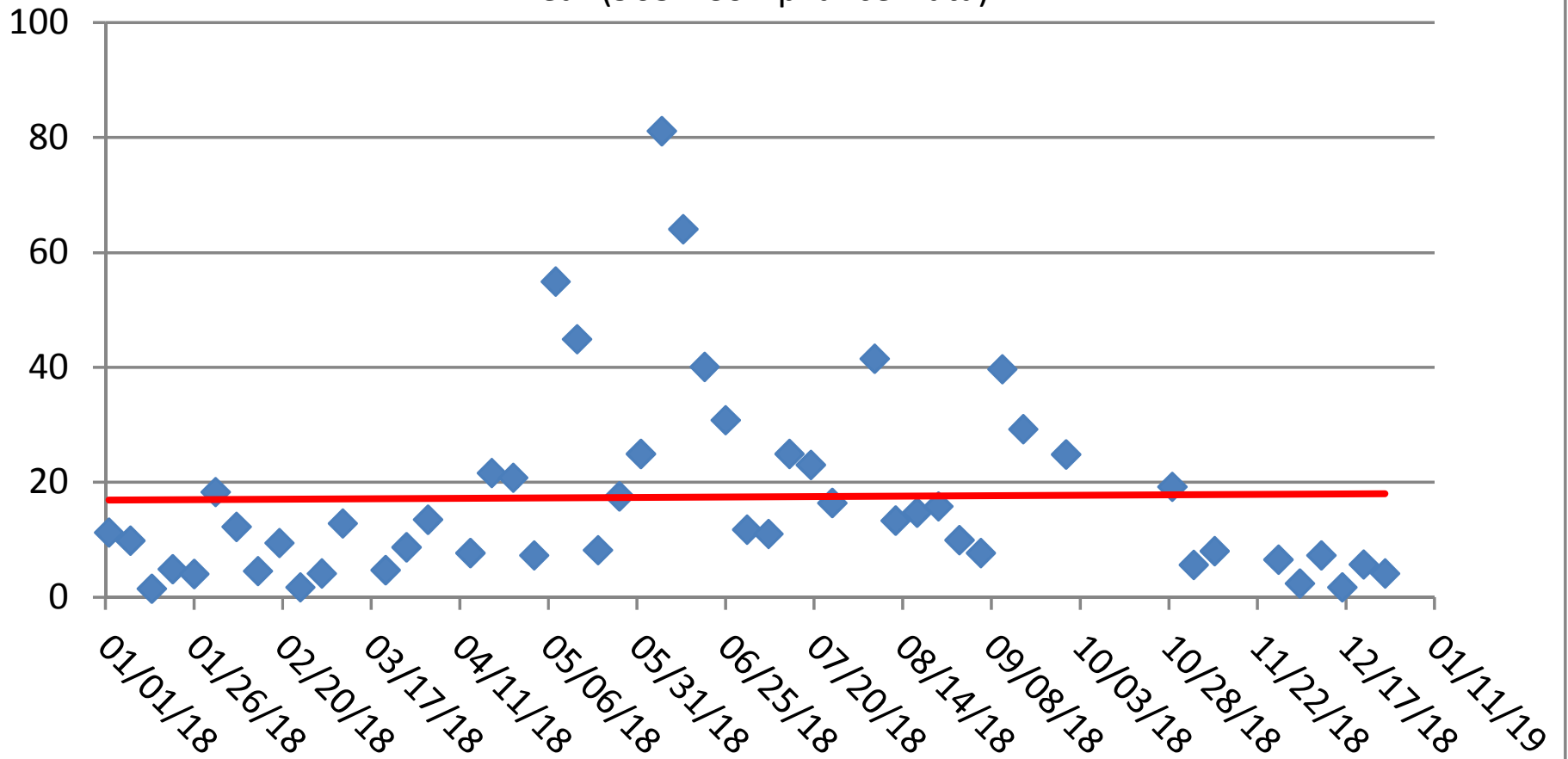
|         |          |         |          |      |     |
|---------|----------|---------|----------|------|-----|
| # Valid | Recovery | Average | St. Dev. | Max  | Min |
| 51      | 84%      | 17.4    | 16.7     | 81.1 | 1.5 |

# 963B Compliance Data-2018

$$y = 0.0031x - 115.27$$
$$R^2 = 0.0004$$

◆ 963B Compliance Data

— Linear (963B Compliance Data)



## **Collocated Monitor 964C**

# PM<sub>10</sub> Sampler Summary

January 1, 2017 - December 31, 2017

Network: Alton Coal Development, LLC

Site: Coal Hollow

Sampler ID: Coal Hollow-C

AQS ID:

Sampler Type: BGI FRM Single

| Date       | Filter ID | Concentration (µg/m3) | Concentration (µg/m3) | Sample Period (hr:min) | Sample Volume (m3) | Std Volume (m3) | Mass (mg) |          |        | Flag     | Comments |
|------------|-----------|-----------------------|-----------------------|------------------------|--------------------|-----------------|-----------|----------|--------|----------|----------|
|            |           | LTP                   | STP                   |                        |                    |                 | Tare      | Gross    | Net    |          |          |
| 01/02/18   | P2945556  | 19.6                  | 23.2                  | 23:43                  | 23.8               | 20.1            | 373.580   | 374.048  | 0.468  | FE       |          |
| 01/08/18   | P2945562  | Invalid - AN          | Invalid - AN          | 16:54                  | 16.9               | 14.4            | 373.649   | 373.774  | 0.125  | SP,FE    |          |
| 01/14/18   | P2945747  | 1.2                   | 1.5                   | 23:59                  | 24.0               | 20.4            | 381.002   | 381.033  | 0.031  |          |          |
| 01/20/18   | P2945752  | 3.7                   | 4.4                   | 23:59                  | 24.0               | 20.2            | 364.825   | 364.915  | 0.090  |          |          |
| 01/26/18   | P2945757  | 3.8                   | 4.5                   | 23:59                  | 24.0               | 20.7            | 369.434   | 369.527  | 0.093  |          |          |
| 02/01/18   | P2946014  | 17.1                  | 20.4                  | 23:59                  | 24.0               | 20.1            | 368.938   | 369.350  | 0.412  |          |          |
| 02/07/18   | P2946019  | 11.6                  | 13.8                  | 23:59                  | 24.1               | 20.3            | 365.867   | 366.148  | 0.281  |          |          |
| 02/13/18   | P2946208  | 3.2                   | 3.7                   | 23:59                  | 24.1               | 20.5            | 374.344   | 374.421  | 0.077  |          |          |
| 02/19/18   | P2946213  | 8.6                   | 10.2                  | 23:59                  | 24.0               | 20.2            | 369.023   | 369.231  | 0.208  | HT       |          |
| 02/25/18   | P2946405  | 1.7                   | 2.0                   | 23:59                  | 24.0               | 20.9            | 366.986   | 367.028  | 0.042  |          |          |
| 03/03/18   | P2946410  | 3.6                   | 4.3                   | 23:59                  | 24.0               | 20.0            | 386.729   | 386.817  | 0.088  |          |          |
| 03/09/18   | P2946415  | 14.0                  | 16.8                  | 23:59                  | 24.0               | 20.0            | 377.970   | 378.307  | 0.337  |          |          |
| 03/15/18   | P2946645  | 2.7                   | 3.2                   | 23:59                  | 24.1               | 20.2            | 378.675   | 378.740  | 0.065  |          |          |
| 03/21/18   | P2946651  | 2.7                   | 3.3                   | 23:59                  | 24.1               | 19.9            | 365.454   | 365.521  | 0.067  |          |          |
| 03/27/18   | P2946885  | 7.0                   | 8.3                   | 23:59                  | 24.0               | 20.3            | 380.264   | 380.434  | 0.170  |          |          |
| 04/02/18   | P2946890  | 10.3                  | 12.6                  | 24:00                  | 24.0               | 19.6            | 377.995   | 378.243  | 0.248  | HT       |          |
| 04/08/18   | P2947090  | 7.2                   | 8.8                   | 23:59                  | 24.0               | 19.7            | 365.754   | 365.929  | 0.175  | HT       |          |
| 04/14/18   | P2947095  | 7.1                   | 8.6                   | 23:59                  | 24.0               | 20.1            | 372.896   | 373.069  | 0.173  |          |          |
| 04/20/18   | P2947100  | 18.6                  | 22.2                  | 23:59                  | 24.0               | 20.1            | 373.078   | 373.527  | 0.449  |          |          |
| 04/26/18   | P2947325  | 34.4                  | 42.5                  | 23:59                  | 24.0               | 19.4            | 386.786   | 387.613  | 0.827  |          |          |
| 05/02/18   | P2947331  | Invalid - AG          | Invalid - AG          | 13:24                  | 13.4               | 11.2            | 377.314   | 377.427  | 0.113  | SP,FE,HT |          |
| 05/08/18   | P2947559  | 40.9                  | 51.1                  | 23:59                  | 24.0               | 19.3            | 369.516   | 370.501  | 0.985  |          |          |
| 05/14/18   | P2947565  | 32.1                  | 39.4                  | 23:59                  | 24.0               | 19.6            | 370.423   | 371.195  | 0.772  |          |          |
| 05/20/18   | P2947771  | Invalid - AG          | Invalid - AG          | 6:58                   | 7.0                | 5.8             | 373.439   | 373.477  | 0.038  | SP,FE    |          |
| 05/26/18   | P2947776  | Invalid - AG          | Invalid - AG          | 6:01                   | 6.0                | 4.7             | 376.583   | 377.317  | 0.734  | SP       |          |
| 06/01/18   | P2947781  | 10.5                  | 13.0                  | 23:59                  | 24.0               | 19.3            | 370.547   | 370.800  | 0.253  |          |          |
| 06/07/18   | P2948033  | 25.6                  | 32.0                  | 23:59                  | 24.0               | 19.2            | 378.472   | 379.088  | 0.616  |          |          |
| 06/13/18   | P2948039  | 41.1                  | 52.0                  | 23:59                  | 24.0               | 19.0            | 373.285   | 374.273  | 0.988  |          |          |
| 06/19/18   | P2948232  | 28.2                  | 35.2                  | 23:59                  | 24.0               | 19.2            | 370.543   | 371.222  | 0.679  |          |          |
| 06/25/18   | P2948238  | 31.7                  | 40.1                  | 23:59                  | 24.0               | 19.0            | 370.953   | 371.716  | 0.763  |          |          |
| 07/01/18   | P2948706  | 9.0                   | 11.3                  | 24:00                  | 24.0               | 19.0            | 390.3320  | 390.5487 | 0.2167 |          |          |
| 07/07/18   | P2948711  | Invalid - AQ          | Invalid - AQ          | 24:01                  | 24.0               | 18.8            | 392.4690  | 392.9538 | 0.4848 | CI       |          |
| 07/13/18   | P2948717  | 16.1                  | 20.1                  | 23:27                  | 23.4               | 18.7            | 390.6380  | 391.0159 | 0.3779 | FE       |          |
| 07/19/18   | P2948950  | Invalid - AN          | Invalid - AN          | 0:05                   | 0.1                | 0.1             | 395.2159  | 395.2287 | 0.0128 | SP,FE,CV |          |
| 07/25/18   | P2948956  | Invalid - AN          | Invalid - AN          | 0:04                   | 0.1                | 0.1             | 392.0671  | 392.0806 | 0.0135 | SP,FE    |          |
| 07/31/18   | P2949157  | Invalid - AN          | Invalid - AN          | 22:46                  | 22.8               | 18.0            | 391.6869  | 392.3139 | 0.6270 | SP,FE    |          |
| 08/06/18   | P2949162  | 38.9                  | 49.1                  | 23:59                  | 24.0               | 19.0            | 397.8629  | 398.7984 | 0.9355 |          |          |
| 08/12/18   | P2949401  | 10.0                  | 12.6                  | 23:59                  | 24.0               | 19.2            | 391.5548  | 391.7975 | 0.2427 |          |          |
| 08/18/18   | P2949406  | 12.2                  | 15.3                  | 23:59                  | 24.0               | 19.1            | 395.6267  | 395.9202 | 0.2935 |          |          |
| 08/24/18   | P2949411  | 58.2                  | 72.5                  | 23:49                  | 23.8               | 19.1            | 388.5952  | 389.9843 | 1.3891 | HT       |          |
| 08/30/18   | P2949632  | 8.7                   | 10.9                  | 23:59                  | 24.0               | 19.3            | 396.3817  | 396.5926 | 0.2109 | HT       |          |
| 09/05/18   | P2949637  | 6.8                   | 8.3                   | 23:25                  | 23.5               | 19.1            | 394.0313  | 394.1913 | 0.1600 | FE       |          |
| 09/11/18   | P2949884  | 34.4                  | 43.1                  | 23:59                  | 24.0               | 19.2            | 391.7225  | 392.5501 | 0.8276 |          |          |
| 09/17/18   | P2950117  | Invalid - AN          | Invalid - AN          | 22:31                  | 22.6               | 18.0            | 391.1037  | 391.6711 | 0.5674 | SP,FE    |          |
| 09/23/18   | P2949890  | Invalid - AN          | Invalid - AN          | 7:13                   | 7.2                | 6.0             | 396.4955  | 396.5513 | 0.0558 | SP,FE    |          |
| 09/29/18   | P2950120  | Invalid - AG          | Invalid - AG          | 6:43                   | 6.7                | 5.4             | 393.5365  | 394.9093 | 1.3728 | SP       |          |
| 10/05/18   | P2950125  | 3.2                   | 3.9                   | 23:59                  | 24.0               | 19.7            | 389.4343  | 389.5127 | 0.0784 |          |          |
| 10/11/18   | P2950419  | 3.7                   | 4.5                   | 23:23                  | 23.4               | 19.5            | 401.2496  | 401.3379 | 0.0883 | FE       |          |
| 10/17/18   | P2950424  | 4.9                   | 5.8                   | 23:59                  | 24.0               | 20.3            | 388.4740  | 388.5927 | 0.1187 |          |          |
| 10/23/18   | P2951630  | 4.4                   | 5.2                   | 24:00                  | 24.0               | 20.0            | 392.2922  | 392.3981 | 0.1059 |          |          |
| 10/29/18   | P2951635  | 20.0                  | 24.4                  | 23:59                  | 24.0               | 19.8            | 394.9893  | 395.4721 | 0.4828 |          |          |
| 11/04/18   | P2951918  | 4.8                   | 5.7                   | 23:59                  | 24.0               | 20.0            | 392.7097  | 392.8256 | 0.1159 |          |          |
| 11/10/18   | P2951923  | 7.1                   | 8.4                   | 23:41                  | 23.7               | 20.1            | 398.2643  | 398.4337 | 0.1694 | FE       |          |
| 11/16/18   | P2951928  | Invalid - AN          | Invalid - AN          | 22:08                  | 22.2               | 18.6            | 399.8122  | 401.6370 | 1.8248 | SP,FE    |          |
| 11/22/18   | P2952182  | Invalid - AN          | Invalid - AN          | 6:10                   | 6.2                | 5.4             | 394.8228  | 395.3407 | 0.5179 | SP       |          |
| 11/28/18   | P2952187  | Invalid - AN          | Invalid - AN          | 7:31                   | 7.5                | 6.4             | 384.5929  | 384.6595 | 0.0666 | SP,FE    |          |
| 12/04/18   | P2952456  | Invalid - AN          | Invalid - AN          | 0:39                   | 0.7                | 0.6             | 389.9278  | 389.9481 | 0.0203 | SP,FE    |          |
| 12/10/18   | P2952460  | Invalid - AN          | Invalid - AN          | 0:05                   | 0.1                | 0.1             | 397.1466  | 397.1599 | 0.0133 | SP,FE,CV |          |
| 12/16/18   | P2952667  | 1.5                   | 1.8                   | 24:00                  | 24.0               | 20.4            | 393.1207  | 393.1583 | 0.0376 |          |          |
| 12/22/18   | P2952673  | 5.3                   | 6.2                   | 23:59                  | 24.0               | 20.4            | 391.6736  | 391.8017 | 0.1281 |          |          |
| 12/28/18   | P2952678  | Invalid - AN          | Invalid - AN          | 10:27                  | 10.5               | 9.1             | 391.6550  | 391.7080 | 0.0530 | SP,FE    |          |
| 02/14/18   | P2946216  |                       | Field Blank           |                        |                    |                 | 376.018   | 376.027  | 0.009  |          |          |
| 05/09/18   | P2947562  |                       | Field Blank           |                        |                    |                 | 373.864   | 373.872  | 0.008  |          |          |
| 09/18/18   | P2949887  |                       | Field Blank           |                        |                    |                 | 395.1453  | 395.1917 | 0.0464 | FBout    | Particle |
| # Valid 44 |           | Recovery 72%          | Average 17.9          | St. Dev. 17.1          | Max 72.5           | Min 1.5         |           |          |        |          |          |

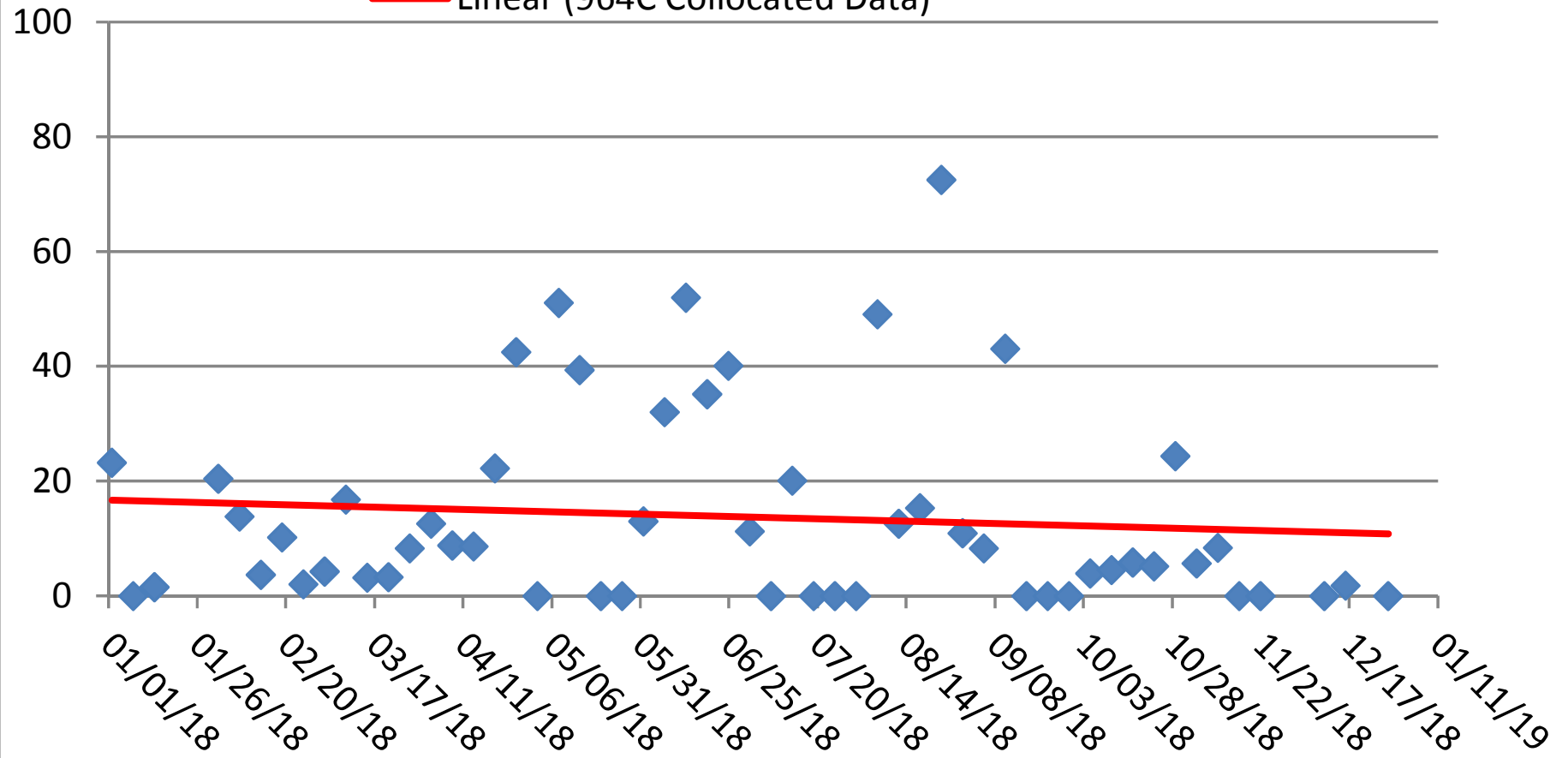
# 964C Collocated Data-2018

$$y = -0.0163x + 719.92$$

$$R^2 = 0.0092$$

◆ 964C Collocated Data

— Linear (964C Collocated Data)



**Compliance Monitor 2366D**

# PM<sub>10</sub> Sampler Summary

January 1, 2017 - December 31, 2017

Network: Alton Coal Development, LLC

Site: Coal Hollow

Sampler ID: Coal Hollow-D

AQS ID:

Sampler Type: BGI FRM Single

| Date     | Filter ID | Concentration | Concentration | Sample Period (hr:min) | Sample Volume (m3) | Std Volume (m3) | Mass (mg) |          |        | Flag  | Comments        |
|----------|-----------|---------------|---------------|------------------------|--------------------|-----------------|-----------|----------|--------|-------|-----------------|
|          |           | (µg/m3) LTP   | (µg/m3) STP   |                        |                    |                 | Tare      | Gross    | Net    |       |                 |
| 01/02/18 | P2945557  | 5.5           | 6.5           | 23:59                  | 24.0               | 20.3            | 372.099   | 372.232  | 0.133  |       |                 |
| 01/08/18 | P2945563  | 4.9           | 5.9           | 23:59                  | 24.0               | 20.2            | 370.646   | 370.766  | 0.120  |       |                 |
| 01/14/18 | P2945748  | 1.8           | 2.1           | 23:59                  | 24.0               | 20.3            | 383.588   | 383.632  | 0.044  |       |                 |
| 01/20/18 | P2945753  | 4.2           | 5.1           | 23:59                  | 24.0               | 20.2            | 368.664   | 368.767  | 0.103  |       |                 |
| 01/26/18 | P2945758  | 4.6           | 5.3           | 23:59                  | 24.0               | 20.6            | 365.110   | 365.221  | 0.111  |       |                 |
| 02/01/18 | P2946015  | 60.5          | 72.7          | 23:59                  | 24.0               | 20.0            | 373.703   | 375.158  | 1.455  |       |                 |
| 02/07/18 | P2946020  | 12.7          | 15.1          | 23:59                  | 24.0               | 20.2            | 376.057   | 376.363  | 0.306  |       |                 |
| 02/13/18 | P2946209  | 5.0           | 5.9           | 23:59                  | 24.0               | 20.4            | 366.900   | 367.021  | 0.121  |       |                 |
| 02/19/18 | P2946214  | 16.3          | 19.4          | 23:59                  | 24.0               | 20.2            | 370.607   | 371.000  | 0.393  | HT    |                 |
| 02/25/18 | P2946406  | 2.0           | 2.3           | 23:59                  | 24.0               | 20.9            | 370.965   | 371.014  | 0.049  |       |                 |
| 03/03/18 | P2946411  | 16.3          | 19.7          | 23:59                  | 24.0               | 20.0            | 386.524   | 386.918  | 0.394  |       |                 |
| 03/09/18 | P2946416  | 55.3          | 66.7          | 23:59                  | 24.0               | 19.9            | 370.969   | 372.299  | 1.330  |       |                 |
| 03/15/18 | P2946646  | 10.1          | 12.1          | 23:59                  | 24.0               | 20.1            | 379.062   | 379.307  | 0.245  |       |                 |
| 03/21/18 | P2946652  | 35.7          | 43.2          | 23:59                  | 24.0               | 19.9            | 365.878   | 366.738  | 0.860  |       |                 |
| 03/27/18 | P2946886  | 22.2          | 26.3          | 23:59                  | 24.0               | 20.3            | 375.618   | 376.152  | 0.534  |       |                 |
| 04/02/18 | P2946891  | 47.9          | 58.8          | 24:00                  | 24.0               | 19.6            | 379.145   | 380.298  | 1.153  | HT    |                 |
| 04/08/18 | P2947091  | 7.2           | 8.8           | 23:59                  | 24.0               | 19.7            | 371.451   | 371.626  | 0.175  | HT    |                 |
| 04/14/18 | P2947096  | 7.1           | 8.6           | 23:59                  | 24.0               | 20.0            | 371.289   | 371.462  | 0.173  |       |                 |
| 04/20/18 | P2947101  | 22.1          | 26.4          | 23:59                  | 24.0               | 20.1            | 377.581   | 378.113  | 0.532  |       |                 |
| 04/26/18 | P2947326  | 57.0          | 70.8          | 23:59                  | 24.0               | 19.4            | 391.077   | 392.449  | 1.372  |       |                 |
| 05/02/18 | P2947332  | 6.9           | 8.2           | 23:59                  | 24.0               | 20.1            | 373.581   | 373.747  | 0.166  | HT    |                 |
| 05/08/18 | P2947560  | 38.1          | 47.8          | 23:59                  | 24.0               | 19.2            | 378.016   | 378.932  | 0.916  |       |                 |
| 05/14/18 | P2947566  | 36.7          | 45.2          | 23:59                  | 24.0               | 19.5            | 368.285   | 369.169  | 0.884  |       |                 |
| 05/20/18 | P2947772  | 6.9           | 8.6           | 23:59                  | 24.0               | 19.3            | 374.157   | 374.324  | 0.167  |       |                 |
| 05/26/18 | P2947777  | 34.4          | 42.6          | 23:59                  | 24.0               | 19.4            | 381.831   | 382.659  | 0.828  |       |                 |
| 06/01/18 | P2947782  | 38.6          | 48.2          | 23:59                  | 24.0               | 19.2            | 371.598   | 372.527  | 0.929  |       |                 |
| 06/07/18 | P2948035  | 47.7          | 60.0          | 23:59                  | 24.0               | 19.1            | 364.697   | 365.845  | 1.148  |       |                 |
| 06/13/18 | P2948040  | 322.5         | 410.1         | 23:59                  | 24.0               | 18.9            | 365.442   | 373.192  | 7.750  |       | Loose particles |
| 06/19/18 | P2948233  | 135.6         | 170.3         | 23:59                  | 24.0               | 19.1            | 362.163   | 365.424  | 3.261  |       | Loose particles |
| 06/25/18 | P2948239  | Invalid - AG  | Invalid - AG  | 63:11                  | 63.3               | 49.6            | 370.842   | 379.812  | 8.970  | SP,CI | Loose particles |
| 07/01/18 | P2948707  | 37.5          | 47.6          | 24:00                  | 24.0               | 19.0            | 392.2050  | 393.1088 | 0.9038 |       |                 |
| 07/07/18 | P2948712  | 47.1          | 59.9          | 23:59                  | 24.0               | 18.9            | 395.5040  | 396.6367 | 1.1327 |       |                 |
| 07/13/18 | P2948718  | 247.7         | 310.8         | 23:59                  | 24.0               | 19.2            | 384.9500  | 390.9035 | 5.9535 | EH    | Loose particles |
| 07/19/18 | P2948951  | 91.0          | 114.6         | 23:59                  | 24.0               | 19.1            | 385.9337  | 388.1222 | 2.1885 |       |                 |
| 07/25/18 | P2948957  | 27.5          | 34.9          | 23:59                  | 24.0               | 18.9            | 390.5236  | 391.1863 | 0.6627 |       |                 |
| 07/31/18 | P2949158  | 75.7          | 96.4          | 23:59                  | 24.0               | 18.9            | 394.1691  | 395.9890 | 1.8199 |       |                 |
| 08/06/18 | P2949163  | 120.8         | 153.5         | 23:59                  | 24.0               | 18.9            | 387.2243  | 390.1286 | 2.9043 |       |                 |
| 08/12/18 | P2949402  | 13.0          | 16.4          | 23:59                  | 24.0               | 19.1            | 390.6152  | 390.9299 | 0.3147 |       |                 |
| 08/18/18 | P2949407  | Invalid - AI  | Invalid - AI  |                        |                    |                 | 391.1424  | 391.1536 | 0.0112 | MD    | No data         |
| 08/24/18 | P2949412  | 21.0          | 26.3          | 23:59                  | 24.0               | 19.2            | 388.5365  | 389.0420 | 0.5055 | HT    |                 |
| 08/30/18 | P2949633  | 116.7         | 146.2         | 23:59                  | 24.0               | 19.2            | 398.8828  | 401.6901 | 2.8073 | HT    |                 |
| 09/05/18 | P2949638  | 41.0          | 50.6          | 23:59                  | 24.0               | 19.5            | 395.4711  | 396.4570 | 0.9859 |       |                 |
| 09/11/18 | P2949885  | 107.0         | 134.5         | 23:59                  | 24.0               | 19.1            | 392.2175  | 394.7900 | 2.5725 |       |                 |
| 09/17/18 | P2950118  | 83.5          | 105.0         | 23:59                  | 24.0               | 19.1            | 394.2477  | 396.2562 | 2.0085 |       |                 |
| 09/23/18 | P2949891  | 17.2          | 21.5          | 23:59                  | 24.0               | 19.3            | 390.5518  | 390.9672 | 0.4154 |       |                 |
| 09/29/18 | P2950121  | 119.8         | 149.8         | 23:59                  | 24.0               | 19.2            | 393.9919  | 396.8727 | 2.8808 |       |                 |
| 10/05/18 | P2950126  | 5.5           | 6.7           | 23:59                  | 24.0               | 19.7            | 383.5001  | 383.6330 | 0.1329 |       |                 |
| 10/11/18 | P2950420  | 5.8           | 7.0           | 23:59                  | 24.0               | 19.9            | 394.9924  | 395.1319 | 0.1395 |       |                 |
| 10/17/18 | P2950425  | 14.9          | 17.8          | 23:59                  | 24.0               | 20.2            | 389.7746  | 390.1347 | 0.3601 |       |                 |
| 10/23/18 | P2951631  | Invalid - AI  | Invalid - AI  |                        |                    |                 | 394.6530  | 394.7436 | 0.0906 | SP,MD | Data corrupt    |
| 10/29/18 | P2951636  | 76.4          | 93.1          | 23:59                  | 24.0               | 19.7            | 395.7656  | 397.6038 | 1.8382 |       |                 |
| 11/04/18 | P2951919  | 4.8           | 5.8           | 23:59                  | 24.0               | 19.9            | 397.3447  | 397.4619 | 0.1172 |       |                 |
| 11/10/18 | P2951924  | 34.1          | 40.6          | 23:59                  | 24.0               | 20.2            | 390.7350  | 391.5564 | 0.8214 |       |                 |
| 11/16/18 | P2951929  | 34.9          | 41.9          | 23:59                  | 24.0               | 20.0            | 396.8132  | 397.6522 | 0.8390 |       |                 |
| 11/22/18 | P2952183  | 12.2          | 14.4          | 23:59                  | 24.0               | 20.3            | 393.4536  | 393.7478 | 0.2942 |       |                 |
| 11/28/18 | P2952189  | 159.8         | 191.6         | 23:59                  | 24.0               | 20.0            | 397.8077  | 401.6494 | 3.8417 |       |                 |
| 12/04/18 | P2952457  | 2.8           | 3.2           | 23:59                  | 24.0               | 21.1            | 397.1055  | 397.1747 | 0.0692 |       |                 |
| 12/10/18 | P2952462  | 8.1           | 9.5           | 23:59                  | 24.0               | 20.5            | 393.9348  | 394.1314 | 0.1966 |       |                 |
| 12/16/18 | P2952669  | 7.6           | 9.0           | 23:59                  | 24.0               | 20.3            | 388.8653  | 389.0480 | 0.1827 |       |                 |
| 12/22/18 | P2952674  | 10.2          | 12.1          | 24:00                  | 24.0               | 20.3            | 390.6447  | 390.8919 | 0.2472 |       |                 |
| 12/28/18 | P2952679  | 24.0          | 27.6          | 23:59                  | 24.0               | 20.9            | 394.3590  | 394.9362 | 0.5772 |       |                 |
| 02/02/18 | P2946023  |               | Field Blank   |                        |                    |                 | 382.998   | 383.013  | 0.015  |       |                 |
| 06/04/18 | P2948034  |               | Field Blank   |                        |                    |                 | 365.733   | 365.758  | 0.025  |       |                 |

