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January 15, 2013

UTAH DEPARTMENT OF
ENVIRONMENTAL QUALITY

DIVISION OF AIR QUALITY

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

RE: 4th QT 2012 Report - Coal Hollow Mine
Project ID: N14047-0002

Dear Mr. Black,

Please find enclosed the Summary of PM_{10} Data Collected at the Coal Hollow Mine, Utah during the Fourth Quarter, 2012 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.

Sincerely,

B. Kirk Nicholes
Environmental Specialist
Alton Coal Development, LLC

Alton Coal Development, LLC.

Summary of PM_{10} Data Collected at Coal Hollow Mine, Utah During the Fourth Quarter, 2012

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
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435.867.5331

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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, (ACD) from the three 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 three 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 fourth quarter of 2012.

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 two 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 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 compliance monitor and the co-located monitor coordinates are 37° 24' 5.04" North Latitude, 112° 27' 20.91" West Longitude, WGS84 Datum. The background monitor coordinates are 37° 24' 21.96" North Latitude, 112° 25' 59.97" West Longitude, WGS84 Datum.

Figure 1 - Site Location Map

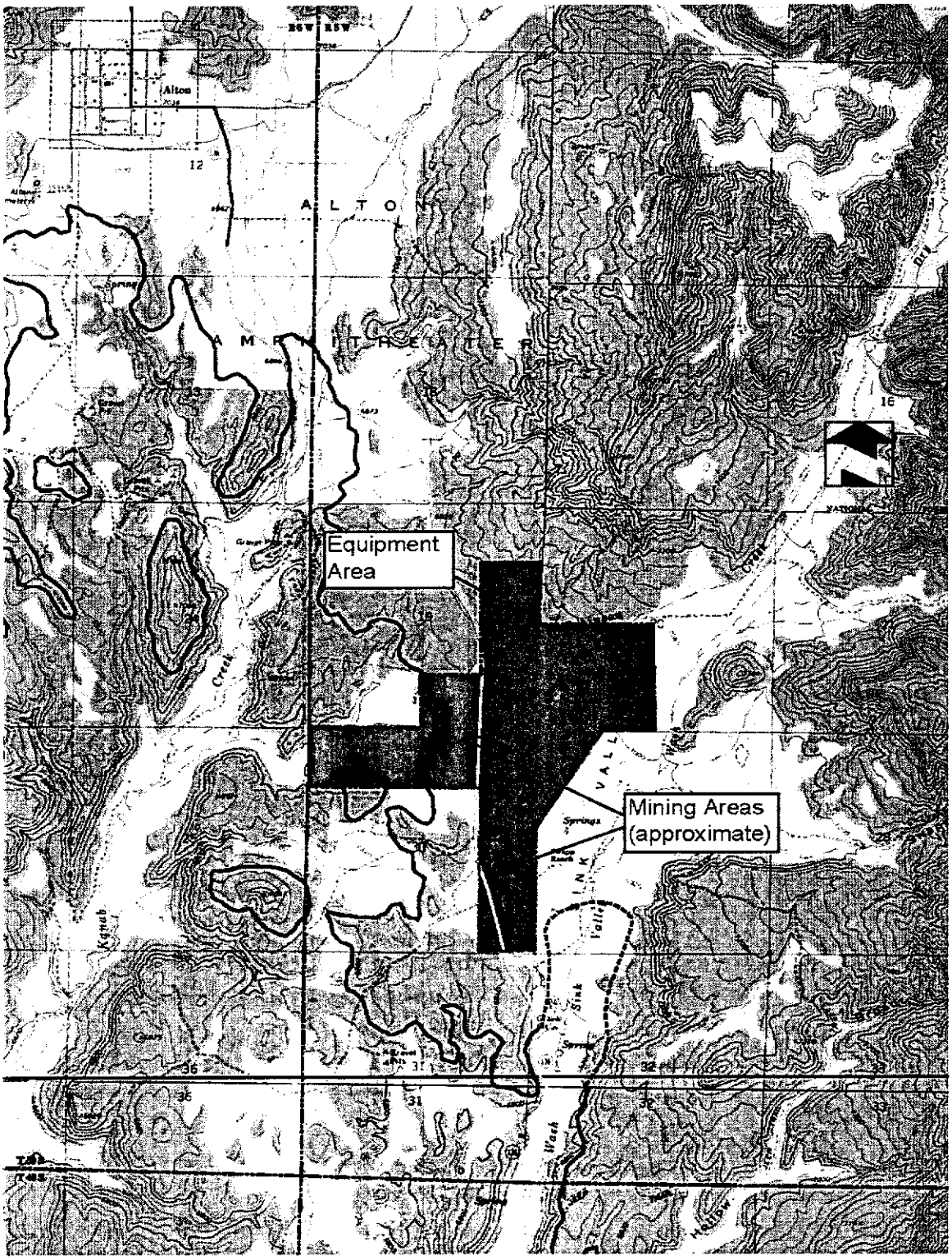
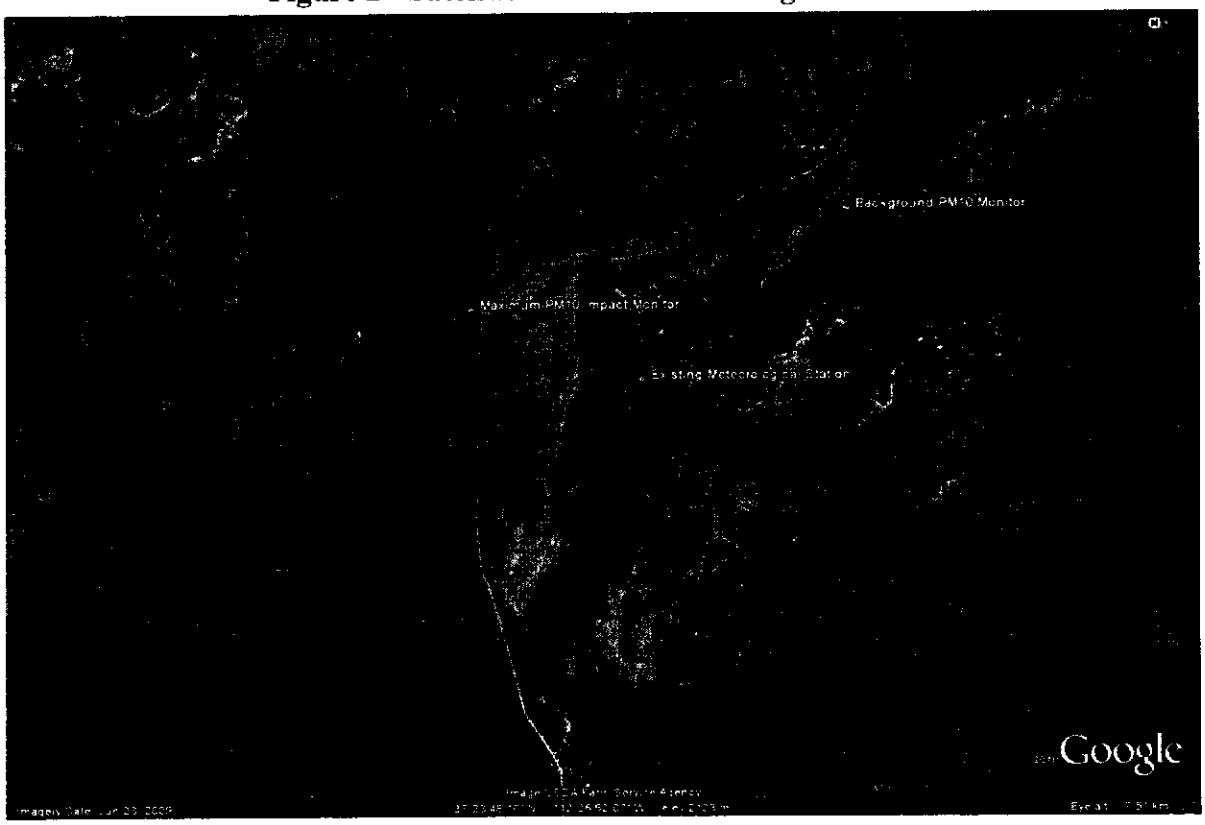


Figure 2 - Satellite View of Monitoring Locations



3.0 AIR QUALITY DATA SUMMARIES

A listing of the measured PM_{10} concentrations for the quarter are presented in Appendix B (individual data sheets found on the enclosed disk in the PDF version of 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 periods and represent the average PM_{10} concentration during the midnight to midnight data collection cycle. As required by the operating permit, duplicate measurements were made with Sampler #963B (designated as a compliance monitor) and Sampler #964C (designated as a co-located sampler). 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.

