Alton Coal Development, LLC
Florida Extension Office
6602 Ilex Circle
Naples, Florida 34109
Phone (239) 825-2332

UTAH DEPARTMENT OF
ENVIRONMENTAL QUALITY
FEB 07 2017
DIVISION OF AIR QUALITY

February 1, 2017

Jon Black
Engineer
Major New Source Review Section
Utah Division of Air Quality
195 North 1950 West
Salt Lake City, UT 84114

RE: 2016 Annual Report - Coal Hollow Mine
Project ID: N14047-0002

Dear Mr. Black,

Please find enclosed the Annual Report of PM_{10} Data Collected at the Coal Hollow Mine, Utah during the 2016 year, prepare by Alton Coal Development, LLC.

Please do not hesitate to contact me if you have any questions. I can be reached at (435) 867-5331 or (435) 691-1551.

File
Site ID # 14047

Sincerely,

B. Kirk Nicholes
Environmental Specialist
Alton Coal Development, LLC

Document Date: 02/07/2017
DAQ-2017-001753

UTAH DEPARTMENT OF
ENVIRONMENTAL QUALITY

FEB 07 2017

DIVISION OF AIR QUALITY

Alton Coal Development, LLC.

Summary of PM_{10} Data
Collected at Coal Hollow Mine, Utah
Annual Report, 2016

Submitted to:
Utah Division of Environmental Quality
Division of Air Quality
195 North 1950 West
Salt Lake City, Utah
Contact: Jon Black

Prepared by:
Alton Coal Development, LLC.
463 N 100W, Suite1
Cedar City, Utah 84721
Contact: Kirk Nicholes
435.867.5331

Alton Coal Development
Coal Hollow
Project

Contents

1.0 Introduction **2**

2.0 Site Location **2**

3.0 AIR QUALITY DATA SUMMARIES **4**

4.0 DATA RECOVERY AND QUALITY ASSURANCE **7**

4.1 Data Recovery 7

4.2 Quality Assurance 8

4.2.1 Precision of PM_{10} Measurements 9

4.2.2 Audit Results 9

4.2.3 Zero and Single Point Flow Rate Checks 11

List of Tables

Table I - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$) 5

Table II - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$) 5

Table III - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$) 6

Table IIII - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$) 6

Table VII - Summary of Data Recovery 8

Table VIII - 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_{10} Concentrations with Polution Trend Graphs

APPENDIX C

Precision and Single-Point Flow Rate Checks

APPENDIX D

Field Data Sheets

APPENDIX E

Independent PM_{10} Sampler Performance Audit Report

1.0 INTRODUCTION

This report summarizes measurements of Particulate Matter less than 10 microns nominal aerodynamic diameter (PM_{10}) 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_{10} is a condition of the mines operating permit.

PM_{10} monitoring at the site consists of five BGI PQ200 PM_{10} 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 2016.

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 PM10 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

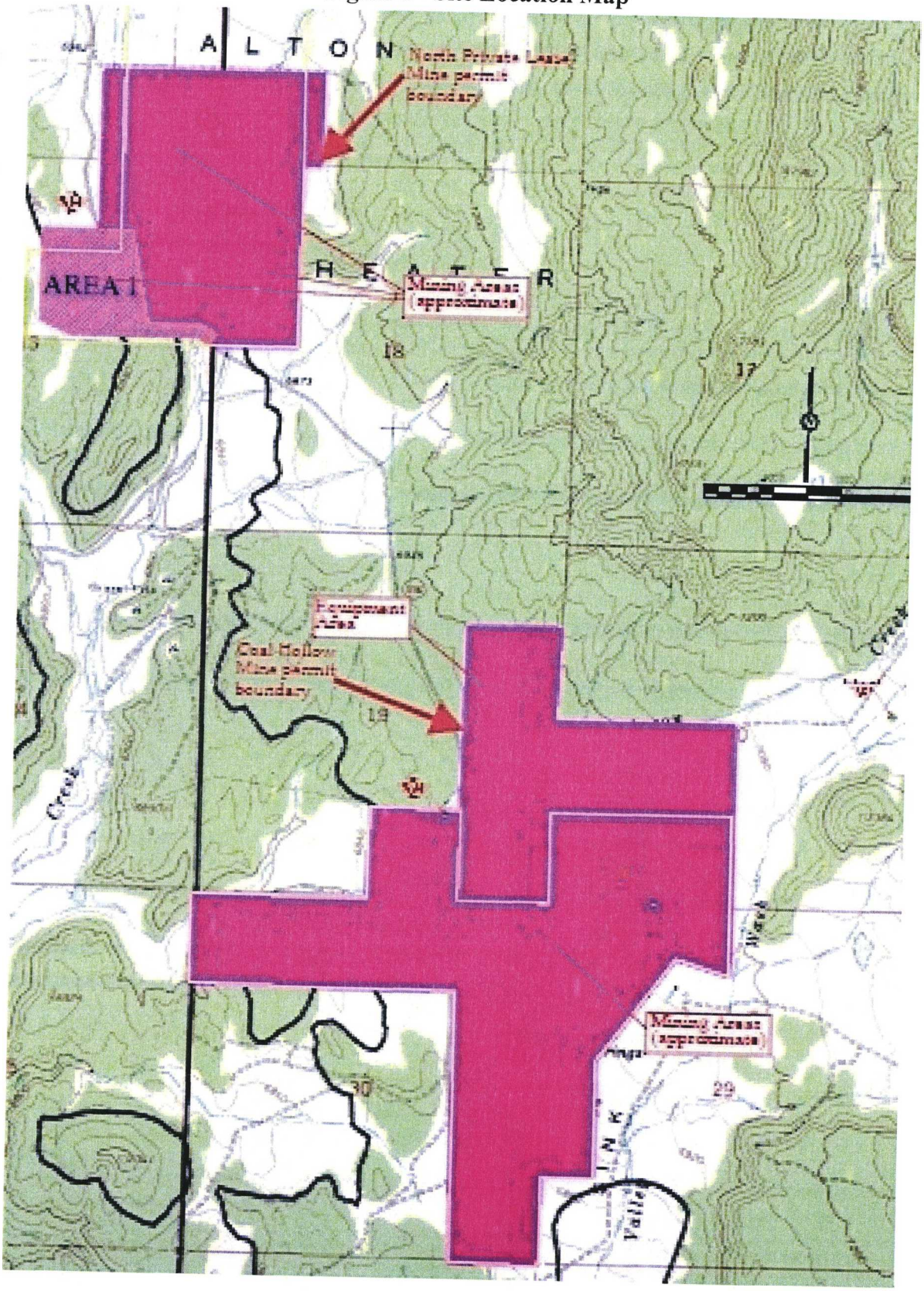


Figure 2 - Satellite View of Monitoring Locations

3.0 AIR QUALITY DATA SUMMARIES

A summary of the measured PM_{10} 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 PM10 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_{10} 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_{10} 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_{10} 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. All measured PM_{10} concentrations were below the 24-hour National Ambient Air Quality Standard (NAAQS) of 150 $\mu g/m^3$ with the exception of the sample date of September 9th for the CHM compliance monitor and the July 7th and July 11th for the NPL compliance & collocated monitors. The September 9th CHM compliance monitor sample was 187.4 $\mu g/m^3$ which is unsupported by the collocated monitor sample of 38.4 $\mu g/m^3$. Due to the lack of activity around near these monitors, it is assumed that the collocated monitor sample more accurately represents the conditions that sample period. The July 7th NPL compliance and collocated monitors samples were 272.3 & 268.4 $\mu g/m^3$ respectively and the July 11th NPL compliance and collocated monitors samples were 224.4 & 231.5 $\mu g/m^3$ respectively. ACD was maintaining road & mining dust suppression with a smaller rental water truck while it's larger water truck was out of service. Fugitive dust during this time period was primarily from a section of County Road 136 that was in construction near the location of these monitors.

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 PM10 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 PM10 concentrations for the next year of mining.

Table I - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Background Monitor - 962A

RANK	DATE	PM_{10} CONCENTRATION
Highest	7/11/2016	24.1
2nd Highest	8/10/2016	17.0
Annual Mean	1/1/16-12/31/16 (57 valid samples)	6.6

Table II - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Compliance Monitor - 963B

RANK	DATE	PM_{10} CONCENTRATION
Highest	9/9/2016	187.4
2nd Highest	11/14/16	111.5

Annual Mean	1/1/16-12/31/16 (60 valid samples)	25.8

Table III - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Compliance Monitor – 964C

RANK	DATE	PM_{10} CONCENTRATION
Highest	11/8/2016	109.6
2nd Highest	12/20/2016	101.9
Annual Mean	1/1/16-12/31/16 (60 valid samples)	25.4

Table IVI - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Compliance Monitor – 2366D

RANK	DATE	PM_{10} CONCENTRATION
Highest	7/5/2016	272.3
2nd Highest	7/11/2016	224.4
Annual Mean	1/1/16-12/31/16 (47 valid samples)	33.0

Table V - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Compliance Monitor – 2398E

RANK	DATE	PM_{10} CONCENTRATION
Highest	7/5/2016	268.4
2nd Highest	7/11/2016	231.5
Annual Mean	1/1/16-12/31/16 (49 valid samples)	32.4

Table VI – Mean Annual Wind Speed

	Annual 2015
Mean Wind Speed (m/s)	3.02

4.0 DATA RECOVERY AND QUALITY ASSURANCE

4.1 Data Recovery

Monitor 962A

Monitor 962A collected 57 of the 61 samples during the quarter. The percent recovery for this quarter is 93%. For the sample date of May 6th a rodent had chewed threw the power supply cable to the monitor causing the monitor to not run the programed time. For the sample date of May 24th the power supply where the rodent had chewed threw lost connection and the monitor failed again. For the sample date of July 23rd variations in flow shut the monitor down at 11 hrs and 24 minutes of run time. For the sample date of Sept 27th the monitor stop time was incorrectly programed and the monitor over ran the 24-hour sample period.

Monitor 963B

Monitor 963B collected 60 of the 61 samples during the quarter. The percent recovery for this quarter is 98%. For the sample date of April 25th the monitor over ran the programed time halted by the operator after 34:43 hours.

Monitor 964C

Monitor 964C collected 60 of the 61 samples during the quarter. The percent recovery for this quarter is 98%. For the sample date of Jan. 1st, the stop time was programed incorrectly for the monitor, it ran 85:20 hours and was shut down by the operator.

Monitor 2366D

Monitor 2366D collected 47 of the 53 samples during the quarter. The percent recovery for this quarter is 89%. For the sample date of Feb.18th, the monitor ran for an insufficient sample period. For the sample date of May 18th, the monitor over ran the programed time halted by the operator after 53:03 hours. For the sample date of Jul 17th the monitor error code indicate that the monitor flow varied more than 5% and was shut down at 17:41 hours. For the sample date of Sep 9th the monitor did not collect data for the run. For the sample date of Nov 2nd, the

monitor timer information indicates that the stop time was inaccurately programed, the run was halted by the operator at 53 hrs. of run time.

Monitor 2398E

Monitor 2398E collected 49 of the 53 samples during the quarter. The percent recovery for this quarter is 92%. For the sample date of Feb. 18th the monitor ran for an insufficient sample period. For the sample date of Apr. 24th the chamber to the monitor was found open at the time of filter collection, thus the sample was invalidated. For the sample date of Sep 9th the monitor stop time was incorrectly programed and the monitor over ran the 24-hour sample period. For the sample date of Sep 27th the monitor did not collect data for the run.

The PM_{10} data recoveries for the three monitoring stations are presented below:

Table VII - Summary of Data Recovery

SAMPLER	POSSIBLE SAMPLES	VALID SAMPLES	PERCENT DATA RECOVERY
962A	61	57%	93%
963B	61	60	98%
964C	61	60	98%
2366D	53	47	89%
2398E	53	49	92%

4.2 Quality Assurance

Quality assurance procedures utilized to verify the integrity of the measured PM_{10} data included the following:

1. Review of PM_{10} precision measurements based upon duplicate, collocated measurements.

2. Independent quarterly audits of the PM_{10} samplers.

3. Monthly zero and single point flow rate checks of the PM_{10} samplers.

4.2.1 Precision of PM_{10} Measurements

The precision of the PM_{10} 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_{10} precision checks are reported for instances when the concentrations for duplicate samples both exceed 3 $\mu g/m^3$. 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 53 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 -50.6% to 132%. The aggregate coefficient of variability (CV) calculated in accordance with *40 CFR, Part 58*, Appendix A Equation 11 is 23.27%. This value is not within the 10% goal for aggregate CV.

Precision calculations at the North Private Lease were developed based on 41 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 -130.2% to 63.9%. The aggregate coefficient of variability (CV) calculated in accordance with *40 CFR, Part 58*, Appendix A Equation 11 is 25.6%. This value is not within the 10% goal for aggregate CV.

4.2.2 Audit Results

The accuracy of the PM_{10} sampler flows for each Quarter was verified by performance audits conducted by Air Resource Specialist on February 22, 2016, April 20, 2016, September 14, 2016 and November 9, 2016. A copy of the audit reports are presented in Appendix E and are summarized in Table VI. The audit results indicate that the three samplers were operating properly throughout the year.

Table VIII - Audit Summary

	SAMPLER	AUDIT % DIFFERENCE	LIMIT*	DESIGN % DIFFERENCE	LIMIT*
1st Quarter	962A	-2.7	±4%	2.8	± 5%
	963B	-0.9	±4%	1.0	± 5%
	964C	-1.5	±4%	1.6	± 5%
	2366D	5.2	±4%	-4.9	± 5%
	2398E	5.0	±4%	-4.8	± 5%
2nd Quarter	962A	-2.6	±4%	2.6	± 5%
	963B	-1.1	±4%	1.1	± 5%
	964C	-0.1	±4%	0.1	± 5%
	2366D	-0.7	±4%	0.7	± 5%
	2398E	-1.0	±4%	1.0	± 5%
3rd Quarter	962A	-1.5	±4%	1.5	± 5%
	963B	-0.9	±4%	0.9	± 5%
	964C	-0.1	±4%	0.1	± 5%
	2366D	-0.6	±4%	0.6	± 5%
	2398E	-0.3	±4%	0.3	± 5%
4th Quarter	962A	-1.5	±4%	1.5	± 5%
	963B	0.1	±4%	-0.1	± 5%
	964C	-0.5	±4%	0.5	± 5%
	2366D	-0.3	±4%	0.3	± 5%
	2398E	-0.4	±4%	0.4	± 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

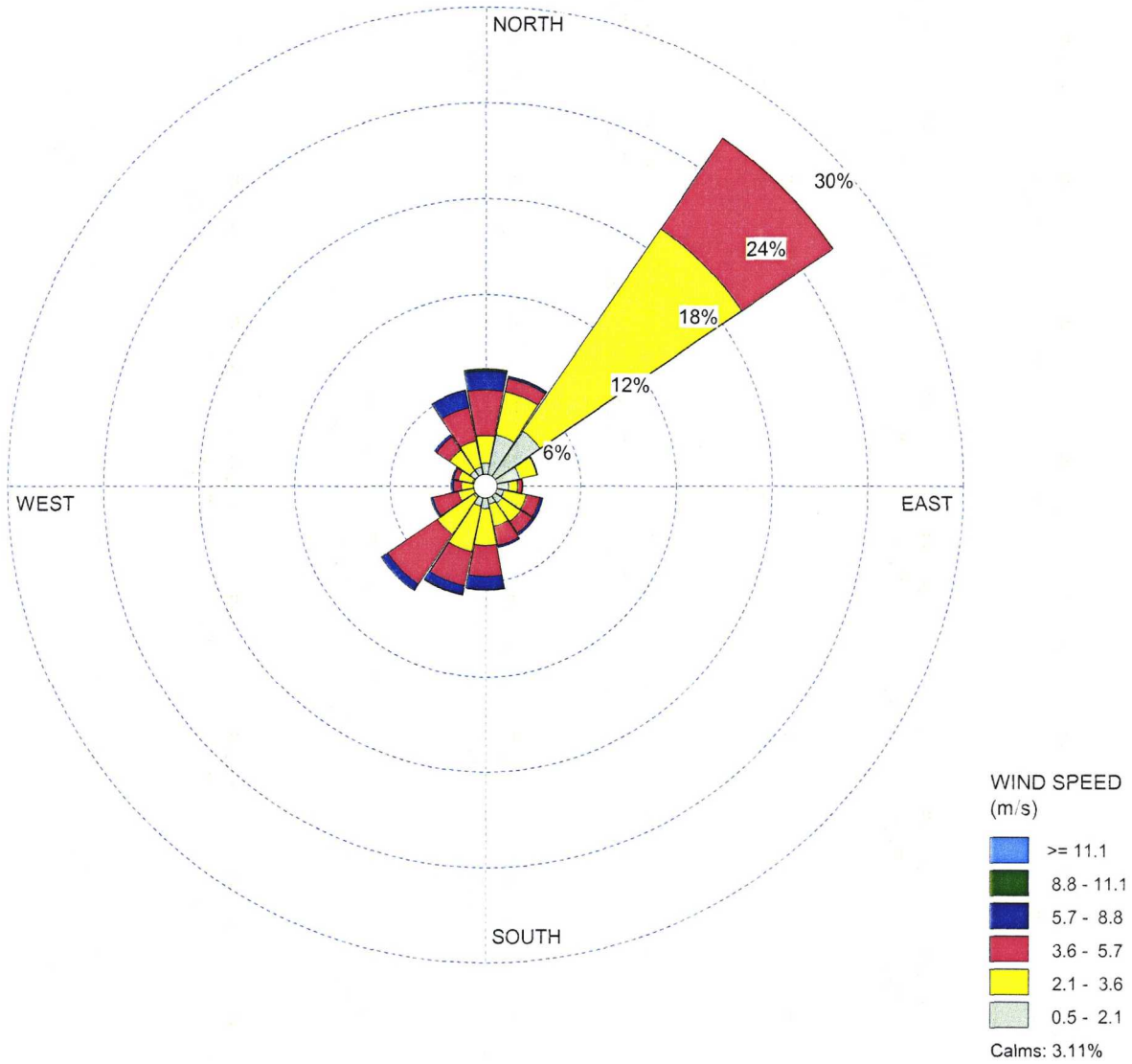
Windrose

WIND ROSE PLOT:

Alton Coal Development, LLC , Alton, Utah
2016 Annual

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/2016 - 00:00 **End Date: 12/31/2016 - 23:00**	**Alton Coal Development, LLC - Coal Hollow Mine**	
		MODELER: **B. Kirk Nicholes**	
	CALM WINDS: **3.11%**	TOTAL COUNT: **8784 hrs.**	
	AVG. WIND SPEED: **3.02 m/s**	DATE: **1/31/2017**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Station ID: 1
Start Date: 1/1/2016 - 00:00
End Date: 12/31/2016 - 23:00

Run ID:

Frequency Distribution
(Count)

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

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	128	150	251	106	9	1	645
11.25-33.75	286	244	75	10	0	0	615
33.75-56.25	364	1345	602	0	0	0	2311
56.25-78.75	193	96	6	0	0	0	295
78.75-101.25	129	49	24	4	0	0	206
101.25-123.75	104	128	75	18	0	0	325
123.75-146.25	113	123	73	15	0	0	324
146.25-168.75	102	123	109	11	0	0	345
168.75-191.25	123	204	169	72	3	0	571
191.25-213.75	114	255	190	51	4	0	614
213.75-236.25	77	245	331	42	0	0	695
236.25-258.75	54	98	144	10	0	0	306
258.75-281.25	63	69	46	11	0	0	189
281.25-303.75	73	79	29	9	0	0	190
303.75-326.25	104	135	87	16	0	0	342
326.25-348.75	107	147	186	96	1	1	538
Total	2134	3490	2397	471	17	2	8784

Frequency of Calm Winds: 273
Average Wind Speed: 3.02 m/s

Station ID: 1
Start Date: 1/1/2016 - 00:00
End Date: 12/31/2016 - 23:00

Run ID:

Frequency Distribution
(Normalized)

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

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	0.014572	0.017077	0.028575	0.012067	0.001025	0.000114	0.073429
11.25-33.75	0.032559	0.027778	0.008538	0.001138	0.000000	0.000000	0.070014
33.75-56.25	0.041439	0.153119	0.068534	0.000000	0.000000	0.000000	0.263092
56.25-78.75	0.021972	0.010929	0.000683	0.000000	0.000000	0.000000	0.033584
78.75-101.25	0.014686	0.005578	0.002732	0.000455	0.000000	0.000000	0.023452
101.25-123.75	0.011840	0.014572	0.008538	0.002049	0.000000	0.000000	0.036999
123.75-146.25	0.012864	0.014003	0.008311	0.001708	0.000000	0.000000	0.036885
146.25-168.75	0.011612	0.014003	0.012409	0.001252	0.000000	0.000000	0.039276
168.75-191.25	0.014003	0.023224	0.019240	0.008197	0.000342	0.000000	0.065005
191.25-213.75	0.012978	0.029030	0.021630	0.005806	0.000455	0.000000	0.069900
213.75-236.25	0.008766	0.027892	0.037682	0.004781	0.000000	0.000000	0.079121
236.25-258.75	0.006148	0.011157	0.016393	0.001138	0.000000	0.000000	0.034836
258.75-281.25	0.007172	0.007855	0.005237	0.001252	0.000000	0.000000	0.021516
281.25-303.75	0.008311	0.008994	0.003301	0.001025	0.000000	0.000000	0.021630
303.75-326.25	0.011840	0.015369	0.009904	0.001821	0.000000	0.000000	0.038934
326.25-348.75	0.012181	0.016735	0.021175	0.010929	0.000114	0.000114	0.061248
Total	0.242942	0.397313	0.272883	0.053620	0.001935	0.000228	0.968921