# Valid  
58

Recovery  
95%

Average  
56.4

St. Dev.  
75.5

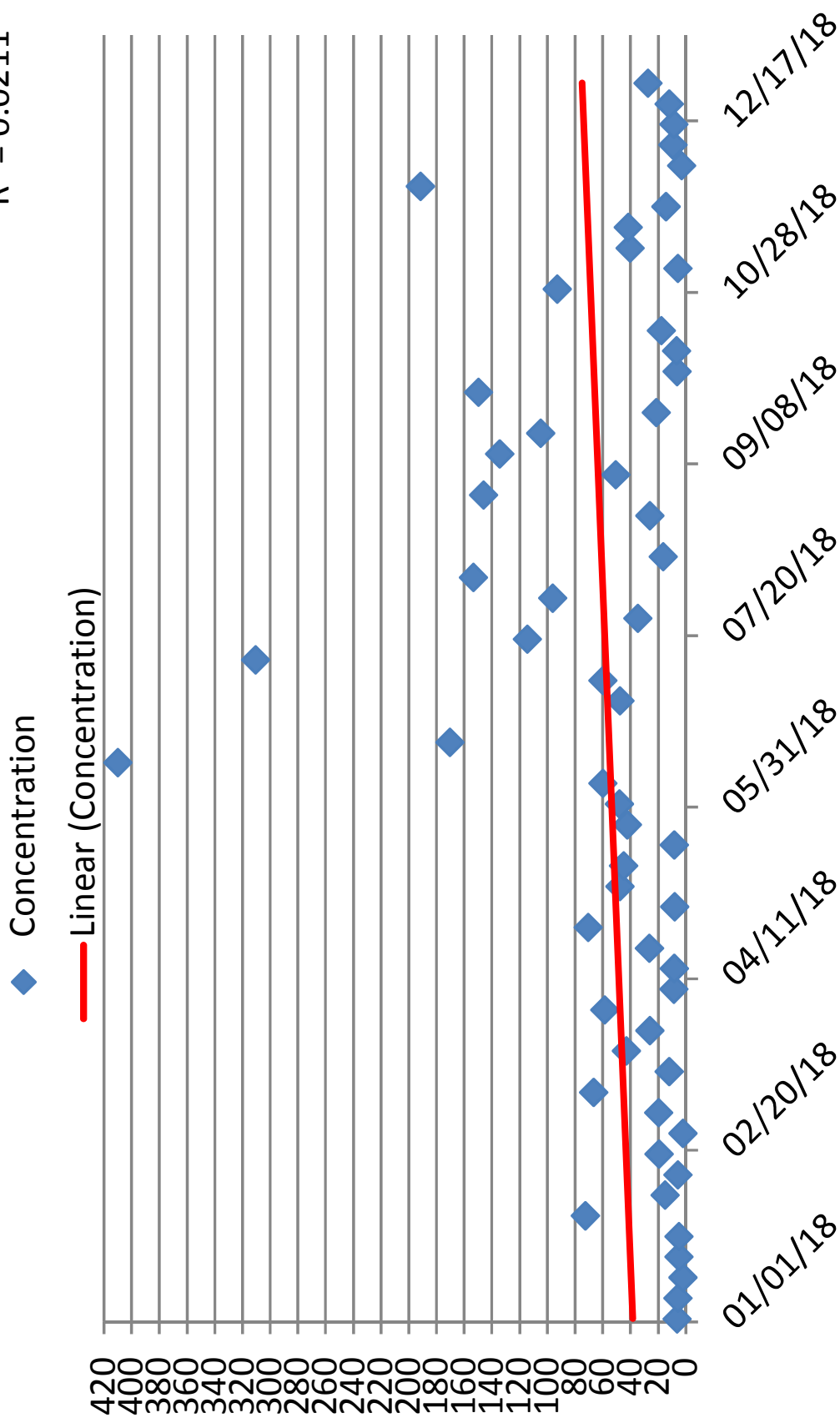
Max  
410.1

Min  
2.1



# 2366D Collocated Data-2018

$$y = 0.1015x - 4334.8$$
$$R^2 = 0.0211$$



## **Collocated Monitor 2398E**

# PM<sub>10</sub> Sampler Summary

January 1, 2017 - December 31, 2017

Network: Alton Coal Development, LLC

Site: Coal Hollow

Sampler ID: Coal Hollow-E

AQS ID:

Sampler Type: BGI FRM Single

| Date     | Filter ID | Concentration | Concentration | Sample Period (hr:min) | Sample Volume (m3) | Std Volume (m3) | Mass (mg) |          |        | Flag  | Comments        |
|----------|-----------|---------------|---------------|------------------------|--------------------|-----------------|-----------|----------|--------|-------|-----------------|
|          |           | (µg/m3) LTP   | (µg/m3) STP   |                        |                    |                 | Tare      | Gross    | Net    |       |                 |
| 01/02/18 | P2945558  | 8.8           | 10.4          | 23:59                  | 24.0               | 20.3            | 369.860   | 370.073  | 0.213  |       |                 |
| 01/08/18 | P2945564  | 2.9           | 3.5           | 23:59                  | 24.0               | 20.2            | 371.577   | 371.648  | 0.071  |       |                 |
| 01/14/18 | P2945749  | 1.4           | 1.7           | 24:00                  | 24.0               | 20.4            | 381.796   | 381.832  | 0.036  |       |                 |
| 01/20/18 | P2945754  | 6.9           | 8.3           | 23:59                  | 24.0               | 20.2            | 368.479   | 368.647  | 0.168  |       |                 |
| 01/26/18 | P2945759  | 6.0           | 7.0           | 23:59                  | 24.0               | 20.6            | 366.593   | 366.739  | 0.146  |       |                 |
| 02/01/18 | P2946016  | 65.2          | 78.1          | 23:59                  | 24.0               | 20.1            | 371.531   | 373.099  | 1.568  |       |                 |
| 02/07/18 | P2946021  | 12.3          | 14.6          | 23:59                  | 24.0               | 20.2            | 373.523   | 373.820  | 0.297  |       |                 |
| 02/13/18 | P2946210  | 5.3           | 6.3           | 23:59                  | 24.0               | 20.4            | 369.449   | 369.578  | 0.129  |       |                 |
| 02/19/18 | P2946215  | 11.5          | 13.7          | 23:59                  | 24.0               | 20.2            | 372.390   | 372.668  | 0.278  | HT    |                 |
| 02/25/18 | P2946407  | 1.7           | 1.9           | 23:59                  | 24.0               | 20.9            | 361.268   | 361.309  | 0.041  |       |                 |
| 03/03/18 | P2946412  | 13.4          | 16.1          | 23:59                  | 24.0               | 20.0            | 379.684   | 380.007  | 0.323  |       |                 |
| 03/09/18 | P2946417  | 61.3          | 73.9          | 23:59                  | 24.0               | 19.9            | 371.332   | 372.806  | 1.474  |       |                 |
| 03/15/18 | P2946647  | 9.1           | 10.9          | 23:59                  | 24.0               | 20.2            | 373.138   | 373.359  | 0.221  |       |                 |
| 03/21/18 | P2946653  | 32.2          | 39.0          | 23:59                  | 24.0               | 19.9            | 374.155   | 374.931  | 0.776  |       |                 |
| 03/27/18 | P2946887  | 20.0          | 23.6          | 23:59                  | 24.0               | 20.3            | 372.957   | 373.438  | 0.481  |       |                 |
| 04/02/18 | P2946892  | 45.4          | 55.7          | 23:59                  | 24.0               | 19.6            | 375.474   | 376.565  | 1.091  | HT    |                 |
| 04/08/18 | P2947092  | 7.7           | 9.4           | 23:59                  | 24.0               | 19.7            | 369.764   | 369.950  | 0.186  | HT    |                 |
| 04/14/18 | P2947097  | 7.7           | 9.2           | 23:59                  | 24.0               | 20.0            | 374.444   | 374.630  | 0.186  |       |                 |
| 04/20/18 | P2947102  | 21.7          | 26.0          | 23:59                  | 24.0               | 20.1            | 370.355   | 370.879  | 0.524  |       |                 |
| 04/26/18 | P2947327  | 50.9          | 63.2          | 23:59                  | 24.0               | 19.4            | 374.426   | 375.651  | 1.225  |       |                 |
| 05/02/18 | P2947333  | 7.0           | 8.4           | 23:59                  | 24.0               | 20.1            | 371.247   | 371.416  | 0.169  | HT    |                 |
| 05/08/18 | P2947561  | 41.7          | 52.3          | 23:59                  | 24.0               | 19.2            | 375.566   | 376.570  | 1.004  |       |                 |
| 05/14/18 | P2947567  | 52.0          | 64.0          | 23:59                  | 24.0               | 19.5            | 378.420   | 379.670  | 1.250  |       |                 |
| 05/20/18 | P2947773  | 8.8           | 10.9          | 23:59                  | 24.0               | 19.3            | 372.113   | 372.325  | 0.212  |       |                 |
| 05/26/18 | P2947778  | 34.4          | 42.5          | 23:59                  | 24.0               | 19.4            | 379.713   | 380.540  | 0.827  |       |                 |
| 06/01/18 | P2947783  | 27.7          | 34.6          | 23:59                  | 24.0               | 19.3            | 368.730   | 369.398  | 0.668  |       |                 |
| 06/07/18 | P2948036  | 70.6          | 88.6          | 23:59                  | 24.0               | 19.2            | 380.173   | 381.871  | 1.698  |       |                 |
| 06/13/18 | P2948041  | 317.0         | 402.6         | 23:59                  | 24.0               | 18.9            | 369.487   | 377.110  | 7.623  |       | Loose particles |
| 06/19/18 | P2948234  | 165.3         | 207.2         | 23:59                  | 24.0               | 19.2            | 373.745   | 377.720  | 3.975  |       | Loose particles |
| 06/25/18 | P2948240  | 115.6         | 146.7         | 23:59                  | 24.0               | 18.9            | 368.360   | 371.139  | 2.779  |       | Loose particles |
| 07/01/18 | P2948708  | 6.7           | 8.5           | 24:00                  | 24.0               | 19.0            | 391.0840  | 391.2474 | 0.1634 |       |                 |
| 07/07/18 | P2948713  | Invalid - AI  | Invalid - AI  |                        |                    |                 | 397.6660  | 398.2978 | 0.6318 | SP,MD | No data         |
| 07/13/18 | P2948719  | 220.6         | 276.3         | 23:59                  | 24.0               | 19.2            | 396.2970  | 401.5984 | 5.3014 | EH    | Loose particles |
| 07/19/18 | P2948952  | 64.4          | 80.8          | 23:59                  | 24.0               | 19.1            | 392.9267  | 394.4748 | 1.5481 |       |                 |
| 07/25/18 | P2948958  | 34.6          | 43.8          | 23:59                  | 24.0               | 19.0            | 391.9415  | 392.7743 | 0.8328 |       |                 |
| 07/31/18 | P2949159  | 68.7          | 87.3          | 23:59                  | 24.0               | 18.9            | 393.0424  | 394.6956 | 1.6532 |       |                 |
| 08/06/18 | P2949164  | 83.8          | 106.3         | 23:59                  | 24.0               | 18.9            | 393.5857  | 395.6012 | 2.0155 |       |                 |
| 08/12/18 | P2949403  | 13.7          | 17.2          | 23:59                  | 24.0               | 19.1            | 396.0417  | 396.3716 | 0.3299 |       |                 |
| 08/18/18 | P2949408  | Invalid - AG  | Invalid - AG  | 1:24                   | 1.4                | 1.2             | 393.9629  | 393.9846 | 0.0217 | SP    |                 |
| 08/24/18 | P2949413  | 28.2          | 35.2          | 23:59                  | 24.0               | 19.2            | 394.0541  | 394.7321 | 0.6780 | HT    |                 |
| 08/30/18 | P2949634  | 169.7         | 211.9         | 23:59                  | 24.0               | 19.3            | 395.8089  | 399.8890 | 4.0801 | HT,EH |                 |
| 09/05/18 | P2949639  | 46.2          | 57.0          | 23:59                  | 24.0               | 19.5            | 394.4182  | 395.5300 | 1.1118 |       |                 |
| 09/11/18 | P2949886  | 95.2          | 119.5         | 23:59                  | 24.0               | 19.2            | 393.8432  | 396.1326 | 2.2894 |       |                 |
| 09/17/18 | P2950119  | 83.6          | 105.0         | 23:59                  | 24.0               | 19.2            | 388.4291  | 390.4406 | 2.0115 |       |                 |
| 09/23/18 | P2949892  | 15.7          | 19.6          | 23:59                  | 24.0               | 19.3            | 388.8324  | 389.2117 | 0.3793 |       |                 |
| 09/29/18 | P2950122  | 114.6         | 143.1         | 23:59                  | 24.0               | 19.3            | 393.5801  | 396.3359 | 2.7558 |       |                 |
| 10/05/18 | P2950127  | 5.0           | 6.2           | 23:59                  | 24.0               | 19.7            | 394.3662  | 394.4886 | 0.1224 |       |                 |
| 10/11/18 | P2950421  | 5.5           | 6.6           | 23:59                  | 24.0               | 19.9            | 391.4853  | 391.6185 | 0.1332 |       |                 |
| 10/17/18 | P2950426  | 14.3          | 17.0          | 23:59                  | 24.0               | 20.2            | 390.7927  | 391.1371 | 0.3444 |       |                 |
| 10/23/18 | P2951632  | 3.9           | 4.7           | 23:59                  | 24.0               | 19.9            | 392.2438  | 392.3389 | 0.0951 |       |                 |
| 10/29/18 | P2951637  | Invalid - AG  | Invalid - AG  | 13:29                  | 13.5               | 11.1            | 394.0511  | 395.2278 | 1.1767 | SP    |                 |
| 11/04/18 | P2951920  | 4.7           | 5.7           | 23:59                  | 24.0               | 19.9            | 397.8135  | 397.9287 | 0.1152 |       |                 |
| 11/10/18 | P2951925  | 40.6          | 48.4          | 23:59                  | 24.0               | 20.2            | 396.4090  | 397.3857 | 0.9767 |       |                 |
| 11/16/18 | P2951930  | 24.9          | 29.9          | 23:59                  | 24.0               | 20.0            | 395.2014  | 395.8006 | 0.5992 |       |                 |
| 11/22/18 | P2952184  | 11.0          | 13.1          | 24:00                  | 24.0               | 20.3            | 392.3320  | 392.5988 | 0.2668 |       |                 |
| 11/28/18 | P2952191  | 176.1         | 211.2         | 23:59                  | 24.0               | 20.0            | 398.3554  | 402.5907 | 4.2353 |       |                 |
| 12/04/18 | P2952458  | 2.7           | 3.1           | 23:59                  | 24.0               | 21.1            | 396.9192  | 396.9851 | 0.0659 |       |                 |
| 12/10/18 | P2952463  | 7.9           | 9.3           | 23:59                  | 24.0               | 20.5            | 393.7009  | 393.8929 | 0.1920 |       |                 |
| 12/16/18 | P2952670  | 6.5           | 7.7           | 23:59                  | 24.0               | 20.3            | 384.2918  | 384.4488 | 0.1570 |       |                 |
| 12/22/18 | P2952675  | 12.0          | 14.1          | 24:00                  | 24.0               | 20.3            | 395.2557  | 395.5444 | 0.2887 |       |                 |
| 12/28/18 | P2952680  | 18.6          | 21.5          | 23:59                  | 24.0               | 20.8            | 399.2334  | 399.6819 | 0.4485 |       |                 |
| 02/02/18 | P2946022  |               | Field Blank   |                        |                    |                 | 388.643   | 388.645  | 0.002  |       |                 |
| 03/28/18 | P2946893  |               | Field Blank   |                        |                    |                 | 371.414   | 371.424  | 0.010  |       |                 |
| 06/13/18 | P2948042  |               | Field Blank   |                        |                    |                 | 371.379   | 371.379  | 0.000  |       |                 |
| 11/26/18 | P2952190  |               | Field Blank   |                        |                    |                 | 395.5004  | 395.5174 | 0.0170 |       |                 |

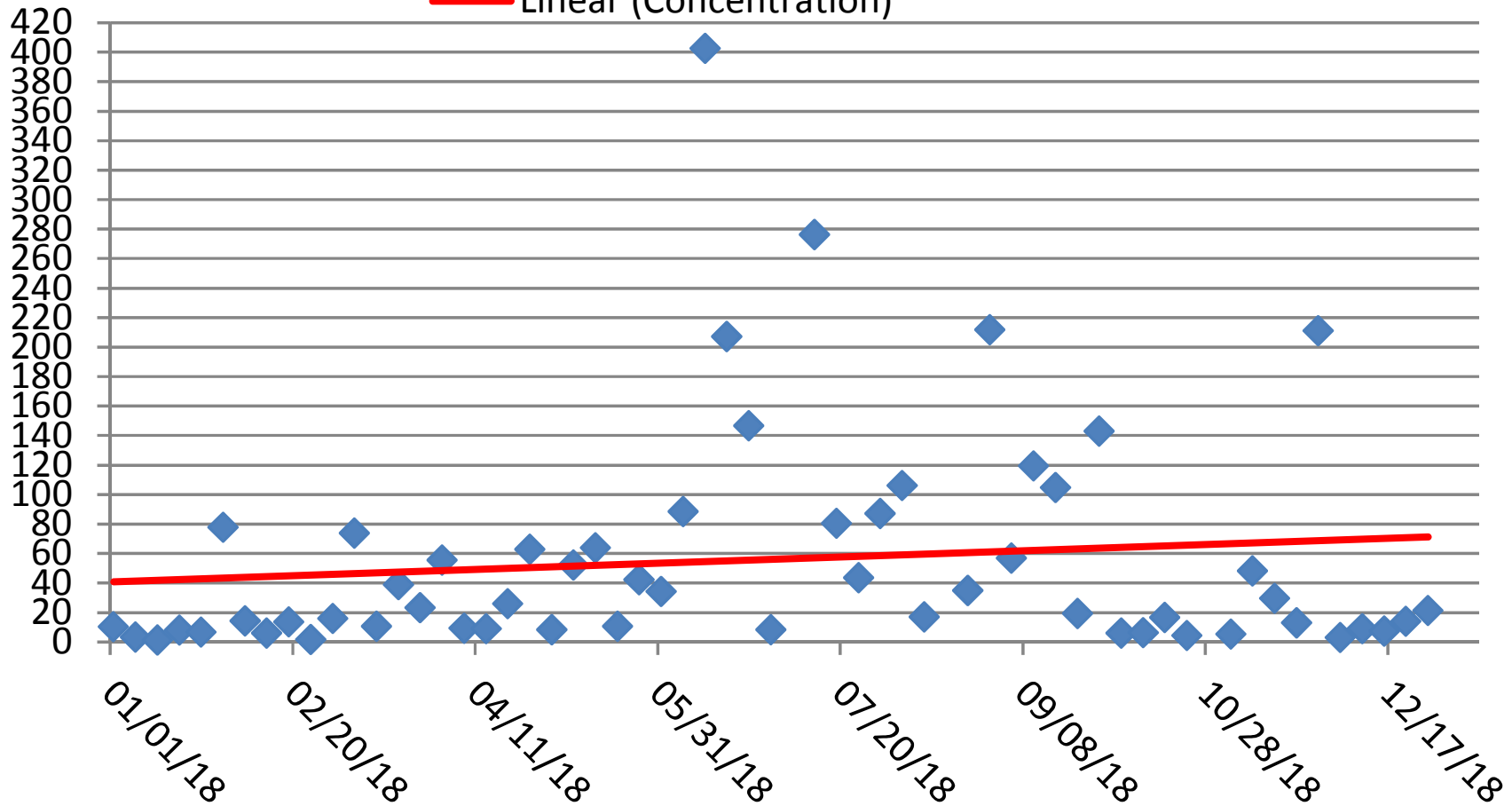
# Valid 58  
Recovery 95%  
Average 55.9  
St. Dev. 76.7  
Max 402.6  
Min 1.7

# 2398E Collocated Data-2018

$$y = 0.0844x - 3597.5$$
$$R^2 = 0.0141$$

◆ Concentration

— Linear (Concentration)



## **APPENDIX C**

### **Precision and Single-Point Flow Rate Checks**

## Precision Report For Collocated Samplers at the SPL

|    |     |     |      |      |      |     |     |      |      |      |      |     |      |      |      |      |     |      |      |      |      |      |       |       |       |       |      |       |       |       |       |      |       |       |       |       |
|----|-----|-----|------|------|------|-----|-----|------|------|------|------|-----|------|------|------|------|-----|------|------|------|------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|
| 26 | 6/1 | 6/7 | 6/13 | 6/19 | 6/25 | 7/1 | 7/7 | 7/13 | 7/19 | 7/25 | 7/31 | 8/6 | 8/12 | 8/18 | 8/24 | 8/30 | 9/5 | 9/11 | 9/17 | 9/23 | 9/29 | 10/5 | 10/11 | 10/17 | 10/23 | 10/29 | 11/4 | 11/10 | 11/16 | 11/22 | 11/28 | 12/4 | 12/10 | 12/16 | 12/22 | 12/28 |
|----|-----|-----|------|------|------|-----|-----|------|------|------|------|-----|------|------|------|------|-----|------|------|------|------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|

Relative Percent Difference =  $((X - Y) / ((X + Y) / 2)) * 100$  X=Coal Hollow-B Y =Coal Hollow-C

| Date  | Relative Percent Difference |
|-------|-----------------------------|
| 1/2   | -65.0                       |
| 1/20  | 15.0                        |
| 1/26  | -10.0                       |
| 2/1   | -10.0                       |
| 2/7   | -10.0                       |
| 2/13  | 20.0                        |
| 2/19  | -10.0                       |
| 3/3   | -10.0                       |
| 3/9   | -25.0                       |
| 3/21  | 30.0                        |
| 3/27  | 10.0                        |
| 4/2   | 10.0                        |
| 4/14  | -15.0                       |
| 4/20  | -5.0                        |
| 4/26  | -75.0                       |
| 5/8   | 10.0                        |
| 5/14  | 15.0                        |
| 6/1   | 65.0                        |
| 6/7   | 80.0                        |
| 6/13  | 20.0                        |
| 6/19  | 15.0                        |
| 6/25  | -25.0                       |
| 7/1   | 5.0                         |
| 7/13  | 20.0                        |
| 8/6   | -15.0                       |
| 8/12  | 10.0                        |
| 8/18  | -5.0                        |
| 8/24  | -125.0                      |
| 8/30  | -10.0                       |
| 9/5   | -10.0                       |
| 9/11  | -10.0                       |
| 10/29 | -25.0                       |
| 11/4  | -5.0                        |
| 11/10 | -10.0                       |
| 12/22 | -10.0                       |

\* Both sample concentrations must be greater than or equal to  $3 \mu\text{g}/\text{m}^3$  to be used for these precision calculations. For a detailed discussion of these precision calculations, refer to 40 CFR 58, Appendix A.