The highest 24-hour mean PM_{10} concentrations measured during the quarter from the two monitoring locations are summarized in Table I, Table II, and Table III. 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 $\mu g/m^3$.

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

RANK	DATE	PM_{10} CONCENTRATION
Highest	10/06/2012	12.1
2nd Highest	10/24/2012	7.5
Monthly Mean	10/1/12-10/31/12	5.8
Monthly Mean	11/1/12-11/30/12	4.1
Monthly Mean	12/1/12-12/31/12	3.0
Quarterly Mean	10/1/12-12/31/12 (15 valid samples)	4.3

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

RANK	DATE	PM_{10} CONCENTRATION
Highest	11/29/2012	66.3
2nd Highest	10/24/2012	62.8
Monthly Mean	10/1/12-10/31/12	42.6
Monthly Mean	11/1/12-11/30/12	28.6
Monthly Mean	12/1/12-12/31/12	12.4
Quarterly Mean	10/1/12-12/31/12 (15 valid samples)	27.9

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

RANK	DATE	PM_{10} CONCENTRATION
Highest	11/29/2012	104.6
2nd Highest	10/24/2012	66.5
Monthly Mean	10/1/12-10/31/12	43.9
Monthly Mean	11/1/12-11/30/12	38.2
Monthly Mean	12/1/12-12/31/12	15.2
Quarterly Mean	10/1/12-12/31/12 (12 valid samples)	32.9

Table IV – Mean Quarterly and Monthly Wind Speed

	4th Quarter 2012*	October*	November	December
Mean Wind Speed (m/s)	2.24	2.11	2.36	2.26

*Information for October and the 4th Quarter are skewed due to sensor that was found to be worn out. It was immediately replaced upon discovery.

4.0 DATA RECOVERY AND QUALITY ASSURANCE

4.1 Data Recovery

Monitor 962A

Monitor 962A collected 15 of the 15 samples during the quarter. The percent recovery for this quarter is 100%.

Monitor 963B

Monitor 963B collected 15 of the 15 samples during the quarter. The percent recovery for this quarter is 100%.

Monitor 964C

Monitor 964C collected 12 of the 15 samples during the quarter. The percent recovery for this quarter is 80.0%. The monitor for the date of November 5th overran the end time for a total of 35 h 19m of run time invalidating this sample. The monitor for the date of November 11th did not run due to a programing error, the month was not changed from October to November. The monitor error code for the date December 29th indicates that the monitor flow rate varied more than +/- 5 percent. A leak checks was performed on the 31st and adjustments made to the filter chamber lock.

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

Table V - Summary of Data Recovery

SAMPLER	POSSIBLE SAMPLES	VALID SAMPLES	PERCENT DATA RECOVERY
962A	15	15	100%
963B	15	15	100%
964C	15	12	80.0%

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. 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 were developed based on 12 valid pairs of co-located monitoring data during the quarter. Single point precision based on *40 CFR, Part 58*, Appendix A Equation 10 ranged from -44.8% to 9.3% with the majority of precision values occurring in the 10% to -10% range. The aggregate coefficient of variability (CV) calculated in accordance with *40 CFR, Part 58*, Appendix A Equation 11 is 15.4%. This value is above the 10% goal for aggregate CV. The value for fourth quarter CV was significantly impacted by the two outlier values of -32.6% and -44.8%. Additionally, the CV value is typically reviewed on an annual basis for assessment of overall measurement error. Improvements have been made in tightening reducing the coefficient of variability, by improved maintenance/cleaning of the monitors. ACD will continue to investigate other causes that may have an effect on the correlation of precision calculations.

4.2.2 Audit Results

The accuracy of the PM_{10} sampler flows was verified by a performance audit conducted by Air Resource Specialist on October 16, 2012. A copy of the audit report is presented in Appendix E and is summarized in Table VI. The audit results indicate that the three samplers were operating properly.

Table VI - Audit Summary

SAMPLER	AUDIT % DIFFERENCE	LIMIT*	DESIGN % DIFFERENCE	LIMIT*
962A	-3.4	±4%	-3.2	± 5%
963B	-1.3	±4%	-0.2	± 5%
964C	-3.8	±4%	-0.0	± 5%
*Values between ± 7% and ± 10% require recalibration but no data are invalidated.				

4.2.3 Zero and Single Point Flow Rate Checks

Zero and single-point flow rate verifications are performed by a site technician on a monthly basis. The data was then input into a statistical calculator to calculate percent difference and bias between each of the monitors and the monthly single point flow rate measured by a NIST

traceable calibration orifice. The calculator used is called the "Data Assessment Statistical Calculator" DASC Tool. DASC was developed for the data user community and can be found in the Precision and Accuracy Reporting System within the Quality Assurance section of EPA's Ambient Monitoring Technology Information System. This data is presented in Appendix C of this report.