Frequency of Calm Winds: 3.11%
Average Wind Speed: 3.02 m/s

APPENDIX B

Listing of PM_{10} Concentrations

Background Monitor 962A

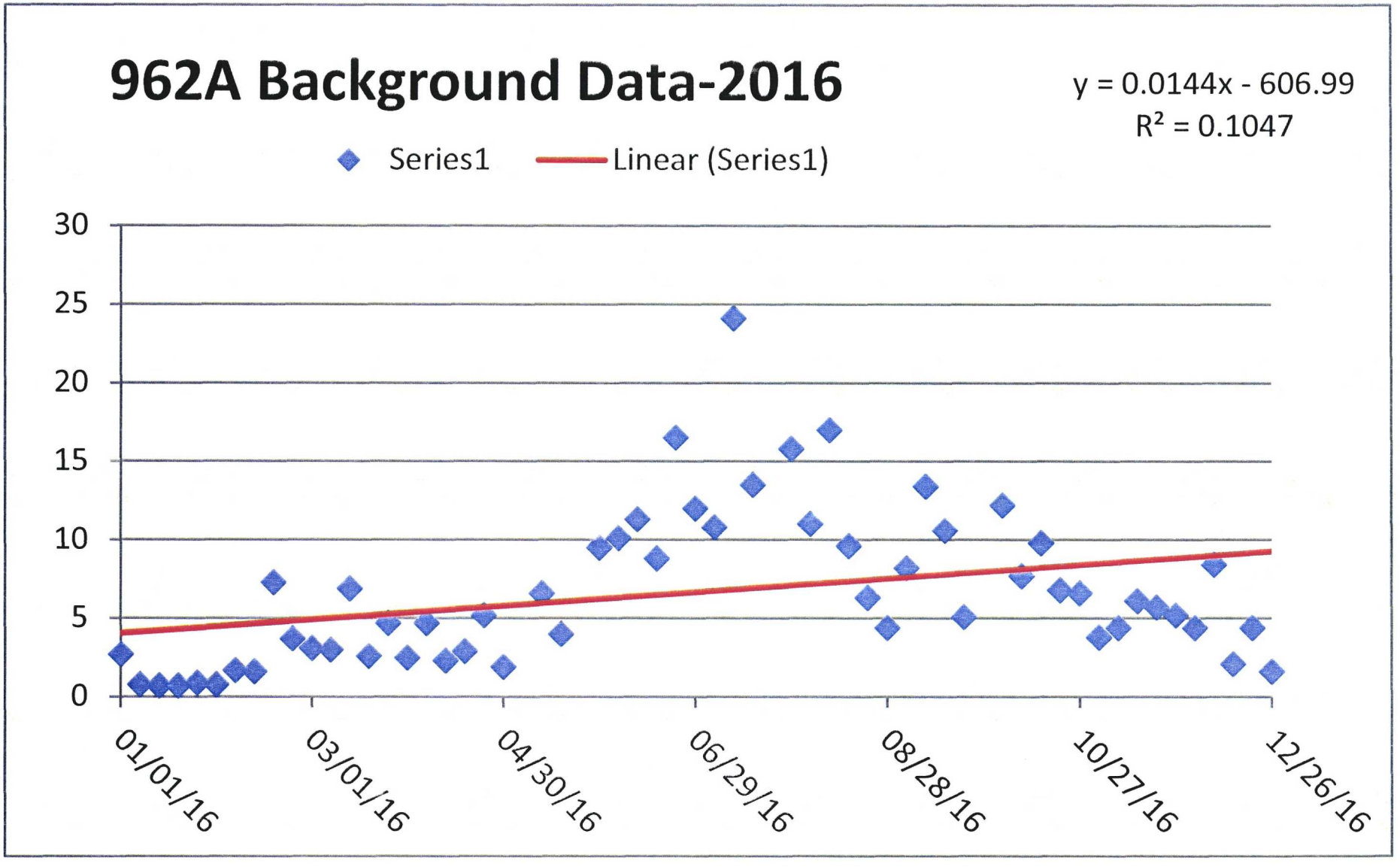
PM_{10} Sampler Summary

January 1, 2016 - December 31, 2016

Network: Alton Coal Development, LLC
Site: Coal Hollow
Sampler ID: Coal Hollow-A **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Mass (mg) Tare	Gross	Net	Flag	Comments
01/01/16	P2926661	2.3	2.7	23 59	24 0	20 7	381 888	381 944	0 056		
01/07/16	P2927855	0.7	0.8	23 59	24 0	20 2	380 073	380 090	0 017		
01/13/16	P2927858	0.6	0.7	23 59	24 0	20 4	375 202	375 218	0 016		
01/19/16	P2928049	0.6	0.7	23 59	24 0	20 3	394 529	394 544	0 015		
01/25/16	P2928052	0.8	0.9	23 59	24 0	20 6	367 494	367 514	0 020	TD	
01/31/16	P2928155	0.6	0.8	23 59	24 0	19 9	391 311	391 327	0 016		
02/06/16	P2928158	1.4	1.7	23 59	24 0	20 6	392 333	392.368	0 035		
02/12/16	P2928161	1.3	1.6	23 59	24 0	20.0	390 325	390.357	0 032		
02/18/16	P2928304	6.0	7.3	23 59	24 0	19 8	371 169	371 314	0 145		
02/24/16	P2928406	3.1	3.7	24 00	24 0	20 2	375 584	375 659	0 075		
03/01/16	P2928416	2.5	3.1	23 59	24 0	19 8	377 214	377 276	0 062	TD	
03/07/16	P2928413	2.5	3.0	23 59	24 0	20 0	351 941	352 003	0 062		
03/13/16	P2928781	5.7	6.9	23 59	24 0	19.9	384 546	384 684	0 138		
03/19/16	P2928786	2.2	2.6	23 59	24 0	19 7	398 302	398 355	0 053		
03/25/16	P2928791	3.9	4.7	23 59	24 0	19 7	389 832	389 926	0 094		
03/31/16	P2928997	2.1	2.5	23 59	24 0	19 9	385 746	385 797	0 051		
04/06/16	P2929002	3.9	4.7	23 59	24 0	19 7	381 351	381 445	0 094		
04/12/16	P2929223	1.9	2.3	23 59	24 0	19 7	371 091	371 138	0 047		
04/18/16	P2929228	2.4	2.9	23 59	24 0	19 9	397 910	397 969	0 059	HT	
04/24/16	P2929387	4.2	5 2	23 59	24 0	19 5	380 256	380 359	0 103		
04/30/16	P2929392	1.6	1.9	23 59	24 0	19 8	382 642	382 681	0 039	HT	
05/06/16	P2929397	Invalid - AG	Invalid - AG	1 48	1 8	1 5	382 474	382 515	0 041	SP,HT	
05/12/16	P2929630	5.3	6.6	24 00	24 0	19 5	369 393	369 522	0 129		
05/18/16	P2929815	3.3	4.0	23 59	24 0	19 6	367 546	367 626	0 080	PI,HT	
05/24/16	P2929820	Invalid - AG	Invalid - AG	8 56	9 0	7 3	367 378	367 462	0 084	SP	
05/30/16	P2929822	7.6	9.5	23 59	24 0	19 3	369 039	369 223	0 184	HT	
06/05/16	P2929635	7.9	10.1	23 59	24 0	18 7	379 482	379 672	0 190	XT	
06/11/16	P2930159	9.0	11.3	23 59	24 0	19 2	377 047	377 265	0 218	HT	
06/17/16	P2930165	7.0	8.8	23 59	24 0	19 2	383 646	383 815	0 169	TD,HT	
06/23/16	P2930501	12.9	16.5	23 59	24 0	18 8	372 958	373 269	0 311		
06/29/16	P2930507	9.4	12.0	23 59	24 0	18 8	377 817	378 043	0 226		
07 05/16	P2930767	8.5	10.8	23 59	24 0	18 9	374 589	374 794	0 205		
07/11/16	P2930772	19.0	24.1	23 59	24 0	18 9	378 573	379 030	0 457	HT	
07/17/16	P2930990	10 6	13.5	23 59	24 0	18 9	368 561	368 817	0 256	PI,HT	
07/23/16	P2930995	Invalid - AG	Invalid - AG	11 24	11 4	9 0	375 849	375 940	0 091	SP,TD,HT	
07/29/16	P2931000	12.3	15.8	23 59	24 0	18 7	389 056	389 352	0 296	TD	
08/04/16	P2931177	8.8	11.0	23 59	24 0	19 2	382 790	383 002	0 212	HT	
08/10/16	P2931182	13.6	17.0	23 59	24 0	19 3	375 660	375 988	0 328	HT	
08/16/16	P2931428	7.5	9.6	23 59	24 0	18 9	392 269	392 451	0 182		
08/22/16	P2931435	5.0	6.3	23 59	24 0	19 3	382 864	382 986	0 122		
08/28/16	P2931711	3.6	4.4	23.59	24 0	19 4	377 675	377 762	0 087		
09/03/16	P2931716	6 5	8.2	23 59	24 0	19 0	382 311	382 468	0 157	TD,HT	
09/09/16	P2931721	10.6	13.4	23 59	24 0	19 0	372 896	373 151	0 255	TD	
09/15/16	P2932013	8.6	10.6	24 00	24 0	19 4	377 990	378 197	0 207		
09/21/16	P2932020	4.1	5.1	23 59	24 0	19 4	374 678	374 777	0 099		
09/27/16	P2933157	Invalid - AG	Invalid - AG	61 11	61 3	49 5	381 323	381 566	0 243	SP,CI	
10/03/16	P2933162	10.0	12 2	23 59	24 0	19 6	369 748	369 989	0 241		
10/09/16	P2933513	6.2	7.7	24 00	24 0	19 5	382 312	382 463	0.151		
10/15/16	P2933523	7.8	9.8	23 59	24 0	19 2	378 220	378 408	0 188		
10/21/16	P2933829	5.5	6.8	23 59	24 0	19 6	387 875	388 008	0 133		
10/27/16	P2933518	5.2	6.6	23 59	24 0	19 2	390 837	390 964	0 127	XT	
11/02/16	P2933830	3.2	3.8	23 59	24 0	19 8	374 041	374 118	0 077	HT	
11/08/16	P2933835	3.6	4.4	23 59	24 0	19 8	380 794	380 882	0 088		
11/14/16	P2934147	5.0	6.1	23 59	24 0	19 8	384 306	384 428	0.122		
11/20/16	P2934428	4.7	5.7	23 59	24 0	19 6	379 950	380 063	0 113		
11/26/16	P2934433	4.3	5.2	23 59	24 0	19 9	375 840	375 945	0 105		
12/02/16	P2934438	3.7	4.4	23 59	24 0	20 4	378 436	378 526	0 090		
12/08/16	P2934772	7.1	8.4	23 59	24 0	20 4	391 553	391 726	0 173		
12/14/16	P2934773	1.7	2.1	24 00	24 0	20 0	382.432	382 475	0 043		
12/20/16	P2935091	3.7	4.4	23.59	24.0	20 4	381 251	381 341	0 090		
12/26/16	P2935096	1.4	1.6	23.59	24 0	21 1	383 239	383 274	0 035	TD	
02/15/16	P2928303		Field Blank				387 440	387 446	0.006		
07/07/16	P2930777		Field Blank				400 056	400.069	0 013		
09/16/16	P2932026		Field Blank				378 783	378 788	0.005		
11/04/16	P2934146		Field Blank				385.463	385.474	0 011		

# Valid	Recovery	Average	St. Dev.	Max	Min
57	93%	6.6	4.9	24.1	0.7


962A Background Data-2016
y = 0.0144x - 606.99
R² = 0.1047
Series1
Linear (Series1)
30
25
20
15
10
5
0
01/01/16
03/01/16
04/30/16
06/29/16
08/28/16
10/27/16
12/26/16

Compliance Monitor 963B

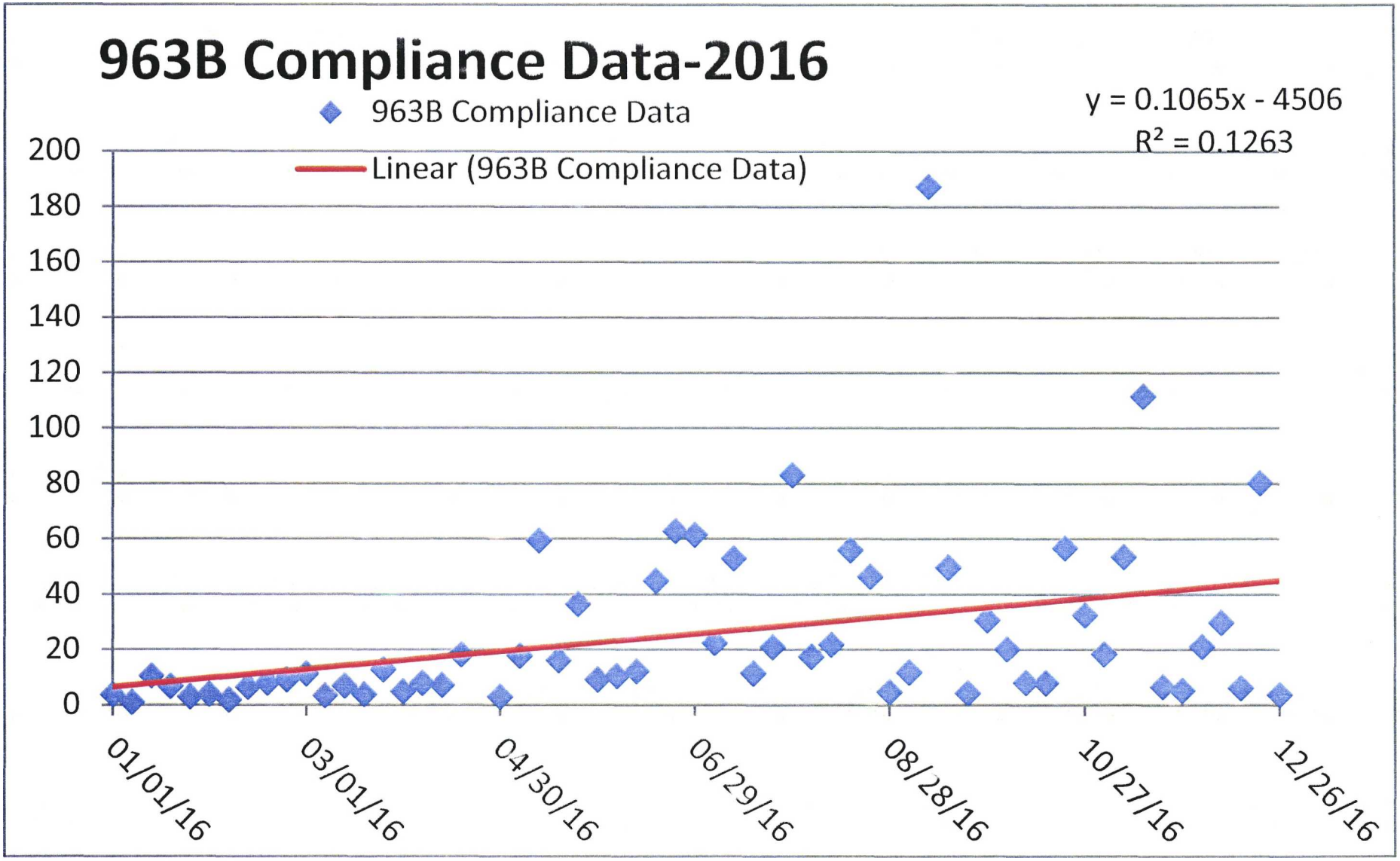
PM_{10} Sampler Summary

January 1, 2015 - December 31, 2015

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) LTP	Concentration (µg/m3) STP	Sample Period (hr.min)	Sample Volume (m3)	Std Volume (m3)	Mass (mg) Tare	Gross	Net	Flag	Comments
01/01/16	P2926662	3.3	3.8	23 59	24 0	21 0	385.897	385 978	0.081		
01/07/16	P2927856	0.8	1 0	23 59	24 0	20 4	372 865	372 886	0 021		
01/13/16	P2927859	9.1	10.6	23 59	24 0	20.6	377 015	377 234	0 219		
01/19/16	P2928050	5.7	6.7	23 59	24 0	20 4	394 493	394 632	0 139		
01/25/16	P2928053	2.5	2 9	23:59	24.0	20.8	372 628	372 689	0 061		
01/31/16	P2928156	3.3	3 9	23 59	24 0	20 1	388 862	388 942	0.080		
02/06/16	P2928159	1.7	1.9	23.59	24 0	20 8	373 606	373 647	0 041		
02/12/16	P2928162	5.4	6.4	23:59	24.0	20 2	387 372	387 502	0 130		
02/18/16	P2928305	6.5	7.9	23.59	24 0	20 0	373.094	373 252	0 158		
02/24/16	P2928407	7.9	9.2	24 00	24 0	20 4	368 493	368 683	0 190		
03/01/16	P2928417	9.4	11.3	23 59	24 0	20 0	372 074	372 300	0 226		
03/07/16	P2928414	2.9	3.5	23 59	24 0	20 2	365 881	365.953	0 072		
03/13/16	P2928782	5 8	6.9	23 59	24.0	20.1	397.743	397 883	0 140		
03/19/16	P2928787	3 2	3.9	23:59	24 0	19 9	386.175	386 254	0 079		
03/25/16	P2928792	10.6	12 8	23 59	24 0	19 9	391 580	391 835	0 255		
03/31/16	P2928998	4.2	5.0	23 59	24 0	20 1	383 570	383 671	0 101		
04/06/16	P2929003	6.6	8.0	23 59	24 0	19 8	357 603	357 762	0 159		
04/12/16	P2929224	5 9	7 2	23 59	24.0	19 9	372 252	372 396	0 144		
04/18/16	P2929229	15 2	18.2	23 59	24 0	20 1	372 995	373 361	0 366	HT	
04/24/16	P2929388	Invalid - AG	Invalid - AG	34 43	34 8	28 5	374 939	375 170	0 231	SP,CI	
04/30/16	P2929393	2.4	2 9	23.59	24 0	20 0	398 449	398 508	0 059	HT	
05/06/16	P2929398	14 4	17.7	23:59	24 0	19 6	394 796	395 144	0 348	HT	
05/12/16	P2929631	48 7	59.5	23 59	24 0	19 7	377 198	378 369	1 171		
05/18/16	P2929816	13 2	16.1	23 59	24 0	19 7	398 149	398 467	0 318	HT	
05/24/16	P2929821	29 8	36 5	23 59	24 0	19 6	369 454	370 171	0 717		
05/30/16	P2929824	7.4	9 2	23 59	24 0	19 4	369 348	369 527	0 179	HT	
06/05/16	P2929637	8.2	10.5	23 59	24 0	18 9	380 649	380 848	0 199	XT	
06/11/16	P2930160	9 8	12.2	23 59	24 0	19 3	371 393	371 630	0 237	HT	
06/17/16	P2930166	36.0	44 9	23 59	24 0	19 3	373 859	374 725	0 866	HT	
06/23/16	P2930502	49.5	62 9	23 59	24 0	18 9	394 793	395 983	1 190		
06/29/16	P2930508	48 6	61 5	23 59	24 0	19 0	371 232	372 400	1 168		Filter darker, smudge
07/05/16	P2930768	17 7	22 4	23 59	24 0	19 0	373 110	373 537	0 427		
07/11/16	P2930773	42.0	52 9	23 59	24 0	19 1	374 373	375 383	1 010	HT	Smudged
07/17/16	P2930991	9.1	11 5	23 59	24 0	18.9	373 007	373 226	0 219	HT	
07/23/16	P2930996	16.4	21.0	23 59	24 0	18 8	369 665	370 061	0 396		
07/29/16	P2931001	65.1	83.1	23 59	24 0	18 8	374 976	376 541	1 565		
08/04/16	P2931178	14 0	17.4	23 59	24 0	19 3	382 165	382 502	0 337	HT	
08/10/16	P2931183	17 6	21.8	23 59	24 0	19 4	374 766	375 190	0 424	HT	
08/16/16	P2931429	44 4	56 0	23 59	24 0	19 1	385 287	386 356	1 069		Smudged
08/22/16	P2931436	37 5	46.5	23 59	24 0	19 4	375 306	376 209	0 903		
08/28/16	P2931712	3.9	4.8	23 59	24 0	19 5	397 613	397 707	0 094		
09/03/16	P2931717	9.5	11.9	23 59	24 0	19 2	384 175	384 404	0 229	HT	
09/09/16	P2931722	149.6	187 4	23:59	24 0	19 2	369 238	372 833	3 595		Much darker
09/15/16	P2932014	40.5	49.8	24 00	24 0	19 6	376 331	377 307	0 976		
09/21/16	P2932021	3 5	4.4	23 59	24 0	19 5	383 888	383.974	0 086		
09/27/16	P2933158	25.1	30 7	23 59	24 0	19 7	377 292	377 897	0 605		Lighter
10/03/16	P2933164	16.6	20 2	23 59	24 0	19 8	373 655	374 056	0 401		
10/09/16	P2933514	6.6	8.1	24 00	24 0	19 7	375 880	376 040	0 160		
10/15/16	P2933524	6 4	8.0	23 59	24 0	19 3	379 486	379 641	0 155		
10/21/16	P2933827	46.7	56 7	23 59	24 0	19 8	383 659	384 783	1 124		Smudged, discoloration
10/27/16	P2933519	26.6	32.6	23 59	24.0	19 7	388 245	388 886	0 641	XT	
11/02/16	P2933831	15.3	18 4	23 59	24 0	20 0	385 662	386 031	0 369	HT	
11/08/16	P2934142	44.5	53.5	23 59	24 0	20 0	389 341	390 412	1 071		
11/14/16	P2934149	92.6	111.5	23 59	24 0	20.0	391 473	393 699	2 226		
11/20/16	P2934429	5.5	6.6	23.59	24 0	19.9	385 179	385 312	0 133		
11/26/16	P2934434	4.4	5 2	23 59	24 0	20.2	378 095	378 202	0.107		
12/02/16	P2934439	18.1	21.1	23:59	24 0	20 6	374 876	375 312	0 436		Lighter color
12/08/16	P2934778	25 6	29.9	23 59	24 0	20 6	374 649	375 266	0 617		Discoloration
12/14/16	P2934783	5.2	6 2	23:59	24.0	20 2	385 377	385 504	0 127		
12/20/16	P2935092	69.0	80.3	23:59	24 0	20 7	390 654	392 314	1 660		Smudges
12/26/16	P2935097	3.3	3.7	23 59	24.0	21 4	384 978	385.059	0.081	PI	
05/31/16	P2929636		Field Blank				376 063	376 101	0 038	XT,FBout	
06/06/16	P2930164		Field Blank				369 551	369 631	0.080	FBout	Specks
08/01/16	P2931186		Field Blank				375 142	375 145	0 003		
09/29/16	P2933163		Field Blank				368 124	368 130	0 006		