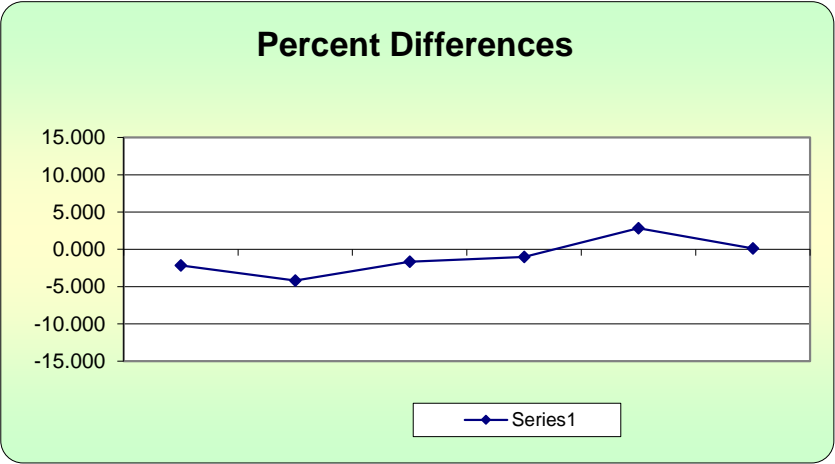
**\*\* CV - Upper 90% Confidence bound for Coefficient of Variation**

Alton Coal Development, LLC - Coal Hollow Mine  
One-Point Flow Rate Bias Estimate

| Site ID: Monitor 962A |               | Pollutant type: |                 | Bias (%)       |       |                 |  |
|-----------------------|---------------|-----------------|-----------------|----------------|-------|-----------------|--|
| Meas Val (Y)          | Audit Val (X) | d (Eqn. 1)      | 25th Percentile | d <sup>2</sup> | d     | d  <sup>2</sup> |  |
| 16.7                  | 17.07         | -2.168          | -1.777          | 4.698          | 2.168 | 4.698           |  |
| 16.7                  | 17.43         | -4.188          | 75th Percentile | 17.541         | 4.188 | 17.541          |  |
| 16.72                 | 17            | -1.647          | 0.136           | 2.713          | 1.647 | 2.713           |  |
| 16.7                  | 16.87         | -1.008          |                 | 1.015          | 1.008 | 1.015           |  |
| 16.7                  | 16.24         | 2.833           |                 | 8.023          | 2.833 | 8.023           |  |
| 16.57                 | 16.55         | 0.121           |                 | 0.015          | 0.121 | 0.015           |  |
| 16.7                  | 16.8          | -0.595          |                 | 0.354          | 0.595 | 0.354           |  |
| 16.7                  | 16.67         | 0.180           |                 | 0.032          | 0.180 | 0.032           |  |

|     |                   |              |
|-----|-------------------|--------------|
| n   | Σ d               | "AB" (Eqn 4) |
| 8   | 12.739            | 1.592        |
| n-1 | Σ d  <sup>2</sup> | "AS" (Eqn 5) |
| 7   | 34.392            | 1.420        |

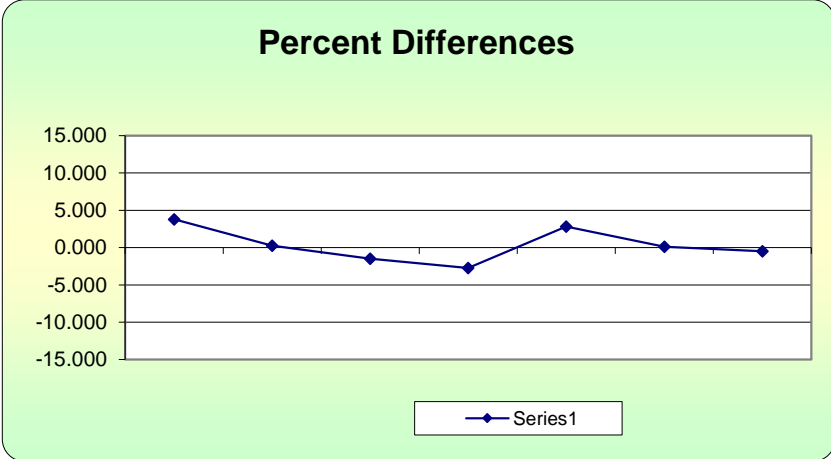
|                  |                     |
|------------------|---------------------|
| Bias (%) (Eqn 3) | Both Signs Positive |
| 2.54             | FALSE               |
| Signed Bias (%)  | Both Signs Negative |
| +/-2.54          | FALSE               |



## Alton Coal Development, LLC - Coal Hollow Mine

### One-Point Flow Rate Bias Estimate

| Site ID: Monitor 963B  |               | Pollutant type: |                 |                | Bias (%) |                 |       |
|--|---------------|-----------------|-----------------|----------------|----------|-----------------|-------|
| Meas Val (Y)   | Audit Val (X) | d (Eqn. 1)      | 25th Percentile | d <sup>2</sup> | d        | d  <sup>2</sup> |       |
| 16.7   | 16.09         | 3.791           | -1.691          | 14.373         | 3.791    | 14.373          |       |
| 16.7   | 16.66         | 0.240           | 75th Percentile | 0.058          | 0.240    | 0.058           |       |
| 16.7   | 16.95         | -1.475          |                 | 0.888          | 2.175    | 1.475           | 2.175 |
| 16.7   | 17.17         | -2.737          |                 |                | 7.493    | 2.737           | 7.493 |
| 16.7   | 16.24         | 2.833           |                 |                | 8.023    | 2.833           | 8.023 |
| 16.57  | 16.55         | 0.121           |                 |                | 0.015    | 0.121           | 0.015 |
| 16.7   | 16.78         | -0.477          |                 | 0.227          | 0.477    | 0.227           |       |
| 16.7   | 17.1          | -2.339          |                 | 5.472          | 2.339    | 5.472           |       |
| <div><div><div><div>nΣ d </div><div>814.013</div></div><div><div>n-1Σ d <sup>2</sup></div><div>737.836</div></div></div><div><div>Bias (%) (Eqn 3)</div><div>2.67</div></div><div><div>Signed Bias (%)</div><div>+/-2.67</div></div></div> <div><div>"AB" (Eqn 4)</div><div>1.752</div></div> <div><div>"AS" (Eqn 5)</div><div>1.378</div></div> <div><div>Both Signs Positive</div><div>FALSE</div></div> <div><div>Both Signs Negative</div><div>FALSE</div></div> |               |                 |                 |                |          |                 |       |



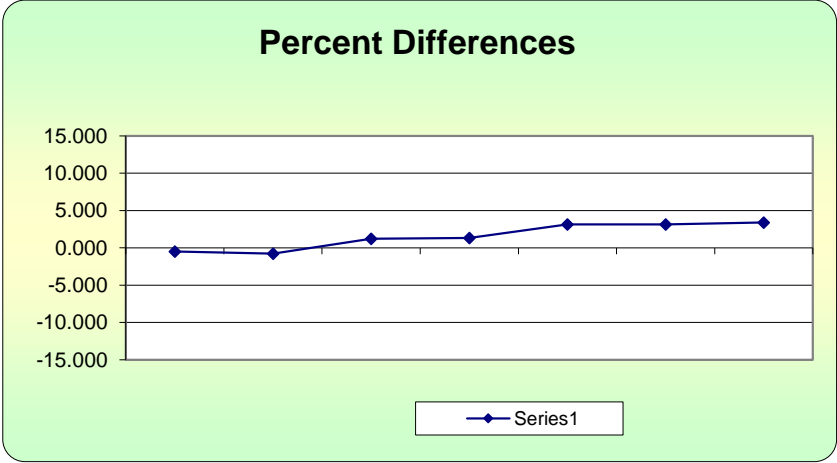


Alton Coal Development, LLC - Coal Hollow Mine  
One-Point Flow Rate Bias Estimate

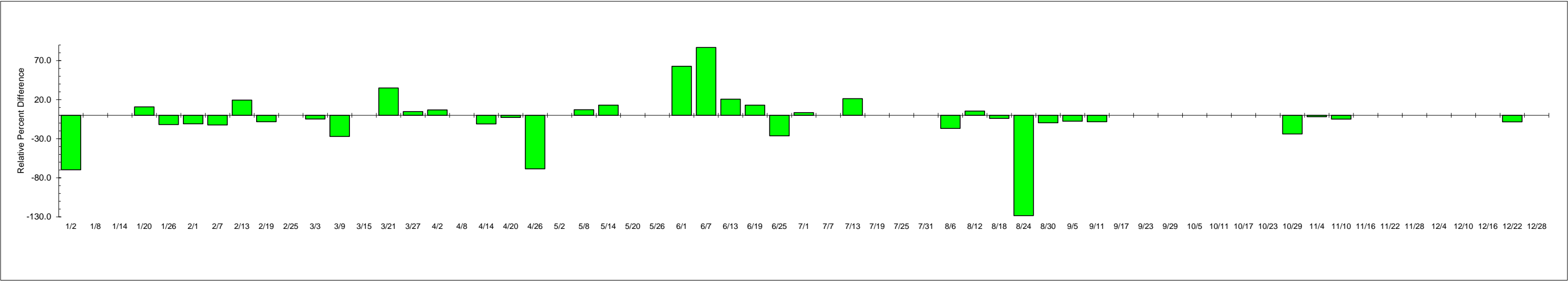
| Site ID: Monitor 964C |               | Pollutant type: |                 | Bias (%)       |       |                 |  |
|-----------------------|---------------|-----------------|-----------------|----------------|-------|-----------------|--|
| Meas Val (Y)          | Audit Val (X) | d (Eqn. 1)      | 25th Percentile | d <sup>2</sup> | d     | d  <sup>2</sup> |  |
| 16.7                  | 16.78         | -0.477          | -0.698          | 0.227          | 0.477 | 0.227           |  |
| 16.72                 | 16.85         | -0.772          | 75th Percentile | 0.595          | 0.772 | 0.595           |  |
| 16.7                  | 16.5          | 1.212           | 2.693           | 1.469          | 1.212 | 1.469           |  |
| 16.7                  | 16.48         | 1.335           |                 | 1.782          | 1.335 | 1.782           |  |
| 16.72                 | 16.21         | 3.146           |                 | 9.899          | 3.146 | 9.899           |  |
| 16.7                  | 16.19         | 3.150           |                 | 9.923          | 3.150 | 9.923           |  |
| 16.7                  | 16.15         | 3.406           |                 | 11.598         | 3.406 | 11.598          |  |
| 16.7                  | 16.72         | -0.120          |                 | 0.014          | 0.120 | 0.014           |  |
| 16.7                  | 16.91         | -1.242          |                 | 1.542          | 1.242 | 1.542           |  |
| 16.7                  | 17.01         | -1.822          |                 | 3.321          | 1.822 | 3.321           |  |

|     |                   |              |
|-----|-------------------|--------------|
| n   | Σ d               | "AB" (Eqn 4) |
| 10  | 16.681            | 1.668        |
| n-1 | Σ d  <sup>2</sup> | "AS" (Eqn 5) |
| 9   | 40.371            | 1.181        |

|                  |                     |
|------------------|---------------------|
| Bias (%) (Eqn 3) | Both Signs Positive |
| 2.35             | FALSE               |
| Signed Bias (%)  | Both Signs Negative |
| +/-2.35          | FALSE               |



# Precision Report For Collocated Samplers at the NPL

[illegible]

\* Both sample concentrations must be greater than or equal to 3 µg/m<sup>3</sup> to be used for these precision calculations. For a detailed discussion of these precision calculations, refer to 40 CFR 58, Appendix A.

**\*\* CV - Upper 90% Confidence bound for Coefficient of Variation**

**Alton Coal Development, LLC - Coal Hollow Mine**  
**One-Point Flow Rate Bias Estimate**

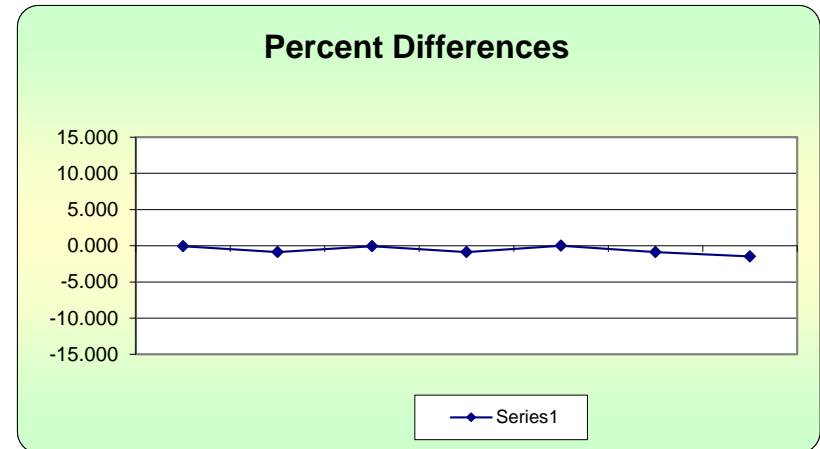
| Site ID: Monitor 2366D |               | Pollutant type: |                 | Bias (%)       |       |                 |  |
|------------------------|---------------|-----------------|-----------------|----------------|-------|-----------------|--|
| Meas Val (Y)           | Audit Val (X) | d (Eqn. 1)      | 25th Percentile | d <sup>2</sup> | d     | d  <sup>2</sup> |  |
| 16.7                   | 16.71         | -0.060          | -0.890          | 0.004          | 0.060 | 0.004           |  |
| 16.7                   | 16.85         | -0.890          | 75th Percentile | 0.792          | 0.890 | 0.792           |  |
| 16.7                   | 16.71         | -0.060          | -0.045          | 0.004          | 0.060 | 0.004           |  |
| 16.7                   | 16.85         | -0.890          |                 | 0.792          | 0.890 | 0.792           |  |
| 16.7                   | 16.7          | 0.000           |                 | 0.000          | 0.000 | 0.000           |  |
| 16.7                   | 16.85         | -0.890          |                 | 0.792          | 0.890 | 0.792           |  |
| 16.7                   | 16.95         | -1.475          |                 | 2.175          | 1.475 | 2.175           |  |
| 16.7                   | 16.62         | 0.481           |                 | 0.232          | 0.481 | 0.232           |  |

|     |                   |              |
|-----|-------------------|--------------|
| n   | Σ d               | "AB" (Eqn 4) |
| 8   | 4.747             | 0.593        |
| n-1 | Σ d  <sup>2</sup> | "AS" (Eqn 5) |
| 7   | 4.792             | 0.531        |

|                  |                     |
|------------------|---------------------|
| Bias (%) (Eqn 3) | Both Signs Positive |
| 0.95             | FALSE               |
| Signed Bias (%)  | Both Signs Negative |
| -0.95            | TRUE                |



**Alton Coal Development, LLC - Coal Hollow Mine**  
**One-Point Flow Rate Bias Estimate**

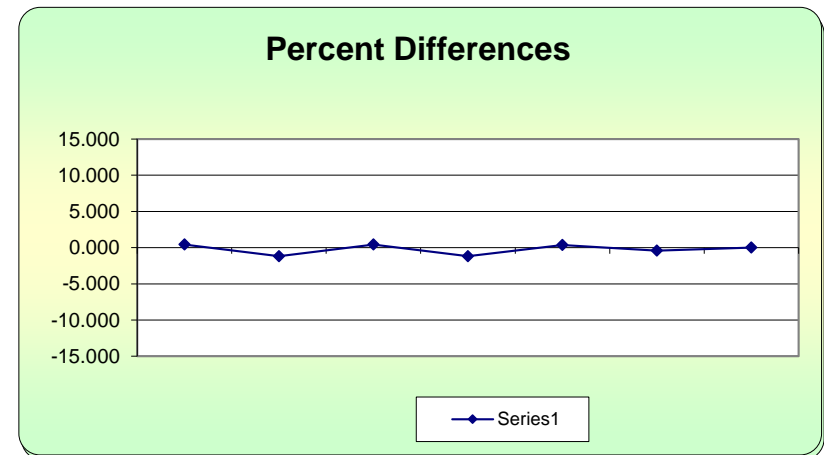
| Site ID: Monitor 2398E |               | Pollutant type: |                 | Bias (%)       |       |                 |  |
|------------------------|---------------|-----------------|-----------------|----------------|-------|-----------------|--|
| Meas Val (Y)           | Audit Val (X) | d (Eqn. 1)      | 25th Percentile | d <sup>2</sup> | d     | d  <sup>2</sup> |  |
| 16.7                   | 16.63         | 0.421           | -0.609          | 0.177          | 0.421 | 0.177           |  |
| 16.7                   | 16.9          | -1.183          | 75th Percentile | 1.401          | 1.183 | 1.401           |  |
| 16.7                   | 16.63         | 0.421           | 0.376           | 0.177          | 0.421 | 0.177           |  |
| 16.7                   | 16.9          | -1.183          |                 | 1.401          | 1.183 | 1.401           |  |
| 16.7                   | 16.64         | 0.361           |                 | 0.130          | 0.361 | 0.130           |  |
| 16.7                   | 16.77         | -0.417          |                 | 0.174          | 0.417 | 0.174           |  |
| 16.7                   | 16.7          | 0.000           |                 | 0.000          | 0.000 | 0.000           |  |
| 16.7                   | 16.64         | 0.361           |                 | 0.130          | 0.361 | 0.130           |  |

|            |                         |                     |
|------------|-------------------------|---------------------|
| <b>n</b>   | <b>Σ d </b>             | <b>"AB" (Eqn 4)</b> |
| 8          | 4.347                   | 0.543               |
| <b>n-1</b> | <b>Σ d <sup>2</sup></b> | <b>"AS" (Eqn 5)</b> |
| 7          | 3.590                   | 0.419               |

|                         |                     |
|-------------------------|---------------------|
| <b>Bias (%) (Eqn 3)</b> | Both Signs Positive |
| 0.82                    | FALSE               |
| <b>Signed Bias (%)</b>  | Both Signs Negative |
| +/-0.82                 | FALSE               |



## **APPENDIX D**

### **Field Data Sheets**

## **Background Monitor 962A**

## Background Monitor 962A

### Table I - Every 6th Day Sampling

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### Table II - Monthly Leak Test

| Date    | Time  | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|---------|-------|------------------|----------------|-----------|----------|------------------|
| 1-10-18 | 10:00 | 97               | 97             | Pass      | KN       | Cleaned Manifold |
| 2-9-18  | 10:09 | 97               | 97             | Pass      | KN       | Cleaned Manifold |
|         |       |                  |                |           |          |                  |
|         |       |                  |                |           |          |                  |

### Table III - Monthly Flow Rate Verification

[illegible]



# Background Monitor 962A

## Table I - Every 6th Day Sampling

| Date     | Time  | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|-------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 03-28-18 | 1207  | 03-28-18       | 1107           | 9                    | 15             | M-M               | 04-02-18          | JKSR             |
| 04-05-18 | 1131  | 04-05-18       | 1030           | 15                   | 26             | M-M               | 04-08-18          | JKSR             |
| 04-10-18 | 1146  | 04-10-18       | 1045           | 26                   | 33             | M-M               | 04-14-18          | JKSR             |
| 04-16-18 | 1501  | 04-16-18       | 1400           | 33                   | 38             | M-M               | 04-20-18          | JKSR             |
| 04-23-18 | 09:42 | 04-23-18       | 0841           | 38                   | 4              | M-M               | 04-26-18          | KN               |
| 04-27-18 | 0953  | 04-27-18       | 0852           | 4                    | 9              | 0852              | 04-27-18          | JKSR             |
| 04-27-18 | 0955  | 04-27-18       | 0854           | 9                    | 10             | M-M               | 05-02-18          | JKSR             |
| 05-04-18 | 1351  | 05-04-18       | 1250           | 10                   | 22             | M-M               | 05-08-18          | JKSR             |
| 05-09-18 | 1029  | 05-09-18       | 0928           | 22                   | 28             | M-M               | 05-14-18          | JKSR             |
| 05-15-18 | 1147  | 05-15-18       | 1045           | 28                   | 17             | M-M               | 05-20-18          | JKSR             |
| 05-22-18 | 1309  | 05-22-18       | 1208           | 17                   | 33             | M-M               | 05-26-18          | JKSR             |
| 05-29-18 | 1116  | 05-29-18       | 1015           | 33                   | 38             | M-M               | 06-01-18          | JKSR             |
| 06-04-18 | 1604  | 06-04-18       | 1502           | 38                   | 11             | M-M               | 06-07-18          | JKSR             |
| 06-08-18 | 1300  | 06-08-18       | 1158           | 11                   | 22             | M-M               | 06-13-18          | JKSR             |
| 06-14-18 | 1511  | 06-14-18       | 1410           | 22                   | 4              | M-M               | 06-19-18          | JKSR             |
| 06-22-18 | 1018  | 06-22-18       | 918            | 4                    | 9              | 10:18             | 06-22-18          | KN               |
| 06-27-18 | 1556  | 06-27-18       | 1455           | 9                    | 17             | AM                | 07-01-18          | JKSR             |

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## Table II - Monthly Leak Test

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|------|------------------|----------------|-----------|----------|------------------|
| 04-23-18 | 0947 | 94               | 93             | Pass      | KN       | Cleaned Manifold |
| 0        | 1023 |                  |                |           |          |                  |
| 06-22-18 | 1024 | 95               | 93             | Pass      | KN       | Cleaned Manifold |

## Table III - Monthly Flow Rate Verification

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 04-23-18 | 0951 | 16.72                | 585                          | 587                            | 17.1             | 17.9                | 13.44               | 17.00               | -1.6     | KN       |
| 06-22-18 | 1024 | 16.70                | 586                          | 587.3                          | 17.1             | 17.9                | 13.03               | 16.87               | -1.0     | KN       |



# Background Monitor 962A

Table I - Every 6th Day Sampling

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 07-03-18 | 1039 | 07-03-18       | 0938           | 17                   | 28             | M-M               | 07-07-18          | JKSR             |
| 07-09-18 | 1013 | 07-09-18       | 0912           | 28                   | 33             | M-M               | 07-13-18          | KN               |
| 07-16-18 | 1445 | 07-16-18       | 1343           | 33                   | 4              | 1343              | 07-18-18          | JKSR             |
| 07-16-18 | 1447 | 07-16-18       | 1345           | 4                    | 5              | M-M               | 07-19-18          | JKSR             |
| 07-20-18 | 1053 | 07-20-18       | 0952           | 5                    | 11             | M-M               | 07-25-18          | JKSR             |
| 07-26-18 | 1130 | 07-26-18       | 1029           | 11                   | 22             | M-M               | 07-31-18          | JKSR             |
| 08-01-18 | 1357 | 08-01-18       | 1256           | 11                   | 27             | M-M               | 08-06-18          | JKSR             |
| 08-07-18 | 1142 | 08-07-18       | 1041           | 27                   | 10             | M-M               | 08-12-18          | JKSR             |
| 08-15-18 | 1021 | 08-15-18       | 0920           | 10                   | 21             | M-M               | 08-18-18          | KN               |
| 08-20-18 | 1154 | 08-20-18       | 1053           | 21                   | 32             | M-M               | 08-24-18          | KN               |
| 08-28-18 | 1335 | 08-28-18       | 1234           | 32                   | 4              | M-M               | 08-30-18          | JKSR             |
| 08-31-18 | 0837 | 08-31-18       | 0736           | 4                    | 9              | M-M               | 09-05-18          | KN               |
| 09-07-18 | 1457 | 09-07-18       | 1356           | 9                    | 23             | M-M               | 09-11-18          | JKSR             |
| 09-13-18 | 1009 | 09-13-18       | 0908           | 23                   | 11             | M-M               | 09-17-18          | KN               |
| 09-18-18 | 1128 | 09-18-18       | 1027           | 11                   | 37             | M-M               | 09-23-18          | JKSR             |
| 09-25-18 | 1518 | 09-25-18       | 1417           | 37                   | 10             | M-M               | 09-29-18          | JKSR             |

Code F

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Code P

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Code K

Table II - Monthly Leak Test

| Date     | Time  | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|-------|------------------|----------------|-----------|----------|------------------|
| 8/5/18   | 10:36 | 110              | 109            | Pass      | KN       | Cleaned Manifold |
| 09/13/18 |       | 108              | 105            | Pass      | KN       | n n              |

Table III - Monthly Flow Rate Verification

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 08/15/18 | 1040 | 16.70                | 587                          | 588                            | 24.8             | 25.5                | 12.88               | 16.79               | -0.5     | KN       |
| 09/13/18 |      | 16.70                | 587                          | 587                            | 28.9             | 19.7                |                     | 16.94               | -1.4     | KN       |

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6



# Background Monitor 962A

Table I - Every 6th Day Sampling

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 10-02-18 | 1310 | 10-02-18       | 1211           | 10                   | 21             | M-M               | 10-05-18          | JKSR             |
| 10-08-18 | 1512 | 10-08-18       | 1411           | 21                   | 4              | M-M               | 10-11-18          | JKSR             |
| 10-13-18 | 1215 | 10-13-18       | 1114           | 4                    | 9              | M-M               | 10-17-18          | KN               |
| 10-18-18 | 1103 | 10-18-18       | 1002           | 9                    | 26             | M-M               | 10-23-18          | BA               |
| 10-24-18 | 1404 | 10-24-18       | 1302           | 26                   | 34             | M-M               | 10-29-18          | JKSR             |
| 10-30-18 | 1415 | 10-30-18       | 1313           | 34                   | 10             | M-M               | 11-4-18           | BA               |
|          |      |                | 1327           |                      |                |                   |                   |                  |
| 11-5-18  | 1059 | 11-5-18        | 1059           | 10                   | 16             | M-M               | 11-10-18          | BA               |
| 11-12-18 | 1248 | 11-12-18       | 1246           | 16                   | 36             | M-M               | 11-16-18          | KN               |
| 11-19-18 | 0936 | 11-19-18       | 0934           | 36                   | 4              | M-M               | 11-22-18          | KN               |
| 11-26-18 | 1034 | 11-26-18       | 1032           | 4                    | 21             | M-M               | 11-28-18          | KN               |
| 11-30-18 | 1640 | 11-30-18       | 1639           | 21                   | 9              | M-M               | 12/4/18           | BA               |
| 12/6/18  | 1327 | 12/6/18        | 1324           | 9                    | 31             | M-M               | 12/10/18          | BA               |
| 12/11/18 | 1438 | 12/11/18       | 1435           | 31                   | 10             | M-M               | 12/16/18          | BA               |
| 12/17/18 | 900  | 12/17/18       | 857            | 10                   | 16             | M-M               | 12/22/18          | BA               |
| 12/23/18 | 1246 | 12/23/18       | 1243           | 16                   | 34             | M-M               | 12/28/18          | BA               |
| 12/29/18 | 1147 | 12/29/18       | 1144           | 34                   | 4              | M-M               | 1/2/19            | BA               |
|          |      | 1/1            |                | 4                    | 29             | M-M               | 1/8/19            |                  |

Table II - Monthly Leak Test

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|------|------------------|----------------|-----------|----------|------------------|
| 12/14/18 | 1119 | 134              | 132            | P         | BA       | Cleaned manifold |
|          |      |                  |                |           |          |                  |
|          |      |                  |                |           |          |                  |
|          |      |                  |                |           |          |                  |

Table III - Monthly Flow Rate Verification

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 12/14/18 | 1123 | 16.7                 | 589                          | 590                            | 3.1              | 5.0                 | 13.97               | 16.80               | -0.60    | BA       |
|          |      |                      |                              |                                |                  |                     |                     |                     |          |          |
|          |      |                      |                              |                                |                  |                     |                     |                     |          |          |
|          |      |                      |                              |                                |                  |                     |                     |                     |          |          |

09

## **Compliance Monitor 963B**

## Compliance Monitor 963B

### Table I - Every 6th Day Sampling

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Wrong End Time

### Table II - Monthly Leak Test

| Date    | Time  | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|---------|-------|------------------|----------------|-----------|----------|------------------|
| 1-10-18 | 12:06 | 97               | 97             | Pass      | KN       | Cleaned Manifold |
| 2-9-18  | 9:09  | 97               | 97             | Pass      | KN       | Cleaned Manifold |
|         |       |                  |                |           |          |                  |
|         |       |                  |                |           |          |                  |

### Table III - Monthly Flow Rate Verification

[illegible]



## Compliance Monitor 963B

**Table I - Every 6th Day Sampling**

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 03-28-18 | 1220 | 03-28-18       | 1117           | 10                   | 17             | M-M               | 04-02-18          | JKSR             |
| 04-05-18 | 1150 | 04-08-18       | 1047           | 17                   | 27             | M-M               | 04-08-18          | JKSR             |
| 04-10-18 | 1201 | 04-10-18       | 1058           | 27                   | 34             | M-M               | 04-14-18          | JKSR             |
| 04-16-18 | 1513 | 04-16-18       | 1410           | 34                   | 39             | M-M               | 04-20-18          | JKSR             |
| 04-23-18 | 1059 | 04-16-18       | 0956           | 39                   | 5              | M-M               | 04-26-18          | KN               |
| 04-27-18 | 1009 | 04-27-18       | 0906           | 5                    | 11             | M-M               | 05-02-18          | JKSR             |
| 05-04-18 | 1403 | 05-04-18       | 1300           | 11                   | 16             | 1403              | 05-08-18          | JKSR             |
| 05-04-18 | 1404 | 05-04-18       | 1301           | 16                   | 23             | M-M               | 05-08-18          | JKSR             |
| 05-09-18 | 1043 | 05-09-18       | 0940           | 23                   | 29             | M-M               | 05-14-18          | JKSR             |
| 05-15-18 | 1159 | 05-15-18       | 1056           | 29                   | 18             | M-M               | 05-20-18          | JKSR             |
| 05-22-18 | 1320 | 05-22-18       | 1217           | 18                   | 34             | M-M               | 05-22-18          | JKSR             |
| 05-29-18 | 1206 | 05-29-18       | 1103           | 34                   | 39             | M-M               | 06-01-18          | JKSR             |
| 06-04-18 | 1621 | 06-04-18       | 1518           | 39                   | 12             | M-M               | 06-07-18          | JKSR             |
| 06-08-18 | 1312 | 06-08-18       | 1209           | 12                   | 23             | M-M               | 06-13-18          | JKSR             |
| 06-14-18 | 1523 | 06-14-18       | 1420           | 23                   | 5              | M-M               | 06-19-18          | JKSR             |
| 06-22-18 | 1049 | 06-22-18       | 0946           | 5                    | 3BR1           | M-M               | 06-25-18          | KN               |
| 06-27-18 | 1609 | 06-27-18       | 1507           | 3BR1                 | 18             | M-M               | 07-01-18          | JKSR             |
|          |      |                |                |                      |                |                   |                   |                  |
|          |      |                |                |                      |                |                   |                   |                  |

still Running

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**Table II - Monthly Leak Test**

| Date     | Time  | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|-------|------------------|----------------|-----------|----------|------------------|
| 04-23-18 | 1103  | 103              | 99             | Pass      | KN       | Cleaned Manifold |
| 06-22-18 | 10:53 | 103              | 100            | Pass      | KN       | Cleaned Manifold |

**Table III - Monthly Flow Rate Verification**

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 04-22-18 | 1110 | 16.76                | 592                          | 593                            | 18.5             | 19.3                | 13.49               | 16.95               | -1.5     | KN       |
| 06-22-18 | 1108 | 16.70                | 592                          | 593                            | 26.2             | 27.1                | 13.28               | 17.17               | -2.7     | KN       |