APPENDIX A

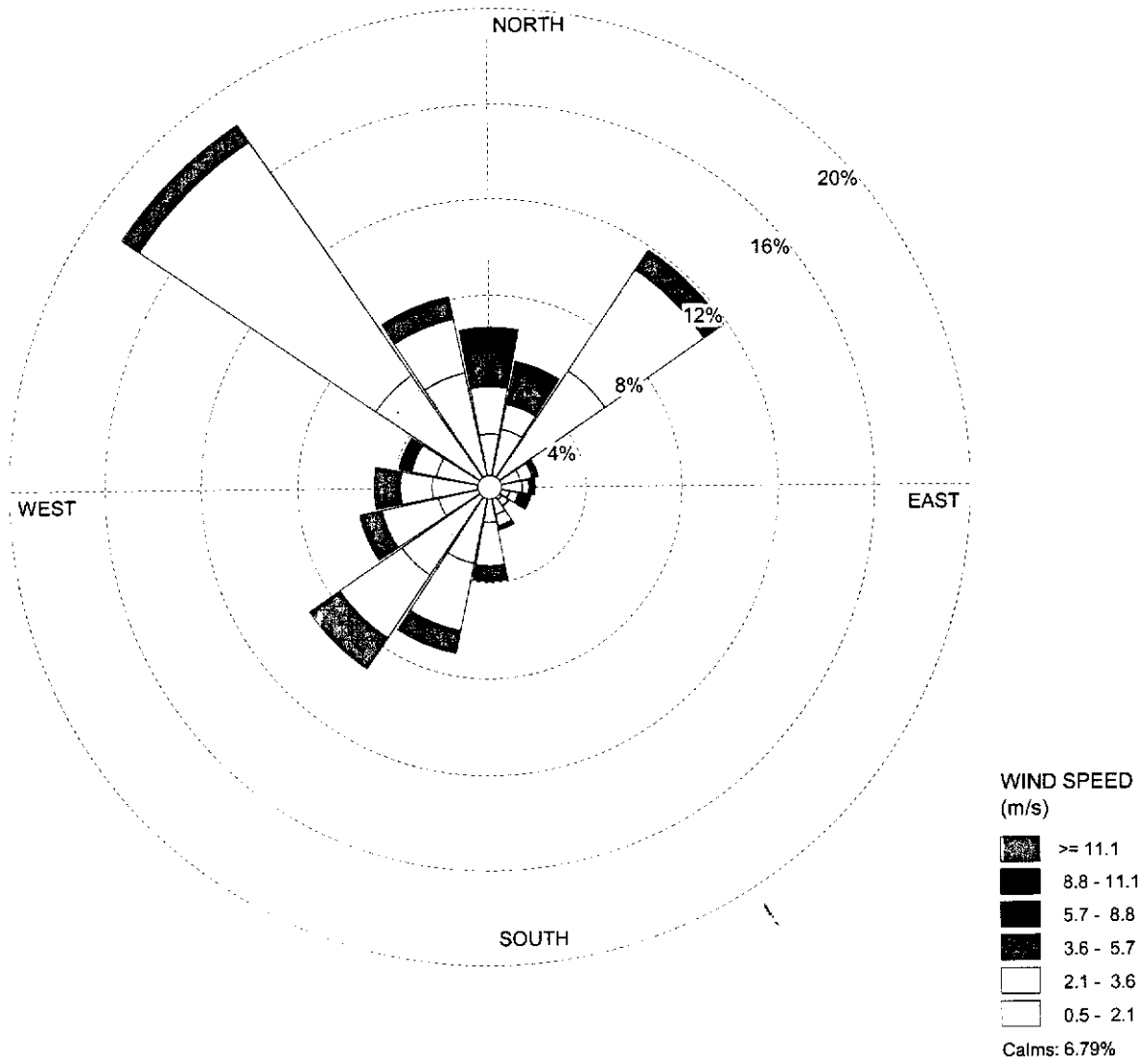
Windrose

WIND ROSE PLOT:

Alton Coal Development , Alton, Utah
2012 4th QT

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 10/1/2012 - 00:00 **End Date: 12/31/2012 - 23:00**	**Coal Hollow Mine**	
		MODELER: **K. Nicholes**	
	CALM WINDS: **6.79%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **2.24 m/s**	DATE: **1/15/2013**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Station ID: 1
Start Date: 10/1/2012 - 00:00
End Date: 12/31/2012 - 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	50	43	35	15	4	0	147
11.25-33.75	55	23	30	10	0	0	118
33.75-56.25	129	110	20	2	0	0	261
56.25-78.75	29	11	5	1	0	0	46
78.75-101.25	30	6	5	1	0	0	42
101.25-123.75	19	8	8	4	0	0	39
123.75-146.25	14	7	1	0	0	0	22
146.25-168.75	26	11	4	0	0	0	41
168.75-191.25	33	40	12	2	0	0	87
191.25-213.75	72	63	21	0	0	0	156
213.75-236.25	98	69	34	0	0	0	201
236.25-258.75	48	53	18	3	0	0	122
258.75-281.25	53	29	24	0	0	0	106
281.25-303.75	50	23	12	0	0	0	85
303.75-326.25	126	261	19	0	0	0	406
326.25-348.75	108	50	19	2	0	0	179
Total	940	807	267	40	4	0	2208

Frequency of Calm Winds: 150
Average Wind Speed: 2.24 m/s

Station ID: 1
Start Date: 10/1/2012 - 00:00
End Date: 12/31/2012 - 23:00

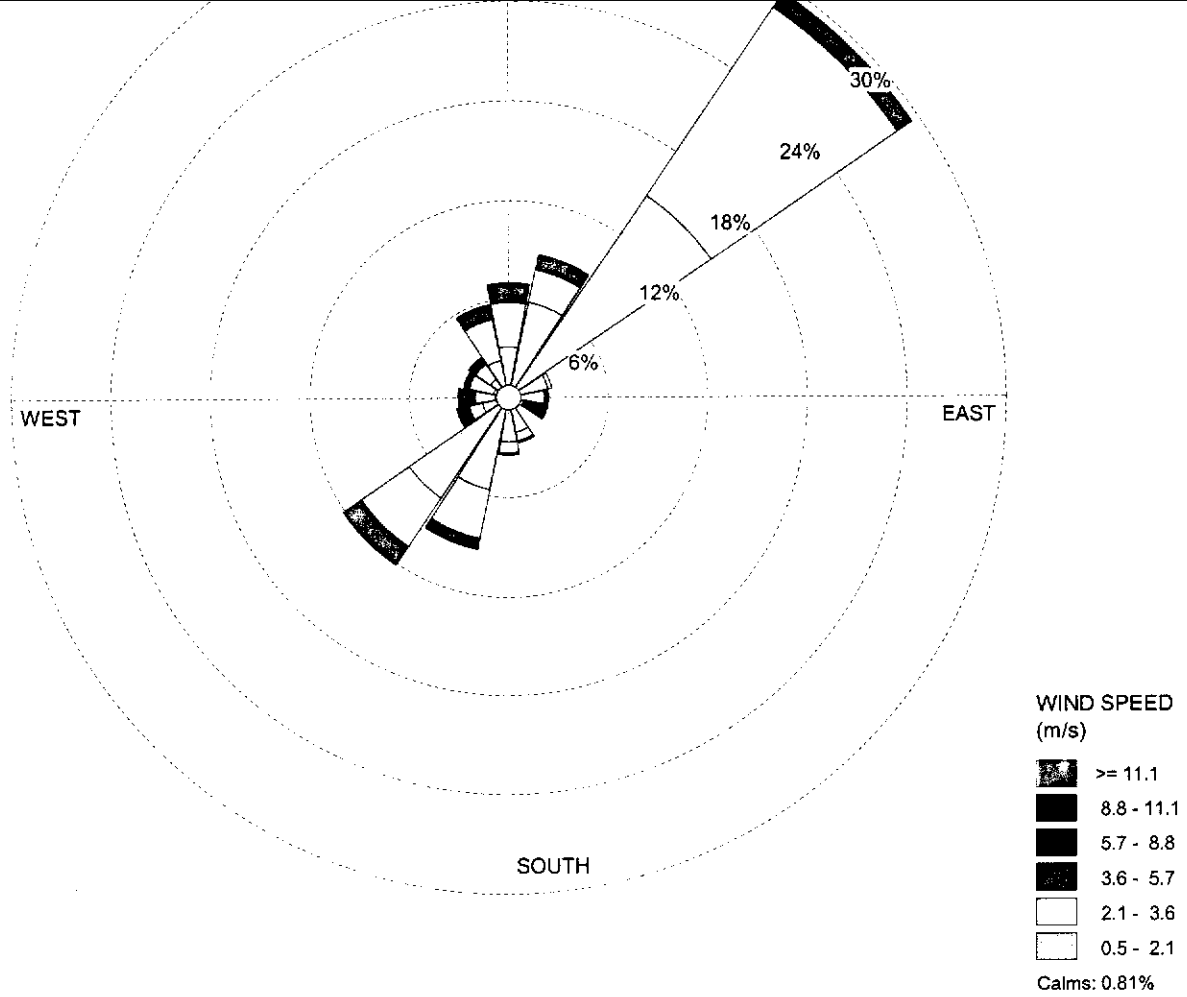
Run ID:

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	0.022645	0.019475	0.015851	0.006793	0.001812	0.000000	0.066576
11.25-33.75	0.024909	0.010417	0.013587	0.004529	0.000000	0.000000	0.053442
33.75-56.25	0.058424	0.049819	0.009058	0.000906	0.000000	0.000000	0.118207
56.25-78.75	0.013134	0.004982	0.002264	0.000453	0.000000	0.000000	0.020833
78.75-101.25	0.013587	0.002717	0.002264	0.000453	0.000000	0.000000	0.019022
101.25-123.75	0.008605	0.003623	0.003623	0.001812	0.000000	0.000000	0.017663
123.75-146.25	0.006341	0.003170	0.000453	0.000000	0.000000	0.000000	0.009964
146.25-168.75	0.011775	0.004982	0.001812	0.000000	0.000000	0.000000	0.018569
168.75-191.25	0.014946	0.018116	0.005435	0.000906	0.000000	0.000000	0.039402
191.25-213.75	0.032609	0.028533	0.009511	0.000000	0.000000	0.000000	0.070652
213.75-236.25	0.044384	0.031250	0.015399	0.000000	0.000000	0.000000	0.091033
236.25-258.75	0.021739	0.024004	0.008152	0.001359	0.000000	0.000000	0.055254
258.75-281.25	0.024004	0.013134	0.010870	0.000000	0.000000	0.000000	0.048007
281.25-303.75	0.022645	0.010417	0.005435	0.000000	0.000000	0.000000	0.038496
303.75-326.25	0.057065	0.118207	0.008605	0.000000	0.000000	0.000000	0.183877
326.25-348.75	0.048913	0.022645	0.008605	0.000906	0.000000	0.000000	0.081069
Total	0.425725	0.365489	0.120924	0.018116	0.001812	0.000000	0.932065

Frequency of Calm Winds: 6.79%
Average Wind Speed: 2.24 m/s



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 10/1/2012 - 00:00 **End Date: 10/31/2012 - 23:00**	**Coal Hollow Mine**	
		MODELER: **K. Nicholes**	
	CALM WINDS: **0.81%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **2.11 m/s**	DATE: **1/15/2013**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Station ID: 1
Start Date: 10/1/2012 - 00:00
End Date: 10/31/2012 - 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	23	20	9	0	0	0	52
11.25-33.75	44	15	7	0	0	0	66
33.75-56.25	110	101	8	0	0	0	219
56.25-78.75	18	2	0	0	0	0	20
78.75-101.25	16	0	2	0	0	0	18
101.25-123.75	4	3	7	4	0	0	18
123.75-146.25	4	2	0	0	0	0	6
146.25-168.75	16	4	1	0	0	0	21
168.75-191.25	20	5	1	0	0	0	26
191.25-213.75	42	22	5	0	0	0	69
213.75-236.25	54	26	10	0	0	0	90
236.25-258.75	12	6	3	3	0	0	24
258.75-281.25	6	9	8	0	0	0	23
281.25-303.75	7	11	3	0	0	0	21
303.75-326.25	10	8	4	0	0	0	22
326.25-348.75	17	19	7	0	0	0	43
Total	403	253	75	7	0	0	744

Frequency of Calm Winds: 6
Average Wind Speed: 2.11 m/s

Station ID: 1
Start Date: 10/1/2012 - 00:00
End Date: 10/31/2012 - 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	0.030914	0.026882	0.012097	0.000000	0.000000	0.000000	0.069892
11.25-33.75	0.059140	0.020161	0.009409	0.000000	0.000000	0.000000	0.088710
33.75-56.25	0.147849	0.135753	0.010753	0.000000	0.000000	0.000000	0.294355
56.25-78.75	0.024194	0.002688	0.000000	0.000000	0.000000	0.000000	0.026882
78.75-101.25	0.021505	0.000000	0.002688	0.000000	0.000000	0.000000	0.024194
101.25-123.75	0.005376	0.004032	0.009409	0.005376	0.000000	0.000000	0.024194
123.75-146.25	0.005376	0.002688	0.000000	0.000000	0.000000	0.000000	0.008065
146.25-168.75	0.021505	0.005376	0.001344	0.000000	0.000000	0.000000	0.028226
168.75-191.25	0.026882	0.006720	0.001344	0.000000	0.000000	0.000000	0.034946
191.25-213.75	0.056452	0.029570	0.006720	0.000000	0.000000	0.000000	0.092742
213.75-236.25	0.072581	0.034946	0.013441	0.000000	0.000000	0.000000	0.120968
236.25-258.75	0.016129	0.008065	0.004032	0.004032	0.000000	0.000000	0.032258
258.75-281.25	0.008065	0.012097	0.010753	0.000000	0.000000	0.000000	0.030914
281.25-303.75	0.009409	0.014785	0.004032	0.000000	0.000000	0.000000	0.028226
303.75-326.25	0.013441	0.010753	0.005376	0.000000	0.000000	0.000000	0.029570
326.25-348.75	0.022849	0.025538	0.009409	0.000000	0.000000	0.000000	0.057796
Total	0.541667	0.340054	0.100806	0.009409	0.000000	0.000000	0.991935

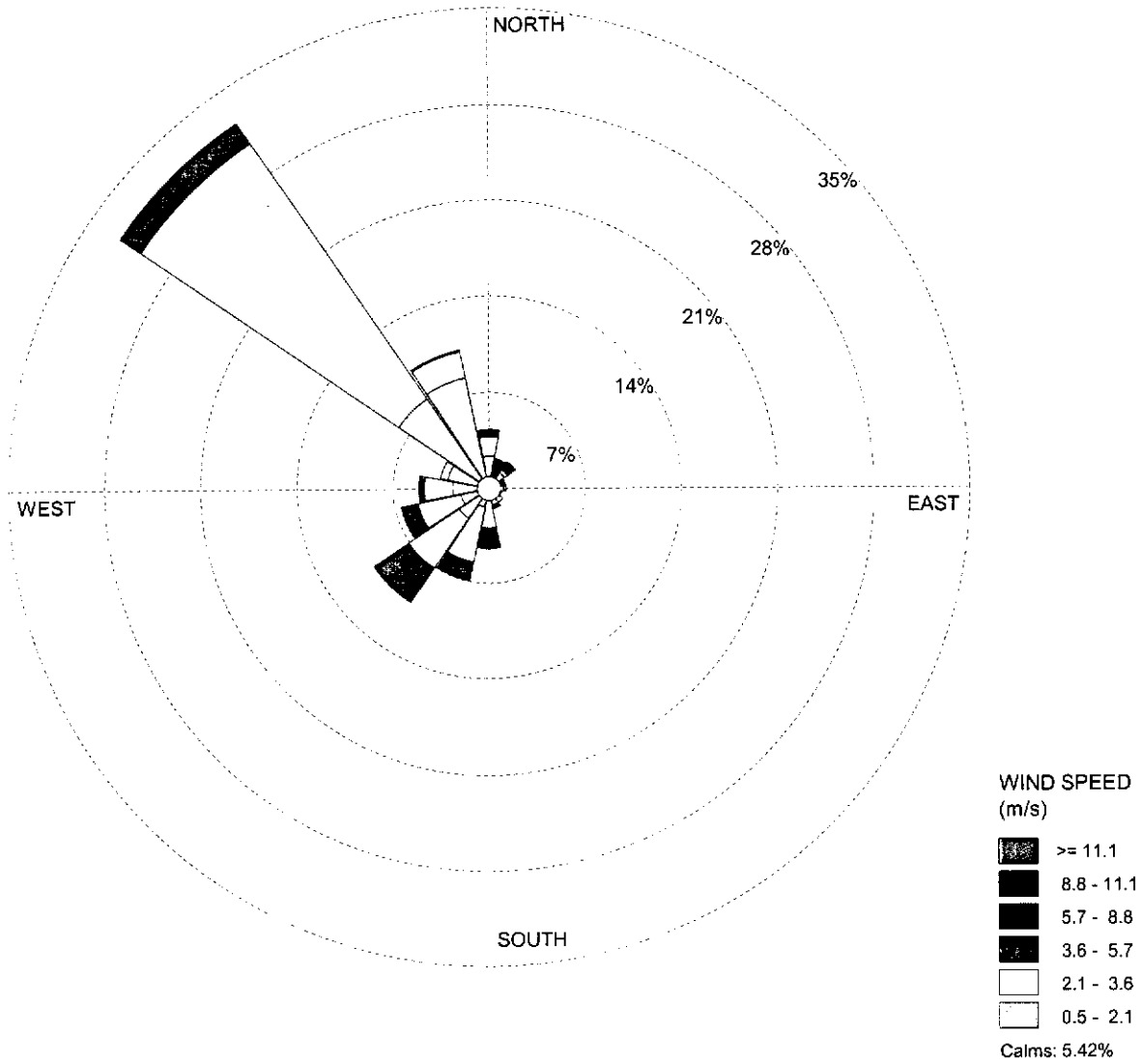
Frequency of Calm Winds: 0.81%
Average Wind Speed: 2.11 m/s