# Valid	Recovery	Average	St. Dev.	Max	Min
60	98%	25.8	32.1	187.4	1.0


963B Compliance Data-2016
963B Compliance Data
Linear (963B Compliance Data)
y = 0.1065x - 4506
R² = 0.1263
200
180
160
140
120
100
80
60
40
20
0
01/01/16
03/01/16
04/30/16
06/29/16
08/28/16
10/27/16
12/26/16

Collocated Monitor 964C

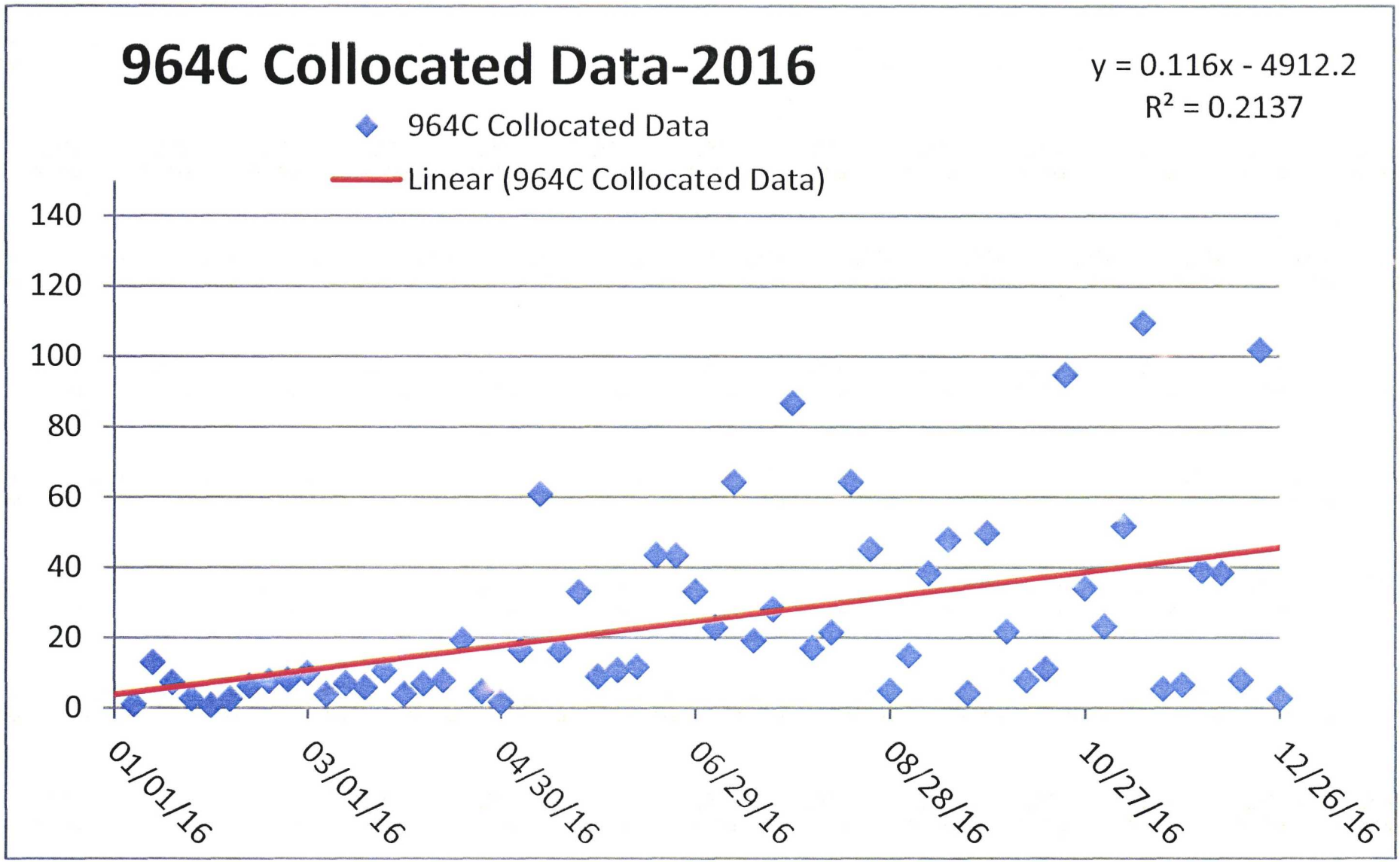
PM_{10} Sampler Summary

January 1, 2015 - December 31, 2015

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) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Tare	Mass (mg) Gross	Net	Flag	Comments
01/01/16	P2926663	Invalid - AG	Invalid - AG	85 20	85 5	73.7	379 427	379 713	0 286	SP,CI	
01/07/16	P2927857	0.9	1.1	23 59	24 0	20 5	360.809	360 832	0.023		
01/13/16	P2927860	11.4	13.2	23 59	24 0	20 7	365 494	365.769	0.275		
01/19/16	P2928051	6.4	7.4	23 59	24 0	20 5	379 360	379 514	0 154		
01/25/16	P2928054	2.4	2.8	23.59	24 0	20 8	385.361	385 421	0 060		
01/31/16	P2928157	0.7	0.9	23 59	24 0	20 2	397 168	397 187	0 019		
02/06/16	P2928160	2.4	2.7	23 59	24 0	20 9	390.999	391 057	0 058		
02/12/16	P2928163	5.4	6.4	23 59	24.0	20.3	391 124	391 254	0 130		
02/18/16	P2928306	6.5	7.8	23 59	24 0	20 1	364 726	364 884	0.158		
02/24/16	P2928408	7.0	8.2	24 00	24 0	20 5	378.380	378 549	0 169		
03/01/16	P2928411	8.4	10.1	23 59	24 0	20 0	377 447	377 651	0 204		
03/07/16	P2928457	3.4	4.0	23 59	24 0	20 2	372.044	372 126	0 082		
03/13/16	P2928783	6.0	7.1	23 59	24.0	20 2	381 807	381 952	0 145		
03/19/16	P2928788	4.9	6.0	23.59	24 0	19 9	404 779	404 899	0 120		
03/25/16	P2928793	9.0	10.8	23:59	24 0	19.9	366 853	367 070	0 217		
03/31/16	P2928999	3.4	4.1	23 59	24.0	20 2	351 987	352 070	0 083		
04/06/16	P2929004	5.9	7.1	24 00	24 0	19 9	375 367	375 510	0 143		
04/12/16	P2929225	6.6	8.0	23 59	24 0	20 0	368 712	368 873	0 161		
04/18/16	P2929230	16.4	19.6	23:59	24.0	20 1	384 429	384 825	0 396	HT	
04/24/16	P2929389	3.9	4.8	23 59	24 0	19 7	384 796	384 892	0 096		
04/30/16	P2929394	1.5	1.8	23 59	24 0	20 0	396 811	396 848	0 037	HT	
05/06/16	P2929399	13.6	16.6	23 59	24 0	19 7	380 084	380 412	0 328	HT	
05/12/16	P2929632	50.0	61.0	23 59	24 0	19 7	373 961	375 164	1 203		
05/18/16	P2929817	13.7	16.6	23 59	24 0	19 8	374 868	375 198	0 330	HT	
05/24/16	P2929628	27.3	33.2	23 59	24 0	19 7	373 635	374 292	0 657		
05/30/16	P2929825	7.4	9.1	23 59	24 0	19 5	396 588	396 767	0 179	HT	
06/05/16	P2930154	8.6	10.9	23 59	24 0	18 9	403 574	403 782	0 208		
06/11/1	P2930161	9.5	11.8	23 59	24 0	19 3	367 198	367 428	0.230	HT	
06/17/16	P2930167	35.1	43.7	23 59	24 0	19 3	381 373	382 218	0 845	HT	
06/23/16	P2930504	34.2	43.5	23 59	24 0	18 9	367 541	368 365	0 824		
06/29/16	P2930509	26.4	33.3	23 59	24 [illegible]	19 1	371 639	372 274	0 635		Filter darker, smudge
07/05/16	P2930769	18.2	23.0	23 59	24 0	19 1	375 913	376 352	0 439		
07/11/16	P2930774	51.2	64.4	23 59	24 0	19 1	372 381	373.613	1 232	HT	
07/17/16	P2930992	15.3	19.3	23 59	24 0	19 0	365 520	365 888	0 368	HT	
07/23/16	P2930997	22.2	28.2	23 59	24 0	18 9	365 580	366 114	0 534		
07/29/16	P2931002	68.2	86.9	23 59	24 0	18 9	379 098	380 738	1 640		
08/04/16	P2931179	13.8	17.2	23 59	24 0	19 4	382 704	383 038	0.334	HT	
08/10/16	P2931184	17.5	21.7	23 59	24 0	19 4	371 421	371 844	0.423	HT	
08/16/16	P2931430	51.2	64.4	23 59	24 0	19 1	384 246	385 478	1 232		Smudged
08/22/16	P2931437	36.6	45.3	23 59	24 0	19 5	386 713	387 595	0 882		
08/28/16	P2931713	4.2	5.1	23 59	24 0	19 6	387 939	388 040	0 101		
09/03/16	P2931718	12.0	15.0	23:59	24 0	19 3	369 854	370 144	0 290	HT	
09/09/16	P2931723	30.7	38.4	23.59	24 0	19 2	374 877	375 616	0 739		Much lighter
09/15/16	P2932015	39.3	48.1	24 00	24 0	19 6	373 451	374 396	0.945		
09/21/16	P2932022	3.6	4.4	23 59	24 0	19 6	379 026	379 113	0.087		
09/27/16	P2933159	40.5	49.9	23 59	24 0	19 5	377 907	378 882	0 975		Darker
10/03/16	P2933165	18.0	21.9	23 59	24.0	19 8	365 099	365 534	0 435		
10/09/16	P2933515	6.5	8.0	24 00	24 0	19 7	389 034	389 192	0.158		
10/15/16	P2933525	9.0	11.2	23 59	24 0	19 4	385 936	386.154	0 218		
10/21/16	P2933828	78.4	94.9	23 59	24 0	19 9	385 604	387 491	1 887		Smudged, discoloration
10/27/16	P2933520	28.0	34.1	23 59	24 0	19 7	379 666	380 340	0 674	XT	
11/02/16	P2933832	19.5	23.4	23 59	24 0	20 0	380 241	380 710	0 469	HT	
11/08/16	P2934143	43.2	51.8	23:59	24 0	20 0	386 573	387 612	1 039		
11/14/16	P2934148	91.3	109.6	23 59	24 0	20 0	372 675	374 869	2 194		
11/20/16	P2934430	4.7	5.6	23 59	24 0	20 0	384 949	385 063	0 114		
11/26/16	P2934435	5.6	6.7	23 59	24 0	20 3	376 199	376 335	0 136		
12/02/16	P2934440	33.6	39.1	23:59	24 0	20 7	377 573	378 383	0 810		Discoloration, darker
12/08/16	P2934780	33.0	38.4	23:59	24 0	20 7	373 670	374 465	0 795		Discoloration
12/14/16	P2934774	6.7	8.0	23:59	24 0	20 2	381 406	381 569	0 163		
12/20/16	P2935093	87.8	101.9	23 59	24 0	20 7	375 324	377 436	2 112		Smudged, loose particles
12/26/16	P2935098	2.5	2.8	23:59	24 0	21.5	381 329	381 390	0 061		
06/20/16	P2930513		Field Blank				372 662	372 674	0 012		
08/05/16	P2931188		Field Blank				379 797	379 800	0 003		

# Valid	Recovery	Average	St. Dev.	Max	Min
60	98%	25.4	26.4	109.6	0.9


964C Collocated Data-2016
y = 0.116x - 4912.2
R² = 0.2137
964C Collocated Data
Linear (964C Collocated Data)
140
120
100
80
60
40
20
0
01/01/16
03/01/16
04/30/16
06/29/16
08/28/16
10/27/16
12/26/16

Compliance Monitor 2366D

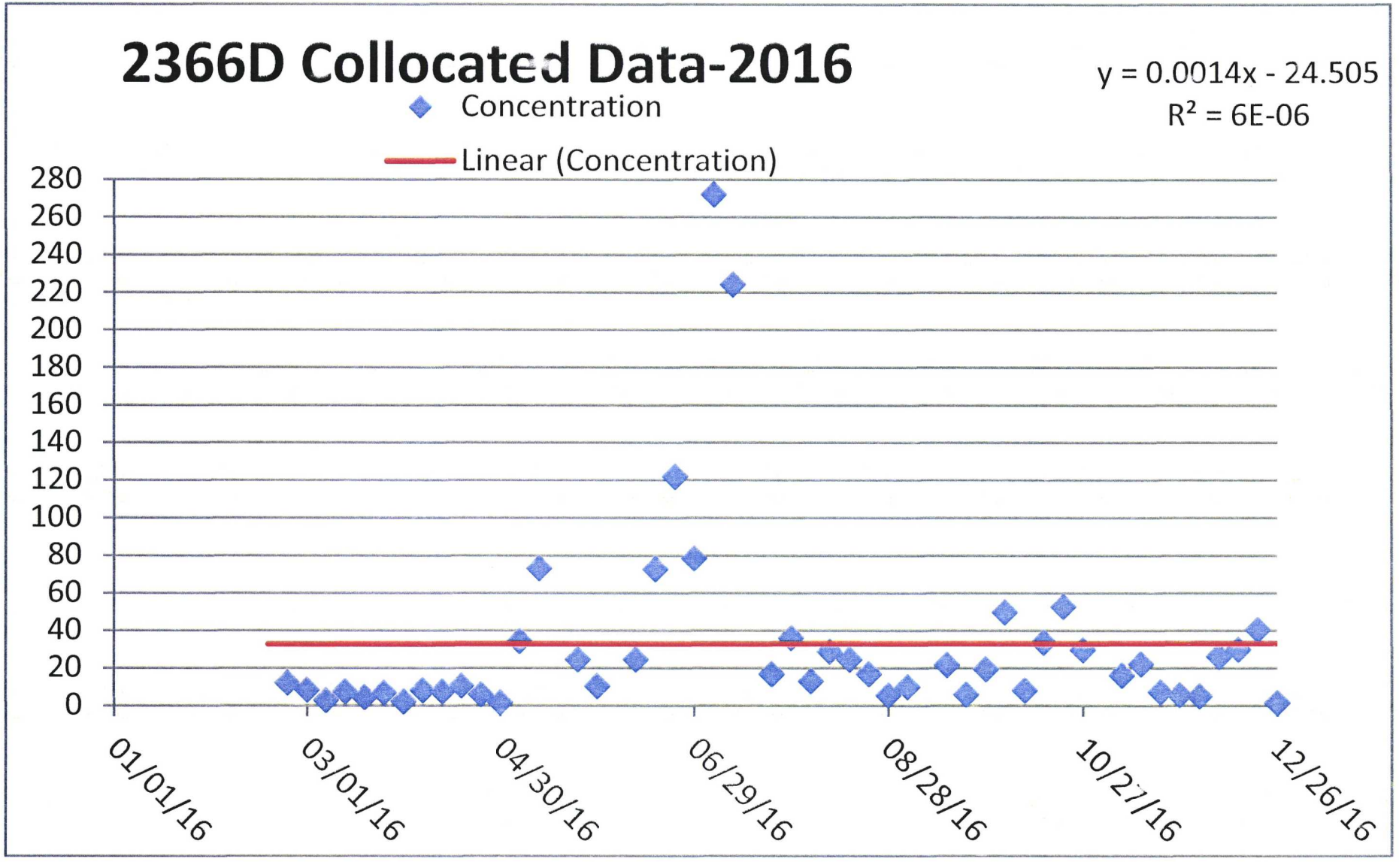
PM_{10} Sampler Summary

January 1, 2015 - December 31, 2015

Network: Alton Coal Development, LLC
Site: Coal Hollow
Sampler ID: Coal Hollow-D **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Tare	Mass (mg) Gross	Net	Flag	Comments
02/18/16	P2928309	Invalid - AN	Invalid - AN				350 514	350 653	0 139	SP	First run
02/24/16	P2928410	10.5	12.4	24 00	24 0	20 4	355 385	355.639	0 254		
03/01/16	P2928307	7.1	8.6	23 59	24 0	20 0	371 788	371 961	0 173		
03/07/16	P2928779	2.5	3.0	23 59	24 0	20 2	385 067	385 129	0 062		
03/13/16	P2928784	6.4	7.7	23 59	24 0	20 1	385 620	385 776	0 156		
03/19/16	P2928789	3.7	4.5	23:59	24.0	19 9	399 436	399 527	0 091		
03/25/16	P2928995	5.8	7.0	23.59	24.0	19 9	378 387	378.528	0.141		
03/31/16	P2929000	2.0	2.4	23.59	24 0	20 2	393.996	394 046	0 050		
04/06/16	P2929005	7.0	8.4	23 59	24.0	19 9	374 089	374 258	0 169		
04/12/16	P2929226	6.4	7.7	23 59	24 0	19 9	364 393	364 547	0 154		
04/18/16	P2929231	9.0	10.7	23 59	24 0	20 1	371 365	371 582	0 217	HT	
04/24/16	P2929390	5.1	6.2	23 59	24 0	19 7	387.186	387 310	0.124		
04/30/16	P2929395	1.5	1.9	23:59	24 0	20 0	392.002	392 040	0 038	HT	
05/06/16	P2929400	28.2	34.4	23 59	24 0	19 7	395 729	396 409	0.680	HT	
05/12/16	P2929633	59.9	73.3	23.59	24.0	19 6	369 264	370 706	1 442		
05/18/16	P2929818	Invalid - AG	Invalid - AG	53 03	53 1	43 2	371 898	373 464	1 566	SP,CI,HT	
05/24/16	P2929629	20.3	24.8	23 59	24.0	19 7	366 491	366 980	0 489		
05/30/16	P2929638	8.5	10.5	23 59	24 0	19.5	375 664	375.870	0 206	XT,HT	
06/05/16	P2930156	Invalid - AG	Invalid - AG	38 25	38 5	30 3	373 362	374 717	1 355	SP,CI	
06/11/16	P2930162	19.8	24.7	23 59	24 0	19 3	369 721	370 197	0 476	HT	
06/17/16	P2930168	58.4	72.8	23 59	24.0	19 3	373.801	375 207	1.406	HT	
06/23/16	P2930505	96.0	122.0	23 59	24 0	18 9	367 137	369 444	2 307		
06/29/16	P2930510	62.2	78.6	23 59	24 0	19 0	371 981	373 477	1 496		Filter darker
07/05/16	P2930770	215.8	272.3	23 59	24 0	19 0	375 502	380 690	5 188		
07/11/16	P2930775	178.1	224.4	23 59	24 0	19 1	392 297	396 577	4 280	HT	
07/17/16	P2930993	Invalid - AG	Invalid - AG	17 41	17 7	14 0	369 126	369 738	0 612	SP,FE,H	Specks
07 23/16	P2930998	13.2	16.9	23 59	24 0	18 8	399 241	399 560	0 319		
07 29/16	P2931003	28.3	36.2	23 59	24 0	18 8	373 205	373 887	0 682		
08/04/16	P2931180	10.6	13.2	23 59	24 0	19 3	381 059	381 314	0 255	HT	
08/10/16	P2931185	23.4	29.0	23 59	24 0	19 4	384 727	385 291	0 564	HT	
08/16/16	P2931431	19.7	24.8	23 59	24 0	19 1	369 896	370 370	0 474		
08/22/16	P2931438	13.8	17.1	23 59	24 0	19 4	391 941	392 275	0 334		
08/28/16	P2931714	4.6	5 6	23:59	24 0	19 5	381 784	381 895	0 111		
09/03/16	P2931719	8.2	10.2	23 59	24 0	19 3	392 595	392 793	0 198	HT	
09/09/16	P2931724	Invalid - AI	Invalid - AI				374 412	374 718	0 306	SP,MD	
09/15/16	P2932016	17 8	21.9	24 00	24 0	19 5	383 741	384 170	0 429		Lighter
09/21/16	P2932023	5.0	6.2	23 59	24 0	19 5	381 024	381 146	0 122		
09/27/16	P2933160	16.0	19.7	23 59	24 0	19 5	378 692	379 077	0 385		
10/03/16	P2933166	41 1	50.0	23 59	24 0	19 8	368 570	369 560	0 990		
10/09/16	P2933516	6.8	8.3	24 00	24 0	19 7	380 858	381 023	0 165		
10/15/16	P2933526	27.2	33.8	23 59	24 0	19 3	381 564	382.218	0 654		
10/21/16	P2933825	43.5	53.0	23 59	24 0	19 8	383 675	384 722	1 047		
10/27/16	P2933521	24.5	29.9	23 59	24 0	19 7	377 400	377 991	0 591	XT	
11/02/16	P2933833	Invalid - AG	Invalid - AG	57 34	57 7	47 9	380 530	380 882	0 352	SP,CI,HT	
11/08/16	P2934144	13.6	16.4	23 59	24 0	20 0	391 246	391 575	0 329		
11/14/16	P2934150	18.6	22.4	23 59	24 0	19 9	381 324	381 771	0 447		
11/20/16	P2934431	6.2	7.5	23 59	24.0	20 0	390 857	391 007	0 150		
11/26/16	P2934436	5.0	6.0	23 59	24 0	20 2	369 731	369.853	0 122		
12/02/16	P2934441	4.5	5.2	23 59	24 0	20 7	381 103	381 212	0 109		
12/08/16	P2934781	22.5	26.2	23 59	24 0	20 6	380 576	381 118	0.542		Darker color
12/14/16	P2934775	25.3	30.0	23 59	24 0	20 2	374 763	375 372	0.609	PI	
12/20/16	P2935094	34.8	40.6	23 59	24 0	20 6	385 229	386 066	0.837		
12/26/16	P2935100	1.4	1.6	23:59	24 0	21 5	379 340	379 375	0.035	PI,TD	
05/31/16	P2930155		Field Blank				373 813	373 829	0 016		
08/19/16	P2931441		Field Blank				381 244	381 253	0 009		
12/22/16	P2935099		Field Blank				384 479	384 513	0 034	FBout	Dark hair