# Compliance Monitor 963B

## Table I - Every 6th Day Sampling

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 07-03-18 | 1127 | 07-03-18       | 1027           | 18                   | 29             | M-M               | 07-07-18          | JKSR             |
| 07-09-18 | 1037 | 07-09-18       | 0938           | 29                   | 34             | M-M               | 07-13-18          | KN               |
| 07-16-18 | 1500 | 07-16-18       | 1901           | 34                   | 6              | M-M               | 07-19-18          | JKSR             |
| 07-20-18 | 1106 | 07-20-18       | 1006           | 6                    | 12             | 1006              | 07-20-18          | JKSR Blank       |
| 07-20-18 | 1107 | 07-20-18       | 1007           | 12                   | 13             | M-M               | 07-25-18          | JKSR             |
| 07-26-18 | 1143 | 07-26-18       | 1043           | 13                   | 23             | M-M               | 07-31-18          | JKSR             |
| 08-01-18 | 1409 | 08-01-18       | 1310           | 23                   | 38             | M-M               | 08-06-18          | JKSR             |
| 08-07-18 | 1155 | 08-07-18       | 1056           | 38                   | 17             | M-M               | 08-12-18          | JKSR             |
| 08-15-18 | 1107 | 08-15-18       | 1008           | 17                   | 28             | M-M               | 08-18-18          | KN               |
| 08-20-18 | 1215 | 08-20-18       | 1116           | 28                   | 42             | M-M               | 08-24-18          | KN               |
| 08-28-18 | 1349 | 08-28-18       | 1250           | 42                   | 5              | M-M               | 08-30-18          | JKSR             |
| 08-31-18 | 0956 | 08-31-18       | 0857           | 5                    | 12             | M-M               | 09-05-18          | KN               |
| 09-07-18 | 1508 | 09-07-18       | 1409           | 12                   | 24             | M-M               | 09-11-18          | JKSR             |
| 09-13-18 | 1237 | 09-13-18       | 1138           | 24                   | 14             | M-M               | 09-17-18          | KN               |
| 09-18-18 | 1156 | 09-18-18       | 1055           | 14                   | 38             | M-M               | 09-23-18          | JKSR             |
| 09-25-18 | 1436 | 09-25-18       | 1336           | 38                   | 13             | M-M               | 09-29-18          | JKSR QT          |

## Table II - Monthly Leak Test

| Date     | Time  | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|-------|------------------|----------------|-----------|----------|------------------|
| 08-15-18 | 11:11 | 110              | 107            | Pass      | KN       | Cleaned Manifold |
| 09-13-18 |       | 109              | 107            | Pass      | KN       | " "              |

## Table III - Monthly Flow Rate Verification

| Date     | Time  | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|-------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 08-15-18 | 11:19 | 16.70                | 593                          | 594                            | 25.3             | 25.6                | 12.42               | 16.24               | -2.85    | KN       |
| 09-13-18 |       | 16.57                | 592                          | 593                            | 23.0             | 23.5                |                     | 16.55               | 0.12     |          |



## Compliance Monitor 963B

### Table I - Every 6th Day Sampling

[illegible]

-Q.T circle

PT code

Did Not Run

No Line

Installed New Pump motor

### Table II - Monthly Leak Test

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|------|------------------|----------------|-----------|----------|------------------|
| 10-18-18 | 103  | 95               | 92             | P         | BA       | Clean manifold   |
| 12/13/18 | 1435 | 95.14            | 110            | P         | BA       | Cleaned Manifold |
|          |      |                  |                |           |          |                  |
|          |      |                  |                |           |          |                  |

### Table III - Monthly Flow Rate Verification

[illegible]

## **Collocated Monitor 964C**



## Co-located Monitor 964C

**Table I - Every 6th Day Sampling**

| Date     | Time  | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|-------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
|          |       |                |                |                      | 6              | M-M               | 1-2-18            | JKSR             |
| 01-01-18 | 1240  | 01-01-18       | 1239           | 6                    | 33             | M-M               | 1-8-18            | KN               |
| 01-10-18 | 1127  | 01-10-18       | 1126           | 33                   | 11             | M-M               | 01-14-18          | KN               |
| 01-16-18 | 1214  | 01-16-18       | 1212           | 11                   | 21             | M-M               | 01-20-18          | JKSR             |
| 01-23-18 | 1414  | 01-23-18       | 1412           | 21                   | 39             | M-M               | 01-26-18          | JKSR             |
| 01-29-18 | 1137  | 01-29-18       | 1135           | 39                   | 14             | M-M               | 02-01-18          | JKSR             |
| 02-02-18 | 1014  | 02-02-18       | 1012           | 14                   | 24             | M-M               | 02-07-18          | KN               |
| 02-08-18 | 1457  | 02-08-18       | 1455           | 24                   | 6              | M-M               | 02-13-18          | JKSR             |
| 02-14-18 | 1224  | 02-14-18       | 1222           | 6                    | 30             | 1222              | 02-14-18          | JKSR             |
| 02-14-18 | 1223  | 02-14-18       | 1224           | 30                   | 11             | M-M               | 02-19-18          | JKSR             |
| 02-20-18 | 1413  | 02-20-18       | 1410           | 11                   | 17             | M-M               | 02-25-18          | JKSR             |
| 02-27-18 | 1153  | 02-27-18       | 1150           | 17                   | 28             | M-M               | 03-03-18          | JKSR             |
| 03-05-18 | 1535  | 03-05-18       | 1531           | 28                   | 39             | M-M               | 03-09-18          | JKSR             |
| 03-02-18 | 11:31 | 03-02-18       | 1027           | 39                   | 6              | M-M               | 03-05-18          | KN               |
| 03-16-18 | 1128  | 03-16-18       | 1024           | 6                    | 23             | M-M               | 03-21-18          | KN               |
| 03-23-18 | 1049  | 03-23-18       | 0945           | 23                   | 11             | M-M               | 03-27-18          | JKSR             |
| 03-28-18 | 1221  | 03-28-18       | 1117           | 11                   | 18             | M-M               | 04-02-18          | JKSR             |
|          |       |                |                |                      |                |                   |                   |                  |
|          |       |                |                |                      |                |                   |                   |                  |

QT code

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**Table II - Monthly Leak Test**

| Date     | Time  | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance                  |
|----------|-------|------------------|----------------|-----------|----------|------------------------------|
| 1-10-18  | 12:32 | 96               | 96             | Pass      | KN       | Cleaned Manifold             |
| 2-9-18   | 10:05 | 98               | 97             | Pass      | KN       | " "                          |
| 03/29/18 |       |                  |                |           |          |                              |
| 03/30/18 | 10:02 | 102              | 102            | Pass      | KN       | Replaced Flow control sensor |

**Table III - Monthly Flow Rate Verification**

| Date    | Time  | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|---------|-------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 1-10-18 | 12:27 | 16.70                | 586                          | 588                            | 6.5              | 1.0                 | 13.72               | 16.78               | -0.48    | KN       |
| 2-9-18  | 10:09 | 16.72                | 587                          | 588                            | 1.2              | 1.6                 | 14.12               | 16.85               | -0.89    | KN       |
| 3/30/18 | 1056  | 16.7                 | 595                          | 594                            | 12.4             | 12.8                | 13.41               | 16.50               | 81.21    | KN       |

## Co-located Monitor 964C

**Table I - Every 6th Day Sampling**

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 03-28-18 | 1221 | 03-28-18       | 1117           | 11                   | 18             | M-M               | 04-02-18          | JKSR             |
| 04-05-18 | 1151 | 04-05-18       | 1047           | 18                   | 28             | M-M               | 04-08-18          | JKSR             |
| 04-10-18 | 1203 | 04-10-18       | 1059           | 28                   | 35             | M-M               | 04-14-18          | JKSR             |
| 04-16-18 | 1515 | 04-16-18       | 1410           | 35                   | 40             | M-M               | 04-20-18          | JKSR             |
| 04-23-18 | 1112 | 04-23-18       | 1008           | 40                   | 6              | M-M               | 04-26-18          | KN               |
| 04-27-18 | 1012 | 04-27-18       | 0907           | 6                    | 12             | M-M               | 05-02-18          | JKSR             |
| 05-04-18 | 1405 | 05-04-18       | 1301           | 12                   | 24             | M-M               | 05-08-18          | JKSR             |
| 05-09-18 | 1042 | 05-09-18       | 0937           | 24                   | 27             | 0937              | 05-09-18          | JKSR             |
| 05-09-18 | 1044 | 05-09-18       | 0939           | 27                   | 30             | M-M               | 05-14-18          | JKSR             |
| 05-15-18 | 1201 | 05-15-18       | 1056           | 30                   | 19             | M-M               | 05-20-18          | JKSR             |
| 05-22-18 | 1322 | 05-22-18       | 1217           | 19                   | 35             | M-M               | 05-26-18          | JKSR             |
| 05-29-18 | 1208 | 05-29-18       | 1103           | 35                   | 40             | M-M               | 06-01-18          | JKSR             |
| 06-04-18 | 1623 | 06-04-18       | 1517           | 40                   | 13             | M-M               | 06-07-18          | JKSR             |
| 06-08-18 | 1314 | 06-08-18       | 1210           | 13                   | 24             | M-M               | 06-13-18          | JKSR             |
| 06-14-18 | 1525 | 06-14-18       | 1420           | 24                   | 6              | M-M               | 06-19-18          | JKSR             |
| 06-22-18 | 1052 | 06-22-18       | 0947           | 6                    | 7              | M-M               | 06-25-18          | KN               |
| 06-27-18 | 1611 | 06-27-18       | 1505           | JBRT                 | 19             | M-M               | 07-01-18          | JKSR             |

QT  
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QT  
Still Running  
No Codes Data 6 hrs

**Table II - Monthly Leak Test**

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance       |
|----------|------|------------------|----------------|-----------|----------|-------------------|
| 04-23-18 | 1118 | 115              | 112            | Pass      | KN       | Cleaned Manifolds |
| 06-22-18 | 1112 | 110              | 109            | Pass      | KN       | Cleaned Manifolds |

**Table III - Monthly Flow Rate Verification**

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 04-23-18 | 1120 | 16.70                | 594                          | 593                            | 18.0             | 19.3                | 12.10               | 16.47               | 1.3      | KN       |
| 06-22-18 | 1115 | 16.70                | 594                          | 593                            | 26.1             | 26.4                | 12.57               | 16.21               | 3.1      | KN       |



## Co-located Monitor 964C

**Table I - Every 6th Day Sampling**

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 07-03-18 | 1129 | 07-03-18       | 1023           | 19                   | 30             | M-M               | 07-07-18          | JKSR             |
| 07-09-18 | 1045 | 07-09-18       | 0938           | 20                   | 35             | M-M               | 07-12-18          | KN               |
| 07-16-18 | 1503 | 07-16-18       | 1357           | 35                   | 7              | M-M               | 07-19-18          | JKSR             |
| 07-20-18 | 1109 | 07-20-18       | 1003           | 7                    | 14             | M-M               | 07-25-18          | JKSR             |
| 07-26-18 | 1144 | 07-26-18       | 1038           | 14                   | 24             | M-M               | 07-31-18          | JKSR             |
| 08-01-18 | 1412 | 08-01-18       | 1306           | 24                   | 39             | M-M               | 08-06-18          | JKSR             |
| 08-07-18 | 1158 | 08-07-18       | 1052           | 39                   | 18             | M-M               | 08-12-18          | JKSR             |
| 08-15-18 | 1156 | 08-15-18       | 1050           | 18                   | 29             | M-M               | 08-18-18          | KN               |
| 08-20-18 | 1223 | 08-20-18       | 1117           | 29                   | JBR1           | M-M               | 08-24-18          | KN               |
| 08-28-18 | 1351 | 08-28-18       | 1244           | JBR1                 | 6              | M-M               | 08-30-18          | JKSR             |
| 08-31-18 | 1001 | 08-31-18       | 0855           | 6                    | 33             | M-M               | 09-05-18          | KN               |
| 09-07-18 | 1510 | 09-07-18       | 1409           | 33                   | 25             | M-M               | 09-11-18          | JKSR             |
| 09-13-18 | 1246 | 09-13-18       | 1145           | 25                   | 15             | M-M               | 09-17-18          | KN               |
| 09-18-18 | 1153 | 09-18-18       | 1053           | 15                   | 36             | 1053              | 09-18-18          | JKSR             |
| 09-18-18 | 1158 | 09-18-18       | 1057           | 36                   | 39             | M-M               | 09-23-18          | JKSR             |
| 09-25-18 | 1438 | 09-25-18       | 1337           | 39                   | 18             | M-M               | 09-29-18          | JKSR             |
|          |      |                |                |                      |                |                   |                   |                  |
|          |      |                |                |                      |                |                   |                   |                  |
|          |      |                |                |                      |                |                   |                   |                  |

Monitor still running

QT codes

QT codes

QT codes

QT codes

still running

codes QT

Blank QT

QT

**Table II - Monthly Leak Test**

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance                                 |
|----------|------|------------------|----------------|-----------|----------|---|
| 08-15-18 | 1158 | 111              | 107            | PASS      | KN       | Cleaned manifold, changed screen, increased |
| 09-13-18 |      |                  |                |           | KN       |   |
|          |      |                  |                |           |          |   |
|          |      |                  |                |           |          |   |

**Table III - Monthly Flow Rate Verification**

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 08-15-18 | 1206 | 16.20                | 595                          | 594                            | 26.0             | 26.2                | 12.59               | 16.19               | 3.15     | KN       |
| 09-13-18 |      | 16.70                | 594                          | 592.5                          | 22.7             | 22.8                |                     | 16.15               | 2.46     | KN       |
|          |      |                      |                              |                                |                  |                     |                     |                     |          |          |
|          |      |                      |                              |                                |                  |                     |                     |                     |          |          |

increased flow 16.57

### Co-located Monitor 964C

### Table I - Every 6th Day Sampling

[illegible]

### QT Flags

### Table II - Monthly Leak Test

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance        |
|----------|------|------------------|----------------|-----------|----------|--------------------|
| 10-18-18 | 1:23 | 111              | 110            | Pass      | BA       | Cleared main, fold |
| 12/13/18 | 1458 | 96               | 95             | P         | BA       | Cleared Main, fold |
|          |      |                  |                |           |          |                    |
|          |      |                  |                |           |          |                    |

### Table III - Monthly Flow Rate Verification

[illegible]

**Compliance Monitor 2366D**



## Compliance Monitor 2366D

### Table I - Every 6th Day Sampling

[illegible]

## Field Blank

### Table II - Monthly Leak Test

| Date    | Time   | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|---------|--------|------------------|----------------|-----------|----------|------------------|
| 1-10-18 | 1:15pm | 96               | 95             | Pass      | KN       | Cleaned manifold |
| 2-9-18  | 11:09  | 95               | 95             | Pass      | KN       | Cleaned manifold |
|         |        |                  |                |           |          |                  |
|         |        |                  |                |           |          |                  |

### Table III - Monthly Flow Rate Verification

[illegible]

## Compliance Monitor 2366D

**Table I - Every 6th Day Sampling**

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 03-28-18 | 1233 | 03-28-18       | 1128           | 12                   | 19             | M-M               | 04-02-18          | JKSR             |
| 04-05-18 | 1206 | 04-05-18       | 1100           | 19                   | 29             | M-M               | 04-08-18          | JKSR             |
| 04-10-18 | 1239 | 04-10-18       | 1133           | 29                   | 36             | M-M               | 04-14-18          | JKSR             |
| 04-16-18 | 1533 | 04-16-18       | 1427           | 36                   | 41             | M-M               | 04-20-18          | JKSR             |
| 04-23-18 | 1435 | 04-23-18       | 1321           | 41                   | 7              | M-M               | 04-26-18          | KN               |
| 04-27-18 | 1025 | 04-27-18       | 0919           | 7                    | 13             | M-M               | 05-02-18          | JKSR             |
| 05-04-18 | 1415 | 05-04-18       | 1309           | 13                   | 25             | M-M               | 05-08-18          | JKSR             |
| 05-09-18 | 1058 | 05-09-18       | 0952           | 25                   | 31             | M-M               | 05-14-18          | JKSR             |
| 05-15-18 | 1211 | 05-15-18       | 1105           | 31                   | 20             | M-M               | 05-20-18          | JKSR             |
| 05-22-18 | 1334 | 05-22-18       | 1228           | 20                   | 38             | M-M               | 05-26-18          | JKSR             |
| 05-29-18 | 1221 | 05-29-18       | 1114           | 38                   | 41             | M-M               | 06-01-18          | JKSR             |
| 06-04-18 | 1630 | 06-04-18       | 1523           | 41                   | 14             |                   | 06-04-18          | JKSR             |
| 06-04-18 | 1631 | 06-04-18       | 1524           | 14                   | 15             | M-M               | 06-07-18          | JKSR             |
| 06-08-18 | 1728 | 06-08-18       | 1221           | 15                   | 26             | M-M               | 06-13-18          | JKSR             |
| 06-14-18 | 1535 | 06-14-18       | 1428           | 26                   | 7              | M-M               | 06-19-18          | JKSR             |
| 06-22-18 | 1258 | 06-23-18       | 11:51          | 7                    | 5888           | M-M               | 06-25-18          | KN               |
| 06-27-18 | 1621 | 06-27-18       | 1514           | 5888                 | 20             | M-M               | 07-01-18          | JKSR             |
|          |      |                |                |                      |                |                   |                   |                  |
|          |      |                |                |                      |                |                   |                   |                  |

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still Running

**Table II - Monthly Leak Test**

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|------|------------------|----------------|-----------|----------|------------------|
| 04-23-18 | 1442 | 111              | 107            | Pass      | KN       | Cleaned Manifold |
| 06-22-18 | 1259 | 128              | 125            | Pass      | KN       | Cleaned Manifold |

**Table III - Monthly Flow Rate Verification**

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 04-23-18 | 1444 | 16.70                | 589                          | 591                            | 20.1             | 21.1                | 13.23               | 16.79               | -0.5     | KN       |
| 06-22-18 | 1303 | 16.70                | 590                          | 591.8                          | 28.9             | 29.3                | 12.64               | 16.45               | 1.5      | KN       |



## Compliance Monitor 2366D

### Table I - Every 6th Day Sampling

[illegible]

-Likely Exceeded

### Table II - Monthly Leak Test

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|------|------------------|----------------|-----------|----------|------------------|
| 08/15/18 |      |                  |                |           | KN       | Cleaned Manifold |
| 09/13/18 |      | 100              | 96             | Pass      | KN       | " "              |
|          |      |                  |                |           |          |                  |
|          |      |                  |                |           |          |                  |

### Table III - Monthly Flow Rate Verification

[illegible]



## Compliance Monitor 2366D

**Table I - Every 6th Day Sampling**

| Date                | Time            | Displayed Date      | Displayed Time  | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date   | Sampler Initials |
|---------------------|-----------------|---------------------|-----------------|----------------------|----------------|-------------------|---------------------|------------------|
| 10-02-18            | 1339            | 10-02-18            | 1237            | 2019                 | 29             | M-M               | 10-05-18            | JKSR             |
| 10-08-18            | 1606            | 10-08-18            | 1504            | 29                   | 7              | M-M               | 10-11-18            | JKSR             |
| 10-13-18            | 1244            | 10-13-18            | 1142            | 7                    | 24             | M-M               | 10-17-18            | KN               |
| <del>10-18-18</del> | <del>1103</del> | <del>10-18-18</del> | <del>1012</del> | <del>9</del>         | <del>26</del>  | <del>M-M</del>    | <del>10-23-18</del> | <del>BA</del>    |
| 10-18-18            | 153             | 10-18-18            | 1250            | 24                   | 32             | M-M               | 10-23-18            | BA               |
| 10-24-18            | 1432            | 10-24-18            | 1330            | 32                   | JBR1           | M-M               | 10-29-18            | JKSR             |
| 10-30-18            | 1442            | 10-30-18            | 1341            | JBR1                 | 14             | M-M               | 11-4-18             | JSR              |
| 11-5-18             | 1204            | 11-5-18             | 1201            | 14                   | 19             | M-M               | 11-10-18            | BN               |
| 11-12-18            | 1329            | 11-12-18            | 13:26           | 19                   | 29             | M-M               | 11-16-18            | KN               |
| 11-19-18            | 1634            | 11-19-18            | 1631            | 29                   | 7              | M-M               | 11-24-18            | KN               |
| 11-26-18            | 1239            | 11-26-18            | 1236            | 7                    | 29             | M-M               | 12-26-18            | KN Field Blank   |
| 11-26-18            | 1242            | 11-26-18            | 1238            | 29                   | 30             | M-M               | 12-28-18            | KN               |
| 11-30-18            | 1712            | 11-30-18            | 1708            | 30                   | 24             | M-M               | 12/4/18             | BA               |
| 12/6/18             | 1429            | 12/6/18             | 1425            | 24                   | 32             | M-M               | 12/10/18            | BA               |
| 12/11/18            | 1516            | 12/11/18            | 1512            | 32                   | 14             | M-M               | 12/16/18            | BA               |
| 12/17/18            | 932             | 12/17/18            | 928             | 14                   | 19             | M-M               | 12/22/18            | BA               |
| 12/23/18            | 1413            | 12/23/18            | 1409            | 19                   | JBR1           | M-M               | 12/28/18            | BA               |
| 12/29/18            | 1221            | 12/29/18            | 1216            | JBR1                 | 7              | M-M               | 1/2/19              | BA               |
|                     |                 |                     |                 | 7                    | 38             | M-M               | 1/8/19              | BA               |

**Table II - Monthly Leak Test**

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance    |
|----------|------|------------------|----------------|-----------|----------|----------------|
| 10-18-18 | 1108 | 95               | 92             | Pass      | KN       | Clean Manifold |
| 10-18-18 | 156  | 99               | 97             | P         | BA       | Clean Manifold |
| 12/17/18 | 1053 | 113              | 110            | P         | BA       | Clean Manifold |

**Table III - Monthly Flow Rate Verification**

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 10-18-18 | 1112 | 16.70                | 593                          | 594                            | 10.5             | 11.1                | 13.8                | 16.78               |          | KN       |
| 10/18/18 | 203  | 16.70                | 592                          | 593                            | 10.0             | 11.2                | 13.76               | 16.83               | -0.89    | BA       |
| 12/17/18 | 1058 | 16.7                 | 592                          | 592.5                          | 4.1              | 9.8                 | 13.65               | 16.62               | 0.48     | BA       |

## **Collocated Monitor 2398E**

## Co-located Monitor 2398E

### Table I - Every 6th Day Sampling

| Date     | Time            | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|-----------------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
|          |                 |                |                |                      | 8              | M-M               | 1-2-18            | JKSR             |
| 1-4-18   | <del>1251</del> | 01-4-18        | 1348           | 8                    | 35             | M-M               | 1-8-18            | KN               |
| 01-10-18 | 1232            | 01-10-18       | 1229           | 35                   | 16             | M-M               | 01-14-18          | KN               |
| 01-16-18 | 1227            | 01-16-18       | 1223           | 16                   | 36             | M-M               | 01-20-18          | JKSR             |
| 01-23-18 | 1443            | 01-23-18       | 1447           | 36                   | 42             | M-M               | 01-26-18          | JKSR             |
| 01-29-18 | 1151            | 01-29-18       | 1147           | 42                   | 18             | M-M               | 02-01-18          | JKSR             |
| 02-02-18 | 1045            | 02-02-18       | 1045           | 18                   | 28             | 1045              | 02-02-18          | KN               |
| 02-02-18 | 1057            | 02-02-18       | 1053           | 28                   | 27             | M-M               | 02-07-18          | KN               |
| 02-08-18 | 1444            | 02-08-18       | 1440           | 27                   | 8              | M-M               | 02-13-18          | JKSR             |
| 02-14-18 | 1241            | 02-14-18       | 1236           | 8                    | 16             | M-M               | 02-19-18          | JKSR             |
| 02-20-18 | 1338            | 02-20-18       | 1333           | 16                   | 19             | M-M               | 02-25-18          | JKSR             |
| 02-27-18 | 1207            | 02-27-18       | 1201           | 19                   | 36             | M-M               | 03-03-18          | JKSR             |
| 03-05-18 | 1518            | 03-05-18       | 1513           | 36                   | 42             | M-M               | 03-09-18          | JKSR             |
| 03-12-18 | 1215            | 03-02-18       | 1110           | 42                   | 8              | M-M               | 03-15-18          | KN               |
| 03-16-18 | 1153            | 03-16-18       | 1048           | 8                    | 25             | M-M               | 03-21-18          | KN               |
| 03-23-18 | 1108            | 03-23-18       | 1002           | 25                   | 14             | M-M               | 03-27-18          | JKSR             |
| 03-28-18 | 1234            | 03-28-18       | 1128           | 14                   | 31             | 1128              | 03-28-18          | JKSR             |
| 03-28-18 | 1236            | 03-28-18       | 1129           | 31                   | 30             | M-M               | 04-02-18          | JKSR             |

Field Blank

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### Table II - Monthly Leak Test

| Date    | Time  | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|---------|-------|------------------|----------------|-----------|----------|------------------|
| 1-10-18 | 1:23  | 98               | 96             | Pass      | KN       | Cleaned Manifold |
| 2-9-18  | 11:11 | 97               | 96             | Pass      | KN       | Cleaned Manifold |
|         |       |                  |                |           |          |                  |
|         |       |                  |                |           |          |                  |

### Table III - Monthly Flow Rate Verification

[illegible]



## Co-located Monitor 2398E

**Table I - Every 6th Day Sampling**

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 03-28-18 | 1236 | 03-28-18       | 03-28-18       | 31                   | 30             | M-M               | 04-02-18          | JKSR             |
| 04-05-18 | 1207 | 04-05-18       | 1101           | 30                   | 32             | M-M               | 04-08-18          | JKSR             |
| 04-10-18 | 1241 | 04-10-18       | 1134           | 32                   | 37             | M-M               | 04-14-18          | JKSR             |
| 04-16-18 | 1534 | 04-16-18       | 1428           | 37                   | 42             | M-M               | 04-20-18          | JKSR             |
| 04-23-18 | 1447 | 04-23-18       | 1341           | 42                   | 8              | M-M               | 04-26-18          | KN               |
| 04-27-18 | 1026 | 04-27-18       | 0919           | 8                    | 14             | M-M               | 05-02-18          | JKSR             |
| 05-04-18 | 1416 | 05-04-18       | 1310           | 14                   | 26             | M-M               | 05-08-18          | JKSR             |
| 05-09-18 | 1100 | 05-09-18       | 0953           | 26                   | 32             | M-M               | 05-14-18          | JKSR             |
| 05-15-18 | 1213 | 05-15-18       | 1106           | 32                   | 21             | M-M               | 05-20-18          | JKSR             |
| 05-22-18 | 1336 | 05-22-18       | 1229           | 21                   | 37             | M-M               | 05-26-18          | JKSR             |
| 05-29-18 | 1222 | 05-29-18       | 1115           | 37                   | 42             | M-M               | 06-01-18          | JKSR             |
| 06-04-18 | 1634 | 06-04-18       | 1526           | 42                   | 16             | M-M               | 06-07-18          | JKSR             |
| 06-08-18 | 1329 | 06-08-18       | 1222           | 16                   | 27             | 1222              | 06-08-18          | JKSR             |
| 06-08-18 | 1330 | 06-08-18       | 1223           | 27                   | 26             | M-M               | 06-13-18          | JKSR             |
| 06-14-18 | 1537 | 06-14-18       | 1430           | 26                   | 8              | M-M               | 06-19-18          | JKSR             |
| 06-22-18 | 1300 | 06-22-18       | 1154           | 8                    | JBR11          | M-M               | 06-25-18          | KN               |
| 06-27-18 | 1624 | 06-27-18       | 1516           | JBR11                | 21             | M-M               | 07-01-18          | JKSR             |
|          |      |                |                |                      |                |                   |                   |                  |
|          |      |                |                |                      |                |                   |                   |                  |

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**Table II - Monthly Leak Test**

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|------|------------------|----------------|-----------|----------|------------------|
| 04-23-18 | 1451 | 100              | 99             | Pass      | KN       | Cleaned Manifold |
| 06-22-18 | 1316 | 100              | 99             | Pass      | KN       | Cleaned Manifold |

**Table III - Monthly Flow Rate Verification**

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 04-23-18 | 1454 | 16.70                | 593                          | 592                            | 20.9             | 21.2                | 13.24               | 16.79               | -0.5     | KN       |
| 06-22-18 | 1312 | 16.70                | 593                          | 592.0                          | 28.7             | 28.4                | 12.97               | 16.81               | -0.7     | KN       |

### Co-located Monitor 2398E

### Table I - Every 6th Day Sampling

[illegible]