WIND ROSE PLOT:

Alton Coal Development , Alton, Utah
2012 November

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 11/1/2012 - 00:00 **End Date: 11/30/2012 - 23:00**	**Coal Hollow Mine**	
		MODELER: **K. Nicholes**	
	CALM WINDS: **5.42%**	TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **2.36 m/s**	DATE: **1/15/2013**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Station ID: 1
Start Date: 11/1/2012 - 00:00
End Date: 11/30/2012 - 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	17	10	4	0	0	0	31
11.25-33.75	7	0	9	0	0	0	16
33.75-56.25	10	2	5	0	0	0	17
56.25-78.75	2	4	3	0	0	0	9
78.75-101.25	8	1	0	0	0	0	9
101.25-123.75	7	0	0	0	0	0	7
123.75-146.25	6	3	0	0	0	0	9
146.25-168.75	3	6	2	0	0	0	11
168.75-191.25	3	18	9	2	0	0	32
191.25-213.75	10	30	10	0	0	0	50
213.75-236.25	19	32	22	0	0	0	73
236.25-258.75	15	23	9	0	0	0	47
258.75-281.25	19	15	3	0	0	0	37
281.25-303.75	22	4	0	0	0	0	26
303.75-326.25	57	163	13	0	0	0	233
326.25-348.75	59	14	1	0	0	0	74
Total	264	325	90	2	0	0	720

Frequency of Calm Winds: 39
Average Wind Speed: 2.36 m/s

Station ID: 1
Start Date: 11/1/2012 - 00:00
End Date: 11/30/2012 - 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	0.023611	0.013889	0.005556	0.000000	0.000000	0.000000	0.043056
11.25-33.75	0.009722	0.000000	0.012500	0.000000	0.000000	0.000000	0.022222
33.75-56.25	0.013889	0.002778	0.006944	0.000000	0.000000	0.000000	0.023611
56.25-78.75	0.002778	0.005556	0.004167	0.000000	0.000000	0.000000	0.012500
78.75-101.25	0.011111	0.001389	0.000000	0.000000	0.000000	0.000000	0.012500
101.25-123.75	0.009722	0.000000	0.000000	0.000000	0.000000	0.000000	0.009722
123.75-146.25	0.008333	0.004167	0.000000	0.000000	0.000000	0.000000	0.012500
146.25-168.75	0.004167	0.008333	0.002778	0.000000	0.000000	0.000000	0.015278
168.75-191.25	0.004167	0.025000	0.012500	0.002778	0.000000	0.000000	0.044444
191.25-213.75	0.013889	0.041667	0.013889	0.000000	0.000000	0.000000	0.069444
213.75-236.25	0.026389	0.044444	0.030556	0.000000	0.000000	0.000000	0.101389
236.25-258.75	0.020833	0.031944	0.012500	0.000000	0.000000	0.000000	0.065278
258.75-281.25	0.026389	0.020833	0.004167	0.000000	0.000000	0.000000	0.051389
281.25-303.75	0.030556	0.005556	0.000000	0.000000	0.000000	0.000000	0.036111
303.75-326.25	0.079167	0.226389	0.018056	0.000000	0.000000	0.000000	0.323611
326.25-348.75	0.081944	0.019444	0.001389	0.000000	0.000000	0.000000	0.102778
Total	0.366667	0.451389	0.125000	0.002778	0.000000	0.000000	0.945833

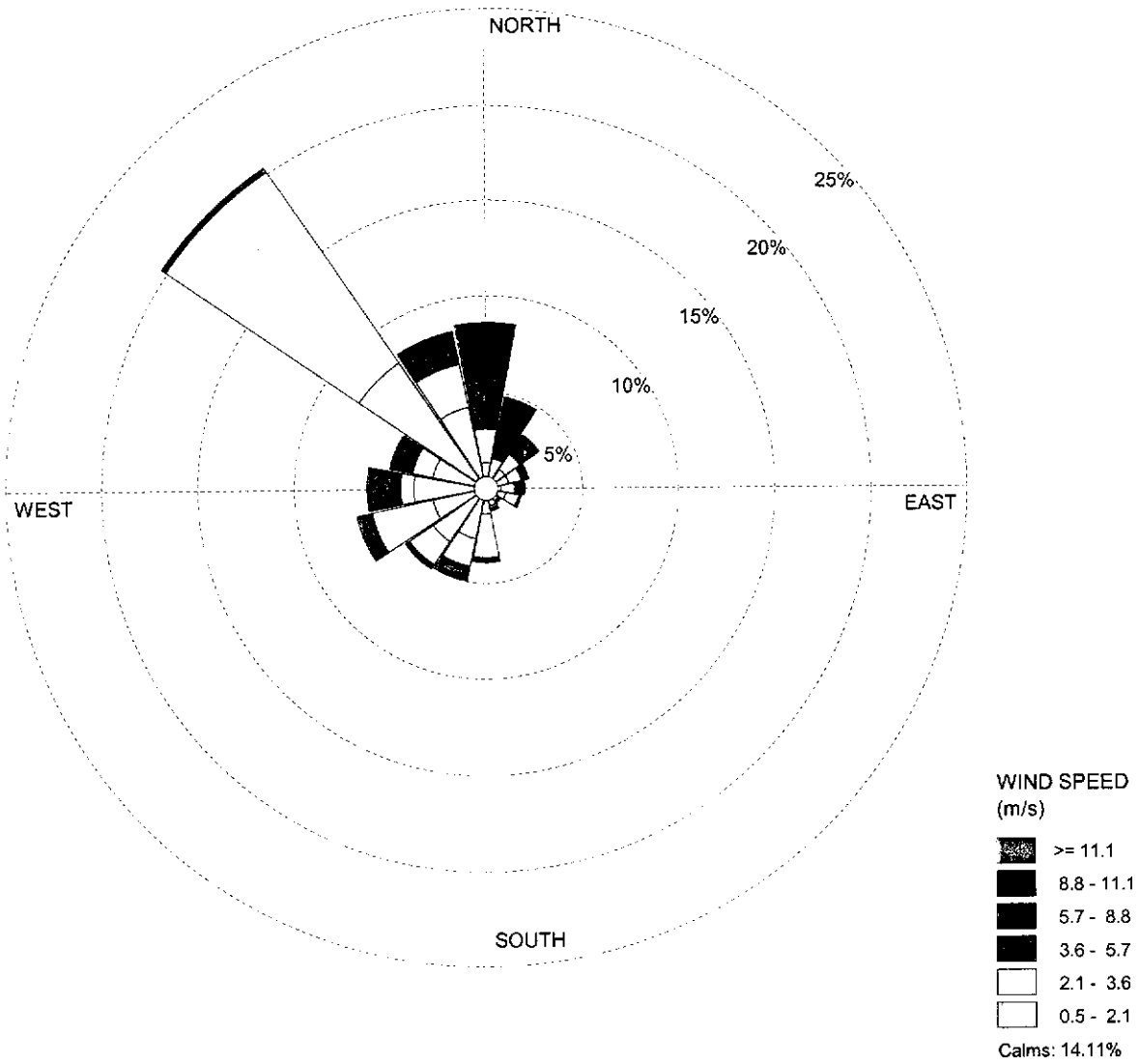
Frequency of Calm Winds: 5.42%
Average Wind Speed: 2.36 m/s

WIND ROSE PLOT:

Alton Coal Development , Alton, Utah
2012 December

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 12/1/2012 - 00:00 **End Date: 12/31/2012 - 23:00**	**Coal Hollow Mine**	
		MODELER: **K. Nicholes**	
	CALM WINDS: **14.11%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **2.26 m/s**	DATE: **1/15/2013**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Station ID: 1
Start Date: 12/1/2012 - 00:00
End Date: 12/31/2012 - 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	10	13	22	15	4	0	64
11.25-33.75	4	8	14	10	0	0	36
33.75-56.25	9	7	7	2	0	0	25
56.25-78.75	9	5	2	1	0	0	17
78.75-101.25	6	5	3	1	0	0	15
101.25-123.75	8	5	1	0	0	0	14
123.75-146.25	4	2	1	0	0	0	7
146.25-168.75	7	1	1	0	0	0	9
168.75-191.25	10	17	2	0	0	0	29
191.25-213.75	20	11	6	0	0	0	37
213.75-236.25	25	11	2	0	0	0	38
236.25-258.75	21	24	6	0	0	0	51
258.75-281.25	28	5	13	0	0	0	46
281.25-303.75	21	8	9	0	0	0	38
303.75-326.25	59	90	2	0	0	0	151
326.25-348.75	32	17	11	2	0	0	62
Total	273	229	102	31	4	0	744

Frequency of Calm Winds: 105
Average Wind Speed: 2.26 m/s

Station ID: 1
Start Date: 12/1/2012 - 00:00
End Date: 12/31/2012 - 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	0.013441	0.017473	0.029570	0.020161	0.005376	0.000000	0.086022
11.25-33.75	0.005376	0.010753	0.018817	0.013441	0.000000	0.000000	0.048387
33.75-56.25	0.012097	0.009409	0.009409	0.002688	0.000000	0.000000	0.033602
56.25-78.75	0.012097	0.006720	0.002688	0.001344	0.000000	0.000000	0.022849
78.75-101.25	0.008065	0.006720	0.004032	0.001344	0.000000	0.000000	0.020161
101.25-123.75	0.010753	0.006720	0.001344	0.000000	0.000000	0.000000	0.018817
123.75-146.25	0.005376	0.002688	0.001344	0.000000	0.000000	0.000000	0.009409
146.25-168.75	0.009409	0.001344	0.001344	0.000000	0.000000	0.000000	0.012097
168.75-191.25	0.013441	0.022849	0.002688	0.000000	0.000000	0.000000	0.038978
191.25-213.75	0.026882	0.014785	0.008065	0.000000	0.000000	0.000000	0.049731
213.75-236.25	0.033602	0.014785	0.002688	0.000000	0.000000	0.000000	0.051075
236.25-258.75	0.028226	0.032258	0.008065	0.000000	0.000000	0.000000	0.068548
258.75-281.25	0.037634	0.006720	0.017473	0.000000	0.000000	0.000000	0.061828
281.25-303.75	0.028226	0.010753	0.012097	0.000000	0.000000	0.000000	0.051075
303.75-326.25	0.079301	0.120968	0.002688	0.000000	0.000000	0.000000	0.202957
326.25-348.75	0.043011	0.022849	0.014785	0.002688	0.000000	0.000000	0.083333
Total	0.366935	0.307796	0.137097	0.041667	0.005376	0.000000	0.858871

Frequency of Calm Winds: 14.11%
Average Wind Speed: 2.26 m/s

APPENDIX B

Listing of PM_{10} Concentrations

Background Monitor 962A

PM_{10} Sampler Summary

October 1, 2012 - December 31, 2012

Network: Alton Coal Development, LLC
Site: Coal Hollow Mine
Sampler ID: 962A **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	Mass (mg) Gross	Mass (mg) Net	Flag	Comments
10/06/12	P0481938	**9.7**	**12.1**	23:59	24.0	19.3	144.284	144.518	0.234		
10/12/12	P0483003	**2.7**	**3.3**	23:59	24.0	19.8	144.090	144.155	0.065		
10/18/12	P0483006	**2.2**	**2.6**	23:59	24.0	19.6	143.602	143.654	0.052		
10/24/12	P0483170	**6.2**	**7.5**	23:59	24.0	19.8	145.898	146.046	0.148		
10/30/12	P0483173	**3.0**	**3.7**	23:59	24.0	19.6	144.497	144.569	0.072		
11/05/12	P0483317	**2.0**	**2.5**	23:59	24.0	19.7	144.062	144.111	0.049		
11/11/12	P0483320	**5.0**	**5.7**	23:59	24.0	20.8	145.517	145.636	0.119		
11/17/12	P0483323	**2.9**	**3.5**	23:59	24.0	19.8	143.491	143.560	0.069		
11/23/12	P0483443	**1.5**	**1.8**	23:59	24.0	20.1	143.781	143.817	0.036		
11/29/12	P0483446	**6.0**	**7.2**	23:59	24.0	20.0	144.128	144.272	0.144		
12/05/12	P0483617	**3.2**	**3.8**	24:00	24.0	19.9	143.072	143.148	0.076		
12/11/12	P0483621	**2.2**	**2.6**	23:59	24.0	20.2	145.882	145.935	0.053		
12/17/12	P0483680	**2.0**	**2.4**	23:59	24.0	20.3	144.710	144.758	0.048		
12/23/12	P0483683	**3.1**	**3.7**	23:59	24.0	20.2	144.296	144.371	0.075		
12/29/12	P0483686	**2.0**	**2.3**	23:59	24.0	20.7	144.317	144.365	0.048		
10/15/12	P0483009		**Field Blank**				144.649	144.663	0.014		

# Valid	Recovery	Average	St. Dev.	Max	Min
15	**100%**	**4.3**	**2.8**	**12.1**	**1.8**

Individual Data Sheets provided on CD

Compliance Monitor 963B

PM_{10} Sampler Summary

October 1, 2012 - December 31, 2012

Network: Alton Coal Development, LLC
Site: Coal Hollow Mine
Sampler ID: 963B **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	Mass (mg) Gross	Mass (mg) Net	Flag	Comments
10/06/12	P0481939	**41.8**	**51.6**	23:59	24.0	19.5	145.710	146.716	1.006		
10/12/12	P0483004	**3.6**	**4.4**	23:59	24.0	19.9	142.111	142.198	0.087		
10/18/12	P0483007	**30.8**	**37.6**	23:59	24.0	19.7	142.873	143.614	0.741		
10/24/12	P0483171	**52.2**	**62.8**	23:59	24.0	20.0	145.417	146.672	1.255		
10/30/12	P0483174	**46.9**	**56.8**	23:59	24.0	19.8	146.269	147.395	1.126		
11/05/12	P0483318	**51.0**	**62.1**	23:59	24.0	19.7	145.754	146.980	1.226		
11/11/12	P0483321	**5.0**	**5.7**	23:59	24.0	21.0	145.030	145.150	0.120		
11/17/12	P0483324	**4.2**	**5.1**	23:59	24.0	20.0	143.905	144.006	0.101		
11/23/12	P0483444	**3.0**	**3.6**	23:59	24.0	20.3	141.556	141.629	0.073		
11/29/12	P0483447	**55.5**	**66.3**	23:59	24.0	20.1	144.762	146.097	1.335		
12/05/12	P0483618	**29.9**	**35.7**	23:59	24.0	20.1	143.664	144.383	0.719		
12/11/12	P0483622	**10.8**	**12.7**	23:59	24.0	20.3	146.442	146.701	0.259		
12/17/12	P0483681	**4.3**	**5.1**	23:59	24.0	20.4	143.223	143.327	0.104		
12/23/12	P0483684	**3.9**	**4.6**	23:59	24.0	20.4	144.773	144.867	0.094		
12/29/12	P0483687	**3.2**	**3.7**	23:59	24.0	20.9	144.222	144.300	0.078		