# Valid	Recovery	Average	St. Dev.	Max	Min
47	89%	33.0	52.0	272.3	1.6


2366D Collocated Data-2016
Concentration
Linear (Concentration)
y = 0.0014x - 24.505
R² = 6E-06
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
01/01/16
03/01/16
04/30/16
06/29/16
08/28/16
10/27/16
12/26/16

Collocated Monitor 2398E

PM_{10} Sampler Summary

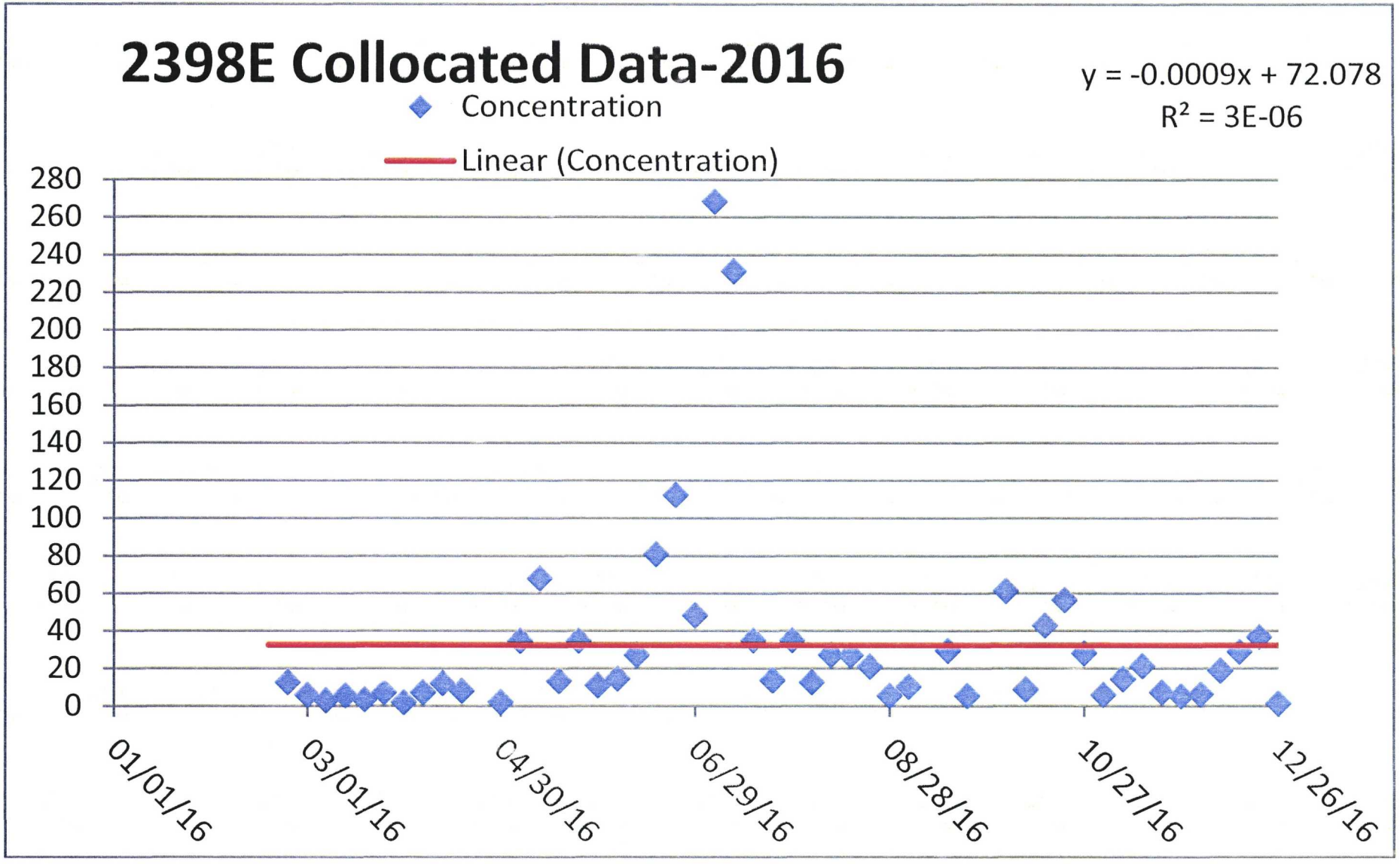
January 1, 2015 - December 31, 2015

Network: **Alton Coal Development, LLC**
Site: Coal Hollow
Sampler ID: Coal Hollow-E **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Mass (mg) Tare	Gross	Net	Flag	Comments
02/18/16	P2928308	**Invalid - AN**	**Invalid - AN**				379 821	379 955	0 134	SP	First run
02/24/16	P2928409	**10.7**	**12.7**	24 00	24 0	20.4	367 081	367 340	0 259		
03/01/16	P2928412	**5.2**	**6.2**	23·59	24 0	19 9	378 847	378.972	0.125		
03/07/16	P2928780	**2.7**	**3.3**	23·59	24 0	20.2	380 582	380.649	0.067		
03/13/16	P2928785	**5.0**	**6.0**	23 59	24 0	20 1	378 529	378.651	0.122		
03/19/16	P2928790	**3.0**	**3.6**	23 59	24 0	19 9	389 956	390.029	0.073		
03/25/16	P2928996	**6.2**	**7.5**	23 59	24 0	19.9	353 867	354 017	0 150		
03/31/16	P2929001	**1.8**	**2.1**	23 59	24.0	20 1	380 367	380 411	0 044		
04/06/16	P2929006	**6.2**	**7.5**	23 59	24.0	19.9	391 337	391 487	0 150		
04/12/16	P2929227	**10.1**	**12.3**	23 59	24 0	19.9	369 995	370 240	0 245		
04/18/16	P2929232	**6.9**	**8.3**	23 59	24 0	20 1	372 800	372 967	0 167	HT	
04/24/16	P2929391	**Invalid - AN**	**Invalid - AN**	23 59	24 0	19.7	391 155	391 160	0 005		Chamber opened
04/30/16	P2929396	**1.9**	**2.3**	23.59	24 0	20 0	385 133	385 180	0 047	HT	
05/06/16	P2929401	**28.6**	**34.9**	23 59	24 0	19 7	372 573	373 261	0 688	HT	
05/12/16	P2929634	**55.6**	**68.1**	23 59	24 0	19 6	373 288	374 626	1 338		
05/18/16	P2929819	**11.1**	**13.5**	23.59	24 0	19 7	370 975	371 242	0 267	HT	
05/24/16	P2929823	**28.5**	**34.9**	23 59	24.0	19.7	364 982	365 669	0 687		
05/30/16	P2929639	**9.1**	**11.3**	23 59	24 0	19.5	370 808	371 029	0 221	XT,HT	
06/05/16	P2930157	**11.5**	**14.7**	23 59	24 0	18 9	366 319	366 597	0 278		
06/11/16	P2930163	**22.0**	**27.4**	23 59	24 0	19 3	368 626	369 155	0 529	HT	
06/17/16	P2930169	**65.1**	**81.0**	23 59	24 0	19 3	376 528	378 093	1 565	HT	
06/23/16	P2930506	**88.7**	**112.6**	23 59	24 0	18 9	366 122	368 254	2 132		
06/29/16	P2930511	**38.4**	**48.4**	23 59	24 0	19 0	365 404	366 327	0 923		Filter lighter
07/05/16	P2930771	**212.9**	**268.4**	23 59	24 0	19 1	379 675	384 792	5 117		
07/11/16	P2930776	**183.8**	**231.5**	23 59	24 0	19 1	374 070	378 488	4 418	HT	
07/17/16	P2930994	**27.7**	**35.1**	24 00	24 0	19 0	374 806	375 473	0 667	HT	
07/23/16	P2930999	**10.9**	**14.0**	23 59	24 0	18 9	400 134	400 398	0 264		
07/29/16	P2931004	**27.5**	**35.2**	23 59	24 0	18 8	360 893	361 555	0 662		
08/04/16	P2931181	**10.2**	**12.7**	23.59	24 0	19 3	379 043	379 289	0 246	HT	
08/10/16	P2931187	**22.1**	**27 4**	23 59	24 0	19 4	384 621	385 153	0 532	HT	
08/16/16	P2931432	**21.5**	**27.1**	23 59	24 0	19 1	377 339	377 856	0 517		
08/22/16	P2931439	**17.2**	**21.2**	23 59	24 0	19 4	381 216	381 630	0 414		
08/28/16	P2931715	**4.5**	**5.6**	23 59	24 0	19 5	376 695	376 805	0 110		
09/03/16	P2931720	**8.5**	**10.6**	23 59	24 0	19 3	381 890	382 095	0 205	HT	
09/09/16	P2931725	**Invalid - AG**	**Invalid - AG**	87 05	87 2	69 9	369 441	372 002	2 561	SP,CI	
09/15/16	P2932019	**24.1**	**29.6**	24 00	24 0	19 6	373 112	373 692	0 580		Darker
09/21/16	P2932024	**4.7**	**5.8**	23 59	24 0	19 5	383 329	383 444	0 115		
09/27/16	P2933161	**Invalid - AI**	**Invalid - AI**				370 920	371 376	0 456	SP,MD	
10/03/16	P2933167	**50.6**	**61.5**	23 59	24 0	19 8	364 482	365 700	1 218		
10/09/16	P2933517	**7.3**	**9.0**	24 00	24 0	19 6	381 201	381 378	0 177		
10/15/16	P2933527	**34.6**	**43.1**	23 59	24 0	19 3	378 992	379 825	0 833		
10/21/16	P2933826	**46.6**	**56.7**	23 59	24.0	19 8	378 726	379 848	1 122		
10/27/16	P2933522	**23.3**	**28.4**	23 59	24 0	19 7	376 622	377 184	0 562	XT	
11/02/16	P2933834	**5.1**	**6.2**	23 59	24 0	20 0	382 533	382 657	0 124	HT	
11/08/16	P2934145	**12.1**	**14.5**	23 59	24 0	20 0	384 806	385 097	0 291		
11/14/16	P2934151	**17.7**	**21.4**	23 59	24 0	19 9	382 999	383 426	0 427		
11/20/16	P2934432	**6.2**	**7.5**	23 59	24 0	20 0	379 386	379 536	0 150		
11/26/16	P2934437	**4.5**	**5.4**	23 59	24 0	20 1	381 107	381 217	0 110		
12/02/16	P2934442	**5.5**	**6.4**	23 59	24 0	20 6	379 188	379 321	0 133		
12/08/16	P2934782	**16.1**	**18.9**	23 59	24 0	20 6	377 924	378 313	0 389		Lighter color
12/14/16	P2934776	**24.4**	**29.0**	23·59	24 0	20 2	381 341	381 928	0 587	PI	
12/20/16	P2935095	**31.7**	**37.0**	23 59	24 0	20 6	383 937	384 700	0 763		
12/26/16	P2935101	**1.3**	**1.5**	23 59	24 0	21 4	378 041	378 074	0 033		

06/24/16	P2930512	**Field Blank**	369.393	369 416	0 023	
09/12/16	P2932018	**Field Blank**	378 109	378 117	0 008	
12/05/16	P2934777	**Field Blank**	376.619	376 625	0.006	

# Valid	Recovery	Average	St. Dev.	Max	Min
49	92%	32.4	50.7	268.4	1.5


2398E Collocated Data-2016
Concentration
Linear (Concentration)
y = -0.0009x + 72.078
R² = 3E-06
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
01/01/16
03/01/16
04/30/16
06/29/16
08/28/16
10/27/16
12/26/16

APPENDIX C

Precision and Single-Point Flow Rate Checks

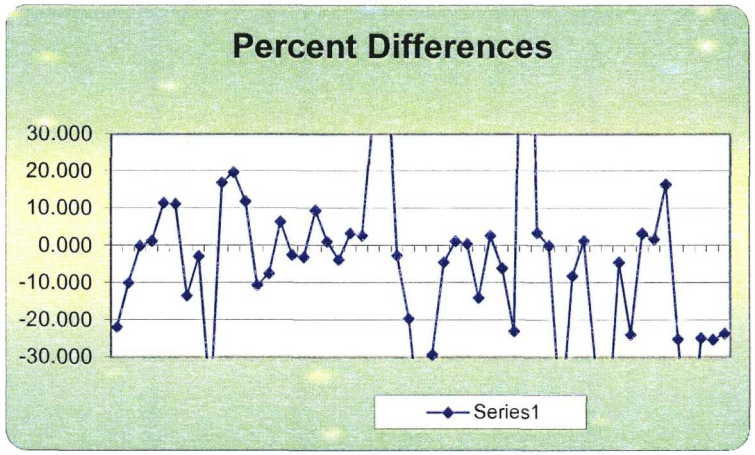
Alton Coal Development, LLC - Coal Hollow Mine

Precision Estimate (From Collocated Samples)

Monitors 963B & 964C		Pollutant type:					CV_{ub} (%)
Meas Val (Y)	**Audit Val (X)**	**d (Eqn 10)**	**25th Percentile**	d^2	$\|d\|$	$\|d\|^2$	
10.6	13.2	-21.849	-21.849	477.367	21.849	477.367	
6.7	7.4	-9.929	**75th Percentile**	98.587	9.929	98.587	
6.4	6.4	0.000	3.229	0.000	0.000	0.000	
7.9	7.8	1.274		1.623	1.274	1.623	
9.2	8.2	11.494		132.118	11.494	132.118	
11.3	10.1	11.215		125.775	11.215	125.775	
3.5	4	-13.333		177.778	13.333	177.778	
6.9	7.1	-2.857		8.163	2.857	8.163	
3.9	6	-42.424		1799.816	42.424	1799.816	
12.8	10.8	16.949		287.274	16.949	287.274	
5	4.1	19.780		391.257	19.780	391.257	
8	7.1	11.921		142.099	11.921	142.099	
7.2	8	-10.526		110.803	10.526	110.803	
18.2	19.6	-7.407		54.870	7.407	54.870	
17.7	16.6	6.414		41.139	6.414	41.139	
59.5	61	-2.490		6.198	2.490	6.198	
16.1	16.6	-3.058		9.352	3.058	9.352	
36.5	33.2	9.469		89.665	9.469	89.665	
9.2	9.1	1.093		1.194	1.093	1.194	
10.5	10.9	-3.738		13.975	3.738	13.975	
12.2	11.8	3.333		11.111	3.333	11.111	
44.9	43.7	2.709		7.338	2.709	7.338	
62.9	43.5	36.466		1329.781	36.466	1329.781	
61.5	33.3	59.494		3539.497	59.494	3539.497	
22.4	23	-2.643		6.986	2.643	6.986	
52.9	64.4	-19.608		384.468	19.608	384.468	
11.5	19.3	-50.649		2565.357	50.649	2565.357	
21	28.2	-29.268		856.633	29.268	856.633	
83.1	86.9	-4.471		19.986	4.471	19.986	
17.4	17.2	1.156		1.336	1.156	1.336	
21.8	21.7	0.460		0.211	0.460	0.211	

n	$\Sigma\|d\|$	$\Sigma\|d\|^2$
53	948.019	43788.978
n-1	Σd	Σd^2
52	-240.274	43788.978

CV (%) (Eqn 11)
23.27



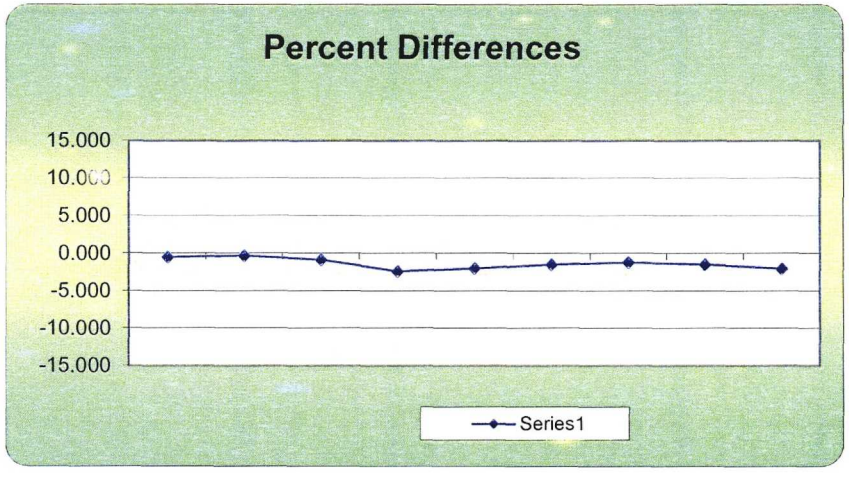
Alton Coal Development, LLC - Coal Hollow Mine

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^2	$\|d\|$	$\|d\|^2$	
16.7	16.78	-0.477	-1.995	0.227	0.477	0.227	
16.7	16.75	-0.299	**75th Percentile**	0.089	0.299	0.089	
16.7	16.84	-0.831	-0.831	0.691	0.831	0.691	
16.7	17.11	-2.396		5.742	2.396	5.742	
16.7	17.04	-1.995		3.981	1.995	3.981	
16.7	16.95	-1.475		2.175	1.475	2.175	
16.7	16.9	-1.183		1.401	1.183	1.401	
16.7	16.95	-1.475		2.175	1.475	2.175	
16.7	17.05	-2.053		4.214	2.053	4.214	

n	$\Sigma\|d\|$	**"AB" (Eqn 4)**
9	12.184	1.354
n-1	$\Sigma\|d\|^2$	**"AS" (Eqn 5)**
8	20.696	0.725

Bias (%) (Eqn 3)	Both Signs Positive
1.8	FALSE
Signed Bias (%)	Both Signs Negative
-1.8	TRUE



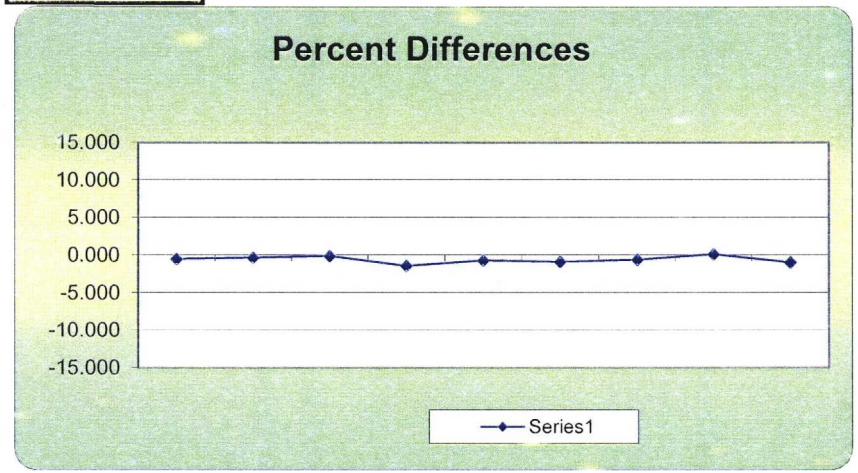
Alton Coal Development, LLC - Coal Hollow Mine