Didn't Run - Programming Correct

The code is incomplete Run  
programming correct

### Table II - Monthly Leak Test

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance      |
|----------|------|------------------|----------------|-----------|----------|------------------|
| 08/15/18 |      |                  |                |           | KN       | Cleaned Manifold |
| 09/13/18 |      | 99               | 96             | Pass      | KN       | " "              |
|          |      |                  |                |           |          |                  |
|          |      |                  |                |           |          |                  |

### Table III - Monthly Flow Rate Verification

[illegible]



## Co-located Monitor 2398E

**Table I - Every 6th Day Sampling**

| Date     | Time | Displayed Date | Displayed Time | Collected Filter ID# | New Filter ID# | Sample Start Time | Sample Start Date | Sampler Initials |
|----------|------|----------------|----------------|----------------------|----------------|-------------------|-------------------|------------------|
| 10-02-18 | 1341 | 10-02-18       | 1240           | 20                   | 30             | M-M               | 10-05-18          | JKSR             |
| 10-08-18 | 1608 | 10-08-18       | 1506           | 30                   | 8              | M-M               | 10-11-18          | JKSR             |
| 10-13-18 | 1249 | 10-13-18       | 1148           | 8                    | 25             | M-M               | 10-17-18          | KAL              |
| 10-18-18 | 1411 | 10-18-18       | 1309           | 25                   | 33             | M-M               | 10-23-18          | BA               |
| 10-24-18 | 1433 | 10-24-18       | 1331           | 33                   | JBR 7          | M-M               | 10-29-18          | JKSR             |
| 10-30-18 | 1345 | 10-30-18       | 1344           | JBR 7                | 15             | M-M               | 11-4-18           | BA               |
| 11-5-18  | 1207 | 11-5-18        | 1205           | 15                   | 20             | M-M               | 11-10-18          | BA               |
| 11-12-18 | 1334 | 11-12-18       | 1332           | 20                   | 40             | M-M               | 11-16-18          | KAL              |
| 11-19-18 | 1250 | 11-19-18       | 1247           | 40                   | 8              | M-M               | 11-22-18          | KN               |
| 11-26-18 | 1246 | 11-26-18       | 1244           | 8                    | 41             | 1246              | 11-26-18          | KN               |
| 11-26-18 | 1247 | 11-26-18       | 1245           | 41                   | JBR 8          | M-M               | 11-28-18          | KN               |
| 11-30-18 | 1715 | 11-30-18       | 1712           | JBR 8                | 25             | M-M               | 12-4-18           | BA               |
| 12-6-18  | 1433 | 12-6-18        | 1430           | 25                   | 33             | M-M               | 12-10-18          | BA               |
| 12-11-18 | 1518 | 12-11-18       | 1515           | 33                   | 15             | M-M               | 12-16-18          | BA               |
| 12-17-18 | 934  | 12-17-18       | 930            | 15                   | 20             | M-M               | 12-22-18          | BA               |
| 12-23-18 | 1417 | 12-23-18       | 1413           | 20                   | JBR 7          | M-M               | 12-28-18          | BA               |
| 12-29-18 | 1223 | 12-29-18       | 1219           | JBR 7                | 8              | M-M               | 1-2-19            | BA               |
|          |      |                |                | 8                    | 39             | M-M               | 1-8-19            | BA               |

Free/Blank

**Table II - Monthly Leak Test**

| Date     | Time | Initial SP Value | Final SP Value | Pass/Fail | Initials | Maintenance    |
|----------|------|------------------|----------------|-----------|----------|----------------|
| 10/18/18 | 1412 | 101              | 100            | P         | BA       | Clean Manifold |
| 12/17/18 | 1102 | 97               | 95             | P         | BA       | Clean Manifold |
|          |      |                  |                |           |          |                |
|          |      |                  |                |           |          |                |

**Table III - Monthly Flow Rate Verification**

| Date     | Time | Monitor Flow (Q Lpm) | Monitor Baro Pressure (mmHg) | Delta Cal Baro Pressure (mmHg) | Monitor Temp (A) | Delta Cal Temp (Ta) | Delta Cal Flow (Qs) | Delta Cal Flow (Qa) | Accuracy | Initials |
|----------|------|----------------------|------------------------------|--------------------------------|------------------|---------------------|---------------------|---------------------|----------|----------|
| 10/18/18 | 1412 | 16.70                | 595                          | 593                            | 10.8             | 11.3                | 13.71               | 16.77               | -0.07    | BA       |
| 12/17/18 | 1105 | 16.70                | 593                          | 592                            | 5.0              | 7.1                 | 13.78               | 16.64               | 0.06     | BA       |
|          |      |                      |                              |                                |                  |                     |                     |                     |          |          |
|          |      |                      |                              |                                |                  |                     |                     |                     |          |          |

9

## **APPENDIX E**

### **Independent PM<sub>10</sub> Sampler Performance Audit Report**

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**AUDIT REPORT  
FOR  
ALTON COAL DEVELOPMENT, LLC  
COAL HOLLOW MINE  
ALTON, UTAH  
FIRST QUARTER 2018**

Prepared for

Kirk Nicholes  
Alton Coal Development, LLC  
463 N 100 W  
Cedar City, Utah, 84721

Prepared by



1901 Sharp Point Drive, Suite F  
Fort Collins, CO 80525  
970-484-7941

Site Audited: March 29, 2018

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A decorative graphic in the bottom left corner consisting of three stylized mountain peaks in shades of green and blue.



## TABLE OF CONTENTS

| <u>Section</u>                                   | <u>Page</u> |
|--|-------------|
| <b>1.0 INTRODUCTION</b>                          | <b>1-1</b>  |
| <b>2.0 AUDIT METHODS AND EQUIPMENT</b>           | <b>2-1</b>  |
| 2.1 Particulate Samplers                         | 2-1         |
| <b>3.0 AUDIT RESULTS</b>                         | <b>3-1</b>  |
| <b>APPENDIX A</b> Audit Data Forms               | A-1         |
| <b>APPENDIX B</b> Audit Standards Certifications | B-1         |

## LIST OF TABLES

| <u>Table</u>  | <u>Page</u> |
|---|-------------|
| 1-1 Site Location Information                                   | 1-1         |
| 1-2 Summary of Particulate Audit Results                        | 1-1         |
| 2-1 Particulate Samplers, Audit Methods and Acceptance Criteria | 2-1         |
| 2-2 Particulate Samplers, Audit Equipment                       | 2-2         |

## 1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on March 29, 2018. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

|           | Primary CHM           | Background            | Primary NPL           |
|-----------|-----------------------|-----------------------|-----------------------|
| Latitude  | 37° 24' 5.0" N        | 37° 24' 20.9" N       | 37° 25' 18.6" N       |
| Longitude | 112° 27' 21.0" W      | 112° 26' 1.1" W       | 112° 28' 12.8" W      |
| UTM       | 12S 371147<br>4140396 | 12S 373119<br>4140856 | 12S 369909<br>4142684 |
| Elevation | 6,890 feet MSL        | 7,158 feet MSL        | 6,892 feet MSL        |

Audit results for the particulate samplers are summarized in Table 1-2. Detailed discussions of performance audit findings and other findings can be found in Section 3.0.

Table 1-2

Summary of Particulate Sampler Audit Results

| Parameter   |                               | Instrument | Within Accuracy Goal |
|-------------|-------------------------------|------------|----------------------|
| Primary CHM | PM <sub>10</sub>              | BGI PQ200S | Yes                  |
|             | PM <sub>10</sub> (collocated) | BGI PQ200S | No                   |
| Background  | PM <sub>10</sub>              | BGI PQ200S | Yes                  |
| Primary NPL | PM <sub>10</sub>              | BGI PQ200  | Yes                  |
|             | PM <sub>10</sub> (collocated) | BGI PQ200  | Yes                  |

Details of the audit are presented in the following sections:

|             |                                |
|-------------|--------------------------------|
| Section 2.0 | Audit Methods and Equipment    |
| Section 3.0 | Audit Results                  |
| Appendix A  | Audit Data Forms               |
| Appendix B  | Audit Standards Certifications |

Any questions related to this audit or audit report should be addressed to:

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Quality Assurance Officer / Lead Auditor  
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## 2.0 AUDIT METHODS

Audit procedures, audit challenge ranges, and acceptance criteria are described below. These ranges and limits conform to EPA's PSD guidelines. Audit results were verbally communicated to the site operator prior to departure from the site. A follow-up e-mail summarizing audit findings was also sent to Alton Coal Development, LLC personnel. Audit details are provided in Appendix A.

Guidance from the following EPA documents was used to establish the audit procedures:

- 40 CFR Part 58, Appendix A. *Quality Assurance Requirements for Monitors Used In Evaluations of National Ambient Air Quality Standards*
- EPA *Quality Assurance Handbook for Air Pollution Measurement Systems*:
  - *Volume I. A Field Guide to Environmental Quality Assurance*
  - *Volume II. Ambient Air Quality Monitoring Program*

### 2.1 PARTICULATE SAMPLERS (FRM PM<sub>10</sub>)

The filter-based FRM PM<sub>10</sub> particulate samplers are audited in their normal operating mode. ARS audits the samplers with a BGI deltaCal audit standard which measures flow, temperature, and barometric pressure. Prior to conducting the flow audit, a system leak check is performed in accordance with the manufacturer's specifications. The observed volumetric operational flow and design flow of the sampler are compared to the audit flows measured by the audit standard. Differences between the operational sampler flow and audit flow that are greater than  $\pm 10\%$  are considered out of tolerance. Differences between the designated design flow and the audit flow greater than  $\pm 10\%$  are considered out of tolerance. In addition to the flow audits, observed ambient temperature, filter temperature, and barometric pressure measurements of the particulate samplers are also audited by comparison to the audit standard. A temperature difference greater than  $\pm 2^{\circ}\text{C}$  and a barometric pressure difference greater than  $\pm 10\text{mm Hg}$  are considered out of tolerance. Audit methods and acceptable criteria for the particulate samplers are summarized in Table 2-1.

Table 2-1  
Particulate Samplers  
Audit Acceptance Criteria

| Parameter            | Audit Method                                    | Acceptance Criteria          |
|----------------------|---|------------------------------|
| FRM PM <sub>10</sub> | Leak Check                                      | Manufacturer specs           |
|                      | Audit flow to actual sampler flow               | $\leq \pm 10\%$              |
|                      | Design criteria flow to audit flow              | $\leq \pm 10\%$              |
|                      | Audit temperature to sampler temperature        | $\leq \pm 2^{\circ}\text{C}$ |
|                      | Audit temperature to sampler filter temperature | $\leq \pm 2^{\circ}\text{C}$ |
|                      | Audit barometric pressure to sampler pressure   | $\leq \pm 10\text{mm Hg}$    |

Table 2-2  
Particulate Samplers  
Audit Equipment

| References | Manufacturer | Model Number | Serial Number | Expiration Date |
|------------|--------------|--------------|---------------|-----------------|
| FRM Flow   | BGI          | DeltaCal     | 1237          | 12/1/2018       |

### **3.0    AUDIT RESULTS**

Audit findings and recommendations are discussed below. Detailed audit results are provided in Appendix A.

#### Performance Audit Results

- The collocated BGI PQ200S at the Primary site failed the performance audit. It appears that the flow sensor may have failed. The audit flow measured was 12.30 LPM, while the instrument display showed 16.70 LPM.
- Although the BGI PQ200S at the Background site passed the performance audit, the instrument display showed a flow that varied between 16.67 and 16.80 LPM. The audit flow was stable at 17.06 LPM. This may be an indication of an issue with the flow sensor.

## **APPENDIX A**

### **AUDIT DATA FORMS**



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 3/29/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N963B  |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -2 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.85     | 16.72      | -0.8%       | 0.9%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 8.2                             | 7.7        | -0.5       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 6.7                            | 5.5        | -1.2       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.5                  | 591.0      | -1.5       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|





# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 3/29/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N964C  |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -4 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 2 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 12.30     | 16.70      | 35.8%       | -26.3%      | FAIL |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 8.3                             | 8.1        | -0.2       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 7.7                            | 7.0        | -0.7       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.5                  | 593.0      | 0.5        | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|                                   |
|-----------------------------------|
| <b>NOTES:</b> failed flow sensor? |
|                                   |



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 3/29/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N962   |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -1 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 17.06     | 16.72      | -2.0%       | 2.2%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 7.5                             | 6.9        | -0.6       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 6.4                            | 5.5        | -0.9       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 586.5                  | 585.0      | -1.5       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

**NOTES:** 16.67-16.80 on instrument display



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 3/29/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2366D |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -5 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.74     | 16.70      | -0.2%       | 0.2%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 9.2                             | 8.6        | -0.6       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 8.7                            | 7.7        | -1.0       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.0                  | 591.0      | -1.0       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 3/29/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2398E |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -6 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.78     | 16.70      | -0.5%       | 0.5%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 9.3                             | 9.1        | -0.2       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 8.9                            | 8.7        | -0.2       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.0                  | 593.0      | 1.0        | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



## SITE INFORMATION

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 3/29/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |        |      |           |
| NETWORK TYPE |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|           |       |     |     |     |                |         |
|-----------|-------|-----|-----|-----|----------------|---------|
|           |       | Deg | Min | Sec |                | Decimal |
| LATITUDE  | North |     |     |     | --CALCULATE--> |         |
| LONGITUDE | West  |     |     |     |                |         |

|         |  |                |     |     |     |
|---------|--|----------------|-----|-----|-----|
| Decimal |  | --CALCULATE--> | Deg | Min | Sec |
|         |  |                |     |     |     |
|         |  |                |     |     |     |

|           |        |                |      |
|-----------|--------|----------------|------|
|           | Meters | --CALCULATE--> | Feet |
| ELEVATION |        |                |      |

|      |                |        |
|------|----------------|--------|
| Feet | --CALCULATE--> | Meters |
|      |                |        |

Please verify site standards used by the site operator

| SITE STANDARDS    | MANUFACTURER | MODEL | SERIAL # | Calibration Expiration Date |
|-------------------|--------------|-------|----------|-----------------------------|
| PM Flow Reference |              |       |          |                             |
|                   |              |       |          |                             |
|                   |              |       |          |                             |

NOTES:

|  |
|--|
|  |
|--|



|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 3/29/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL     | SERIAL # | Calibration Expiration Date |
|------------------------------------|--------------|-----------|----------|-----------------------------|
| Ozone Transfer Standard            |              |           |          |                             |
| Gas Dilution Transfer Standard     |              |           |          |                             |
| MFC High Flow Reference            |              |           |          |                             |
| MFC Low Flow Reference             |              |           |          |                             |
| Temperature Reference              |              |           |          |                             |
| AT/RH Sensor Reference             |              |           |          |                             |
| Barometric Pressure Reference      |              |           |          |                             |
| Wind Speed Reference (high rpm)    |              |           |          |                             |
| Wind Speed Reference (low rpm)     |              |           |          |                             |
| Wind Speed Torque Gauge            |              |           |          |                             |
| Wind Direction Alignment Reference |              |           |          |                             |
| Wind Direction Linearity Reference |              |           |          |                             |
| Wind Direction Torque Gauge        |              |           |          |                             |
| Solar Radiation Reference          |              |           |          |                             |
| Multiplier                         |              | W/m2 / mV |          |                             |
| UV Radiation Reference             |              |           |          |                             |
| Multiplier                         |              | W/m2 / mV |          |                             |
| Precipitation Reference            |              |           |          |                             |
| Volume                             |              | mL        |          |                             |

|                     |     |          |      |           |
|---------------------|-----|----------|------|-----------|
| PM Flow Standard #1 | BGI | deltaCal | 1237 | 12/1/2018 |
| PM Flow Standard #2 |     |          |      |           |
| PM Flow Standard #3 |     |          |      |           |
| PM Flow Standard #4 |     |          |      |           |

|                            |     |          |      |           |
|----------------------------|-----|----------|------|-----------|
| PM Temperature Standard #1 | BGI | deltaCal | 1237 | 12/1/2018 |
| PM Temperature Standard #2 |     |          |      |           |
| PM Temperature Standard #3 |     |          |      |           |
| PM Temperature Standard #4 |     |          |      |           |

|                                    |     |          |      |           |
|------------------------------------|-----|----------|------|-----------|
| PM Barometric Pressure Standard #1 | BGI | deltaCal | 1237 | 12/1/2018 |
| PM Barometric Pressure Standard #2 |     |          |      |           |
| PM Barometric Pressure Standard #3 |     |          |      |           |
| PM Barometric Pressure Standard #4 |     |          |      |           |

|                   |  |  |  |  |
|-------------------|--|--|--|--|
| TEOM MTV Standard |  |  |  |  |
|-------------------|--|--|--|--|

|                             |  |  |  |  |
|-----------------------------|--|--|--|--|
| HiVol Direct Flow Reference |  |  |  |  |
| Orifice                     |  |  |  |  |
| ΔP orifice manometer        |  |  |  |  |



## **APPENDIX B**

### **AUDIT STANDARDS CERTIFICATIONS**



## CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: **1237**

DATE: 22-Nov-2017

Calibration Operator: P.Pitty

**Critical Venturi Flow Meter:** Max Uncertainty = 0.346%

Serial Number: 1A CEESI NVLAP NIST Data File 07BGI-0001

Serial Number: 2A CEESI NVLAP NIST Data File 07BGI-0003

Serial Number: 5C COX Nist Data File CCAL33222 - 5 C

Serial Number: 4A CEESI NVLAP NIST Data File 07BGI-0002

Serial Number: 3A CEESI NVLAP NIST Data File 07BGI-0004

**Room Temperature:** +/- 0.03°C from -5°C - 70°C Room Temperature: 23.5 °C

Brand: Telatemp Serial Number: 358921

Std Cal Date 19-Apr-17 Std Cal Due Date 19-Apr-18

deltaCal:

Ambient Temperature (set): 23.5 °C

Aux (filter) Temperature (set): 23.5 °C

### Barometric Pressure and Absolute Pressure

Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%

Serial Number: H0850001

Std Cal Date 27-Mar-17 Std Cal Due Date 27-Mar-18

deltaCal:

Barometric pressure (set): 749 mm of Hg

### Results of Venturi Calibration

Flow Rate (Q) vs. Pressure Drop ( $\Delta P$ ).

Where: Q=Lpm,  $\Delta P$ = Cm of H<sub>2</sub>O

Q= 3.93154  $\Delta P$  ^ 0.51535

Overall Uncertainty: 0.35%

Q= 3.87507  $\Delta P$  ^ 0.50721

Overall Uncertainty: 0.35%

Date Placed In Service 12/1/17

(To be filled in by operator upon receipt)

Recommended Recalibration Date 12/1/18

(12 months from date placed in service)

# **To Check a deltaCal**

**1.5-19.5**

**VER 4.00P**

22-Nov-17 P.Pitty

BP= 749 mm of Hg

Maximum allowable error at any flow rate is .75%.

**Serial No. 1237**

|           | Reading     |       | CV     |           |         |
|-----------|-------------|-------|--------|-----------|---------|
|           | Abs. P      |       | Qa     | Qa        |         |
|           | Crit. Vent. | Room  | Flow   | deltaCal  |         |
|           | mm of Hg    | Temp  | Lpm    | Indicated | % Error |
| # 2       | 125.05      | 23.50 | 1.410  | 1.413     | 0.23    |
|           | 215.29      | 23.50 | 2.462  | 2.468     | 0.24    |
|           | 266.58      | 23.50 | 3.060  | 3.051     | -0.30   |
|           | 405.05      | 23.50 | 4.675  | 4.684     | 0.19    |
|           | 567.26      | 23.50 | 6.567  | 6.530     | -0.56   |
| #1        | 177.30      | 23.50 | 7.067  | 7.100     | 0.46    |
|           | 269.58      | 23.50 | 10.825 | 10.816    | -0.09   |
|           | 333.95      | 23.50 | 13.447 | 13.417    | -0.22   |
|           | 411.08      | 23.50 | 16.588 | 16.580    | -0.05   |
|           | 483.80      | 23.50 | 19.549 | 19.564    | 0.07    |
| Average % |             |       |        |           | 0.00    |

To Check a deltaCal  
1.5-19.5

VER 4.00P

22-Nov-17 Pre-Recert

BP= 748.5 mm of Hg

Maximum allowable error at any flow rate is .75%.

Serial No. 1237

|           | Reading<br>Abs. P<br>Crit. Vent.<br>mm of Hg | Room<br>Temp | CV<br>Qa<br>Flow<br>Lpm | Qa<br>deltaCal<br>Indicated | % Error |
|-----------|--|--------------|-------------------------|-----------------------------|---------|
| # 2       | 138.23                                       | 19.70        | 1.544                   | 1.801                       | 16.61   |
|           | 309.57                                       | 19.70        | 3.518                   | 3.690                       | 4.88    |
|           | 551.18                                       | 19.70        | 6.302                   | 6.380                       | 1.24    |
| #1        | 188.43                                       | 19.70        | 7.429                   | 7.520                       | 1.22    |
|           | 371.83                                       | 19.70        | 14.807                  | 14.970                      | 1.10    |
|           | 481.42                                       | 19.70        | 19.216                  | 19.460                      | 1.27    |
| Average % |  |              |                         |                             | 4.39    |

---

**AUDIT REPORT  
FOR  
ALTON COAL DEVELOPMENT, LLC  
COAL HOLLOW MINE  
ALTON, UTAH  
SECOND QUARTER 2018**

Prepared for

Kirk Nicholes  
Alton Coal Development, LLC  
463 N 100 W  
Cedar City, Utah, 84721

Prepared by



1901 Sharp Point Drive, Suite F  
Fort Collins, CO 80525  
970-484-7941

Site Audited: June 28, 2018



## TABLE OF CONTENTS

| <u>Section</u>                                   | <u>Page</u> |
|--|-------------|
| <b>1.0 INTRODUCTION</b>                          | <b>1-1</b>  |
| <b>2.0 AUDIT METHODS AND EQUIPMENT</b>           | <b>2-1</b>  |
| 2.1 Particulate Samplers                         | 2-1         |
| <b>3.0 AUDIT RESULTS</b>                         | <b>3-1</b>  |
| <b>APPENDIX A</b> Audit Data Forms               | A-1         |
| <b>APPENDIX B</b> Audit Standards Certifications | B-1         |

## LIST OF TABLES

| <u>Table</u>  | <u>Page</u> |
|---|-------------|
| 1-1 Site Location Information                                   | 1-1         |
| 1-2 Summary of Particulate Audit Results                        | 1-1         |
| 2-1 Particulate Samplers, Audit Methods and Acceptance Criteria | 2-1         |
| 2-2 Particulate Samplers, Audit Equipment                       | 2-2         |



## 1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on June 28, 2018. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

|           | Primary CHM           | Background            | Primary NPL           |
|-----------|-----------------------|-----------------------|-----------------------|
| Latitude  | 37° 24' 5.0" N        | 37° 24' 20.9" N       | 37° 24' 43" N         |
| Longitude | 112° 27' 21.0" W      | 112° 26' 1.1" W       | 112° 27' 30.6" W      |
| UTM       | 12S 371147<br>4140396 | 12S 373119<br>4140856 | 12S 370928<br>4141570 |
| Elevation | 6,890 feet MSL        | 7,158 feet MSL        | 6,959 feet MSL        |

Audit results for the particulate samplers are summarized in Table 1-2. Detailed discussions of performance audit findings and other findings can be found in Section 3.0.

Table 1-2

Summary of Particulate Sampler Audit Results

| Parameter     |                               | Instrument | Within Accuracy Goal |
|---------------|-------------------------------|------------|----------------------|
| Primary CHM   | PM <sub>10</sub>              | BGI PQ200S | Yes                  |
|               | PM <sub>10</sub> (collocated) | BGI PQ200S | Yes                  |
| Background #1 | PM <sub>10</sub>              | BGI PQ200S | Yes                  |
| Primary NPL   | PM <sub>10</sub>              | BGI PQ200  | Yes                  |
|               | PM <sub>10</sub> (collocated) | BGI PQ200  | Yes                  |

Details of the audit are presented in the following sections:

|             |                                |
|-------------|--------------------------------|
| Section 2.0 | Audit Methods and Equipment    |
| Section 3.0 | Audit Results                  |
| Appendix A  | Audit Data Forms               |
| Appendix B  | Audit Standards Certifications |

Any questions related to this audit or audit report should be addressed to:

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Quality Assurance Officer / Lead Auditor  
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E-mail: [ckirk@air-resource.com](mailto:ckirk@air-resource.com)

## 2.0 AUDIT METHODS

Audit procedures, audit challenge ranges, and acceptance criteria are described below. These ranges and limits conform to EPA's PSD guidelines. Audit results were verbally communicated to the site operator prior to departure from the site. A follow-up e-mail summarizing audit findings was also sent to Alton Coal Development, LLC personnel. Audit details are provided in Appendix A.

Guidance from the following EPA documents was used to establish the audit procedures:

- 40 CFR 58, Appendix A. *Quality Assurance Requirements for SLAMS, SPMs, and PSD Air Monitoring*
- EPA *Quality Assurance Handbook for Air Pollution Measurement Systems*:
  - *Volume I. A Field Guide to Environmental Quality Assurance*
  - *Volume II. Ambient Air Quality Monitoring Program*
  - *Volume IV. Meteorological Measurements*
- EPA *Meteorological Monitoring Guidance for Regulatory Modeling Applications*
- EPA *Transfer Standards for Calibration of Air Monitoring Analyzers for Ozone*

### 2.1 PARTICULATE SAMPLERS (FRM PM<sub>10</sub>)

The filter-based FRM PM<sub>10</sub> particulate samplers are audited in their normal operating mode. ARS audits the samplers with a BGI DeltaCal audit standard which measures flow, temperature, and barometric pressure. Prior to conducting the flow audit, a system leak check is performed in accordance with the manufacturer's specifications. The observed volumetric operational flow and design flow of the sampler are compared to the audit flows measured by the audit standard. Differences between the operational sampler flow and audit flow that are greater than  $\pm 10\%$  are considered out of tolerance. Differences between the designated design flow and the audit flow greater than  $\pm 10\%$  are considered out of tolerance. In addition to the flow audits, observed ambient temperature, filter temperature, and barometric pressure measurements of the particulate samplers are also audited by comparison to the audit standard. A temperature difference greater than  $\pm 2^\circ\text{C}$  and a barometric pressure difference greater than  $\pm 10\text{ mm Hg}$  are considered out of tolerance. Audit methods and acceptable criteria for the particulate samplers are summarized in Table 2-1.

Table 2-1

#### Particulate Samplers Audit Acceptance Criteria

| Parameter            | Audit Method                                    | Acceptance Criteria        |
|----------------------|---|----------------------------|
| FRM PM <sub>10</sub> | Leak Check                                      | Manufacturer specs         |
|                      | Audit flow to actual sampler flow               | $\leq \pm 10\%$            |
|                      | Design criteria flow to audit flow              | $\leq \pm 10\%$            |
|                      | Audit temperature to sampler temperature        | $\leq \pm 2^\circ\text{C}$ |
|                      | Audit temperature to sampler filter temperature | $\leq \pm 2^\circ\text{C}$ |
|                      | Audit barometric pressure to sampler pressure   | $\leq \pm 10\text{ mm Hg}$ |

Table 2-2  
Particulate Samplers  
Audit Equipment

| References | Manufacturer | Model Number | Serial Number | Expiration Date |
|------------|--------------|--------------|---------------|-----------------|
| FRM Flow   | BGI          | DeltaCal     | 1220          | 3/16/2019       |

### **3.0    AUDIT RESULTS**

Audit findings and recommendations are discussed below. Detailed audit results are provided in Appendix A.

#### Performance Audit Results

- There were no performance audit findings.