# Valid	Recovery	Average	St. Dev.	Max	Min
15	**100%**	**27.9**	**26.0**	**66.3**	**3.6**

Individual Data Sheets provided on CD

Collocated Monitor 964C

PM_{10} Sampler Summary

October 1, 2012 - December 31, 2012

Network: Alton Coal Development, LLC
Site: Coal Hollow Mine
Sampler ID: 964C **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	Mass (mg) Gross	Mass (mg) Net	Flag	Comments
10/06/12	P0481940	**38.1**	**47.0**	23:59	24.0	19.5	144.402	145.318	0.916		
10/12/12	P0483005	**3.9**	**4.7**	23:59	24.0	19.9	141.897	141.991	0.094		
10/18/12	P0483008	**32.6**	**39.7**	23:59	24.0	19.7	144.227	145.010	0.783		
10/24/12	P0483172	**55.2**	**66.5**	23:59	24.0	20.0	144.494	145.821	1.327		
10/30/12	P0483175	**50.6**	**61.4**	23:59	24.0	19.8	144.374	145.590	1.216		
11/05/12	P0483319	**Invalid - AG**	**Invalid - AG**	35:19	35.4	29.2	144.184	145.750	1.566	SP	
11/11/12	P0483322	**Invalid - AN**	**Invalid - AN**				144.562	144.565	0.003	SP	No run
11/17/12	P0483325	**4.2**	**5.1**	23:59	24.0	20.0	144.404	144.505	0.101		
11/23/12	P0483445	**4.2**	**5.0**	23:59	24.0	20.3	145.366	145.467	0.101		
11/29/12	P0483448	**87.5**	**104.6**	23:59	24.0	20.1	143.585	145.689	2.104		
12/05/12	P0483619	**29.5**	**35.2**	23:59	24.0	20.1	144.834	145.542	0.708		
12/11/12	P0483620	**13.1**	**15.5**	23:59	24.0	20.4	146.246	146.561	0.315		
12/17/12	P0483682	**4.8**	**5.6**	23:59	24.0	20.4	144.613	144.728	0.115		
12/23/12	P0483685	**3.8**	**4.5**	23:59	24.0	20.4	143.125	143.217	0.092		
12/29/12	P0483688	**Invalid - AG**	**Invalid - AG**	18:55	19.0	16.4	143.055	143.118	0.063	SP	
10/25/12	P0483176		**Field Blank**				144.232	144.240	0.008		
11/26/12	P0483449		**Field Blank**				145.465	145.477	0.012		
12/06/12	P0483623		**Field Blank**				144.779	144.792	0.013		

# Valid	Recovery	Average	St. Dev.	Max	Min
12	**80%**	**32.9**	**32.4**	**104.6**	**4.5**

Individual Data Sheets provided on CD

APPENDIX C

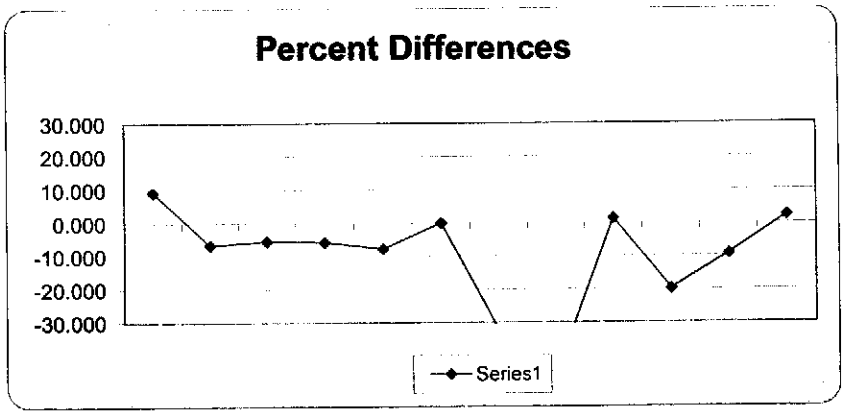
Precision and Single-Point Flow Rate Checks

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	$\|d\|$	$\|d\|^2$			
51.6	47	9.331	-11.974	87.061	9.331	87.061			
4.4	4.7	-6.593	**75th Percentile**	43.473	6.593	43.473	**n**	$\Sigma\|d\|$	$\Sigma\|d\|^2$
37.6	39.7	-5.433	0.353	29.522	5.433	29.522	12	145.056	3810.903
62.8	66.5	-5.723		32.754	5.723	32.754	**n-1**	Σd	Σd^2
56.8	61.4	-7.783		60.582	7.783	60.582	11	-119.178	3810.903
5.1	5.1	0.000		0.000	0.000	0.000			
3.6	5	-32.558		1060.032	32.558	1060.032			
66.3	104.6	-44.822		2008.97	44.822	2008.970			
35.7	35.2	1.410		1.989	1.410	1.989			
12.7	15.5	-19.858		394.3464	19.858	394.346			
5.1	5.6	-9.346		87.344	9.346	87.344			
4.6	4.5	2.198		4.830	2.198	4.830			

CV (%) (Eqn 11)
15.35



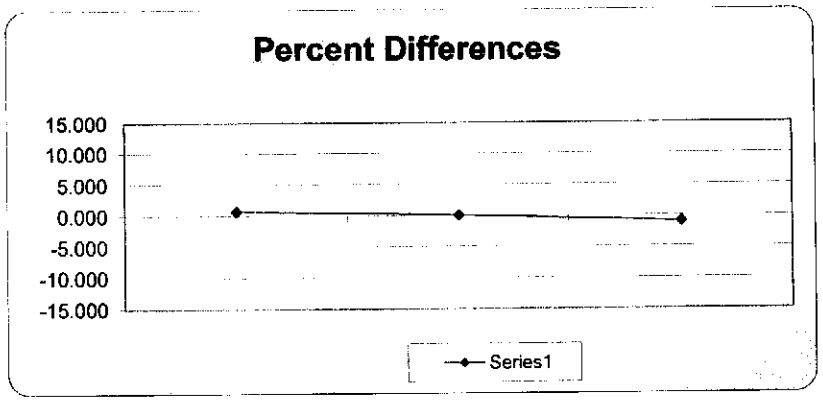
Alton Coal Development, LLC - Coal Hollow Mine

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|**	**$\|d\|^2$**
16.71	16.59	0.723	-0.474	0.523	0.723	0.523
16.7	16.69	0.060	**75th Percentile**	0.004	0.060	0.004
16.7	16.87	-1.008	0.392	1.015	1.008	1.015

n	**$\Sigma\|d\|$**	**"AB" (Eqn 4)**
3	1.791	0.597
n-1	**$\Sigma\|d\|^2$**	**"AS" (Eqn 5)**
2	1.542	0.486

Bias (%) (Eqn 3)	Both Signs Positive
1.42	FALSE
Signed Bias (%)	Both Signs Negative
+/-1.42	FALSE



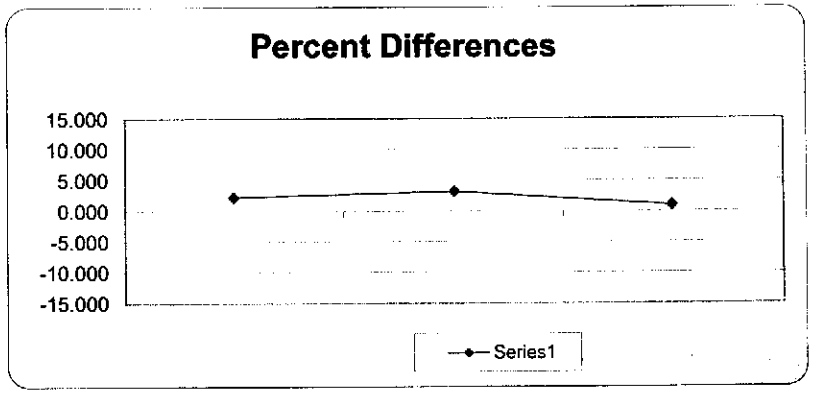
Alton Coal Development, LLC - Coal Hollow Mine