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^2	$\|d\|$	$\|d\|^2$	
16.7	16.78	-0.477	-0.890	0.227	0.477	0.227	
16.7	16.75	-0.299	75th Percentile	0.089	0.299	0.089	
16.7	16.72	-0.120	-0.299	0.014	0.120	0.014	
16.7	16.94	-1.417		2.007	1.417	2.007	
16.75	16.87	-0.711		0.506	0.711	0.506	
16.7	16.85	-0.890		0.792	0.890	0.792	
16.7	16.8	-0.595		0.354	0.595	0.354	
16.7	16.68	0.120		0.014	0.120	0.014	
16.7	16.87	-1.008		1.015	1.008	1.015	

n	$\Sigma\|d\|$	"AB" (Eqn 4)
9	5.636	0.626
n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
8	5.021	0.432

Bias (%) (Eqn 3)	Both Signs Positive
0.89	FALSE
Signed Bias (%)	Both Signs Negative
-0.89	TRUE



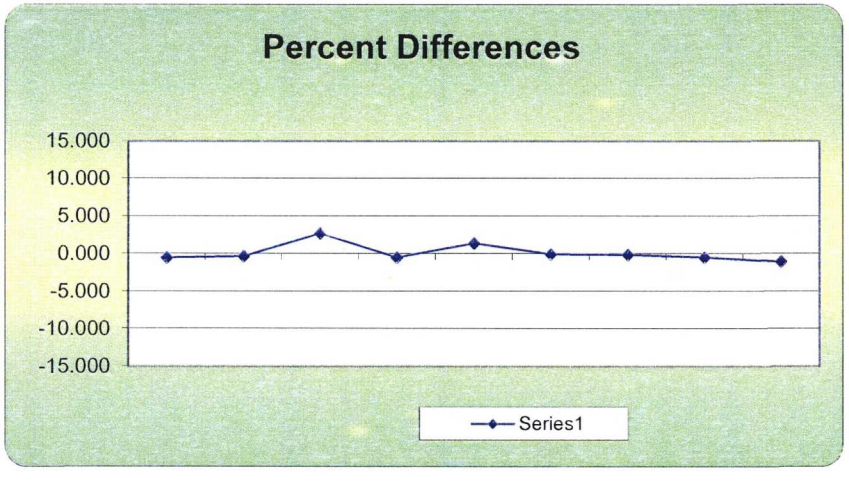
Alton Coal Development, LLC - Coal Hollow Mine

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^2	$\|d\|$	$\|d\|^2$	
16.7	16.78	-0.477	-0.477	0.227	0.477	0.227	
16.7	16.75	-0.299	75th Percentile	0.089	0.299	0.089	
16.7	16.26	2.706	-0.060	7.323	2.706	7.323	
16.7	16.78	-0.477		0.227	0.477	0.227	
16.7	16.47	1.396		1.950	1.396	1.950	
16.7	16.71	-0.060		0.004	0.060	0.004	
16.7	16.72	-0.120		0.014	0.120	0.014	
16.7	16.78	-0.477		0.227	0.477	0.227	
16.7	16.88	-1.066		1.137	1.066	1.137	

n	$\Sigma\|d\|$	"AB" (Eqn 4)
9	7.077	0.786
n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
8	11.199	0.839

Bias (%) (Eqn 3)	Both Signs Positive
1.31	FALSE
Signed Bias (%)	Both Signs Negative
-1.31	TRUE



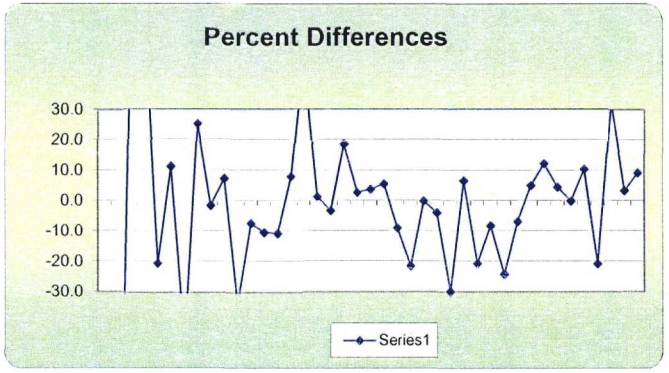
Alton Coal Development, LLC - Coal Hollow Mine - North Private Lease

Precision Estimate (From Collocated Samples)

Monitors 963D & 964E		Pollutant type:					CV_{ub} (%)
Meas Val (Y)	Audit Val (X)	d (Eqn 10)	25th Percentile	d^2	$\|d\|$	$\|d\|^2$	
17.6	25.5	-36.7	-10.663	1343.877	36.659	1343.877	
9.2	43.5	-130.2	75th Percentile	16944.431	130.171	16944.431	
32.5	17.2	61.6	8.014	3790.793	61.569	3790.793	
32.2	16.6	63.9		4087.611	63.934	4087.611	
14.1	17.3	-20.4		415.433	20.382	415.433	
8.4	7.5	11.3		128.159	11.321	128.159	
7.7	12.3	-46.0		2116.000	46.000	2116.000	
10.7	8.3	25.3		638.227	25.263	638.227	
34.4	34.9	-1.4		2.082	1.443	2.082	
73.3	68.1	7.4		54.096	7.355	54.096	
24.8	34.9	-33.8		1144.864	33.836	1144.864	
10.5	11.3	-7.3		53.868	7.339	53.868	
24.7	27.4	-10.4		107.427	10.365	107.427	
72.8	81	-10.7		113.704	10.663	113.704	
122	112.6	8.0		64.218	8.014	64.218	
78.6	48.4	47.6		2261.864	47.559	2261.864	
272.3	268.4	1.443		2.081	1.443	2.081	
224.4	231.5	-3.115		9.701	3.115	9.701	
16.9	14	18.770		352.321	18.770	352.321	
36.2	35.2	2.801		7.846	2.801	7.846	
13.2	12.7	3.861		14.907	3.861	14.907	
29	27.4	5.674		32.192	5.674	32.192	
24.8	27.1	-8.863		78.556	8.863	78.556	
17.1	21.2	-21.410		458.385	21.410	458.385	
5.6	5.6	0.000		0.000	0.000	0.000	
10.2	10.6	-3.846		14.793	3.846	14.793	
21.9	29.6	-29.903		894.184	29.903	894.184	
6.2	5.8	6.667		44.444	6.667	44.444	
50	61.5	-20.628		425.506	20.628	425.506	
8.3	9	-8.092		65.488	8.092	65.488	
33.8	43.1	-24.187		585.023	24.187	585.023	
53	56.7	-6.746		45.504	6.746	45.504	
29.9	28.4	5.146		26.479	5.146	26.479	
16.4	14.5	12.298		151.234	12.298	151.234	
22.4	21.4	4.566		20.850	4.566	20.850	
7.5	7.5	0.000		0.000	0.000	0.000	
6	5.4	10.526		110.803	10.526	110.803	
5.2	6.4	-20.690		428.062	20.690	428.062	
26.2	18.9	32.373		1047.979	32.373	1047.979	
30	29	3.390		11.491	3.390	11.491	
40.6	37	9.278		86.088	9.278	86.088	

n	$\Sigma\|d\|$	$\Sigma\|d\|^2$
41	786.145	38180.576
n-1	Σd	Σd^2
40	-102.530	38180.576

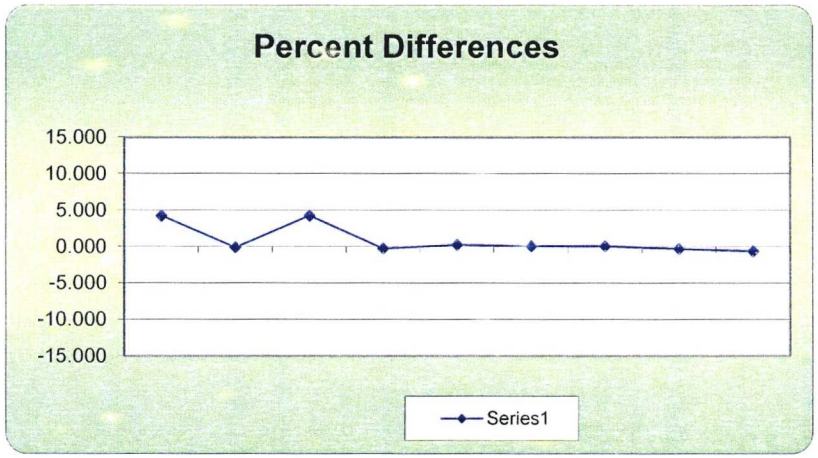
CV (%) (Eqn 11)
25.55



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^2	$\|d\|$	$\|d\|^2$			
16.72	16.03	4.304	-0.239	18.528	4.304	18.528			
16.7	16.71	-0.060	75th Percentile	0.004	0.060	0.004	n	$\Sigma\|d\|$	"AB" (Eqn 4)
16.72	16.03	4.304	0.300	18.528	4.304	18.528	9	10.280	1.142
16.72	16.76	-0.239		0.057	0.239	0.057	n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
16.7	16.65	0.300		0.090	0.300	0.090	8	37.731	1.802
16.7	16.69	0.060		0.004	0.060	0.004			
16.7	16.69	0.060		0.004	0.060	0.004	Bias (%) (Eqn 3)		Both Signs Positive
16.7	16.75	-0.299		0.089	0.299	0.089	2.26		FALSE
16.7	16.81	-0.654		0.428	0.654	0.428	Signed Bias (%)		Both Signs Negative
							+/-2.26		FALSE

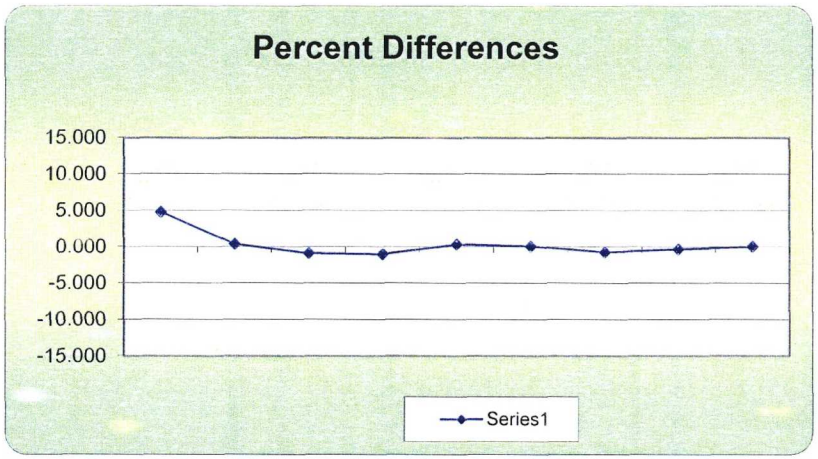


Alton Coal Development, LLC - Coal Hollow Mine

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^2	|d|	$\|d\|^2$			
16.7	15.93	4.834	-0.772	23.364	4.834	23.364			
16.7	16.63	0.421	75th Percentile	0.177	0.421	0.177	n	$\Sigma\|d\|$	"AB" (Eqn 4)
16.7	16.85	-0.890	0.361	0.792	0.890	0.792	9	8.703	0.967
16.7	16.87	-1.008		1.015	1.008	1.015	n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
16.7	16.64	0.361		0.130	0.361	0.130	8	26.208	1.491
16.7	16.69	0.060		0.004	0.060	0.004			
16.7	16.83	-0.772		0.597	0.772	0.597			
16.7	16.76	-0.358		0.128	0.358	0.128			
16.7	16.7	0.000		0.000	0.000	0.000			

Bias (%) (Eqn 3)	Both Signs Positive
1.89	FALSE
Signed Bias (%)	Both Signs Negative
+/-1.89	FALSE



APPENDIX D

Field Data Sheets

Background Monitor 962A

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	
01-04-16	1312	01-04-16	1310	18	5	M-M	01-07-16	JKSR	
01-08-16	1145	01-08-16	1142	5	8	M-M	01-12-16	JKSR	
01-14-16	1250	01-14-16	1246	8	11	M-M	01-19-16	JKSR	
01-20-16	1150	01-20-16	1146	11	12	M-M	01-25-16	KN	
01-28-16	1238	01-28-16	1234	12	4	M-M	01-31-16	JKSR	Fan screen
02-03-16	0929	02-03-16	0925	4	7	M-M	02-06-16	JKSR	
02-08-16	1032	02-08-16	1028	7	16	M-M	02-12-16	JKSR	
02-15-16	0957	02-15-16	0953	16	9	~~M-M~~	~~02-18-16~~	JKSR	Blank
02-15-16	0958	02-15-16	0954	16	10	M-M	02-18-16	JKSR	
02-19-16	1024	02-19-16	1019	10	4	M-M	02-24-16	JKSR	Reset clock
02-25-16	1355	02-25-16	1355	4	JBR11	M-M	03-01-16	JKSR	
03-03-16	0908	03-03-16	0908	JBR11	JBR1	M-M	03-07-16	JKSR	E code
03-10-16	1137	03-10-16	1137	JBR1	11	M-M	03-13-16	JKSR	
03-14-16	1558	03-14-16	1458	11	19	M-M	03-19-16	JKSR	
03-22-16	1521	03-22-16	1420	19	24	M-M	03-25-16	JKSR	
03-28-16	1625	03-28-16	1526	24	29	M-M	03-31-16	JKSR	
04-02-16	11:58	04-02-16	10:57	29	34	M-M	04-06-16	KN	
04-07-16	1522	04-07-16	1421	24	4	M-M	04-12-16	JKSR	
04-13-16	1432	04-13-16	1431	4	13	M-M	04-18-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
02-28-16	12:08	97	97	Pass	KN	clean vent, downtube etc
04-02-16	12:02	101	100	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
02-28-16	12:03	16.70	580	582	-03C	0.2	14.24	17.07	-2.17	KN
04-02-16	12:06	16.70	589	590	10.7°C	10.3	13.90	17.03	-2.19	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	
					13				
04-20-16	10:17	04-20-16	9:17	13	16	M-M	4/24/16	KN	
04-25-16	1132	04-25-16	1030	16	21	M-M	04-30-16	JKSR	
05-02-16	1051	05-02-16	0950	21	26	M-M	05-06-16	JKSR	
05-09-16	1623	05-09-16	1522	26	31	M-M	05-12-16	JKSR	T Low Battery Shutdown mouse chewed cable
05-13-16	08:22	05-13-16	0722	31	4	M-M	05-16-16	KN	Repaired 9/10 KN
05-20-16	0532	05-20-16	0431	4	9	M-M	05-24-16	KN	
05-25-16	1007	05-25-16	1006	9	13	M-M	05-30-16	JKSR	T Low Battery shutdown Repaired cable again
05-31-16	1039	05-31-16	0938	13	36	M-M	06-05-16	KN	
06-06-16	1439	06-06-16	1338	36	21	M-M	06-11-16	JKSR	
06-14-16	1336	06-14-16	1235	21	27	M-M	06-17-16	JKSR	
06-20-16	1041	06-20-16	0939	27	4	M-M	06-23-16	JKSR	F-code
06-24-16	1213	06-24-16	1112	4	9	M-M	06-29-16	JKSR	
07-01-16	1659	07-01-16	1558	9	13	M-M	07-05-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
04-29-16	9:40	99	99	Pass	KN	
05-31-16	10:42	98	98	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
04-29-16	9:45	16.70	584	585	18.6	18.6	17.34	16.84	-0.83	KN
05-31-16	10:48	16.70	565	586	19.5	19.7	13.45	17.11	-2.4	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	
07-01-16	1659	07-01-16	1558	9	13	M-M	07-05-16	JKSR	
07-07-16	1351	07-07-16	1250	13	36 Blank	1250	07-07-16	JKSR	Blank
07-07-16	1353	07-07-16	1252	36	18	M-M	07-11-16	JKSR	
07-12-16	1031	07-12-16	0930	18	4	M-M	07-17-16	KN	
07-19-16	0953	07-19-16	0852	4	22	M-M	07-23-16	JKSR	code P
07-25-16	1409	07-25-16	1307	21	27	M-M	07-29-16	JKSR	code FT
08-01-16	1557	08-01-16	1456	27	9	M-M	08-04-16	JKSR	code F
08-05-16	0907	08-05-16	0806	9	14	M-M	08-10-16	JKSR	
08-11-16	1516	08-11-16	1415	14	19	M-M	08-16-16	JKSR	
08-19-16	1122	08-19-16	1020	19	37	M-M	08-22-16	JKSR	
08-25-16	1022	08-25-16	0911	37	4	M-M	08-28-16	JKSR	
08-29-16	1524	08-29-16	1423	4	18	M-M	09-03-16	JKSR	
09-06-16	1759	09-06-16	1657	18	25	M-M	09-09-16	JKSR	code F
09-12-16	1544	09-12-16	1443	25	9	M-M	09-15-16	JKSR	code F
09-16-16	1447	09-16-16	1346	9	26	~~M-M~~	09-16-16	JKSR	Blank
09-16-16	1450	09-16-16	1349	26	15	M-M	09-21-16	JKSR	
09-23-16	14:12	09-23-16	1311	15	31	M-M	09-27-16	KN	
09-29-16	14 16	09-29-16	1315	31	36	M-M	10-03-16	JKSR	Still Running

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
07-12-16	10:39	98	98	Pass	KN	Cleaned Intake Manifold
08-05-16	11:15	98	97	Pass	KN	Cleaned Intake 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
07-12-16	1204	16.70	586	587.5	24.9	25.4	13.15	17.04	-1.995	KN
08-05-16	11:18	16.70	586	587	22.8	21.9	13.11	16.95	-1.5	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	
10-04-16	1458	10-04-16	1356	36	4	M-M	10-09-16	JKSR	
10-11-16	0933	10-11-16	0832	4	9	M-M	10-15-16	JKSR	
10-18-16	1719	10-18-16	1618	9	16	M-M	10-21-16	KN	
10-24-16	0909	10-24-16	0807	16	37	M-M	10-27	KN	
10-28-16	1133	10-28-16	1032	37	17	M-M	11-02-16	JKSR	
11-04-16	1013	11-04-16	0911	17	28	M-M	11-04-16	JKSR	Blank
11-04-16	1015	11-04-16	0913	28	22	M-M	11-08-16	JKSR	
11-09-16	1017	11-09-16	1015	22	31	M-M	11-14-16	KN	
11-16-16	1004	11-16-16	1003	31	4	M-M	11-20-16	KN	
11-23-16	1137	11-23-16	1135	4	9	M-M	11-26-16	JKSR	
11-29-16	1459	11-29-16	1457	9	15	M-M	12-02-16	JKSR	
12-5-16	1205	12-5-16	12:03	15	10	M-M	12-08-16	KN	
12-09-16	0837	12-09-16	0837	10	17	M-M	12-14-16	KN	
12-15-16	12:55	12-15-16	12:54	17	31	M-M	12-20-16	KN	
12-22-16	1316	12-22-16	1315	31	36	M-M	12-26-16	JKSR	
12-28-16	1002	12-28-16	1001	36	9	M-M	01-01-17	JKSR	Code F

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	10:58	98	99	Pass	KN	Cleaned Manifold
11/9/16		99	96	Pass	KN	
12/9/16	0908	99	96	Pass	KN	Cleaned Manifold, applied Vaseline grease

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
10/6/16	1108	16.70	585	586	10.2	11.0	13.68	16.90	-1.18	KN
11/9/16		16.70	591.0	591.5	14.2	14.0		16.95	-1.48	KN
12/9/16	0813	16.70	587	588	1.8	2.9	14.20	17.05	-2.05	KN