## **APPENDIX A**

### **AUDIT DATA FORMS**





# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |             |      |           |
|--------------|-----|-------------------------|------------|---------|-------------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M. Gosselin | DATE | 6/28/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |             |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |             |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1220          | 3/16/2019       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N963B  |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| 0 min   |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 1 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.95     | 16.70      | -1.5%       | 1.5%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 25.9                            | 25.8       | -0.1       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 27.8                           | 26.7       | -1.1       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 591.5                  | 591.0      | -0.5       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |             |      |           |
|--------------|-----|-------------------------|------------|---------|-------------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M. Gosselin | DATE | 6/28/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |             |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |             |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1220          | 3/16/2019       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N964C  |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| 0 min   |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.72     | 16.39      | -2.0%       | 0.1%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 26.0                            | 26.1       | 0.1        | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 27.1                           | 27.1       | 0.0        | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 591.5                  | 592.0      | 0.5        | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |             |      |           |
|--------------|-----|-------------------------|------------|---------|-------------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M. Gosselin | DATE | 6/28/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |             |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |             |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1220          | 3/16/2019       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PG200S |
| SERIAL NUMBER | N962   |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| 0 min   |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 17.00     | 16.70      | -1.8%       | 1.8%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 24.7                            | 24.6       | -0.1       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 26.0                           | 25.3       | -0.7       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 586.0                  | 585.0      | -1.0       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

**NOTES:** Fluctuated around 16.67-16.7



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |             |      |           |
|--------------|-----|-------------------------|------------|---------|-------------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M. Gosselin | DATE | 6/28/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |             |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |             |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1220          | 3/16/2019       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2366D |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| 0 min   |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 4 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.64     | 16.70      | 0.4%        | -0.4%       | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 26.3                            | 26.2       | -0.1       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 27.8                           | 27.3       | -0.5       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 591.0                  | 589.0      | -2.0       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |             |      |           |
|--------------|-----|-------------------------|------------|---------|-------------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M. Gosselin | DATE | 6/28/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |             |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |             |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1220          | 3/16/2019       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1220          | 3/16/2019       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2398E |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| 0 min   |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 4.0                  | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.82     | 16.67      | -0.9%       | 0.7%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 26.7                            | 27.2       | 0.5        | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 28.1                           | 27.9       | -0.2       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 590.5                  | 592.0      | 1.5        | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



## SITE INFORMATION

|              |     |                         |            |         |             |      |           |
|--------------|-----|-------------------------|------------|---------|-------------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M. Gosselin | DATE | 6/28/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |             |      |           |
| NETWORK TYPE |     | Alton Coal- Coal Hollow |            |         |             |      |           |

|           |       |     |     |     |                |         |
|-----------|-------|-----|-----|-----|----------------|---------|
|           |       | Deg | Min | Sec |                | Decimal |
| LATITUDE  | North |     |     |     | --CALCULATE--> |         |
| LONGITUDE | West  |     |     |     |                |         |

|         |  |                |     |     |     |
|---------|--|----------------|-----|-----|-----|
| Decimal |  | --CALCULATE--> | Deg | Min | Sec |
|         |  |                |     |     |     |
|         |  |                |     |     |     |

|           |        |                |      |
|-----------|--------|----------------|------|
|           | Meters | --CALCULATE--> | Feet |
| ELEVATION |        |                |      |

|      |                |        |
|------|----------------|--------|
| Feet | --CALCULATE--> | Meters |
|      |                |        |

Please verify site standards used by the site operator

| SITE STANDARDS    | MANUFACTURER | MODEL | SERIAL # | Calibration Expiration Date |
|-------------------|--------------|-------|----------|-----------------------------|
| PM Flow Reference |              |       |          |                             |
|                   |              |       |          |                             |
|                   |              |       |          |                             |

NOTES:





|              |     |                         |            |         |             |      |           |
|--------------|-----|-------------------------|------------|---------|-------------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M. Gosselin | DATE | 6/28/2018 |
| SITE NAME    |     | Coal Hollow Mine        |            |         |             |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |             |      |           |

|                                    | MANUFACTURER | MODEL     | SERIAL # | Calibration Expiration Date |
|------------------------------------|--------------|-----------|----------|-----------------------------|
| Ozone Transfer Standard            |              |           |          |                             |
| Gas Dilution Transfer Standard     |              |           |          |                             |
| MFC High Flow Reference            |              |           |          |                             |
| MFC Low Flow Reference             |              |           |          |                             |
| Temperature Reference              |              |           |          |                             |
| AT/RH Sensor Reference             |              |           |          |                             |
| Barometric Pressure Reference      |              |           |          |                             |
| Wind Speed Reference (high rpm)    |              |           |          |                             |
| Wind Speed Reference (low rpm)     |              |           |          |                             |
| Wind Speed Torque Gauge            |              |           |          |                             |
| Wind Direction Alignment Reference |              |           |          |                             |
| Wind Direction Linearity Reference |              |           |          |                             |
| Wind Direction Torque Gauge        |              |           |          |                             |
| Solar Radiation Reference          |              |           |          |                             |
| Multiplier                         |              | W/m2 / mV |          |                             |
| UV Radiation Reference             |              |           |          |                             |
| Multiplier                         |              | W/m2 / mV |          |                             |
| Precipitation Reference            |              |           |          |                             |
| Volume                             | 1000         | mL        |          |                             |

|                     |     |          |      |           |
|---------------------|-----|----------|------|-----------|
| PM Flow Standard #1 | BGI | deltaCal | 1220 | 3/16/2019 |
| PM Flow Standard #2 |     |          |      |           |
| PM Flow Standard #3 |     |          |      |           |
| PM Flow Standard #4 |     |          |      |           |

|                            |     |          |      |           |
|----------------------------|-----|----------|------|-----------|
| PM Temperature Standard #1 | BGI | deltaCal | 1220 | 3/16/2019 |
| PM Temperature Standard #2 |     |          |      |           |
| PM Temperature Standard #3 |     |          |      |           |
| PM Temperature Standard #4 |     |          |      |           |

|                                    |     |          |      |           |
|------------------------------------|-----|----------|------|-----------|
| PM Barometric Pressure Standard #1 | BGI | deltaCal | 1220 | 3/16/2019 |
| PM Barometric Pressure Standard #2 |     |          |      |           |
| PM Barometric Pressure Standard #3 |     |          |      |           |
| PM Barometric Pressure Standard #4 |     |          |      |           |

|                   |  |  |  |  |
|-------------------|--|--|--|--|
| TEOM MTV Standard |  |  |  |  |
|-------------------|--|--|--|--|

|                             |  |  |  |  |
|-----------------------------|--|--|--|--|
| HiVol Direct Flow Reference |  |  |  |  |
| Orifice                     |  |  |  |  |
| ΔP orifice manometer        |  |  |  |  |

## **APPENDIX B**

### **AUDIT STANDARDS CERTIFICATIONS**



## CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: 1220

DATE: 16-Mar-2018

Calibration Operator: P.Pitty

**Critical Venturi Flow Meter:** Max Uncertainty = 0.346%

Serial Number: 1A CEESI NVLAP NIST Data File 07BGI-0001

Serial Number: 2A CEESI NVLAP NIST Data File 07BGI-0003

Serial Number: 5C COX Nist Data File CCAL33222 - 5 C

Serial Number: 4A CEESI NVLAP NIST Data File 07BGI-0002

Serial Number: 3A CEESI NVLAP NIST Data File 07BGI-0004

**Room Temperature:** +/- 0.03°C from -5°C - 70°C Room Temperature: 24.0 °C

|                 |                |                            |
|-----------------|----------------|----------------------------|
| Brand: Telatemp | Serial Number: | 358921                     |
| Std Cal Date    | 19-Apr-17      | Std Cal Due Date 19-Apr-18 |

deltaCal:

Ambient Temperature (set): 24.0 °C

Aux (filter) Temperature (set): 24.0 °C

### Barometric Pressure and Absolute Pressure

Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%

|                |           |                  |           |
|----------------|-----------|------------------|-----------|
| Serial Number: | H0850001  |                  |           |
| Std Cal Date   | 27-Mar-17 | Std Cal Due Date | 27-Mar-18 |

deltaCal:

Barometric pressure (set): 744.5 mm of Hg

### Results of Venturi Calibration

Flow Rate (Q) vs. Pressure Drop ( $\Delta P$ ).

Where: Q=Lpm,  $\Delta P$ = Cm of H<sub>2</sub>O

Q= 4.03153  $\Delta P$  ^ 0.51384

Overall Uncertainty: 0.35%

Q= 4.03950  $\Delta P$  ^ 0.48616

Overall Uncertainty: 0.35%

Date Placed In Service 4/6/18

(To be filled in by operator upon receipt)

Recommended Recalibration Date 4/6/19

(12 months from date placed in service)

# To Check a deltaCal

1.5-19.5

VER 4.00P

16-Mar-18 P.Pitty

BP= 744.5 mm of Hg

Maximum allowable error at any flow rate is .75%.

Serial No. 1220

|           | Reading     |       | CV     |           |         |
|-----------|-------------|-------|--------|-----------|---------|
|           | Abs. P      |       | Qa     | Qa        |         |
|           | Crit. Vent. | Room  | Flow   | deltaCal  |         |
|           | mm of Hg    | Temp  | Lpm    | Indicated | % Error |
| # 2       | 148.31      | 24.00 | 1.694  | 1.687     | -0.41   |
|           | 213.33      | 24.00 | 2.458  | 2.457     | -0.05   |
|           | 394.60      | 24.00 | 4.588  | 4.590     | 0.04    |
|           | 475.49      | 24.00 | 5.539  | 5.532     | -0.13   |
|           | 527.63      | 24.00 | 6.152  | 6.122     | -0.48   |
| #1        | 178.24      | 24.60 | 7.175  | 7.208     | 0.46    |
|           | 271.68      | 24.60 | 11.018 | 11.022    | 0.04    |
|           | 341.52      | 24.60 | 13.890 | 13.881    | -0.06   |
|           | 415.33      | 24.60 | 16.925 | 16.910    | -0.09   |
|           | 478.46      | 24.60 | 19.521 | 19.522    | 0.01    |
| Average % |             |       |        |           | -0.07   |

# **To Check a deltaCal**

**1.5-19.5**

**VER 4.00P**

16-Mar-18 Pre-Recert

BP= 743 mm of Hg

Maximum allowable error at any flow rate is .75%.

**Serial No. 1220**

|           | Reading<br>Abs. P<br>Crit. Vent.<br>mm of Hg | Room<br>Temp | CV<br>Qa<br>Flow<br>Lpm | Qa<br>deltaCal<br>Indicated | % Error |
|-----------|--|--------------|-------------------------|-----------------------------|---------|
| # 2       | 140.58                                       | 21.50        | 1.593                   | 1.676                       | 5.22    |
|           | 296.30                                       | 21.50        | 3.411                   | 3.400                       | -0.33   |
|           | 533.94                                       | 21.50        | 6.186                   | 6.170                       | -0.26   |
| #1        | 199.13                                       | 21.50        | 7.966                   | 7.776                       | -2.39   |
|           | 329.20                                       | 21.50        | 13.270                  | 12.950                      | -2.41   |
|           | 481.00                                       | 21.50        | 19.460                  | 19.325                      | -0.69   |
| Average % |  |              |                         |                             | -0.14   |

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**AUDIT REPORT  
FOR  
ALTON COAL DEVELOPMENT, LLC  
COAL HOLLOW MINE  
ALTON, UTAH  
THIRD QUARTER 2018**

Prepared for

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463 N 100 W  
Cedar City, Utah, 84721

Prepared by



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Site Audited: September 13, 2018





## TABLE OF CONTENTS

| <u>Section</u>                                   | <u>Page</u> |
|--|-------------|
| <b>1.0 INTRODUCTION</b>                          | <b>1-1</b>  |
| <b>2.0 AUDIT METHODS AND EQUIPMENT</b>           | <b>2-1</b>  |
| 2.1 Particulate Samplers                         | 2-1         |
| 2.2 Meteorological Parameters                    | 2-2         |
| <b>3.0 AUDIT RESULTS</b>                         | <b>3-1</b>  |
| <b>APPENDIX A</b> Audit Data Forms               | A-1         |
| <b>APPENDIX B</b> Audit Standards Certifications | B-1         |

## LIST OF TABLES

| <u>Table</u>   | <u>Page</u> |
|--|-------------|
| 1-1 Site Location Information                                    | 1-1         |
| 1-2 Summary of Particulate Audit Results                         | 1-1         |
| 1-3 Summary of Meteorological Audit Results                      | 1-1         |
| 2-1 Particulate Samplers, Audit Methods and Acceptance Criteria  | 2-1         |
| 2-2 Particulate Samplers, Audit Equipment                        | 2-2         |
| 2-3 Meteorological Sensors, Audit Ranges and Acceptance Criteria | 2-3         |
| 2-4 Meteorological Equipment                                     | 2-4         |

## 1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on September 13, 2018. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

|           | Primary CHM           | Background            | Primary NPL           | Meteorological        |
|-----------|-----------------------|-----------------------|-----------------------|-----------------------|
| Latitude  | 37° 24' 5.0" N        | 37° 24' 20.9" N       | 37° 24' 43" N         | 37° 23' 53.2" N       |
| Longitude | 112° 27' 21.0" W      | 112° 26' 1.1" W       | 112° 27' 30.6" W      | 112° 26' 43.1" W      |
| UTM       | 12S 371147<br>4140396 | 12S 373119<br>4140856 | 12S 370928<br>4141570 | 12S 372073<br>4140018 |
| Elevation | 6,890 feet MSL        | 7,158 feet MSL        | 6,959 feet MSL        | 7,007 feet MSL        |

Audit results for the particulate samplers are summarized in Table 1-2. Audit results for the meteorological measurements are summarized in Table 1-3. Detailed discussions of performance audit findings and other findings can be found in Section 3.0.

Table 1-2

Summary of Particulate Sampler Audit Results

|               | Parameter                     | Instrument | Within Accuracy Goal |
|---------------|-------------------------------|------------|----------------------|
| Primary CHM   | PM <sub>10</sub>              | BGI PQ200S | Yes                  |
|               | PM <sub>10</sub> (collocated) | BGI PQ200S | Yes                  |
| Background #1 | PM <sub>10</sub>              | BGI PQ200S | Yes                  |
| Primary NPL   | PM <sub>10</sub>              | BGI PQ200  | Yes                  |
|               | PM <sub>10</sub> (collocated) | BGI PQ200  | Yes                  |

Table 1-3

Summary of Meteorological Audit Results

| Parameter      | Sensor                    | Within Accuracy Goal |
|----------------|---------------------------|----------------------|
| Wind Speed     | Met-One 34B               | Yes                  |
| Wind Direction | Met-One 34B               | Yes                  |
| Temperature    | Campbell Scientific 107   | Yes                  |
| Precipitation  | Hydrological Services TB4 | Yes                  |

Details of the audit are presented in the following sections:

|             |                                |
|-------------|--------------------------------|
| Section 2.0 | Audit Methods and Equipment    |
| Section 3.0 | Audit Results                  |
| Appendix A  | Audit Data Forms               |
| Appendix B  | Audit Standards Certifications |

Any questions related to this audit or audit report should be addressed to:

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## 2.0 AUDIT METHODS

Audit procedures, audit challenge ranges, and acceptance criteria are described below. These ranges and limits conform to EPA's PSD guidelines. Audit results were verbally communicated to the site operator prior to departure from the site. A follow-up e-mail summarizing audit findings was also sent to Alton Coal Development, LLC personnel. Audit details are provided in Appendix A.

Guidance from the following EPA documents was used to establish the audit procedures:

- 40 CFR 58, Appendix B. *Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring*
- EPA *Quality Assurance Handbook for Air Pollution Measurement Systems*:
  - *Volume I. A Field Guide to Environmental Quality Assurance*
  - *Volume II. Ambient Air Quality Monitoring Program*
  - *Volume IV. Meteorological Measurements*
- EPA *Meteorological Monitoring Guidance for Regulatory Modeling Applications*

### 2.1 PARTICULATE SAMPLERS (FRM PM<sub>10</sub>)

The filter-based FRM PM<sub>10</sub> particulate samplers are audited in their normal operating mode. ARS audits the samplers with a BGI deltaCal audit standard which measures flow, temperature, and barometric pressure. Prior to conducting the flow audit, a system leak check is performed in accordance with the manufacturer's specifications. The observed volumetric operational flow and design flow of the sampler are compared to the audit flows measured by the audit standard. Differences between the operational sampler flow and audit flow that are greater than  $\pm 10\%$  are considered out of tolerance. Differences between the designated design flow and the audit flow greater than  $\pm 10\%$  are considered out of tolerance. In addition to the flow audits, observed ambient temperature, filter temperature, and barometric pressure measurements of the particulate samplers are also audited by comparison to the audit standard. A temperature difference greater than  $\pm 2^\circ\text{C}$  and a barometric pressure difference greater than  $\pm 10\text{mm Hg}$  are considered out of tolerance. Audit methods and acceptable criteria for the particulate samplers are summarized in Table 2-1.

Table 2-1  
Particulate Samplers  
Audit Acceptance Criteria

| Parameter            | Audit Method                                    | Acceptance Criteria        |
|----------------------|---|----------------------------|
| FRM PM <sub>10</sub> | Leak Check                                      | Manufacturer specs         |
|                      | Audit flow to actual sampler flow               | $\leq \pm 10\%$            |
|                      | Design criteria flow to audit flow              | $\leq \pm 10\%$            |
|                      | Audit temperature to sampler temperature        | $\leq \pm 2^\circ\text{C}$ |
|                      | Audit temperature to sampler filter temperature | $\leq \pm 2^\circ\text{C}$ |
|                      | Audit barometric pressure to sampler pressure   | $\leq \pm 10\text{mm Hg}$  |

Table 2-2  
Particulate Samplers  
Audit Equipment

| References | Manufacturer | Model Number | Serial Number | Expiration Date |
|------------|--------------|--------------|---------------|-----------------|
| FRM Flow   | BGI          | DeltaCal     | 1237          | 12/1/2018       |

## 2.2 METEOROLOGICAL PARAMETERS

Meteorological measurement systems are audited in accordance with (and accuracy goals were obtained from) the EPA's *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV – Meteorological Measurements*, (March 2008). ARS uses National Institute of Standards and Technologies (NIST) traceable test equipment for all meteorological parameters. All equipment is recertified annually. Audit ranges and acceptable criteria for each parameter are summarized in Table 2-3.

### 2.2.1 Wind Speed

Wind speed sensors are audited using an R.M. Young model 18802 (high RPM) or 18811 (low RPM) pulsed motor wind speed calibrator. Each sensor is tested at zero and five shaft revolution speeds. The equivalent wind speed is calculated corresponding to the sensor manufacturer's specified values for shaft speed versus wind velocity and compared to readings obtained from the on-site datalogger.

### 2.2.2 Wind Direction

Wind direction sensor audits include the verification of sensor orientation, linearity, and starting threshold (bearing integrity). The sensor orientation accuracy is verified by a reference. The reference can be an internal reference (a tower-mounted alignment vane) or external (pointing at landmarks from the sensor). Accuracy of the references is verified by the solar azimuth method for the determination of true north. Using a compass and the site latitude and longitude, a computer model outputs the sun's azimuth for that exact time of day. The compass is adjusted to that azimuth, effectively correcting for the compass to the local magnetic declination (which may include local magnetic field disturbances). The sensor orientation accuracy is checked by aligning the wind direction vane to and from each landmark reference, recording sensor responses from the on-site datalogger.

Potentiometer linearity is tested by verifying the change in response between two successive orientations across eight points on a calibrated disc mounted atop the sensor. For example, any two adjacent orientations on the eight-point disc are separated by 45 degrees. The difference in the datalogger response for these two adjacent orientations is compared to this value.

### 2.2.3 Ambient Temperature

Temperature sensors that are non-immersible are audited by collocation of the audit sensor under ambient conditions utilizing similar methods of sensor aspiration. Collocated comparisons are typically carried out using hourly averages. Audit data are collected by a datalogger provided by the auditor. Temperature sensors that are immersible are audited by comparison to the audit sensor in water baths. The test baths are typically at 0°C, near ambient conditions (or approximately 25°C), and near the full scale of the sensor (typically near 50°C). Data observed on the on-site datalogger are used to assess the accuracy of sensors. Sensor aspirators are inspected for proper function, including fan function and flow direction.

### 2.2.4 Precipitation

The tipping bucket style precipitation gauges are audited with a volumetric precipitation gauge calibrator by transferring a known amount of water through the gauge orifice at a maximum rate equivalent to 2.0 inches/hour of precipitation. The total values from the on-site datalogger values are compared to the actual introduced volume. The level and cleanliness of the sensor is observed where possible.

Table 2-3

Meteorological Sensors  
Audit Ranges and Acceptance Criteria

| Parameter                                      | Audit Method                                   | Acceptance Criteria  |
|--|--|----------------------|
| Wind Speed                                     | Accuracy at five speeds with anemometer drive  | $\leq \pm 0.2$ m/s   |
|  | Starting threshold with torque gauge           | Manufacturer specs   |
| Wind Direction                                 | Accuracy with compass                          | $\leq \pm 5^\circ$   |
|  | Linearity                                      | $\leq \pm 5^\circ$   |
|  | Starting threshold with torque gauge           | Manufacturer specs   |
| Ambient Temperature<br>(non-immersible sensor) | Accuracy via collocation in ambient conditions | $\leq \pm 0.5^\circ$ |
| Ambient Temperature<br>(immersible sensor)     | Accuracy via collocation in three water baths  | $\leq \pm 0.5^\circ$ |
| Precipitation                                  | Accuracy via known volume of water             | $\leq \pm 10\%$      |

Table 2-4

## Meteorological Audit Equipment

| <b>References</b>          | <b>Manufacturer</b> | <b>Model Number</b> | <b>Serial Number</b> | <b>Expiration Date</b> |
|----------------------------|---------------------|---------------------|----------------------|------------------------|
| Wind Speed (high rpm)      | R.M. Young          | 18802               | CA4104               | 3/9/2018               |
| Wind Direction Orientation | Brunton             | Transit             | 5103212072           | N/A                    |
| Temperature (immersible)   | Eutechnics          | 4400                | 307635               | 2/28/2019              |
| Precipitation              | R.M. Young          | 52260               | N/A                  | N/A                    |



### **3.0 AUDIT RESULTS**

Audit findings and recommendations are discussed below. Detailed audit results are provided in Appendix A.

#### **Performance Audit Results**

All parameters at the meteorological station passed the performance audit. It should be noted that the auditor could only perform qualitative checks on the wind speed measurement. Quantitative checks on the wind speed measurement will be conducted next quarter.

The Primary site PQ200 had highly variable flow rates, as both indicated by the instrument and the BGI deltaCal flow calibrator. While all flow rates noted passed the performance audit requirements, the %CV flow is likely an issue for sampling. Based upon recent data downloads, it looks like this issue just started. The issue appears to be related to the pump. The collocated PQ200 initially failed the leak check due to a minuscule leak. Once the filter holder assembly was tightened, there was no issue.

No issues were noted at the Background and NPL sites.

## **APPENDIX A**

### **AUDIT DATA FORMS**



## TEMPERATURE / DELTA-TEMPERATURE SYSTEM AUDIT

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                       | MANUFACTURER | MODEL | SERIAL NUMBER | EXPIRATION DATE |
|-----------------------|--------------|-------|---------------|-----------------|
| Temperature Reference | Eutechnics   | 4400  | 307635        | 2/28/2019       |

| 2m Temperature Sensor |                     |
|-----------------------|---------------------|
| Manufacturer          | Campbell Scientific |
| Model                 | 107                 |
| Serial Number         | 10755-14 / WO#1272  |

**List sensors according to height on tower, from highest to lowest.**

| Temp. Deltas |  |
|--------------|--|
|              |  |
|              |  |
|              |  |

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| CALIBRATION ACCEPTANCE CRITERIA (<=) |     |
|--------------------------------------|-----|
| Ambient Temperature Difference (°C)  | 0.5 |
| Vertical Temperature Difference (°C) | 0.1 |

| AS FOUND           | 2m Temperature |            |      |  |  |  |  |  |  |  |  |  |
|--------------------|----------------|------------|------|--|--|--|--|--|--|--|--|--|
| Bath Temp (°C)     | DAS            | Difference |      |  |  |  |  |  |  |  |  |  |
| 0.23               | 0.29           | 0.06       | PASS |  |  |  |  |  |  |  |  |  |
| 36.12              | 36.35          | 0.23       | PASS |  |  |  |  |  |  |  |  |  |
| 21.58              | 21.74          | 0.16       | PASS |  |  |  |  |  |  |  |  |  |
| MAX ABS Difference |                | 0.23       | PASS |  |  |  |  |  |  |  |  |  |

[illegible]

|                              |                              |                             |   |
|------------------------------|------------------------------|-----------------------------|---|
| Aspirator fan functional 2m? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
|                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A            |
|                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A            |
|                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A            |

Each sensor was verified against its data channel ? ☐ Yes ☐ No ☒ N/A

Each Temperature Difference = Upper - Lower ? ☐ Yes ☐ No ☒ N/A

**NOTES:**

|  |  |
|--|--|
|  |  |
|--|--|



## WIND SPEED SENSOR AUDIT

|              |     |                         |            |                  |        |      |           |
|--------------|-----|-------------------------|------------|------------------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | FIELD SPECIALIST | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |                  |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |                  |        |      |           |

|                         | MANUFACTURER | MODEL | SERIAL NUMBER | EXPIRATION DATE |
|-------------------------|--------------|-------|---------------|-----------------|
| Wind Speed Reference    | RM Young     | 18802 | CA04104       | 3/9/2019        |
| Wind Speed Torque Gauge | RM Young     | 18310 |               |                 |

|                        |                |
|------------------------|----------------|
| Manufacturer and Model | Met One - 034B |
| Sensor Serial #        | E2281          |
| Cups Serial #          |                |

| AUDIT CRITERIA (<=)         |      |
|-----------------------------|------|
| Wind Speed Difference (m/s) | 0.20 |
| Wind Speed Difference (%)   | N/A  |

|              |     |
|--------------|-----|
| Select UNITS | m/s |
|--------------|-----|

| Motor Speed (rpm) | Target Speed | Wind Speed |            |     |     |
|-------------------|--------------|------------|------------|-----|-----|
|                   |              | DAS        | Difference |     |     |
| 0                 | 0.000        | 0.000      | N/A        | N/A | N/A |
| 100               | 2.943        |            |            |     |     |
| 200               | 5.607        |            |            |     |     |
| 300               | 8.270        |            |            |     |     |
| 600               | 16.260       |            |            |     |     |
| 1800              | 48.220       |            |            |     |     |

|                    |        |
|--------------------|--------|
| Starting Threshold | TORQUE |
| Torque <= 0.2 g-cm |        |

|                           |                              |                             |   |
|---------------------------|------------------------------|-----------------------------|---|
| Heater sleeve functional? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
|---------------------------|------------------------------|-----------------------------|---|

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# WIND DIRECTION AUDIT

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                               | MANUFACTURER | MODEL   | SERIAL NUMBER | EXPIRATION DATE |
|-------------------------------|--------------|---------|---------------|-----------------|
| Direction Alignment Reference | Brunton      | Transit | 5103212072    |                 |
| Direction Linearity Reference | RM Young     | 18212   | n/a           |                 |
| Direction Torque Gauge        | RM Young     | 18331   | n/a           |                 |

|                      |                |
|----------------------|----------------|
| Manufacturer & Model | Met One - 034B |
| Sensor Serial #      | E2281          |
| Vane Serial #        |                |

|                                      |     |
|--------------------------------------|-----|
| Local Magnetic Declination (degrees) | 0.0 |
| Method                               | n/a |

|                                   |  |  |  |      |
|-----------------------------------|--|--|--|------|
| Mag. Dec. from NOAA (deg/min/sec) |  |  |  | 0.00 |
|-----------------------------------|--|--|--|------|

<http://www.ngdc.noaa.gov/geomag-web/#declination>

| AUDIT CRITERIA (<=)                 |   |
|-------------------------------------|---|
| Cross-arm Alignment Error (degrees) | 2 |
| Total Align. Diff (degrees)         | 5 |
| Sensor Linearity (degrees)          | 5 |

| Landmarks                                 | Degrees |
|---|---------|
| To left most building/barn to the east    | 338     |
| From left most building/barn to the east  | 158     |
| From center of right rock outcrop, saddle | 73      |
| To center of right rock outcrop, saddle   | 253     |

|                                     |     |      |
|-------------------------------------|-----|------|
| Reference Alignment Error (degrees) | 0.0 | PASS |
|-------------------------------------|-----|------|

| SENSOR ALIGNMENT |              |     |            |
|------------------|--------------|-----|------------|
| Reference        | Degrees      | DAS | Difference |
| From the North   | 0            |     |            |
| From the South   | 180          |     |            |
| From the East    | 90           |     |            |
| From the West    | 270          |     |            |
| Total Alignment  | MAX ABS Diff |     |            |

OR

| SENSOR ALIGNMENT        |              |       |            |
|-------------------------|--------------|-------|------------|
| Landmark                | Degrees      | DAS   | Difference |
| most building/barn to   | 338          | 335.8 | -2.2       |
| most building/barn to   | 158          | 156.0 | -2.0       |
| er of right rock outcro | 73           | 72.5  | -0.5       |
| r of right rock outcro  | 253          | 250.8 | -2.2       |
| Total Alignment         | MAX ABS Diff | 2.2   | PASS       |

| SENSOR LINEARITY |     |            |
|------------------|-----|------------|
| Point            | DAS | Difference |
| 1                |     | N/A        |
| 2                |     |            |
| 3                |     |            |
| 4                |     |            |
| 5                |     |            |
| 6                |     |            |
| 7                |     |            |
| 8                |     |            |
| 1                |     |            |
| MAX Difference   |     |            |

|                    |          |
|--------------------|----------|
| Starting Threshold | TORQUE   |
| Torque <=          | 6.5 g-cm |

|                           |  |
|---------------------------|--|
| Heater sleeve functional? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
|---------------------------|--|

NOTES:



# PRECIPITATION SENSOR AUDIT

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                         | MANUFACTURER | MODEL | SERIAL NUMBER | EXPIRATION DATE |
|-------------------------|--------------|-------|---------------|-----------------|
| Precipitation Reference | RM Young     | 52260 | n/a           |                 |

|               |                       |
|---------------|-----------------------|
| Manufacturer  | Hydrological Services |
| Model         | TB4                   |
| Serial Number | 05-94                 |

| AUDIT CRITERIA (<=)              |     |
|----------------------------------|-----|
| Difference from Input Volume (%) | 10% |

| Reference Chart      |                |                | Input Volume (mL) |        | 1000       |
|----------------------|----------------|----------------|-------------------|--------|------------|
| Manufacturer         | Model          | Diameter (in.) | mm/tip            | mL/tip | DAS target |
| Met One              | 385            | 12             | 0.254             | 18.53  | 13.71      |
| RM Young             | 52202          | 6.2825         | 0.100             | 2.00   | 50.00      |
| Climatronics         | 100097-1-G0-H0 | 8              | 0.254             | 8.24   | 30.84      |
| Climatronics         | 100508         | 9.66           | 0.100             | 4.73   | 21.15      |
| X Hydrological Serv. | TB4            | 8              | 0.254             | 8.24   | 30.84      |
|                      |                |                |                   |        |            |
|                      |                |                |                   |        |            |

| Conversions |       |       |       |
|-------------|-------|-------|-------|
| Value       | Units | Value | Units |
| 1.000       | inch  | 25.40 | mm    |
| 25.40       | mm    | 1.000 | inch  |

| Precipitation  |             |          |            |
|----------------|-------------|----------|------------|
| Reference (mL) | Target (mm) | DAS (mm) | Difference |
| 1000           | 30.84       | 29.47    | -4.4%      |

PASS

|                    |                              |                             |   |
|--------------------|------------------------------|-----------------------------|---|
| Heater functional? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
|--------------------|------------------------------|-----------------------------|---|

NOTES: Slightly dirty, level, tipping mechanism calibrated well



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N963B  |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| +1 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 2 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.55     | 16.57      | 0.1%        | -0.9%       | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 22.6                            | 22.1       | -0.5       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 23.5                           | 23.0       | -0.5       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 593.0                  | 592.0      | -1.0       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

**NOTES:** Flow fluctuated on deltacal (16.33-16.78 LPM) and the instrument (16.22-16.92), It looks like a pump issue.





# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N964C  |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -1 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
|                      | FAIL      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.50     | 16.70      | 1.2%        | -1.2%       | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 22.8                            | 22.7       | -0.1       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 23.8                           | 23.6       | -0.2       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.5                  | 594.0      | 1.5        | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

**NOTES:** initially leak check failed due to a tiny leak. The filter holder assembly was tighten and the leak check passed. Data integrity is ok.