Compliance Monitor 963B

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	
01-04-16	1326	01-04-16	1325	19	6	M-M	01-07-16	JKSR	
01-08-16	1217	01-08-16	1216	6	9	M-M	01-13-16	JKSR	
01-14-16	1303	01-14-16	1301	9	12	M-M	01-19-16	JKSR	
01-20-16	1210	01-20-16	1208	12	13	M-M	01-25-16	KN	
01-28-16	1253	01-28-16	1251	13	5	M-M	01-31-16	JKSR	
02-03-16	0948	02-03-16	0950	5	13	M-M	02-06-16	JKSR	
02-08-16	1051	02-08-16	1048	13	17	M-M	02-12-16	JKSR	
02-15-16	1014	02-15-16	1011	17	11	M-M	02-18-16	JKSR	
02-19-16	1102	02-19-16	1058	11	5	M-M	02-24-16	JKSR	Reset clock
02-25-16	1424	02-25-16	1424	5	JBR12	M-M	03-01-16	JKSR	
03-03-16	0923	03-03-16	0923	JBR12	JBR 7	M-M	03-07-16	JKSR	
03-10-16	1150	03-10-16	1150	JBR 7	12	M-M	03-13-16	JKSR	
03-14-16	1611	03-14-16	1511	12	20	M-M	03-19-16	JKSR	
03-22-16	1548	03-22-16	1448	20	25	M-M	03-25-16	JKSR	
03-28-16	1634	03-28-16	1534	25	30	M-M	03-31-16	JKSR	
04-02-16	12:22	04-02-16	11:22	30	25	M-M	04-06-16	KN	
04-07-16	1534	04-07-16	1433	25	5	M-M	04-12-16	JKSR	
04-13-16	1444	04-13-16	1343	5	14	M-M	04-18-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
02/28/16	12:16	97	97	Pass	KN	Cleaned Venturi + distribution
04/02/16	12:23	115	112	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
02/28/16	12:20	16.70	586	588	0.5	1.2	14.00	16.69	0.06	KN
04/02/16	12:44	16.70	595	596	11.5°C	12.4°C	13.82	16.82	0.7	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	
				[redacted]	14				
04-20-16	10:47	04-20-16	9:46	14	17	M-M	04/24/16	KN	
04-25-16	1146	04-25-16	1045	17	22	M-M	04-30-16	JKSR	still Running
05-02-16	1108	05-02-16	1007	22	27	M-M	05-06-16	JKSR	
05-09-16	1639	05-09-16	1538	27	32	M-M	05-12-16	JKSR	
05-13-16	0846	05-13-16	0745	32	5	M-M	05-18-16	KN	
05-20-16	0549	05-20-16	0448	5	10	M-M	0524-16	KN	
05-25-16	1120	05-25-16	1019	10	15	M-M	05-30-16	JKSR	
05-31-16	1102	05-31-16	1001	15	37	1103	Field	Blank KN	
05-31-16	1107	05-31-16	1006	37	38	M-M	06/05/16	KN	
06-06-16	1456	06-06-16	1356	38	26		06-06-16	JKSR	Blank
06-06-16	1457	06-06-16	1357	~~38~~ 26	22	M-M	06-11-16	JKSR	
06-14-16	1519	06-14-16	1418	22	28	M-M	06-17-16	JKSR	
06-20-16	1055	06-20-16	0955	28	5	M-M	06-23-16	JKSR	
06-24-16	1226	06-24-16	1125	5	10	M-M	06-27-16	JKSR	
07-01-16	1714	07-01-16	1613	10	14	M-M	07-05-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
04-29-16	10:10	110	108	Pass	KN	
05-31-16	1111	[redacted]	110	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
04-29-16	10:15	16.70	591	592	20.7°C	20.8°C	13.22	16.72	-0.12	KN
5-31-16	1120	16.70	591	592	20.9	21.6	13.36	16.94	-1.47	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	
07-01-16	1714	07-01-16	1613	10	14	M-M	07-05-16	JKSR	
07-07-16	1412	07-07-16	1312	14	19	M-M	07-11-16	JKSR	
07-12-16	1229	07-12-16	1129	19	5	M-M	07-17-16	KN	
07-19-16	1006	07-19-16	0905	5	22	M-M	07-23-16	JKSR	
07-25-16	1508	07-25-16	1408	22	28	M-M	07-29-16	JKSR	
08-01-16	1626	08-01-16	1525	28	32 Blank	~~M-M~~	08-04-16	JKSR	Blank
08-01-16	1632	08-01-16	1531	32	10	M-M	08-04-16	JKSR	
08-05-16	0925	08-05-16	0824	10	15	M-M	08-10-16	JKSR	
08-11-16	1532	08-11-16	1431	15	20	M-M	08-16-16	JKSR	
08-19-16	1134	08-19-16	1433	20	38	M-M	08-22-16	JKSR	
08-25-16	1028	08-25-16	0928	38	5	M-M	08-28-16	JKSR	
08-29-16	1538	08-29-16	1437	5	21	M-M	09-03-16	JKSR	
09-06-16	1812	09-06-16	1711	21	27	M-M	09-09-16	JKSR	
09-12-16	1559	09-12-16	1458	27	10	M-M	09-15-16	JKSR	
09-16-16	1504	09-16-16	1403	10	16	M-M	09-21-16	JKSR	
09-23-16	1425	09-23-16	1325	16	32	M-M	09-27-16	KN	
09-29-16	1445	09-29-16	1345	32	42 Blank	1445	09-29-16	JKSR	Blank
09-29-16	1446	09-29-16	1346	Blank 42	JBR-1	M-M	10-03-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
07-12-16	12:35	95	92	Pass	KN	Cleaned Intake Manifold
08-05-16	11:40	98	96	Pass	KN	Cleaned Intake 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
7-12-16	1243	16.75	592	593.3	25.9°	26.7	17.07	16.87	-0.71	KN
08-05-16	1143	16.70	586	587	22.10	22.8	17.07	16.85	-0.89	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
10-04-16	1514	10-04-16	1414	JBR1	5	M-M	10-07-16	JKSR
10-11-16	1015	10-11-16	0914	5	14	M-M	10-15-16	JKSR
10-18-16	1703	10-18-16	1603	14	13	M-M	10-21-16	KN
10-24-16	1203	10-24-16	1129	13	38	M-M	10-28-16	KN
10-28-16	1151	10-28-16	1052	38	18	M-M	11-02-16	JKSR
11-04-16	1031	11-04-16	0930	18	23	M-M	11-08-16	JKSR
11-09-16	1055	11-09-16	1055	23	33	M-M	11-14-16	KN
11-16-16	1326	11-16-16	13:26	33	5	M-M	11-20-16	KN
11-23-16	1153	11-23-16	1152	5	11	M-M	11-26-16	JKSR
11-29-16	1512	11-29-16	1510	11	16	M-M	12-02-16	JKSR
12-5-16	1230	12-5-16	12:29	16	22	M-M	12-08-16	KN
12-9-16	0946	12-9-16	0946	22	28	M-M	12-14-16	KN
12-15-16	1314	12-15-16	1314	28	32	M-M	12-20-16	KN
12-21-16	1329	12-21-16	1328	32	37	M-M	12-26-16	JKSR
12-28-16	1021	12-28-16	1020	37	10	M-M	01-01-17	JKSR

23 Black Backfilling Robinson

CODE P

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10-6-16	1142	105	92	Pass	KN	Cleaned Manifold, adj. filter light
11-9-16		105	102	Pass	KN	
12-09-16	0941	100	96	Pass	KN	Cleaned Manifold, vaccum grease

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
10-6-16	1201	16.7	592	592.5	11.8	12.8	13.65	16.80	-0.60	KN
11-9-16		16.7	599	597.5	15.3	14.3		16.68	0.12	KN
12-9-16	0945	16.7	599	599.5	2.0	3.6	14.21	16.87	-1.01	KN

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	
01-04-16	1329	01-04-16	1326	20	7	M-M	01-07-16	JKSR	still Running
01-08-16	1219	01-08-16	1216	7	10	M-M	01-13-16	JKSR	
01-14-16	1306	01-14-16	1302	10	14	M-M	01-19-16	JKSR	
01-20-16	1216	01-20-16	1212	14	IML BGI 1	M-M	01-25-16	KN	
01-28-16	1255	01-28-16	1251	IML BGI 1	6	M-M	01-31-16	JKSR	
02-03-16	0951	02-03-16	~~0948~~ 0946	6	15	M-M	02-06-16	JKSR	
02-08-16	1052	02-08-16	1047	15	18	M-M	02-12-16	JKSR	
02-15-16	1015	02-15-16	1010	18	12	M-M	02-18-16	JKSR	
02-19-16	1103	02-19-16	1058	12	6	M-M	02-24-16	JKSR	Reset clock
02-25-16	1426	02-25-16	1426	6	13	M-M	03-01-16	JKSR	
03-03-16	0924	03-03-16	0924	13	JBR 8	M-M	03-07-16	JKSR	
03-10-16	1151	03-10-16	1151	JBR 8	16	M-M	03-13-16	JKSR	
03-14-16	1613	03-14-16	1512	16	21	M-M	03-19-16	JKSR	
03-22-16	1550	03-22-16	1449	21	26	M-M	03-25-16	JKSR	
03-28-16	1636	03-28-16	1535	26	31	M-M	03-31-16	JKSR	
04-02-16	12:39	04-02-16	11:38	31	36	M-M	04-02-16	KN	
04-07-16	1535	04-07-16	1433	36	6	M-M	04-12-16	JKSR	
04-13-16	1445	04-13-16	1344	6	15	M-M	04-18-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
02-28-16	12:23	96	96	Pass	KN	Clean venturi + downtube
04-02-16	12:49	102	102	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
02-28-16	12:27	16.70	586	588	0.5	1.0	13.72	16.78	-0.48	KN
04-02-16	12:52	16.70	597	596	12.4°C	13.5°C	13.69	16.75	~~[illegible]~~ 0.30	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
					15			
04-20-16	10149	04-20-16	9:48	15	18	MM	04-29-16	KN
04-25-16	1149	04-30-16	1047	18	23	M-M	04-30-16	JKSR
05-02-16	1109	05-02-16	1007	23	28	M-M	05-06-16	JKSR
05-09-16	1640	05-09-16	1538	28	33	M-M	05-12-16	JKSR
05-13-16	0850	05-13-16	0748	33	6	M-M	05-18-16	KN
05-20-16	0554	05-20-16	0452	6	11	M-M	05-24-16	KN
05-25-16	1121	05-25-16	1019	11	16	M-M	05-30-16	JKSR
05-31-16	1125	05-31-16	1023	16	17	M-M	06-05-16	KN
06-06-16	1459	06-06-16	1357	17	23	M-M	06-11-16	JKSR
06-14-16	1520	06-14-16	1417	23	29	MM	06-17-16	JKSR
06-20-16	1054	06-20-16	0951	29	Blank 34	1054	06-20-16	JKSR Blank
06-20-16	1058	06-20-16	0955	Blank 34	6	M-M	06-23-16	JKSR
06-24-16	1228	06-24-16	1125	6	11	M-M	06-29-16	JKSR
07-01-16	1715	07-01-16	1612	11	15	M-M	07-05-16	JKSR

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
04-29-16	10:21	93	91	Pass	KN	
05-31-16	1128	114	111	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
04-29-16	10:26	16.70	594	593	20.6°C	20.8°C	13.02	16.26	2.7	KN
05-31-16	11:32	16.78 593	593	592	20.9	21.1	13.23	16.78	-0.5	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	
07-01-16	1715	07-01-16	1612	11	15	M-M	07-05-16	JKSR	
07-07-16	1414	07-07-16	1311	15	20	M-M	07-11-16	JKSR	
07-12-16	1237	07-12	1135	20	6	M-M	07-17-16	KN	
07-19-16	1007	07-19-16	0904	6	23	M-M	07-23-16	JKSR	
07-25-16	1510	07-25-16	1407	23	29	M-M	07-29-16	JKSR	
08-01-16	1536	08-01-16	1531	29	11	M-M	08-04-16	JKSR	
08-05-16	0923	08-05-16	0820	11	34	0820	08-05-16	JKSR	Blank
08-05-16	0926	08-05-16	0823	34	16	M-M	08-10-16	JKSR	
08-11-16	1533	08-11-16	1429	16	26	M-M	08-16-16	JKSR	
08-19-16	1135	08-19-16	1031	26	39	M-M	08-22-16	JKSR	
08-25-16	1030	08-25-16	0926	39	6	M-M	08-28-16	JKSR	
08-29-16	1540	08-29-16	1437	6	22	M-M	09-03-16	JKSR	
09-06-16	1814	09-06-16	1709	22	28	M-M	09-09-16	JKSR	
09-12-16	1601	09-12-16	1457	28	11	M-M	09-15-16	JKSR	
09-16-16	1505	09-16-16	1402	11	17	M-M	09-21-16	JKSR	
09-23-16	1430	09-23-16	1327	17	JJ	M-M	09-27-16	KN	
09-29-16	1449	09-29-16	1345	33	JBR-7	M-M	10-03-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
07-12-16	13:01	113	112	Pass	KN	Cleaned Intake Manifold
08-05-16	11:52	112	111	Pass	KN	Cleaned Intake 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
7/12/16	13:02	16.70	594	593	27.8	27.3	12.76	16.47	1.40	KN
08-05-16	11:56	16.70	595	593	22.1	22.3	12.97	16.71	-0.06	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	
10-04-16	1515	10-04-16	1412	JBR 7	6	M-M	10-09-16	JKSR	
10-11-16	1017	10-11-16	0913	6	25	M-M	10-15-16	JKSR	
10-18-16	1657	10-18-16	1557	25	15	M-M	10-21-16	KN	
10-24-16	1236	10-24-16	1132	15	39	M-M	10-27-16	KN	
10-28-16	1153	10-28-16	1048	39	19	M-M	11-02-16	JKSR	
11-04-16	1032	11-04-16	0937	19	24	M-M	11-08-16	JKSR	Black Working on Robinson
11-09-16	1048	11-09-16	1043	24	10	1045	11-09-16	KN	Blank
11-09-16	10:43	11-09-16	10:43	10	32	M-M	11-14-16	KN	
11-16-16	1332	11-16-16	1329	32	6	M-M	11-20-16	KN	
11-23-16	1154	11-23-16	1149	6	12	M-M	11-26-16	JKSR	
11-29-16	1514	11-29-16	1508	6	25	M-M	12-02-16	JKSR	
12-05-16	12:30	12-05-16	1231	25	23	12:38	12-05-16	KN	Blank
12-05-16	12:33	12-05-16	1233	23	24	M-M	12-08-16	KN	
12-09-16	10:04	12-09-16	1004	20	18	M-M	12-14-16	KN	
12-15-16	1320	12-15-16	1314	18	33	M-M	12-20-16	KN	
12-22-16	1330	12-22-16	1325	33	38	M-M	12-26-16	JKSR	
12-28-16	1023	12-28-16	1017	38	11	M-M	01-01-17	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	12:02	95	92	Pass	KN	Cleaned Manifold
11/9/16		100	96	Pass	KN	
12/9/16	0957	105	103	Pass	KN	cleaned Manifold, vacuum grease

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
10/6/16	12:06	16.71	593	592.5	12.1	12.7	13.59	16.72	-0.12	KN
11/9/16		16.70	597	597.5	14.6	14.5		16.78	-0.48	KN
12/09/16	1001	16.70	596	595	2.5	3.3	19.29	16.88	-1.07	KN

Compliance Monitor 2366D

Background Monitor ~~2367D~~ 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
02-19-16	1127	02-19-16	1127	20	8	M-M	02-24-16	JKSR
02-25-16	1455	02-25-16	1455	8	14	M-M	03-01-16	JKSR
03-03-16	0936	03-03-16	0936	14	9	M-M	03-07-16	JKSR
03-10-16	1242	03-10-16	1241	9	17	M-M	03-13-16	JKSR
03-14-16	1623	03-14-16	1522	17	22	M-M	03-19-16	JKSR
03-22-16	1602	03-22-16	1501	22	27	M-M	03-25-16	JKSR
03-28-16	1646	03-28-16	1544	27	32	M-M	03-31-16	JKSR
04-02-16	1310	04-02-16	13:09	32	37	MM-MM	04-06-16	KN
04-07-16	1545	04-07-16	1443	37	7	M-M	04-12-16	JKSR
04-13-16	1459	04-13-16	1357	7	39	M-M	04-18-16	JKSR

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
2/16/2016	11:44	98	97	Pass	KN	Set up and prefomed checks
04/02/16	1315	96	95	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
2/18/2016	11:48	16.72	592	593	8	8.9	16.03	13.23	4.30	KN
04/02/16	1318	16.70	594	595	12.8	13.3	13.62*	16.71	~~KN~~ -0.06	KN

2366D

~~2367~~D

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	
					39				
04-20-16	11:18	04-20-16	10:16	39	19	M-M	04-24-16	KN	
04-25-16	1200	04-25-16	1058	19	24	M-M	04-30-16	JKSR	
05-02-16	1119	05-06-16	1017	24	29	M-M	05-06-16	JKSR	
05-09-16	1650	05-09-16	1548	29	34	M-M	05-12-16	JKSR	
05-13-16	0904	05-13-16	0801	34	7	M-M	05-18-16	KN	
05-20-16	0607	05-20-16	0504	7	12	M-M	05-24-16	KN	→ start stop same
05-25-16	1133	05-25-16	1030	12	41	M-M	05-30-16	JKSR	
05-31-16	1249	05-31-16	1146	41	18	1149	05-31-16	KN	→ Field Blank
05-31-16	1253	05-31-16	11:50	18	19	M-M	06-05-16	KN	
06-06-16	1530	06-06-16	1427	19	24	M-M	06-11-16	JKSR	still Running
06-14-16	1531	06-14-16	1428	24	30	M-M	06-17-16	JKSR	
06-20-16	1129	06-20-16	1026	30	7	M-M	06-23-16	JKSR	
06-24-16	1238	06-24-16	1135	7	12	M-M	06-29-16	JKSR	
07-01-16	1725	07-01-16	1622	12	16	M-M	07-05-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
04-29-16	10:54	98	97	Pass	KN	
05-31-16	1255	99	97	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
04-29-16	11:00	16.72	589	590	21.2	21.8	13.02	16.26	4.3	KN
05-31-16	1300	16.72	589	591	23.1	24.0	13.08	16.76	-0.24	KN

2366 D

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	
07-01-16	1725	07-01-16	1622	12	16	M-M	07-05-16	JKSR	
07-07-16	1427	07-07-16	1323	16	26	M-M	07-11-16	JKSR	
07-12-16	1339	07-12-16	1235	26	7	M-M	07-17-16	KN	
07-19-16	1021	07-19-16	0917	7	24	M-M	07-23-16	JKSR	CODE QT
07-25-16	1520	07-25-16	1416	24	30	M-M	07-29-16	JKSR	
08-01-16	1653	08-01-16	1548	30	12	M-M	08-04-16	JKSR	
08-05-16	0937	08-05-16	0833	12	17	M-M	08-10-16	JKSR	
08-11-16	1544	08-11-16	1440	17	35	M-M	08-16-16	JKSR	
08-19-16	1042	08-19-16	1042	35	42	1042	08-19-16	JKSR	Blank
08-19-16	1149	08-19-16	1044	42	40	M-M	08-23-16	JKSR	
08-25-16	1043	08-25-16	0938	40	7	M-M	08-29-16	JKSR	
08-29-16	1550	08-29-16	1445	7	23	M-M	09-03-16	JKSR	
09-06-16	1823	09-06-16	1718	23	29	M-M	09-09-16	JKSR	
09-12-16	1615	09-12-16	1510	29	12	M-M	09-15-16	JKSR	
09-16-16	1516	09-16-16	1411	12	19	M-M	09-21-16	JKSR	
09-22-16	1444	09-22-16	13:39	19	34	M-M	09-27-16	KN	
09-29-16	1504	09-29-16	1359	34	JBR-8	M-M	10-03-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
~~7/17/16~~	1341	97	96	Pass	KN	Cleaned Intake Manifold
08-05-16	1208	96	96	Pass	KN	Cleaned Intake 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
7/12/16	1346	16.70	591	592.5	26.4	27.2	12.91	16.65	0.30	KN
08-05-16	1212	16.70	592	592.5	23.1	23.6	12.95	16.69	0.06	KN

2366 D

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	
10-04-16	1528	10-04-16	1423	JBR 8	7	M-M	10-09-16	JKSR	
10-11-16	1033	10-11-16	0928	7	29	M-M	10-15-16	JKSR	
10-18-16	16:37	10-18-16	16:31	29	11	M-M	10-21-16	KN	
10-24-16	1355	10-24-16	1349	11	40	M-M	10-27-16	KN	
10-28-16	1205	10-28-16	1059	40	20	M-M	11-02-16	JKSR	
11-04-16	1044	11-04-16	0938	20	26	M-M	11-08-16	JKSR	
11-09-16	1131	11-09-16	1125	26	34	M-M	11-14-16	KN	
11-16-16	1348	11-16-16	1342	34	7	M-M	11-20-16	KN	
11-23-16	1205	11-23-16	1158	7	13	M-M	11-26-16	JKSR	
11-29-16	1526	11-29-16	1519	13	29	M-M	12-02-16	JKSR	
12-05-16	1256	12-05-16	1249	29	26	M-M	12-08-16	KN	
12-09-16	1059	12-09-16	1059	26	19	M-M	12-14-16	KN	
12-15-16	1481	12-15-16	1400	19	34	M-M	12-16-16	KN	Chamber Open
12-22-16	1342	12-22-16	1341	34	39 Blank	1341	12-21-16	JKSR	Blank
12-22-16	1345	12-22-16	1344	39 Blank	40	M-M	12-26-16	JKSR	
12-28-16	1037	12-28-16	1035	40	12	M-M	01-01-17	JKSR	CODES - P,F

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	1330	105	104	Pass	KN	cleaned Manifold
11/9/16		99	97	Pass	KN	
12/09/16	1106	94	92	Pass	KN	cleaned Manifold, vac. grease seals

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
10/6/16	1333	16.7	591	592	13.3	14.1	13.48	16.69	-0.06	KN
11/9/16		16.7	595	596.5	17.3	16.1		16.75	-0.30	KN
12/9/16	1110	16.70	594	594	5.0 °C	6.4	14.02	16.81	-0.65	KN