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N962   |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -1 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.94     | 16.70      | -1.4%       | 1.4%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 19.7                            | 18.9       | -0.8       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 18.8                           | 18.2       | -0.6       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 587.0                  | 585.0      | -2.0       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2366D |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -2 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 4 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.70     | 16.70      | 0.0%        | 0.0%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 24.2                            | 23.6       | -0.6       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 24.6                           | 24.1       | -0.5       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.0                  | 590.0      | -2.0       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Temperature Standard #1         | BGI          | deltaCal | 1237          | 12/1/2018       |
| PM Barometric Pressure Standard #1 | BGI          | deltaCal | 1237          | 12/1/2018       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2398E |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -1 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3 cm                 | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.64     | 16.70      | 0.4%        | -0.4%       | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 24.4                            | 24.4       | 0.0        | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 592.0                          | 593.0      | 1.0        | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 24.4                   | 24.7       | 0.3        | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



## SITE INFORMATION

|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| NETWORK TYPE |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|           |       |     |     |      |                |          |
|-----------|-------|-----|-----|------|----------------|----------|
|           |       | Deg | Min | Sec  |                | Decimal  |
| LATITUDE  | North | 37  | 23  | 53.2 | --CALCULATE--> | 37.3981  |
| LONGITUDE | West  | 112 | 26  | 43.1 |                | 112.4453 |

|         |                |     |     |     |
|---------|----------------|-----|-----|-----|
| Decimal |                | Deg | Min | Sec |
|         | --CALCULATE--> |     |     |     |
|         |                |     |     |     |

|           |        |                |      |
|-----------|--------|----------------|------|
|           | Meters |                | Feet |
| ELEVATION |        | --CALCULATE--> |      |

|      |                |        |
|------|----------------|--------|
| Feet |                | Meters |
|      | --CALCULATE--> |        |

Please verify site standards used by the site operator

|                   |              |       |          |                             |
|-------------------|--------------|-------|----------|-----------------------------|
| SITE STANDARDS    | MANUFACTURER | MODEL | SERIAL # | Calibration Expiration Date |
| PM Flow Reference |              |       |          |                             |
|                   |              |       |          |                             |
|                   |              |       |          |                             |

NOTES:

|  |
|--|
|  |
|--|



|              |     |                         |            |         |        |      |           |
|--------------|-----|-------------------------|------------|---------|--------|------|-----------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | C.Kirk | DATE | 9/13/2018 |
| SITE NAME    |     | Alton- Coal Hollow Mine |            |         |        |      |           |
| Network type |     | Alton Coal- Coal Hollow |            |         |        |      |           |

|                                    |      |           | MANUFACTURER | MODEL   | SERIAL #   | Calibration Expiration Date |
|------------------------------------|------|-----------|--------------|---------|------------|-----------------------------|
| Ozone Transfer Standard            |      |           |              |         |            |                             |
| Gas Dilution Transfer Standard     |      |           |              |         |            |                             |
| MFC High Flow Reference            |      |           |              |         |            |                             |
| MFC Low Flow Reference             |      |           |              |         |            |                             |
| Temperature Reference              |      |           | Eutechnics   | 4400    | 307635     | 2/28/2019                   |
| AT/RH Sensor Reference             |      |           |              |         |            |                             |
| Barometric Pressure Reference      |      |           |              |         |            |                             |
| Wind Speed Reference (high rpm)    |      |           | RM Young     | 18802   | CA04104    | 3/9/2019                    |
| Wind Speed Reference (low rpm)     |      |           |              |         |            |                             |
| Wind Speed Torque Gauge            |      |           | RM Young     | 18310   |            |                             |
| Wind Direction Alignment Reference |      |           | Brunton      | Transit | 5103212072 |                             |
| Wind Direction Linearity Reference |      |           | RM Young     | 18212   | n/a        |                             |
| Wind Direction Torque Gauge        |      |           | RM Young     | 18331   | n/a        |                             |
| Solar Radiation Reference          |      |           |              |         |            |                             |
| Multiplier                         |      | W/m2 / mV |              |         |            |                             |
| UV Radiation Reference             |      |           |              |         |            |                             |
| Multiplier                         |      | W/m2 / mV |              |         |            |                             |
| Precipitation Reference            |      |           |              |         |            |                             |
| Volume                             | 1000 | mL        | RM Young     | 52260   | n/a        |                             |

|                     |     |          |      |           |
|---------------------|-----|----------|------|-----------|
| PM Flow Standard #1 | BGI | deltaCal | 1237 | 12/1/2018 |
| PM Flow Standard #2 |     |          |      |           |
| PM Flow Standard #3 |     |          |      |           |
| PM Flow Standard #4 |     |          |      |           |

|                            |     |          |      |           |
|----------------------------|-----|----------|------|-----------|
| PM Temperature Standard #1 | BGI | deltaCal | 1237 | 12/1/2018 |
| PM Temperature Standard #2 |     |          |      |           |
| PM Temperature Standard #3 |     |          |      |           |
| PM Temperature Standard #4 |     |          |      |           |

|                                    |     |          |      |           |
|------------------------------------|-----|----------|------|-----------|
| PM Barometric Pressure Standard #1 | BGI | deltaCal | 1237 | 12/1/2018 |
| PM Barometric Pressure Standard #2 |     |          |      |           |
| PM Barometric Pressure Standard #3 |     |          |      |           |
| PM Barometric Pressure Standard #4 |     |          |      |           |

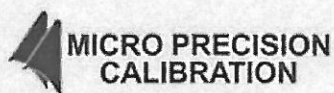
|                   |  |  |  |  |
|-------------------|--|--|--|--|
| TEOM MTV Standard |  |  |  |  |
|-------------------|--|--|--|--|

|                             |  |  |  |  |
|-----------------------------|--|--|--|--|
| HiVol Direct Flow Reference |  |  |  |  |
| Orifice                     |  |  |  |  |
| ΔP orifice manometer        |  |  |  |  |

## **APPENDIX B**

### **AUDIT STANDARDS CERTIFICATIONS**





MICRO PRECISION CALIBRATION  
22835 INDUSTRIAL PLACE  
GRASS VALLEY CA 95949  
530-268-1860

## Certificate of Calibration

Date: Feb 28, 2018

Cert No. 512200813278800

**Customer:**

AIR RESOURCE SPECIALIST, INC  
1901 SHARP POINT DRIVE, SUITE F  
FORT COLLINS CO 80525

MPC Control #: AX7278  
Asset ID: N/A  
Gage Type: DIGITAL THERMOMETER  
Manufacturer: EUTECHNICS  
Model Number: 4400  
Size: -20 to 130 Deg C  
Temp/RH: 70.0°F / 45.0%  
Location: Calibration performed at MPC facility

Work Order #: SAC-70093204  
Purchase Order #: a32178  
Serial Number: 307635  
Department: N/A  
Performed By: TODD MORRIS  
Received Condition: IN TOLERANCE  
Returned Condition: IN TOLERANCE  
Cal. Date: February 28, 2018  
Cal. Interval: 12 MONTHS  
Cal. Due Date: February 28, 2019

**Calibration Notes:**

**Standards Used to Calibrate Equipment**

| I.D.   | Description.   | Model   | Serial  | Manufacturer            | Cal. Due Date | Traceability #  |
|--------|--|---------|---------|-------------------------|---------------|-----------------|
| CR6700 | DOUBLE WELL BATH   | 7013    | 79006   | HART SCIENTIFIC         | Sep 30, 2018  | 512200813015067 |
| DA8367 | PRECISION PLATINUM<br>RESISTANCE THERMOMETER<br>SPRT W/ CASE | 8167-25 | 1803221 | LEEDS & NORTHRUP<br>CO. | Aug 1, 2019   | 512200812443997 |
| N1741  | ICE POINT CELL   | K140-4  | 802125  | KAYE INSTRUMENTS        | Jan 31, 2020  | 512200813197782 |

**Procedures Used in this Event**

| Procedure Name | Description  |
|----------------|--|
| MPC-TEM-001    | Temperature Sensor and Indicators, General, Oct-31-2017, rev01 |

Calibrating Technician:

TODD MORRIS

QC Approval:

BRIAN GOLD

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered conform with ISO/IEC 17025:2005, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.



**R.M. Young Company**  
2801 Aero Park Drive  
Traverse City, Michigan 49686 USA

### CERTIFICATE OF CALIBRATION AND TESTING

Model: 18802  
Serial Number: CA04104

Description: Anemometer Drive - 200 to 15000 RPM  
(Comprised of 18820A Control Unit and 18830A Motor Assembly)

R. M. Young Company certifies that the above equipment was inspected and calibrated prior to shipment in accordance with established manufacturing and testing procedures. Standards established by R.M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology.

| Nominal<br>Motor RPM<br>RPM   | 27106D Output<br>Frequency<br>Hz (1) | Calculated<br>RPM (2) | Indicated<br>RPM (3) |
|---|--------------------------------------|-----------------------|----------------------|
| 300   | 50                                   | 300                   | 300                  |
| 2700  | 450                                  | 2700                  | 2700                 |
| 5100  | 850                                  | 5100                  | 5100                 |
| 7500  | 1250                                 | 7500                  | 7500                 |
| 10200   | 1700                                 | 10200                 | 10200                |
| 12600   | 2100                                 | 12600                 | 12600                |
| 15000   | 2500                                 | 15000                 | 15000                |
| <input checked="" type="checkbox"/> Clockwise and Counterclockwise rotation verified. |                                      |                       |                      |

- (1) Measured output frequency of YOUNG model 27106D standard anemometer attached to motor shaft.
- (2) YOUNG model 27106D produces 10 pulsed per revolution of the anemometer shaft.
- (3) Indicated on the Control Unit LCD.

\* Indicates out of tolerance.

☐ New Unit

☒ Service / Repair Unit

☐ As found

☒ No calibration adjustments required

☐ As left

Traceable frequency meter used for calibration:

Model: 34405A

Serial Number: 53020093

Date: 9 March 2018

Calibration Interval: One year

Tested By : EC

M E T E O R O L O G I C A L I N S T R U M E N T S

Tel: 231-946-3980 Fax: 231-946-4772 Email: met.sales@youngusa.com Website: youngusa.com

ISO 9001:2008 CERTIFIED



## CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: **1237**

DATE: 22-Nov-2017

Calibration Operator: P.Pitty

**Critical Venturi Flow Meter:** Max Uncertainty = 0.346%

Serial Number: 1A CEESI NVLAP NIST Data File 07BGI-0001

Serial Number: 2A CEESI NVLAP NIST Data File 07BGI-0003

Serial Number: 5C COX Nist Data File CCAL33222 - 5 C

Serial Number: 4A CEESI NVLAP NIST Data File 07BGI-0002

Serial Number: 3A CEESI NVLAP NIST Data File 07BGI-0004

**Room Temperature:** +/- 0.03°C from -5°C - 70°C Room Temperature: 23.5 °C

Brand: Telatemp

Serial Number:

358921

Std Cal Date

19-Apr-17

Std Cal Due Date

19-Apr-18

deltaCal:

Ambient Temperature (set): 23.5 °C

Aux (filter) Temperature (set): 23.5 °C

### Barometric Pressure and Absolute Pressure

Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%

Serial Number:

H0850001

Std Cal Date

27-Mar-17

Std Cal Due Date

27-Mar-18

deltaCal:

Barometric pressure (set): 749 mm of Hg

### Results of Venturi Calibration

Flow Rate (Q) vs. Pressure Drop ( $\Delta P$ ).

Where: Q=Lpm,  $\Delta P$ = Cm of H<sub>2</sub>O

Q= 3.93154  $\Delta P$  ^ 0.51535

Overall Uncertainty: 0.35%

Q= 3.87507  $\Delta P$  ^ 0.50721

Overall Uncertainty: 0.35%

Date Placed In Service 12/1/17

(To be filled in by operator upon receipt)

Recommended Recalibration Date 12/1/18

(12 months from date placed in service)

# **To Check a deltaCal**

**1.5-19.5**

**VER 4.00P**

22-Nov-17 P.Pitty

BP= 749 mm of Hg

Maximum allowable error at any flow rate is .75%.

**Serial No. 1237**

|           | Reading     |       | CV     |           |         |
|-----------|-------------|-------|--------|-----------|---------|
|           | Abs. P      |       | Qa     | Qa        |         |
|           | Crit. Vent. | Room  | Flow   | deltaCal  |         |
|           | mm of Hg    | Temp  | Lpm    | Indicated | % Error |
| # 2       | 125.05      | 23.50 | 1.410  | 1.413     | 0.23    |
|           | 215.29      | 23.50 | 2.462  | 2.468     | 0.24    |
|           | 266.58      | 23.50 | 3.060  | 3.051     | -0.30   |
|           | 405.05      | 23.50 | 4.675  | 4.684     | 0.19    |
|           | 567.26      | 23.50 | 6.567  | 6.530     | -0.56   |
| #1        | 177.30      | 23.50 | 7.067  | 7.100     | 0.46    |
|           | 269.58      | 23.50 | 10.825 | 10.816    | -0.09   |
|           | 333.95      | 23.50 | 13.447 | 13.417    | -0.22   |
|           | 411.08      | 23.50 | 16.588 | 16.580    | -0.05   |
|           | 483.80      | 23.50 | 19.549 | 19.564    | 0.07    |
| Average % |             |       |        |           | 0.00    |



To Check a deltaCal  
1.5-19.5

VER 4.00P

22-Nov-17 Pre-Recert

BP= 748.5 mm of Hg

Maximum allowable error at any flow rate is .75%.

Serial No. 1237

|           | Reading<br>Abs. P<br>Crit. Vent.<br>mm of Hg | Room<br>Temp | CV<br>Qa<br>Flow<br>Lpm | Qa<br>deltaCal<br>Indicated | % Error |
|-----------|--|--------------|-------------------------|-----------------------------|---------|
| # 2       | 138.23                                       | 19.70        | 1.544                   | 1.801                       | 16.61   |
|           | 309.57                                       | 19.70        | 3.518                   | 3.690                       | 4.88    |
|           | 551.18                                       | 19.70        | 6.302                   | 6.380                       | 1.24    |
| #1        | 188.43                                       | 19.70        | 7.429                   | 7.520                       | 1.22    |
|           | 371.83                                       | 19.70        | 14.807                  | 14.970                      | 1.10    |
|           | 481.42                                       | 19.70        | 19.216                  | 19.460                      | 1.27    |
| Average % |  |              |                         |                             | 4.39    |

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**AUDIT REPORT  
FOR  
ALTON COAL DEVELOPMENT, LLC  
COAL HOLLOW MINE  
ALTON, UTAH  
FOURTH QUARTER 2018**

Prepared for

Kirk Nicholes  
Alton Coal Development, LLC  
463 N 100 W  
Cedar City, Utah, 84721

Prepared by



1901 Sharp Point Drive, Suite F Fort  
Collins, CO 80525  
970-484-7941

Site Audited: November 19, 2018

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A decorative graphic in the bottom left corner consisting of three stylized mountain peaks in shades of green and blue.

## TABLE OF CONTENTS

| <u>Section</u>                                   | <u>Page</u> |
|--|-------------|
| <b>1.0 INTRODUCTION</b>                          | <b>1-1</b>  |
| <b>2.0 AUDIT METHODS AND EQUIPMENT</b>           | <b>2-1</b>  |
| 2.1 Particulate Samplers                         | 2-1         |
| 2.2 Meteorological Parameters                    | 2-2         |
| <b>3.0 AUDIT RESULTS</b>                         | <b>3-1</b>  |
| <b>APPENDIX A</b> Audit Data Forms               | A-1         |
| <b>APPENDIX B</b> Audit Standards Certifications | B-1         |

## LIST OF TABLES

| <u>Table</u>   | <u>Page</u> |
|--|-------------|
| 1-1 Site Location Information                                    | 1-1         |
| 1-2 Summary of Particulate Audit Results                         | 1-1         |
| 1-3 Summary of Meteorological Audit Results                      | 1-1         |
| 2-1 Particulate Samplers, Audit Methods and Acceptance Criteria  | 2-1         |
| 2-2 Particulate Samplers, Audit Equipment                        | 2-2         |
| 2-3 Meteorological Sensors, Audit Ranges and Acceptance Criteria | 2-3         |
| 2-4 Meteorological Equipment                                     | 2-4         |

## 1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on November 19, 2018. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

|           | Primary CHM           | Background            | Primary NPL           | Meteorological        |
|-----------|-----------------------|-----------------------|-----------------------|-----------------------|
| Latitude  | 37° 24' 5.0" N        | 37° 24' 20.9" N       | 37° 24' 43" N         | 37° 23' 53.2" N       |
| Longitude | 112° 27' 21.0" W      | 112° 26' 1.1" W       | 112° 27' 30.6" W      | 112° 26' 43.1" W      |
| UTM       | 12S 371147<br>4140396 | 12S 373119<br>4140856 | 12S 370928<br>4141570 | 12S 372073<br>4140018 |
| Elevation | 6,890 feet MSL        | 7,158 feet MSL        | 6,959 feet MSL        | 7,007 feet MSL        |

Audit results for the particulate samplers are summarized in Table 1-2. Audit results for the meteorological measurements are summarized in Table 1-3. Detailed discussions of performance audit findings and other findings can be found in Section 3.0.

Table 1-2

Summary of Particulate Sampler Audit Results

| Parameter     |                               | Instrument | Within Accuracy Goal |
|---------------|-------------------------------|------------|----------------------|
| Primary CHM   | PM <sub>10</sub>              | BGI PQ200S | No                   |
|               | PM <sub>10</sub> (collocated) | BGI PQ200S | Yes                  |
| Background #1 | PM <sub>10</sub>              | BGI PQ200S | Yes                  |
| Primary NPL   | PM <sub>10</sub>              | BGI PQ200  | Yes                  |
|               | PM <sub>10</sub> (collocated) | BGI PQ200  | Yes                  |

Table 1-3

Summary of Meteorological Audit Results

| Parameter      | Sensor                    | Within Accuracy Goal |
|----------------|---------------------------|----------------------|
| Wind Speed     | Met-One 34B               | Yes                  |
| Wind Direction | Met-One 34B               | Yes                  |
| Temperature    | Campbell Scientific 107   | Yes                  |
| Precipitation  | Hydrological Services TB4 | Yes                  |



Details of the audit are presented in the following sections:

|             |                                |
|-------------|--------------------------------|
| Section 2.0 | Audit Methods and Equipment    |
| Section 3.0 | Audit Results                  |
| Appendix A  | Audit Data Forms               |
| Appendix B  | Audit Standards Certifications |

Any questions related to this audit or audit report should be addressed to:

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Quality Assurance Officer / Lead Auditor  
**Air Resource Specialists, Inc.**  
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## 2.0 AUDIT METHODS

Audit procedures, audit challenge ranges, and acceptance criteria are described below. These ranges and limits conform to EPA's PSD guidelines. Audit results were verbally communicated to the site operator prior to departure from the site. A follow-up e-mail summarizing audit findings was also sent to Alton Coal Development, LLC personnel. Audit details are provided in Appendix A.

Guidance from the following EPA documents was used to establish the audit procedures:

- 40 CFR 58, Appendix B. *Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring*
- EPA *Quality Assurance Handbook for Air Pollution Measurement Systems*:
  - *Volume I. A Field Guide to Environmental Quality Assurance*
  - *Volume II. Ambient Air Quality Monitoring Program*
  - *Volume IV. Meteorological Measurements*
- EPA *Meteorological Monitoring Guidance for Regulatory Modeling Applications*

### 2.1 PARTICULATE SAMPLERS (FRM PM<sub>10</sub>)

The filter-based FRM PM<sub>10</sub> particulate samplers are audited in their normal operating mode. ARS audits the samplers with a BGI deltaCal audit standard which measures flow, temperature, and barometric pressure. Prior to conducting the flow audit, a system leak check is performed in accordance with the manufacturer's specifications. The observed volumetric operational flow and design flow of the sampler are compared to the audit flows measured by the audit standard. Differences between the operational sampler flow and audit flow that are greater than  $\pm 10\%$  are considered out of tolerance. Differences between the designated design flow and the audit flow greater than  $\pm 10\%$  are considered out of tolerance. In addition to the flow audits, observed ambient temperature, filter temperature, and barometric pressure measurements of the particulate samplers are also audited by comparison to the audit standard. A temperature difference greater than  $\pm 2^\circ\text{C}$  and a barometric pressure difference greater than  $\pm 10\text{mm Hg}$  are considered out of tolerance. Audit methods and acceptable criteria for the particulate samplers are summarized in Table 2-1.

Table 2-1  
Particulate Samplers  
Audit Acceptance Criteria

| Parameter            | Audit Method                                    | Acceptance Criteria        |
|----------------------|---|----------------------------|
| FRM PM <sub>10</sub> | Leak Check                                      | Manufacturer specs         |
|                      | Audit flow to actual sampler flow               | $\leq \pm 10\%$            |
|                      | Design criteria flow to audit flow              | $\leq \pm 10\%$            |
|                      | Audit temperature to sampler temperature        | $\leq \pm 2^\circ\text{C}$ |
|                      | Audit temperature to sampler filter temperature | $\leq \pm 2^\circ\text{C}$ |
|                      | Audit barometric pressure to sampler pressure   | $\leq \pm 10\text{mm Hg}$  |

Table 2-2  
Particulate Samplers  
Audit Equipment

| References | Manufacturer | Model Number | Serial Number | Expiration Date |
|------------|--------------|--------------|---------------|-----------------|
| FRM Flow   | BGI          | DeltaCal     | 141170        | 5/22/2019       |

## 2.2 METEOROLOGICAL PARAMETERS

Meteorological measurement systems are audited in accordance with (and accuracy goals were obtained from) the EPA's *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV – Meteorological Measurements*, (March 2008). ARS uses National Institute of Standards and Technologies (NIST) traceable test equipment for all meteorological parameters. All equipment is recertified annually. Audit ranges and acceptable criteria for each parameter are summarized in Table 2-3.

### 2.2.1 Wind Speed

Wind speed sensors are audited using an R.M. Young model 18802 (high RPM) or 18811 (low RPM) pulsed motor wind speed calibrator. Each sensor is tested at zero and five shaft revolution speeds. The equivalent wind speed is calculated corresponding to the sensor manufacturer's specified values for shaft speed versus wind velocity and compared to readings obtained from the on-site datalogger.

### 2.2.2 Wind Direction

Wind direction sensor audits include the verification of sensor orientation, linearity, and starting threshold (bearing integrity). The sensor orientation accuracy is verified by a reference. The reference can be an internal reference (a tower-mounted alignment vane) or external (pointing at landmarks from the sensor). Accuracy of the references is verified by the solar azimuth method for the determination of true north. Using a compass and the site latitude and longitude, a computer model outputs the sun's azimuth for that exact time of day. The compass is adjusted to that azimuth, effectively correcting for the compass to the local magnetic declination (which may include local magnetic field disturbances). The sensor orientation accuracy is checked by aligning the wind direction vane to and from each landmark reference, recording sensor responses from the on-site datalogger.

Potentiometer linearity is tested by verifying the change in response between two successive orientations across eight points on a calibrated disc mounted atop the sensor. For example, any two adjacent orientations on the eight-point disc are separated by 45 degrees. The difference in the datalogger response for these two adjacent orientations is compared to this value.

### 2.2.3 Ambient Temperature

Temperature sensors that are non-immersible are audited by collocation of the audit sensor under ambient conditions utilizing similar methods of sensor aspiration. Collocated comparisons are typically carried out using hourly averages. Audit data are collected by a datalogger provided by the auditor. Temperature sensors that are immersible are audited by comparison to the audit sensor in water baths. The test baths are typically at 0°C, near ambient conditions (or approximately 25°C), and near the full scale of the sensor (typically near 50°C). Data observed on the on-site datalogger are used to assess the accuracy of sensors. Sensor aspirators are inspected for proper function, including fan function and flow direction.

### 2.2.4 Precipitation

The tipping bucket style precipitation gauges are audited with a volumetric precipitation gauge calibrator by transferring a known amount of water through the gauge orifice at a maximum rate equivalent to 2.0 inches/hour of precipitation. The total values from the on-site datalogger values are compared to the actual introduced volume. The level and cleanliness of the sensor is observed where possible.

Table 2-3  
Meteorological Sensors  
Audit Ranges and Acceptance Criteria

| Parameter                                      | Audit Method                                   | Acceptance Criteria  |
|--|--|----------------------|
| Wind Speed                                     | Accuracy at five speeds with anemometer drive  | $\leq \pm 0.2$ m/s   |
|  | Starting threshold with torque gauge           | Manufacturer specs   |
| Wind Direction                                 | Accuracy with compass                          | $\leq \pm 5^\circ$   |
|  | Linearity                                      | $\leq \pm 5^\circ$   |
|  | Starting threshold with torque gauge           | Manufacturer specs   |
| Ambient Temperature<br>(non-immersible sensor) | Accuracy via collocation in ambient conditions | $\leq \pm 0.5^\circ$ |
| Ambient Temperature<br>(immersible sensor)     | Accuracy via collocation in three water baths  | $\leq \pm 0.5^\circ$ |
| Precipitation                                  | Accuracy via known volume of water             | $\leq \pm 10\%$      |

Table 2-4

## Meteorological Audit Equipment

| <b>References</b>          | <b>Manufacturer</b> | <b>Model Number</b> | <b>Serial Number</b> | <b>Expiration Date</b> |
|----------------------------|---------------------|---------------------|----------------------|------------------------|
| Wind Speed (low rpm)       | R.M. Young          | 18811               | CA03912              | 12/14/2018             |
| Wind Direction Orientation | Brunton             | Transit             | 5103212072           | N/A                    |
| Temperature (immersible)   | Eutechnics          | 4400                | 307635               | 2/28/2019              |
| Precipitation              | R.M. Young          | 52260               | N/A                  | N/A                    |

### **3.0 AUDIT RESULTS**

Audit findings and recommendations are discussed below. Detailed audit results are provided in Appendix A.

#### **Performance Audit Results**

The Primary CHM PM<sub>10</sub> instrument (serial number 963B) did not pass the flow performance audit and was found with a non-functional pump.

## **APPENDIX A**

### **AUDIT DATA FORMS**





## TEMPERATURE / DELTA-TEMPERATURE SYSTEM AUDIT

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                       | MANUFACTURER | MODEL | SERIAL NUMBER | EXPIRATION DATE |
|-----------------------|--------------|-------|---------------|-----------------|
| Temperature Reference | Eutechnics   | 4400  | 307635        | 2/28/2019       |

| 2m Temperature Sensor |                     |
|-----------------------|---------------------|
| Manufacturer          | Campbell Scientific |
| Model                 | 107                 |
| Serial Number         | 10755-14/WO #1272   |

**List sensors according to height on tower, from highest to lowest.**

| Temp. Deltas |  |
|--------------|--|
|              |  |
|              |  |
|              |  |

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| CALIBRATION ACCEPTANCE CRITERIA (<=) |     |
|--------------------------------------|-----|
| Ambient Temperature Difference (°C)  | 0.5 |
| Vertical Temperature Difference (°C) | 0.1 |

| AS FOUND           | 2m Temperature |            |      |  |  |  |  |  |  |  |  |  |
|--------------------|----------------|------------|------|--|--|--|--|--|--|--|--|--|
| Bath Temp (°C)     | DAS            | Difference |      |  |  |  |  |  |  |  |  |  |
| 0.11               | 0.25           | 0.14       | PASS |  |  |  |  |  |  |  |  |  |
| 30.49              | 30.38          | -0.11      | PASS |  |  |  |  |  |  |  |  |  |
| 21.19              | 21.38          | 0.19       | PASS |  |  |  |  |  |  |  |  |  |
| MAX ABS Difference |                | 0.19       | PASS |  |  |  |  |  |  |  |  |  |

|                    |  |  |  |  |  |
|--------------------|--|--|--|--|--|
|                    |  |  |  |  |  |
|                    |  |  |  |  |  |
|                    |  |  |  |  |  |
|                    |  |  |  |  |  |
|                    |  |  |  |  |  |
| MAX ABS Difference |  |  |  |  |  |

|                              |                              |                             |   |
|------------------------------|------------------------------|-----------------------------|---|
| Aspirator fan functional 2m? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
|                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A            |
|                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A            |
|                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A            |

Each sensor was verified against its data channel ? ☐ Yes ☐ No ☒ N/A

Each Temperature Difference = Upper - Lower ? ☐ Yes ☐ No ☒ N/A

**NOTES:**

|  |  |
|--|--|
|  |  |
|--|--|



**Air Resource**  
SPECIALISTS

## WIND SPEED SENSOR AUDIT

|              |     |                         |            |                  |            |      |            |
|--------------|-----|-------------------------|------------|------------------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | FIELD SPECIALIST | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |                  |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |                  |            |      |            |

|                         | MANUFACTURER | MODEL | SERIAL NUMBER | EXPIRATION DATE |
|-------------------------|--------------|-------|---------------|-----------------|
| Wind Speed Reference    |              |       |               |                 |
| Wind Speed Torque Gauge | RM Young     | 18310 |               |                 |

|                        |                |
|------------------------|----------------|
| Manufacturer and Model | Met One - 034B |
| Sensor Serial #        | E2281          |
| Cups Serial #          |                |

| AUDIT CRITERIA (<=)         |      |
|-----------------------------|------|
| Wind Speed Difference (m/s) | 0.20 |
| Wind Speed Difference (%)   | N/A  |

|              |     |
|--------------|-----|
| Select UNITS | m/s |
|--------------|-----|

| Motor Speed (rpm) | Target Speed | Wind Speed |            |     |      |
|-------------------|--------------|------------|------------|-----|------|
|                   |              | DAS        | Difference |     |      |
| 0                 | 0.000        | 0.000      | N/A        | N/A | N/A  |
| 100               | 2.943        | 2.920      | -0.02      |     | PASS |
| 200               | 5.607        | 5.630      | 0.02       |     | PASS |
| 300               | 8.270        | 8.300      | 0.03       |     | PASS |
| 600               | 16.260       |            |            |     |      |
| 1800              | 48.220       |            |            |     |      |

|                    |                       |
|--------------------|-----------------------|
| Starting Threshold | TORQUE                |
| Torque <= 0.2 g-cm | 0.2                   |
|                    | NO ACTION<br>REQUIRED |

|                           |                              |                             |   |
|---------------------------|------------------------------|-----------------------------|---|
| Heater sleeve functional? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
|---------------------------|------------------------------|-----------------------------|---|

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



## WIND DIRECTION AUDIT

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                               | MANUFACTURER | MODEL   | SERIAL NUMBER | EXPIRATION DATE |
|-------------------------------|--------------|---------|---------------|-----------------|
| Direction Alignment Reference | Brunton      | Transit | 5103212072    |                 |
| Direction Linearity Reference | RM Young     | 18212   | n/a           |                 |
| Direction Torque Gauge        | RM Young     | 18331   | n/a           |                 |

|                      |                |
|----------------------|----------------|
| Manufacturer & Model | Met One - 034B |
| Sensor Serial #      | E2281          |
| Vane Serial #        |                |

|                                      |               |
|--------------------------------------|---------------|
| Local Magnetic Declination (degrees) | 11.5          |
| Method                               | solar azimuth |

|                                   |  |  |  |      |
|-----------------------------------|--|--|--|------|
| Mag. Dec. from NOAA (deg/min/sec) |  |  |  | 0.00 |
|-----------------------------------|--|--|--|------|

<http://www.ngdc.noaa.gov/geomag-web/#declination>

| AUDIT CRITERIA (<=)                 |   |
|-------------------------------------|---|
| Cross-arm Alignment Error (degrees) | 2 |
| Total Align. Diff (degrees)         | 5 |
| Sensor Linearity (degrees)          | 5 |

| Landmarks                        | Degrees |
|----------------------------------|---------|
| building to the east             | 338     |
| from building to the east        | 158     |
| from center of right rock saddle | 73      |
| to center of right rock saddle   | 253     |

|                                     |     |      |
|-------------------------------------|-----|------|
| Reference Alignment Error (degrees) | 0.0 | PASS |
|-------------------------------------|-----|------|

| SENSOR ALIGNMENT |              |     |            |
|------------------|--------------|-----|------------|
| Reference        | Degrees      | DAS | Difference |
| From the North   | 0            |     |            |
| From the South   | 180          |     |            |
| From the East    | 90           |     |            |
| From the West    | 270          |     |            |
| Total Alignment  | MAX ABS Diff |     |            |

OR

| SENSOR ALIGNMENT               |              |       |            |
|--------------------------------|--------------|-------|------------|
| Landmark                       | Degrees      | DAS   | Difference |
| building to the east           | 338          | 339.0 | 0.9        |
| from building to the east      | 158          | 156.0 | -2.0       |
| center of right rock saddle    | 73           | 74.1  | 1.1        |
| to center of right rock saddle | 253          | 251.0 | -2.0       |
| Total Alignment                | MAX ABS Diff | 2.0   | PASS       |

| SENSOR LINEARITY |     |            |
|------------------|-----|------------|
| Point            | DAS | Difference |
| 1                |     | N/A        |
| 2                |     |            |
| 3                |     |            |
| 4                |     |            |
| 5                |     |            |
| 6                |     |            |
| 7                |     |            |
| 8                |     |            |
| 1                |     |            |
| MAX Difference   |     |            |

|                    |          |
|--------------------|----------|
| Starting Threshold | TORQUE   |
| Torque <=          | 6.5 g-cm |

|                           |  |
|---------------------------|--|
| Heater sleeve functional? | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A |
|---------------------------|--|

NOTES:



## PRECIPITATION SENSOR AUDIT

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                         | MANUFACTURER | MODEL | SERIAL NUMBER | EXPIRATION DATE |
|-------------------------|--------------|-------|---------------|-----------------|
| Precipitation Reference | RM Young     | 52260 | n/a           |                 |

|               |                       |
|---------------|-----------------------|
| Manufacturer  | Hydrological Services |
| Model         | TB4                   |
| Serial Number | 05-94                 |

| AUDIT CRITERIA (<=)              |     |
|----------------------------------|-----|
| Difference from Input Volume (%) | 10% |

| Reference Chart      |                |                | Input Volume (mL) |        | 1000       |
|----------------------|----------------|----------------|-------------------|--------|------------|
| Manufacturer         | Model          | Diameter (in.) | mm/tip            | mL/tip | DAS target |
| Met One              | 385            | 12             | 0.254             | 18.53  | 13.71      |
| RM Young             | 52202          | 6.2825         | 0.100             | 2.00   | 50.00      |
| Climatronics         | 100097-1-G0-H0 | 8              | 0.254             | 8.24   | 30.84      |
| Climatronics         | 100508         | 9.66           | 0.100             | 4.73   | 21.15      |
| X Hydrological Serv. | TB4            | 8              | 0.254             | 8.24   | 30.84      |
|                      |                |                |                   |        |            |
|                      |                |                |                   |        |            |

| Conversions |       |       |       |
|-------------|-------|-------|-------|
| Value       | Units | Value | Units |
| 1.000       | inch  | 25.40 | mm    |
| 30.84       | mm    | 1.214 | inch  |

| Precipitation  |             |          |            |
|----------------|-------------|----------|------------|
| Reference (mL) | Target (mm) | DAS (mm) | Difference |
| 1000           | 30.84       | 29.72    | -3.6%      |

PASS

|                    |                              |                             |   |
|--------------------|------------------------------|-----------------------------|---|
| Heater functional? | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
|--------------------|------------------------------|-----------------------------|---|

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Temperature Standard #1         | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Barometric Pressure Standard #1 | BGI          | DeltaCal | 141170        | 5/22/2019       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N963B  |

|  |
|--|
| <b>Date and Time correct?</b>                            |
| <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>                               |
| 0 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
|                      |           |  |

| FLOW VERIFICATION |           |            |             |             |  |
|-------------------|-----------|------------|-------------|-------------|--|
|                   | Reference | Instrument | Actual Diff | Design Diff |  |
| Total Flow        |           |            |             |             |  |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |  |
|---------------------------------|------------|------------|--|
| Reference                       | Instrument | Difference |  |
|                                 |            |            |  |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |  |
|--------------------------------|------------|------------|--|
| Reference                      | Instrument | Difference |  |
|                                |            |            |  |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |  |
|------------------------|------------|------------|--|
| Reference              | Instrument | Difference |  |
|                        |            |            |  |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

**NOTES:** pump dead, failed leak and flow checks.



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Temperature Standard #1         | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Barometric Pressure Standard #1 | BGI          | DeltaCal | 141170        | 5/22/2019       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PQ200S |
| SERIAL NUMBER | N964C  |

|  |
|--|
| <b>Date and Time correct?</b>                            |
| <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>                               |
| -2 min   |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 1.0                  | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.91     | 16.70      | -1.2%       | 1.3%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |           |            |            |      |
|---------------------------------|-----------|------------|------------|------|
|                                 | Reference | Instrument | Difference |      |
|                                 | 7.1       | 6.8        | -0.3       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |           |            |            |      |
|--------------------------------|-----------|------------|------------|------|
|                                | Reference | Instrument | Difference |      |
|                                | 6.9       | 6.8        | -0.1       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |           |            |            |
|------------------------|-----------|------------|------------|
|                        | Reference | Instrument | Difference |
|                        | 593.0     | 595.0      | 2.0        |
|                        | PASS      |            |            |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

**NOTES:** erradict flow 16.65-16.82



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Temperature Standard #1         | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Barometric Pressure Standard #1 | BGI          | DeltaCal | 141170        | 5/22/2019       |

|               |        |
|---------------|--------|
| MANUFACTURER  | BGI    |
| MODEL         | PG200S |
| SERIAL NUMBER | N962   |

|  |
|--|
| <b>Date and Time correct?</b>                            |
| <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>                               |
| -2 min   |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 4.0                  | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 17.14     | 16.67      | -2.7%       | 2.6%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 5.5                             | 5.7        | 0.2        | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 3.0                            | 2.0        | -1.0       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 587.0                  | 586.0      | -1.0       | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Temperature Standard #1         | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Barometric Pressure Standard #1 | BGI          | DeltaCal | 141170        | 5/22/2019       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2366D |

|  |
|--|
| <b>Date and Time correct?</b>                            |
| <input type="checkbox"/> Yes <input type="checkbox"/> No |
| <b>If no, time off by:</b>                               |
| 0 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 4.0                  | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.72     | 16.95      | 1.4%        | 0.1%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 8.1                             | 8.0        | -0.1       | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 8.4                            | 8.8        | 0.4        | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.5                  | 593.0      | 0.5        | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|





# FRM AUDIT (PM<sub>10</sub>)

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                                    | MANUFACTURER | MODEL    | SERIAL NUMBER | EXPIRATION DATE |
|------------------------------------|--------------|----------|---------------|-----------------|
| PM Flow Standard #1                | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Temperature Standard #1         | BGI          | DeltaCal | 141170        | 5/22/2019       |
| PM Barometric Pressure Standard #1 | BGI          | DeltaCal | 141170        | 5/22/2019       |

|               |       |
|---------------|-------|
| MANUFACTURER  | BGI   |
| MODEL         | PQ200 |
| SERIAL NUMBER | 2398E |

|   |
|---|
| <b>Date and Time correct?</b>                                       |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| <b>If no, time off by:</b>  |
| -3 min  |

| SETTINGS   |       |
|------------|-------|
| Total Flow | 16.70 |

| Automated LEAK CHECK |           |  |
|----------------------|-----------|--|
| Vacuum Loss Rate     | Pass/Fail |  |
| 3.0                  | PASS      |  |

| FLOW VERIFICATION |           |            |             |             |      |
|-------------------|-----------|------------|-------------|-------------|------|
|                   | Reference | Instrument | Actual Diff | Design Diff |      |
| Total Flow        | 16.87     | 16.70      | -1.0%       | 1.0%        | PASS |

| AUDIT CRITERIA (<=) |     |
|---------------------|-----|
| Actual Flow % Diff  | 10% |
| Design Flow % Diff  | 10% |

| AMBIENT TEMPERATURE SENSOR (°C) |            |            |      |
|---------------------------------|------------|------------|------|
| Reference                       | Instrument | Difference |      |
| 9.4                             | 9.6        | 0.2        |      |
|                                 |            |            | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| FILTER TEMPERATURE SENSOR (°C) |            |            |      |
|--------------------------------|------------|------------|------|
| Reference                      | Instrument | Difference |      |
| 7.4                            | 6.7        | -0.7       |      |
|                                |            |            | PASS |

| AUDIT CRITERIA (<=)         |   |
|-----------------------------|---|
| Temperature Difference (°C) | 2 |

| PRESSURE SENSOR (mmHg) |            |            |      |
|------------------------|------------|------------|------|
| Reference              | Instrument | Difference |      |
| 592.5                  | 594.0      | 1.5        |      |
|                        |            |            | PASS |

| AUDIT CRITERIA (<=)        |    |
|----------------------------|----|
| Pressure Difference (mmHg) | 10 |

|        |  |
|--------|--|
| NOTES: |  |
|--------|--|



## SITE INFORMATION

|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| NETWORK TYPE |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|           |       |     |     |     |                |          |
|-----------|-------|-----|-----|-----|----------------|----------|
|           |       | Deg | Min | Sec |                | Decimal  |
| LATITUDE  | North | 37  | 23  | 50  | --CALCULATE--> | 37.3972  |
| LONGITUDE | West  | 112 | 27  | 9   |                | 112.4525 |

|         |                |     |     |     |
|---------|----------------|-----|-----|-----|
| Decimal |                | Deg | Min | Sec |
|         | --CALCULATE--> |     |     |     |
|         |                |     |     |     |

|           |        |                |      |
|-----------|--------|----------------|------|
|           | Meters |                | Feet |
| ELEVATION |        | --CALCULATE--> |      |

|      |                |        |
|------|----------------|--------|
| Feet |                | Meters |
|      | --CALCULATE--> |        |

Please verify site standards used by the site operator

|                   |              |       |          |                             |
|-------------------|--------------|-------|----------|-----------------------------|
| SITE STANDARDS    | MANUFACTURER | MODEL | SERIAL # | Calibration Expiration Date |
| PM Flow Reference |              |       |          |                             |
|                   |              |       |          |                             |
|                   |              |       |          |                             |

NOTES:

|  |
|--|
|  |
|--|



|              |     |                         |            |         |            |      |            |
|--------------|-----|-------------------------|------------|---------|------------|------|------------|
| ABBR.        | n/a | CLIENT                  | Alton Coal | AUDITOR | M Gosselin | DATE | 11/19/2018 |
| SITE NAME    |     | Alton Coal- Coal Hollow |            |         |            |      |            |
| Network type |     | Alton Coal- Coal Hollow |            |         |            |      |            |

|                                    |      |           | MANUFACTURER | MODEL   | SERIAL #   | Calibration Expiration Date |
|------------------------------------|------|-----------|--------------|---------|------------|-----------------------------|
| Ozone Transfer Standard            |      |           |              |         |            |                             |
| Gas Dilution Transfer Standard     |      |           |              |         |            |                             |
| MFC High Flow Reference            |      |           |              |         |            |                             |
| MFC Low Flow Reference             |      |           |              |         |            |                             |
| Temperature Reference              |      |           | Eutechnics   | 4400    | 307635     | 2/28/2019                   |
| AT/RH Sensor Reference             |      |           |              |         |            |                             |
| Barometric Pressure Reference      |      |           |              |         |            |                             |
| Wind Speed Reference (high rpm)    |      |           |              |         |            |                             |
| Wind Speed Reference (low rpm)     |      |           | RM Young     | 18811   | CA03912    | 12/14/2018                  |
| Wind Speed Torque Gauge            |      |           | RM Young     | 18310   |            |                             |
| Wind Direction Alignment Reference |      |           | Brunton      | Transit | 5103212072 |                             |
| Wind Direction Linearity Reference |      |           | RM Young     | 18212   | n/a        |                             |
| Wind Direction Torque Gauge        |      |           | RM Young     | 18331   | n/a        |                             |
| Solar Radiation Reference          |      |           |              |         |            |                             |
| Multiplier                         |      | W/m2 / mV |              |         |            |                             |
| UV Radiation Reference             |      |           |              |         |            |                             |
| Multiplier                         |      | W/m2 / mV |              |         |            |                             |
| Precipitation Reference            |      |           |              |         |            |                             |
| Volume                             | 1000 | mL        | RM Young     | 52260   | n/a        |                             |

|                     |     |          |        |           |
|---------------------|-----|----------|--------|-----------|
| PM Flow Standard #1 | BGI | DeltaCal | 141170 | 5/22/2019 |
| PM Flow Standard #2 |     |          |        |           |
| PM Flow Standard #3 |     |          |        |           |
| PM Flow Standard #4 |     |          |        |           |

|                            |     |          |        |           |
|----------------------------|-----|----------|--------|-----------|
| PM Temperature Standard #1 | BGI | DeltaCal | 141170 | 5/22/2019 |
| PM Temperature Standard #2 |     |          |        |           |
| PM Temperature Standard #3 |     |          |        |           |
| PM Temperature Standard #4 |     |          |        |           |

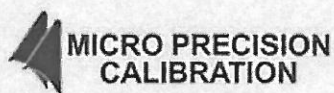
|                                    |     |          |        |           |
|------------------------------------|-----|----------|--------|-----------|
| PM Barometric Pressure Standard #1 | BGI | DeltaCal | 141170 | 5/22/2019 |
| PM Barometric Pressure Standard #2 |     |          |        |           |
| PM Barometric Pressure Standard #3 |     |          |        |           |
| PM Barometric Pressure Standard #4 |     |          |        |           |

|                   |  |  |  |  |
|-------------------|--|--|--|--|
| TEOM MTV Standard |  |  |  |  |
|-------------------|--|--|--|--|

|                             |  |  |  |  |
|-----------------------------|--|--|--|--|
| HiVol Direct Flow Reference |  |  |  |  |
| Orifice                     |  |  |  |  |
| ΔP orifice manometer        |  |  |  |  |

## **APPENDIX B**

### **AUDIT STANDARDS CERTIFICATIONS**



MICRO PRECISION CALIBRATION  
22835 INDUSTRIAL PLACE  
GRASS VALLEY CA 95949  
530-268-1860

## Certificate of Calibration

Date: Feb 28, 2018

Cert No. 512200813278800

**Customer:**

AIR RESOURCE SPECIALIST, INC  
1901 SHARP POINT DRIVE, SUITE F  
FORT COLLINS CO 80525

MPC Control #: AX7278  
Asset ID: N/A  
Gage Type: DIGITAL THERMOMETER  
Manufacturer: EUTECHNICS  
Model Number: 4400  
Size: -20 to 130 Deg C  
Temp/RH: 70.0°F / 45.0%  
Location: Calibration performed at MPC facility

Work Order #: SAC-70093204  
Purchase Order #: a32178  
Serial Number: 307635  
Department: N/A  
Performed By: TODD MORRIS  
Received Condition: IN TOLERANCE  
Returned Condition: IN TOLERANCE  
Cal. Date: February 28, 2018  
Cal. Interval: 12 MONTHS  
Cal. Due Date: February 28, 2019

**Calibration Notes:**

**Standards Used to Calibrate Equipment**

| I.D.   | Description.   | Model   | Serial  | Manufacturer            | Cal. Due Date | Traceability #  |
|--------|--|---------|---------|-------------------------|---------------|-----------------|
| CR6700 | DOUBLE WELL BATH   | 7013    | 79006   | HART SCIENTIFIC         | Sep 30, 2018  | 512200813015067 |
| DA8367 | PRECISION PLATINUM<br>RESISTANCE THERMOMETER<br>SPRT W/ CASE | 8167-25 | 1803221 | LEEDS & NORTHRUP<br>CO. | Aug 1, 2019   | 512200812443997 |
| N1741  | ICE POINT CELL   | K140-4  | 802125  | KAYE INSTRUMENTS        | Jan 31, 2020  | 512200813197782 |

**Procedures Used in this Event**

Procedure Name  
MPC-TEM-001

Description  
Temperature Sensor and Indicators, General, Oct-31-2017, rev01

Calibrating Technician:

TODD MORRIS

QC Approval:

BRIAN GOLD

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered conform with ISO/IEC 17025:2005, ANSI/NCSL Z540-1-1994, ANSI/NCSL Z540.3-2006, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.



**R.M. Young Company**  
2801 Aero Park Drive  
Traverse City, Michigan 49686 USA

### CERTIFICATE OF CALIBRATION AND TESTING

Model: 18811  
Serial Number: CA03912

Description: Anemometer Drive - 20 to 990 RPM  
(Comprised of 18820A Control Unit and 18831A Motor Assembly)

R. M. Young Company certifies that the above equipment was inspected and calibrated prior to shipment in accordance with established manufacturing and testing procedures. Standards established by R.M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology.

| Nominal<br>Motor RPM<br>RPM   | 27106D Output<br>Frequency<br>Hz (1) | Calculated<br>RPM (2) | Indicated<br>RPM (3) |
|---|--------------------------------------|-----------------------|----------------------|
| 30.0  | 5                                    | 30.0                  | 30.0                 |
| 150.0   | 25                                   | 150.0                 | 150.0                |
| 300.0   | 50                                   | 300.0                 | 300.0                |
| 450.0   | 75                                   | 450.0                 | 450.0                |
| 600.0   | 100                                  | 600.0                 | 600.0                |
| 750.0   | 125                                  | 750.0                 | 750.0                |
| 990.0   | 165                                  | 990.0                 | 990.0                |
| <input checked="" type="checkbox"/> Clockwise and Counterclockwise rotation verified. |                                      |                       |                      |

- (1) Measured output frequency of YOUNG model 27106D standard anemometer attached to motor shaft.
- (2) YOUNG model 27106D produces 10 pulsed per revolution of the anemometer shaft.
- (3) Indicated on the Control Unit LCD.

\* Indicates out of tolerance.

☐ New Unit

☒ Service / Repair Unit

☒ As found

☒ No calibration adjustments required

☐ As left

Traceable frequency meter used for calibration:  
Model: 34405A

Serial Number: 53020093

Date: 14 December 2017

Calibration Interval: One year

Tested By : SS

**M E T E O R O L O G I C A L I N S T R U M E N T S**

Tel: 231-946-3980 Fax: 231-946-4772 Email: met.sales@youngusa.com Website: youngusa.com

ISO 9001:2008 CERTIFIED



## CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: 141170

DATE: 25-Apr-2018

Calibration Operator: E. Albuja

---

### Critical Venturi Flow Meter: Max Uncertainty = 0.346%

Serial Number: 1 CEESI NVLAP NIST Data File 04BGI151

Serial Number: 2 CEESI NVLAP NIST Data File 04BGI152

Serial Number: 3 CEESI NVLAP NIST Data File 04BGI153

Serial Number: 4 CEESI NVLAP NIST Data File 02BGI004

---

**Room Temperature:**  $\pm 0.03^{\circ}\text{C}$  from  $-5^{\circ}\text{C}$  -  $70^{\circ}\text{C}$  Room Temp: 24.3  $^{\circ}\text{C}$

Brand: Telatemp Serial Number: 358654

Std Cal Date: 23-Oct-17 Std Cal Due Date: 23-Oct-18

deltaCal:

Ambient Temperature (set): 24.3  $^{\circ}\text{C}$

Aux (filter) Temperature (set): 24.3  $^{\circ}\text{C}$

---

### Barometric Pressure and Absolute Pressure

Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%

Serial Number: C4310002

Std Cal Date: 26-Mar-18 Std Cal Due Date: 26-Mar-19

deltaCal:

Barometric pressure (set): 742.5 mm of Hg

---

### Results of Venturi Calibration

Flow Rate (Q) vs. Pressure Drop ( $\Delta P$ ).

Where: Q=Lpm,  $\Delta P$ = Cm of H<sub>2</sub>O

Q= 3.81660  $\Delta P$  ^ 0.53680 Overall Uncertainty: 0.35%

Q= 3.86245  $\Delta P$  ^ 0.52151 Overall Uncertainty: 0.35%

---

Date Placed In Service: 5/22/18

(To be filled in by operator upon receipt)

Recommended Recalibration Date: 5/22/19

(12 months from date placed in service)

Revised: March 2016  
Cal102-01T1 Rev D



**To Check a deltaCal**

E. Albuja

Date

25-Apr-2018 Pre recert

1.5-19.5 **VER 4.00**

BP= 743 mm of Hg

Maximum allowable error at any flow rate is .75%.

Serial No. 141170

|     | Reading     |       | CV     |           |         |
|-----|-------------|-------|--------|-----------|---------|
|     | Abs. P      |       | Qa     | Qa        |         |
|     | Crit. Vent. | Room  | Flow   | deltaCal  | % Error |
|     | mm of Hg    | Temp  | Lpm    | Indicated |         |
| # 2 | 122.19      | 22.60 | 1.369  | 1.557     | 13.72   |
|     | 218.85      | 22.60 | 2.490  | 2.585     | 3.80    |
|     | 296.35      | 22.60 | 3.390  | 3.400     | 0.31    |
|     | 382.58      | 22.60 | 4.390  | 4.424     | 0.78    |
|     | 466.61      | 22.60 | 5.365  | 5.399     | 0.64    |
| # 1 | 170.46      | 22.60 | 6.733  | 6.795     | 0.92    |
|     | 252.99      | 22.60 | 10.091 | 10.075    | -0.16   |
|     | 327.64      | 22.60 | 13.128 | 13.125    | -0.02   |
|     | 387.45      | 22.60 | 15.561 | 16.075    | 3.30    |
|     | 478.02      | 22.60 | 19.246 | 19.351    | 0.55    |
|     |             |       |        | Average % | 2.38    |



**To Check a deltaCal****E. Albuja**

Date

**25-Apr-2018****1.5-19.5 VER 4.00**BP= **742.5** mm of Hg

Maximum allowable error at any flow rate is .75%.

**Serial No. 141170**

|           | Reading     |       | CV     |           |         |
|-----------|-------------|-------|--------|-----------|---------|
|           | Abs. P      |       | Qa     | Qa        |         |
|           | Crit. Vent. | Room  | Flow   | deltaCal  | % Error |
|           | mm of Hg    | Temp  | Lpm    | Indicated |         |
| # 2       | 149.87      | 24.30 | 1.701  | 1.698     | -0.18   |
|           | 194.06      | 24.30 | 2.217  | 2.204     | -0.59   |
|           | 279.78      | 24.30 | 3.218  | 3.198     | -0.62   |
|           | 356.20      | 24.30 | 4.110  | 4.138     | 0.68    |
|           | 464.51      | 24.30 | 5.375  | 5.402     | 0.51    |
| # 1       | 156.23      | 24.30 | 6.194  | 6.227     | 0.53    |
|           | 272.79      | 24.30 | 10.967 | 10.981    | 0.13    |
|           | 343.84      | 24.30 | 13.876 | 13.899    | 0.17    |
|           | 431.97      | 24.30 | 17.484 | 17.517    | 0.19    |
|           | 478.28      | 24.30 | 19.380 | 19.452    | 0.37    |
| Average % |             |       |        |           | 0.12    |