Collocated Monitor 2398E

Background Monitor 2398 E

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	
02-19-16	1130	02-19-16	~~1130~~		7	M-M	02-24-16	JKSR	Display not working
02-25-16	1457	02-25-16	~~1457~~	7	15	M-M	03-01-16	JKSR	Display off (not working)
03-03-16	0937	03-03-16	—	15	10	M-M	03-07-16	JKSR	Display not working
03-10-16	1243	03-10-16		10	18	M-M	03-13-16	JKSR	No Display
03-14-16	1624	03-14-16	1523	18	23	M-M	03-19-16	JKSR	
03-22-16	1604	03-22-16	1502	23	28	M-M	03-25-16	JKSR	
03-28-16	1648	03-28-16	1646	28	33	M-M	03-31-16	JKSR	
04-02-16	1331	04-02-16	1330	33	38	M-M	04-02-16	KN	
04-07-16	1546	04-07-16	1444	38	8	M-M	04-12-16	JKSR	
04-13-16	1502	04-13-16	1400	8	40	M-M	04-18-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
2/16/2016	11:38	98	97	Pass	KN	Set up and prefomed checks
04/02/16	1332	98	96	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
2/16/2016	11:40	16.7	592	593	7.6	8.4	15.93	13.16	4.8	KN
04/02/16	1339	16.7	594	595	14.7	14.2	13.51	16.63	~~KN~~ 0.4	KN

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	
					40				
04-20-16	11:13	04-20-16	16:11	40	20	M-M	04/24/16	KN	
04-25-16	1202	04-25-16	1100	20	25	M-M	04-30-16	JKSR	Filter chamber open UC filter
05-02-16	1121	05-02-16	1019	25	30	M-M	05-06-16	JKSR	
05-09-16	1652	05-09-16	1548	30	35	M-M	05-12-16	JKSR	
05-13-16	0910	05-13-16	08:07	35	8	M-M	05-18-16	KN	
05-20-16	0616	05-20-16	0513	8	14	M-M	05-24-16	KN	
05-25-16	1134	05-25-16	1030	14	42	M-M	05-30-16	JKSR	
05-31-16	1305	05-31-16	1204	42	20	M-M	06-05-16	KN	
06-06-16	1532	06-06-16	1429	20	25	M-M	06-11-16	JKSR	
06-14-16	1532	06-14-16	1428	25	31	M-M	06-17-16	JKSR	
06-20-16	1130	06-20-16	1026	31	8	M-M	06-23-16	JKSR	
06-24-16	1241	06-24-16	1135	8	33 Blank ~~M-M~~		06-24-16	JKSR	Blank
06-24-16	1240	06-24-16	1136	33	32	M-M	06-29-16	JKSR	
07-01-16	1727	07-01-16	1623	32	17	M-M	07-05-16	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
04-29-16	11:06	99	97	Pass	KN	
05-31/16	1306	96	94	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
04-29-16	11:11	16.7	591	591	21.3	21.8	13.19	16.85	-0.89	KN
05-31-16	1309	16.7	591	591	22.5	22.9	13.22	16.87	-1.01	KN

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
07-01-16	1727	07-01-16	1623	32	17	M-M	07-05-16	JKSR
07-07-16	1428	07-07-16	1323	17	35	M-M	07-11-16	JKSR
07-12-16	1352	07-12-16	1247	35	8	M-M	07-17-16	KN
07-19-16	1022	07-19-16	0918	8	25	M-M	07-23-16	JKSR
07-25-16	~~1407~~	07-25-16	~~1307~~	25	31	M-M	07-29-16	JKSR
↑	1522		1417	↑				
08-01-16	1654	08-01-16	1549	31	13	M-M	08-04-16	JKSR
08-05-16	0939	08-05-16	0833	13	33	M-M	08-10-16	JKSR
08-11-16	1547	08-11-16	1442	33	36	M-M	08-16-16	JKSR
08-19-16	1152	08-19-16	1044	36	41	M-M	08-22-16	JKSR
08-25-16	1044	08-25-16	0938	41	8	M-M	08-28-16	JKSR
08-29-16	1551	08-29-16	1446	8	24	M-M	09-03-16	JKSR
09-06-16	1824	09-06-16	1719	24	30	M-M	09-09-16	JKSR
09-12-16	1613	09-12-16	1507	30	13	1507	09-12-16	JKSR Blank
09-12-16	1618	09-12-16	1512	13	14	M-M	09-15-16	JKSR Still Running
09-16-16	1517	09-16-16	1411	14	20	M-M	09-21-16	JKSR
09-23-16	1449	09-16-16	1343	20	35	M-M	09-27-16	KN
09-29-16	1506	09-29-16	1400	35	JBR-11	M-M	10-03-16	JKSR

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
07-12-16	1356	110	109	Pass	KN	Cleaned Manifold (intake)
08-05-16	1215					

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
07-12-16	1358	16.70	592	592.5	27.4	27.5	12.85	16.64	0.361	KN
08-05-16	1220	16.70	592	592.5	23.7	23.9	12.95	16.69	0.06	KN

2398 E

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
10-04-16	1530	10-04-16	1424	JBR 11	8	M-M	10-09-16	JKSR
10-11-16	1035	10-11-16	0929	8	30	M-M	10-15-16	JKSR
10-18-16	1641	10-18-16	1535	30	12	M-M	10-21-16	KN
10-24-16	1359	10-24-16	1352	12	41	M-M	10-27-16	KN
10-28-16	1206	10-28-16	1059	41	21	M-M	11-02-16	JKSR
11-04-16	1046	11-04-16	0939	21	27	M-M	11-08-16	JKSR
11-09-16	1148	11-09-16	1141	27	35	M-M	11-14-16	KN
11-16-16	1354	11-16-16	1346	35	8	M-M	11-20-16	KN
11-23-16	1207	11-23-16	1159	8	14	M-M	11-26-16	JKSR
11-29-16	1528	11-29-16	1519	14	30	M-M	12-02-16	JKSR
12-05-16	1303	12-05-16	1255	30	27	M-M	12-08-16	KN
~~12-09-16~~	~~[illegible]~~	~~12-09-16~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
12-09-16	1117	1209	1116	27	21	11:18	12/9/16	KN
12-09-16	1126	12-09-16	1126	21	20	M-M	12/14/16	KN
12-15-16	1446	12-15-16	1444	20	35	M-M	12/20/16	KN
12-22-16	1346	12-22-16	1344	35	41	M-M	12-21-16	JKSR
12-28-16	1038	12-28-16	1036	41	13	M-M	01-01-17	JKSR

Blank

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	1337	95	95	Pass	KN	Cleaned Manifold
11/9/16		98		Fail	KN	adjusted filter carrier height
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~cleaned manifold, applied vacuum grease~~
12/09/16	1120	108	106	Pass	KN	cleaned Manifold, grease

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
10/6/16	1340	16.70	591	592	14.2	14.9	13.57	16.83	-0.77	KN
11/9/16		16.70	597	596.5	15.9	16.0		16.76	-0.36	KN
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~		~~[illegible]~~
12/09/16	1135	16.70	594	594	4.8	5.4	13.96	16.70	0	KN

APPENDIX E

Independent PM_{10} Sampler Performance Audit Report

AUDIT REPORT
FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
FIRST QUARTER 2016

Prepared for

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

Prepared by

Air Resource SPECIALISTS

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

Site Audited: February 22, 2016

TABLE OF CONTENTS

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

LIST OF TABLES

Table		Page
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	2-2
2-4	Meteorological Equipment	2-3

1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on February 22, 2016. 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 4140396	12S 373119 4140856	12S 370928 4141570	12S 372073 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	PM_{10}	BGI PQ200S	Yes
	PM_{10} (collocated)	BGI PQ200S	Yes
Background #1	PM_{10}	BGI PQ200S	Yes
Background #2	PM_{10}	BGI PQ200S	Yes
	PM_{10} (collocated)	BGI PQ200S	Yes

Table 1-3

Summary of Meteorological Audit Results

Parameter	**Sensor**	**Within Accuracy Goal**
Wind Speed	Met-One 34B	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:

Christian A. Kirk
Quality Assurance Officer / Lead Auditor
Air Resource Specialists, Inc.
1901 Sharp Point Drive, Suite E
Fort Collins, Colorado 80525
Telephone: 970-484-7941
Fax: 970-484-3423
E-mail: 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_{10})

The filter-based FRM PM_{10} 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 ±10% are considered out of tolerance. Differences between the designated design flow and the audit flow greater than ±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 ±2°C and a barometric pressure difference greater than ±10mm 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_{10}	Leak Check	Manufacturer specs
	Audit flow to actual sampler flow	≤ ± 4%
	Design criteria flow to audit flow	≤ ± 5%
	Audit temperature to sampler temperature	≤ ± 2 °C
	Audit temperature to sampler filter temperature	≤ ± 2 °C
	Audit barometric pressure to sampler pressure	≤ ±10mm Hg

Table 2-2

Particulate Samplers
Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
FRM Flow	BGI	DeltaCal	141170	4/17/2016

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.

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

Table 2-4

Meteorological Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
Wind Speed	R.M. Young	18811	CA03912	1/18/2017

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 failures during this visit. Although the two newest FRM samplers passed the performance audit, the flows on both instruments were found around 5% low.

APPENDIX A

AUDIT DATA FORMS

Air Resource Specialists, Inc.

WIND SPEED SENSOR AUDIT

ABBR.	n/a	CLIENT	Alton	FIELD SPECIALIST	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Wind Speed Reference	RM Young	18811	CA 03912	1/18/2017
Wind Speed Torque Gauge				

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

		Wind Speed			
Motor Speed (rpm)	Target 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	5.550	-0.06		PASS
300	8.270	8.270	0.00		PASS
600	16.260				
1800	48.220				

Starting Threshold	TORQUE
Torque <= 0.2 g-cm	

Heater sleeve functional?	☐ Yes ☐ No ☑ N/A

NOTES:

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/17/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	962A

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
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	17.16	16.70	-2.7%	2.8%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
5.0	5.2	0.2	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
7.1	6.5	-0.6	PASS

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

PRESSURE SENSOR (mmHg)			
Reference	Instrument	Difference	
583.5	582.0	-1.5	PASS

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

NOTES:

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/17/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	963 B

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 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	16.86	16.70	-0.9%	1.0%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
7.4	7.3	-0.1	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
6.3	6.6	0.3	PASS

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

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

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

NOTES:

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/17/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	964 C

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK	
Vacuum Loss Rate	Pass/Fail
0 cm	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.97	16.72	-1.5%	1.6%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
5.9	5.2	-0.7	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
6.1	6.9	0.8	PASS

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

PRESSURE SENSOR (mmHg)			
Reference	Instrument	Difference	
589.0	589.0	0.0	PASS

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

NOTES:

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/17/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2366 D

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 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	15.89	16.72	5.2%	-4.9%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	6.5	7.2	0.7	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	6.8	6.8	0.0	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	588.5	589.0	0.5	PASS

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

NOTES:

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/17/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2398 E

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
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	15.90	16.70	5.0%	-4.8%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	6.0	6.7	0.7	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	7.1	7.7	0.6	PASS

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

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	588.0	589.0	1.0	PASS

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

NOTES:

Air Resource Specialists, Inc.

SITE INFORMATION

ABBR.	n/a	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
NETWORK TYPE		Alton Coal- Coal Hollow					

		Deg	Min	Sec		Decimal
LATITUDE	North	34	24	22.1	--CALCULATE->	34.4061
LONGITUDE	West	112	27	15.5		112.4543

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:

Air Resource Specialists, Inc.

CALIBRATION AND VERIFICATION STANDARDS

ABBR.	n/a	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	2/22/2016
SITE NAME		Alton Coal					
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)	RM Young	18811	CA 03912	1/18/2017
Wind Speed Reference (low rpm)	RM Young	18811	CA 03912	1/18/2017
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	Mesa Labs	deltaCal	141170	4/17/2016
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/17/2016
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 AND TESTING

MODEL: **18811** (Comprised of Models 18820A Control Unit & 18831A Motor Assembly)
SERIAL NUMBER: CA3912

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 Motor Rpm	27106D Output Frequency Hz (1)	Calculated Rpm (1)	Indicated Rpm (2)
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
☒ Clockwise and Counterclockwise rotation verified			

(1) Measured frequency output of RM Young Model 27106D standard anemometer attached to motor shaft 27106D produces 10 pulses per revolution of the anemometer shaft
(2) Indicated on the Control Unit LCD display

* Indicates out of tolerance

☐ New Unit	☒ Service / Repair Unit ☒ No Calibration Adjustments Required	☐ As Found ☐ As Left

Traceable frequency meter used in calibration Model: 34405A SN: 53020093

Date of inspection 1/18/2016
Inspection Interval One Year

Tested By RP

Mesa Labs 10 Park Place Butler, NJ 07405
NIST Traceable Calibration Facility, ISO 9001:2008 Registered

MesaLabs

CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: **141170** DATE: 17-Apr-2015

Calibration Operator: P.Pitty

Critical Venturi Flow Meter: Max Uncertainity = 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: Uncertainity=0.071% Room Temperature: 23.8 °C
Brand: Accu-Safe Serial Number: 254881
NIST Traceability No. 516837
deltaCal:
Ambient Temperature (set): 23.8 °C
Aux (filter) Temperature (set): 23.8 °C

Barometric Pressure ans Absolute Pressure
Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%
S/N DH0850001
NIST Traceable (Princo Primary Standard Model 453 S/N W12537) Certificate No. P-7485
deltaCal:
Barometric pressure (set): 750 mm of Hg

Results of Venturi Calibration
Flow Rate (Q) vs. Pressure Drop (ΔP). Where: Q=Lpm, ΔP= Cm of H2O

Q= 3.80837 ΔP ^ 0.52497 Overall Uncertainty: 0.35%

Date Placed In Service 5/4/15
(To be filled in by operator upon receipt)

Recommended Recalibration Date 5/4/16
(12 months from date placed in service)

Revised: October 2014
Cal102-01T2 Rev A

To Check a deltaCal 17-Apr-15 P.Pitty

1.5-19.5 VER 3.41P

BP= 750 mm of Hg

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

Serial No. **141170**

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 5	140.7	23.8	4.58	4.61	**0.68**
	292.8	23.8	9.77	9.72	**-0.50**
	394.0	23.8	13.22	13.2	**-0.16**
	491.8	23.8	16.56	16.57	**0.09**
	573.3	23.8	19.34	19.43	**0.47**
				Average %	**0.12**

AUDIT REPORT
FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
SECOND QUARTER 2016

Prepared for

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

Prepared by

Air Resource SPECIALISTS

1901 Sharp Point Dr.
Suite E
Fort Collins, CO 80525
970-484-7941

Site Audited: April 20, 2016

TABLE OF CONTENTS

Section		Page
1.0	**INTRODUCTION**	**1-1**
2.0	**AUDIT METHODS AND EQUIPMENT**	**2-1**
	2.1 Particulate Samplers	2-1
3.0	**AUDIT RESULTS**	**3-1**
APPENDIX A	Audit Data Forms	A-1
APPENDIX B	Audit Standards Certifications	B-1

LIST OF TABLES

Table		Page
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 April 20, 2016. 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 4140396	12S 373119 4140856	12S 370928 4141570	12S 372073 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. 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_{10}	BGI PQ200S	Yes
	PM_{10} (collocated)	BGI PQ200S	Yes
Background #1	PM_{10}	BGI PQ200S	Yes
Primary NPL	PM_{10}	BGI PQ200	Yes
	PM_{10} (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:

Christian A. Kirk
Quality Assurance Officer / Lead Auditor
Air Resource Specialists, Inc.
1901 Sharp Point Drive, Suite E
Fort Collins, Colorado 80525
Telephone: 970-484-7941
Fax: 970-484-3423
E-mail: 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_{10})

The filter-based FRM PM_{10} 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 ±10% are considered out of tolerance. Differences between the designated design flow and the audit flow greater than ±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 ±2°C and a barometric pressure difference greater than ±10mm 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_{10}	Leak Check	Manufacturer specs
	Audit flow to actual sampler flow	≤ ± 10%
	Design criteria flow to audit flow	≤ ± 10%
	Audit temperature to sampler temperature	≤ ± 2 °C
	Audit temperature to sampler filter temperature	≤ ± 2 °C
	Audit barometric pressure to sampler pressure	≤ ±10 mm Hg

Table 2-2

Particulate Samplers
Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
FRM Flow	BGI	DeltaCal	1237	1/26/2017

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 issues or other findings to discuss.

APPENDIX A

AUDIT DATA FORMS

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton	AUDITOR	C.Kirk	DATE	4/20/2016
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltacal	1237	1/26/2017
PM Temperature Standard #1	BGI	deltacal	1237	1/26/2017
PM Barometric Pressure Standard #1	BGI	deltacal	1237	1/26/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N962A

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-1 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK	
Vacuum Loss Rate	Pass/Fail
4 cm H2O	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	17.14	16.70	-2.6%	2.6%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
15.3	14.9	-0.4	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
15.1	14.7	-0.4	PASS

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

PRESSURE SENSOR (mmHg)			
Reference	Instrument	Difference	
585.5	585.0	-0.5	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton	AUDITOR	C.Kirk	DATE	4/20/2016
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltacal	1237	1/26/2017
PM Temperature Standard #1	BGI	deltacal	1237	1/26/2017
PM Barometric Pressure Standard #1	BGI	deltacal	1237	1/26/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N963B

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK		
	Vacuum Loss Rate	Pass/Fail
	3 cm H2O	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.88	16.70	-1.1%	1.1%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	16.2	16.1	-0.1	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	16.3	15.8	-0.5	PASS

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

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	591.0	591.0	0.0	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton	AUDITOR	C.Kirk	DATE	4/20/2016
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltacal	1237	1/26/2017
PM Temperature Standard #1	BGI	deltacal	1237	1/26/2017
PM Barometric Pressure Standard #1	BGI	deltacal	1237	1/26/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N964C

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-2 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK	
Vacuum Loss Rate	Pass/Fail
2 cm H2O	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.71	16.70	-0.1%	0.1%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	16.7	16.8	0.1	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	16.1	16.5	0.4	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	591.0	593.0	2.0	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton	AUDITOR	C.Kirk	DATE	4/20/2016
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltacal	1237	1/26/2017
PM Temperature Standard #1	BGI	deltacal	1237	1/26/2017
PM Barometric Pressure Standard #1	BGI	deltacal	1237	1/26/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2366D

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-2 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK	
Vacuum Loss Rate	Pass/Fail
2 cm H2O	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.82	16.70	-0.7%	0.7%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	17.0	17.1	0.1	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	18.2	18.4	0.2	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	590.5	590.0	-0.5	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton	AUDITOR	C.Kirk	DATE	4/20/2016
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltacal	1237	1/26/2017
PM Temperature Standard #1	BGI	deltacal	1237	1/26/2017
PM Barometric Pressure Standard #1	BGI	deltacal	1237	1/26/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2398E

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-2 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK	
Vacuum Loss Rate	Pass/Fail
4 cm H2O	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	
18.0	17.8	-0.2	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
18.0	18.1	0.1	PASS

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

PRESSURE SENSOR (mmHg)			
Reference	Instrument	Difference	
590.5	591.0	0.5	PASS

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

NOTES:

Air Resource SPECIALISTS

SITE INFORMATION

ABBR.	N/A	CLIENT	Alton	AUDITOR	C.Kirk	DATE	4/20/2016
SITE NAME		Coal Hollow					
NETWORK TYPE		Alton Coal- Coal Hollow					

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

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:

Air Resource SPECIALISTS

CALIBRATION AND VERIFICATION STANDARDS

ABBR.	N/A	CLIENT	Alton	AUDITOR	C.Kirk	DATE	4/20/2016
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	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	1/26/2017
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	BGI	deltacal	1237	1/26/2017
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	BGI	deltacal	1237	1/26/2017
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

Mesa Labs 10 Park Place Butler, NJ 07405
NIST Traceable Calibration Facility, ISO 9001:2008 Registered

MesaLabs

CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: **1237** DATE: 15-Jan-2016

Calibration Operator: P.Pitty

Critical Venturi Flow Meter: Max Uncertainity = 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: Uncertainity=0.071% Room Temperature: 24.8 °C
Brand: Accu-Safe Serial Number: 254881
NIST Traceability No. 516837
deltaCal:
Ambient Temperature (set): 24.8 °C
Aux (filter) Temperature (set): 24.8 °C

Barometric Pressure ans Absolute Pressure
Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%
S/N DH0850001
NIST Traceable (Princo Primary Standard Model 453 S/N W12537) Certificate No. P-7485
deltaCal:
Barometric pressure (set): 746 mm of Hg

Results of Venturi Calibration
Flow Rate (Q) vs. Pressure Drop (ΔP). Where: Q=Lpm, ΔP= Cm of H2O

Q= 3.88294 ΔP ^ 0.52106 Overall Uncertainty: 0.35%
Q= 3.78777 ΔP ^ 0.54863 Overall Uncertainty: 0.35%

Date Placed In Service 1/26/16
(To be filled in by operator upon receipt)
Recommended Recalibration Date 1/26/17
(12 months from date placed in service)

Revised: September 2015
Cal102-01T2 Rev D

To Check a deltaCal 15-Jan-16 P.Pitty

1.5-19.5 VER 4.00P

BP= 746 mm of Hg

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

Serial No. 1237

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 2	145.17	24.75	1.658	1.651	-0.42
	188.07	24.75	2.162	2.155	-0.34
	318.63	24.75	3.697	3.710	0.34
	402.50	24.75	4.684	4.700	0.35
	473.53	24.75	5.519	5.550	0.57
#1	150.00	24.90	6.008	6.000	-0.13
	259.53	24.90	10.507	10.463	-0.42
	337.29	24.90	13.702	13.671	-0.22
	398.26	24.90	16.207	16.180	-0.16
	476.34	24.90	19.414	19.454	0.21
				Average %	-0.02

To Check a deltaCal 15-Jan-16 Pre-Recert

1.5-19.5 VER 3.41P

BP= 746 mm of Hg

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

Serial No. 1237

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 5	151.5	24.7	4.99	5.01	0.42
	258.5	24.7	8.67	8.60	-0.80
	343.1	24.7	11.58	11.49	-0.77
	455.5	24.7	15.45	15.14	-1.98
	566.3	24.7	19.26	18.94	-1.64
				Average %	-0.95

AUDIT REPORT
FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
THIRD QUARTER 2016

Prepared for

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

Prepared by

Air Resource SPECIALISTS

1901 Sharp Point Dr.
Suite E
Fort Collins, CO 80525
970-484-7941

Site Audited: September 14th, 2016

TABLE OF CONTENTS

Section		Page
1.0	**INTRODUCTION**	**1-1**
2.0	**AUDIT METHODS AND EQUIPMENT**	**2-1**
	2.1 Particulate Samplers	2-1
3.0	**AUDIT RESULTS**	**3-1**
APPENDIX A	Audit Data Forms	A-1
APPENDIX B	Audit Standards Certifications	B-1

LIST OF TABLES

Table		Page
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 September 14th, 2016. 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 4140396	12S 373119 4140856	12S 370928 4141570	12S 372073 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. 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_{10}	BGI PQ200S	Yes
	PM_{10} (collocated)	BGI PQ200S	Yes
Background #1	PM_{10}	BGI PQ200S	Yes
Primary NPL	PM_{10}	BGI PQ200	Yes
	PM_{10} (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:

Christian A. Kirk
Quality Assurance Officer / Lead Auditor
Air Resource Specialists, Inc.
1901 Sharp Point Drive, Suite E
Fort Collins, Colorado 80525
Telephone: 970-484-7941
Fax: 970-484-3423
E-mail: 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_{10})

The filter-based FRM PM_{10} 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 ±10% are considered out of tolerance. Differences between the designated design flow and the audit flow greater than ±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 ±2°C and a barometric pressure difference greater than ±10mm 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_{10}	Leak Check	Manufacturer specs
	Audit flow to actual sampler flow	≤ ± 10%
	Design criteria flow to audit flow	≤ ± 10%
	Audit temperature to sampler temperature	≤ ± 2 °C
	Audit temperature to sampler filter temperature	≤ ± 2 °C
	Audit barometric pressure to sampler pressure	≤ ±10 mm Hg

Table 2-2

Particulate Samplers
Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
FRM Flow	BGI	DeltaCal	141170	4/5/2017

3.0 AUDIT RESULTS

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

Performance Audit Results

The flow on the background sampler was found fluctuating, but was within specifications. The pump was noisier than usual; there were no other findings to report.

APPENDIX A

AUDIT DATA FORMS

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	ALTON	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	9/14/2016
SITE NAME		Alton Coal - Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/5/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	962A

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
1 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	
	14.8	13.3	-1.5	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	14.5	14.4	-0.1	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: Pump flow is fluctuating from 16.7 to 16.4

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	ALTON	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	9/14/2016
SITE NAME		Alton Coal - Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/5/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	963B

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
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	16.85	16.70	-0.9%	0.9%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	14.8	13.3	-1.5	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	14.1	13.3	-0.8	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	593.5	593.0	-0.5	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	ALTON	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	9/14/2016
SITE NAME		Alton Coal - Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/5/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	964C

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
4 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	16.71	16.70	-0.1%	0.1%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	14.8	13.6	-1.2	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	13.8	13.8	0.0	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:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	ALTON	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	9/14/2016
SITE NAME		Alton Coal - Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/5/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2366D

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
5 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK		
	Vacuum Loss Rate	Pass/Fail
	0 cm	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.80	16.70	-0.6%	0.6%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	13.8	12.1	-1.7	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	12.1	11.7	-0.4	PASS

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

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	592.5	592.0	-0.5	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	ALTON	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	9/14/2016
SITE NAME		Alton Coal - Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/5/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2398E

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
5 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	16.75	16.70	-0.3%	0.3%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	14.0	12.7	-1.3	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	12.8	12.4	-0.4	PASS

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

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	592.5	592.0	-0.5	PASS

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

NOTES:

Air Resource SPECIALISTS

SITE INFORMATION

ABBR.	ALTON	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	9/14/2016
SITE NAME		Alton Coal - Coal Hollow					
NETWORK TYPE		Alton Coal- Coal Hollow					

		Deg	Min	Sec		Decimal
LATITUDE	North	37	24	22	--CALCULATE->	37.4061
LONGITUDE	West	112	27	15.5		112.4543

Decimal		Deg	Min	Sec
	--CALCULATE->			

	Meters		Feet
ELEVATION		--CALCULATE->	

Feet		Meters
6980	--CALCULATE->	2128

Please verify site standards used by the site operator

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

NOTES:

Air Resource SPECIALISTS

CALIBRATION AND VERIFICATION STANDARDS

ABBR.	ALTON	CLIENT	Alton	AUDITOR	M. Farinacci	DATE	9/14/2016
SITE NAME		Alton Coal - Coal Hollow					
Network type		Alton Coal- Coal Hollov					

	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	Mesa Labs	deltaCal	141170	4/5/2017
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	141170	4/5/2017
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

Mesa Labs 10 Park Place Butler, NJ 07405
NIST Traceable Calibration Facility, ISO 9001:2008 Registered

MesaLabs

CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: **141170** DATE: 5-Apr-2016

Calibration Operator: P.Pitty

Critical Venturi Flow Meter: Max Uncertainity = 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: Uncertainity=0.071% Room Temperature: 25.4 °C
Brand: Teletemp Serial Number: 300907
Std Cal Date 13-May-15 Std Cal Due Date 12-May-16
deltaCal:
Ambient Temperature (set): 25.4 °C
Aux (filter) Temperature (set): 25.4 °C

Barometric Pressure ans Absolute Pressure
Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%
S/N DH0850001
NIST Traceable (Princo Primary Standard Model 453 S/N W12537) Certificate No. P-7485
deltaCal:
Barometric pressure (set): 742 mm of Hg

Results of Venturi Calibration
Flow Rate (Q) vs. Pressure Drop (ΔP). Where: Q=Lpm, ΔP= Cm of H2O

Q= 3.87619 ΔP ^ 0.52037 Overall Uncertainty: 0.35%
Q= 3.77376 ΔP ^ 0.54379 Overall Uncertainty: 0.35%

Date Placed In Service 4/19/16
(To be filled in by operator upon receipt)
Recommended Recalibration Date 4/19/17
(12 months from date placed in service)

Revised: September 2015
Cal102-01T2 Rev E

To Check a deltaCal 5-Apr-16 P.Pitty

1.5-19.5 VER 4.00P

BP= 742 mm of Hg

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

Serial No. 141170

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 2	134.42	25.40	1.543	1.548	**0.31**
	214.88	25.40	2.496	2.509	**0.50**
	292.82	25.40	3.420	3.417	**-0.08**
	421.43	25.40	4.943	4.935	**-0.17**
	474.12	25.40	5.568	5.581	**0.24**
#1	148.83	26.00	6.014	5.985	**-0.48**
	256.85	26.00	10.492	10.463	**-0.27**
	339.94	26.00	13.936	13.923	**-0.10**
	408.90	26.00	16.795	16.777	**-0.11**
	472.25	26.00	19.421	19.461	**0.20**
				Average %	**0.01**

To Check a deltaCal 5-Apr-16 Pre-Recert

1.5-19.5 VER 3.41P

BP= 741.5 mm of Hg

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

Serial No. 141170

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 5	76.4	24.7	2.42	2.47	**2.10**
	260.2	24.7	8.78	8.70	**-0.92**
	362.4	24.7	12.32	12.2	**-0.95**
	472.4	24.7	16.12	15.98	**-0.90**
	563.8	24.7	19.29	19.16	**-0.67**
				Average %	**-0.27**

AUDIT REPORT
FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
FOURTH QUARTER 2016

Prepared for

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

Prepared by

Air Resource SPECIALISTS

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

Site Audited: November 9, 2016

TABLE OF CONTENTS

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

LIST OF TABLES

Table		Page
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 9, 2016. 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 4140396	12S 373119 4140856	12S 370928 4141570	12S 372073 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_{10}	BGI PQ200S	Yes
	PM_{10} (collocated)	BGI PQ200S	Yes
Background #1	PM_{10}	BGI PQ200S	Yes
Primary NPL	PM_{10}	BGI PQ200	Yes
	PM_{10} (collocated)	BGI PQ200	Yes*

*Failed leak check. See Section 3.0.

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	No

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:

Christian A. Kirk
Quality Assurance Officer / Lead Auditor
Air Resource Specialists, Inc.
1901 Sharp Point Drive, Suite E
Fort Collins, Colorado 80525
Telephone: 970-484-7941
Fax: 970-484-3423
E-mail: 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_{10})

The filter-based FRM PM_{10} 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 ±10% are considered out of tolerance. Differences between the designated design flow and the audit flow greater than ±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 ±2°C and a barometric pressure difference greater than ±10mm 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_{10}	Leak Check	Manufacturer specs
	Audit flow to actual sampler flow	≤ ± 4%
	Design criteria flow to audit flow	≤ ± 5%
	Audit temperature to sampler temperature	≤ ± 2 °C
	Audit temperature to sampler filter temperature	≤ ± 2 °C
	Audit barometric pressure to sampler pressure	≤ ±10mm Hg

Table 2-2

Particulate Samplers
Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
FRM Flow	BGI	DeltaCal	1237	1/15/2017

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	$\leq \pm 5°$
	Linearity	$\leq \pm 5°$
	Starting threshold with torque gauge	Manufacturer specs
Ambient Temperature (non-immersible sensor)	Accuracy via collocation in ambient conditions	$\leq \pm 0.5°$
Ambient Temperature (immersible sensor)	Accuracy via collocation in three water baths	$\leq \pm 0.5°$
Precipitation	Accuracy via known volume of water	$\leq \pm 10\%$

Table 2-4

Meteorological Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
Wind Speed (high rpm)	R.M. Young	18802	CA03359	4/7/2017
Wind Direction Orientation	Brunton	Transit	5103212072	N/A
Temperature (immersible)	Eutechnics	4400	307635	3/28/2017
Precipitation	Novalynx	260-2595	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 leak check on the collocated sampler at the Primary NPL site failed. After adjustment by the operator, it passed. This leak did not appear to impact flow and, consequently, should not impact data.
- Although the collocated sampler at the Primary CHM site passed all performance audit requirements, the water collection jar on the PM_{10} inlet was found broken. This could significantly impact the particle size collection and the apparent concentration measured.
- The precipitation gauge was found responding outside of audit requirements. It is recommended that the gauge be challenged again and adjusted, if required.
- The clock for Campbell Scientific CR510 data logger at the meteorological station was set to Mountain Daylight Time. The clock should always be set to Mountain Standard Time.

APPENDIX A

AUDIT DATA FORMS

Air Resource SPECIALISTS

TEMPERATURE / DELTA-TEMPERATURE SYSTEM AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Temperature Reference	Eutechnics	4400	307635	3/28/2017

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	

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

AS FOUND	2m Temperature											
Bath Temp (°C)	DAS	Difference										
0.03	0.16	0.13	PASS									
15.20	15.46	0.26	PASS									
30.15	30.33	0.18	PASS									
MAX ABS Difference		0.26	PASS									

MAX ABS Difference						

Aspirator fan functional 2m?	☐ Yes	☐ No	☑ N/A
	☐ Yes	☐ No	☐ N/A
	☐ Yes	☐ No	☐ N/A
	☐ Yes	☐ No	☐ 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	FIELD SPECIALIST	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Wind Speed Reference	RM Young	18802	CA03359	4/7/2017
Wind Speed Torque Gauge				

Manufacturer and Model	Met One - 034B
Sensor Serial #	E2281
Cups Serial #	N/A

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

Select UNITS	m/s

		Wind Speed			
Motor Speed (rpm)	Target 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	8.270	0.00		PASS
600	16.260	16.340	0.08		PASS
1800	48.220				

Starting Threshold	TORQUE
Torque <= 0.2 g-cm	

Heater sleeve functional?	☐ Yes ☐ No ☑ N/A

NOTES:

Air Resource SPECIALISTS

WIND DIRECTION AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Direction Alignment Reference	Brunton	Transit	5103212072	
Direction Linearity Reference				
Direction Torque Gauge				

Manufacturer & Model	Met One - 034B
Sensor Serial #	E2281
Vane Serial #	N/A

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
ost building/barn to	338	338.0	0.0
most building/barn t	158	157.0	-1.0
er of right rock outcr	73	73.0	0.0
r of right rock outcro	253	253.0	0.0
Total Alignment MAX ABS Diff		1.0	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? ☐ Yes ☐ No ☑ N/A

NOTES:

Air Resource SPECIALISTS

PRECIPITATION SENSOR AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Precipitation Reference	Novalynx	260-2595	N/A	

Manufacturer	Hydrological Services
Model	TB4
Serial Number	05-94

AUDIT CRITERIA (<=)	
Difference from Input Volume (%)	0%

	Reference Chart			Input Volume (mL)		946
	Manufacturer	Model	Diameter (in.)	mm/tip	mL/tip	DAS target
	Met One	385	12	0.254	18.53	12.96
	RM Young	52202	6.2825	0.100	2.00	47.30
	Climatronics	100097-1-G0-H0	8	0.254	8.24	29.17
	Climatronics	100508	9.66	0.100	4.73	20.01
X	Hydrological Serv.	TB4	8	0.254	8.24	29.17

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	
946	29.17	22.61	-22.5%	FAIL

Heater functional?	☐ Yes	☐ No	☑ N/A

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N963B

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-4 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK	
Vacuum Loss Rate	Pass/Fail
3 cm H2O	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.68	16.70	0.1%	-0.1%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
14.7	15.3	0.6	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
15.0	15.3	0.3	PASS

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

PRESSURE SENSOR (mmHg)			
Reference	Instrument	Difference	
597.5	599.0	1.5	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N964C

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK		
	Vacuum Loss Rate	Pass/Fail
	4 cm H2O	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	
	14.5	14.6	0.1	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	597.5	597.0	-0.5	PASS

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

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	14.3	14.4	0.1	PASS

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

NOTES: broken jar on PM10 inlet

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	962A

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK		
	Vacuum Loss Rate	Pass/Fail
	3 cm H2O	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	
	14.0	14.2	0.2	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	12.8	12.2	-0.6	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:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2366D

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-6 min

SETTINGS	
Total Flow	16.70

Automated LEAK CHECK	
Vacuum Loss Rate	Pass/Fail
2 cm H2O	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.75	16.70	-0.3%	0.3%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
15.6	15.5	-0.1	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
16.1	17.3	1.2	PASS

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

PRESSURE SENSOR (mmHg)			
Reference	Instrument	Difference	
596.5	595.0	-1.5	PASS

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

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-7 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	16.76	16.70	-0.4%	0.4%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	16.0	15.9	-0.1	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	596.5	597.0	0.5	PASS

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

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	16.3	17.5	1.2	PASS

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

NOTES: Subsequent leak check passed following adjustment by operator. Flow does not appear to be impacted.

Air Resource SPECIALISTS

SITE INFORMATION

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		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: Lat/Long for met station

Air Resource SPECIALISTS

CALIBRATION AND VERIFICATION STANDARDS

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

			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	3/28/2017
AT/RH Sensor Reference						
Barometric Pressure Reference						
Wind Speed Reference (high rpm)			RM Young	18802	CA03359	4/7/2017
Wind Speed Reference (low rpm)						
Wind Speed Torque Gauge						
Wind Direction Alignment Reference			Brunton	Transit	5103212072	
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	946	mL	Novalynx	260-2595	N/A	

PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017
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 INC.

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

Certificate of Calibration

Date: Mar 28, 2016 **Cert No. 222008122912902**

Customer:
AIR RESOURCE SPECIALIST, INC
1901 SHARP POINT DR, STE E
FORT COLLINS CO 80525

		Work Order #:	SAC-70077720
		Purchase Order #:	A30449
MPC Control #:	AX7278	Serial Number:	307635
Asset ID:	N/A	Department:	N/A
Gage Type:	DIGITAL THERMOMETER	Performed By:	JAKE WEST
Manufacturer:	EUTECHNICS	Received Condition:	IN TOLERANCE
Model Number:	4400	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	March 28, 2016
Temp/RH:	70.0°F / 38.0%	Cal. Interval:	12 MONTHS
		Cal. Due Date:	March 28, 2017

Calibration Notes:

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CR6700	DOUBLE WELL BATH	7013	79006	HART	Oct 14, 2016	222008122697272
DA8367	PRECISION PLATINUM RESISTANCE THERMOMETER SPRT W/ CASE	8167-25	1803221	LEEDS & NORTHRUP	Apr 27, 2016	818600

Procedures Used in this Event

Procedure Name	Description
MPC-00074	Temperature Devices

Calibrating Technician: Jake West — JAKE WEST

QC Approval: Brian Gold — 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 comply with ISO 17025:2005, ANSI/NCSL Z540-1, 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.

CERTIFICATE OF CALIBRATION AND TESTING

MODEL: **18802** (Comprised of Models 18820A Control Unit & 18830A Motor Assembly)
SERIAL NUMBER: CA03359

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 Motor Rpm	27106D Output Frequency Hz (1)	Calculated Rpm (1)	Indicated Rpm (2)
300	50	300	300
2700	450	2700	2700
5100	850	5100	5100
7500	1250	7500	7500
10,200	1700	10,200	10,200
12,600	2100	12,600	12,600
15,000	2500	15,000	15,000
☒ Clockwise and Counterclockwise rotation verified			

(1) Measured frequency output of RM Young Model 27106D standard anemometer attached to motor shaft 27106D produces 10 pulses per revolution of the anemometer shaft
(2) Indicated on the Control Unit LCD display

* Indicates out of tolerance

☐ New Unit	☒ Service / Repair Unit ☒ No Calibration Adjustments Required	☐ As Found ☐ As Left

Traceable frequency meter used in calibration Model: DP5740 SN: 4863

Date of inspection 7 Apr 2016
Inspection Interval One Year

Tested By EC

Mesa Labs 10 Park Place Butler, NJ 07405
NIST Traceable Calibration Facility, ISO 9001:2008 Registered

MesaLabs

CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: **1237** DATE: 15-Jan-2016

Calibration Operator: P.Pitty

Critical Venturi Flow Meter: Max Uncertainity = 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: Uncertainity=0.071% Room Temperature: 24.8 °C
Brand: Accu-Safe Serial Number: 254881
NIST Traceability No. 516837
deltaCal:
Ambient Temperature (set): 24.8 °C
Aux (filter) Temperature (set): 24.8 °C

Barometric Pressure ans Absolute Pressure
Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%
S/N DH0850001
NIST Traceable (Princo Primary Standard Model 453 S/N W12537) Certificate No. P-7485
deltaCal:
Barometric pressure (set): 746 mm of Hg

Results of Venturi Calibration
Flow Rate (Q) vs. Pressure Drop (ΔP). Where: Q=Lpm, ΔP= Cm of H2O

Q= 3.88294 ΔP ^ 0.52106 Overall Uncertainty: 0.35%
Q= 3.78777 ΔP ^ 0.54863 Overall Uncertainty: 0.35%

Date Placed In Service 1/26/16
(To be filled in by operator upon receipt)
Recommended Recalibration Date 1/26/17
(12 months from date placed in service)

Revised: September 2015
Cal102-01T2 Rev D

To Check a deltaCal 15-Jan-16 P.Pitty

1.5-19.5 VER 4.00P

BP= 746 mm of Hg

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

Serial No. 1237

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 2	145.17	24.75	1.658	1.651	**-0.42**
	188.07	24.75	2.162	2.155	**-0.34**
	318.63	24.75	3.697	3.710	**0.34**
	402.50	24.75	4.684	4.700	**0.35**
	473.53	24.75	5.519	5.550	**0.57**
#1	150.00	24.90	6.008	6.000	**-0.13**
	259.53	24.90	10.507	10.463	**-0.42**
	337.29	24.90	13.702	13.671	**-0.22**
	398.26	24.90	16.207	16.180	**-0.16**
	476.34	24.90	19.414	19.454	**0.21**
				Average %	**-0.02**

To Check a deltaCal 15-Jan-16 Pre-Recert

1.5-19.5 VER 3.41P

BP= 746 mm of Hg

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

Serial No. 1237

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 5	151.5	24.7	4.99	5.01	0.42
	258.5	24.7	8.67	8.60	-0.80
	343.1	24.7	11.58	11.49	-0.77
	455.5	24.7	15.45	15.14	-1.98
	566.3	24.7	19.26	18.94	-1.64
				Average %	-0.95