One-Point Flow Rate Bias Estimate

Site ID: Monitor 963B		Pollutant type:				Bias (%)
Meas Val (Y)	**Audit Val (X)**	**d (Eqn. 1)**	**25th Percentile**	**d^2**	**|d|**	**$\|d\|^2$**
16.67	16.3	2.270	1.619	5.153	2.270	5.153
16.7	16.18	3.214	**75th Percentile**	10.329	3.214	10.329
16.7	16.54	0.967	2.742	0.936	0.967	0.936

n	**$\Sigma\|d\|$**	**"AB" (Eqn 4)**
3	6.451	2.150
n-1	**$\Sigma\|d\|^2$**	**"AS" (Eqn 5)**
2	16.417	1.128

Bias (%) (Eqn 3)	Both Signs Positive
4.05	TRUE
Signed Bias (%)	Both Signs Negative
+4.05	FALSE



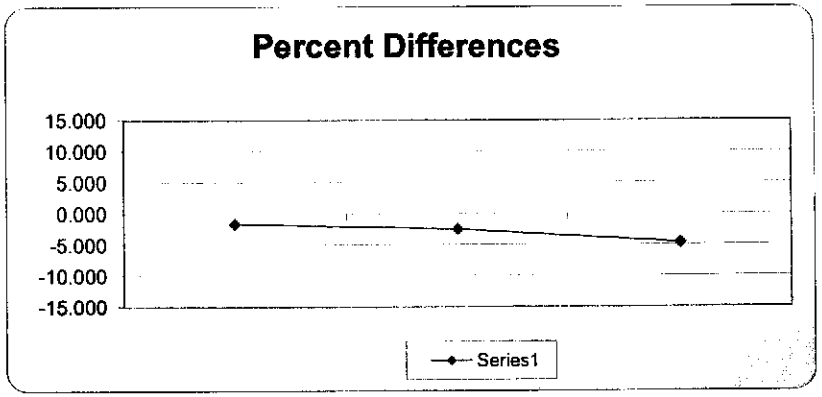
Alton Coal Development, LLC - Coal Hollow Mine

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	$\|d\|$	$\|d\|^2$
16.71	16.99	-1.648	-3.537	2.716	1.648	2.716
16.7	17.12	-2.453	**75th Percentile**	6.019	2.453	6.019
16.72	17.53	-4.621	-2.051	21.350	4.621	21.350

n	$\Sigma\|d\|$	**"AB" (Eqn 4)**
3	8.722	2.907
n-1	$\Sigma\|d\|^2$	**"AS" (Eqn 5)**
2	30.085	1.537

Bias (%) (Eqn 3)	Both Signs Positive
5.5	FALSE
Signed Bias (%)	Both Signs Negative
-5.5	TRUE



APPENDIX D

Field Data Sheets

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
10-1-12	11:37am	10-1-12	11:37 am	14	17	M-M	10-6-12	KN
10-8-12	10:37am	10-8-12	10:37 am	17	4	M-M	10-12-12	KN
10-15-12	9:41AM	10-15-12	9:41 Am	4	7	M-M	10-18-12	KN/JKSR
10-19-12	13:34	10-19-12	13:33	7	11	M-M	10-24-12	KN
10-25-12	11:41	10-25-12	11:41	11	14	M-M	10-30-12	JKSR
10-31-12	10:27am	10-31-12	10:26am	14	4	M-M	11-5-12	KN
11-6-12	11:00am	11-6-12	11:00am	4	7	M-M	11-11-12	KN
11-12-12	1:02pm	11-12-12	13:02	7	10	M-M	11-17-12	KN
10-19-12	10:24am	11-19-12	10:23am	10	11	M-M	11-23-12	KN
11-26-12	10:34	11-26-12	10:34	11	14	M-M	11-29-12	KN/JKSR
11-30-12	10:47am	11-30-12	10:46am	14	4	M-M	12-5-12	KN
12-6-12	10:09am	12-6-12	10:08am	4	8	M-M	12-11-12	KN
12-13-12	13:29	12-13-12	13:28	8	10	M-M	12-17-12	KN
12-18-12	9:15am	12-18-12	9:14 am	10	13	M-M	12-23-12	KN
12-24-12	12:21am	12-24-12	12:19am	13	16	M-M	12-29-12	KN
12-31-12	11:20am	12-31-12	11:19am	16	5	M-M	1-4-13	KN

Set for Time change

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10-29-12	11:19am	95	95	Pass	KN	Cleaned Monitor Venturi, down tab, etc.
11-30-12	12:27am	98	97	Pass	KN	Cleaned Monitor Venturi down tab etc.
12-31-12	11:11am	95	93	Pass	KN	Cleaned Monitor Venturi down tab

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
10-29-12	11:29	16.71	589	591.5	15.8	16.5	13.25	16.59	0.723	KN
11-30-12	12:47	16.70	585	587	6.4°	7.4°	13.69	16.69	0.060	KN
12-31-12	11:17	16.70	580	582	-6.4	-5.4	14.40	16.87	-1.008	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	
10-1-12	12:11am	10-1-12	12:11	15	18	M-M	10-6-12	KN	
10-8-12	11:08am	10-8-12	11:07am	18	5	M-M	10-12-12	KN	
10-15-12	9:20 Am	10-15-12	9:20 AM	5	8	M-M	10-18-12	KN/JKSR	
10-19-12	14:09	10-19-12	14:08	8	12	M-M	10-24-12	KN	
10-25-12	12:39	10-25-12	12:39	12	15	M-M	10-30-12	JKSR	
10-31-12	10:00am	10-31-12	10:59	15	5	M-M	11-5-12	KN	set for Time change
11-6-12	11:29am	11-6-12	11:29am	5	8	M-M	11-11-12	KN	
11-12-12	1:29 pm	11-12-12	13:29 pm	8	18	M-M	11-17-12	KN	
11-19-12	10:50am	11-19-12	10:49 am	18	12	M-M	11-23-12	KN	
11-26-12	10:11	11-26-12	10:11	12	15	M-M	11-29-12	KN/JKSR	
11-30-12	1:12pm	11-30-12	13:11	15	5	M-M	12-5-12	KN	
12-6-12	10:35am	12-6-12	10:34am	5	9	M-M	12-11-12	KN	
12-13-12	14:05	12-13-12	14:05	9	11	M-M	12-17-12	KN	
12-18-12	9:43am	12-18-12	9:43am	11	14	M-M	12-23-12	KN	
12-24-12	13:06	12-24-12	13:05	14	17	M-M	12-29-12	KN	
12-31-12	11:56am	12-31-12	11:55	17	6	M-M	1-4-13	KN	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10-29-12	12:12	98	96	Pass	KN	Clean Monitor Venturi, down tab etc
11-30-12	1:16pm	95	95	Pass	KN	Clean Monitor Venturi, down tab etc.
12-31-12	11:58am	96	96	Pass	KN	Clean Monitor Venturi down tab etc

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
10-29-12	12:16	16.67	595	597	170	17.5	13:12	16.30	2.207	KN
11-30-12	1:21pm	16.70	591	592.5	7.6	7.8	13:30	16.18	3.214	KN
12-31-12	12:01	16.20	587	588	-3.5	-4.2	14.14	16.54	0.967	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
10-1-12	12:15	10-1-12	12:13	16	19	M-M	10-6-12	KN
10-8-12	11:13	10-8-12	11:11am	19	6	M-M	10-12-12	KN
10-15-12	9:22Am	10-15-12	9:22 Am	6	9	M-M	10-18-12	KN/JKSR
10-19-12	14:13	10-19-12	14:11	9	13	M-M	10-24-12	KN
10-25-12	12:41	10-25-12	12:41	13	16	M-M	10-30-12	JKSR
10-31-12	11:05am	10-31-12	11:02am	16	6	M-M	11-5-12	KN
11-6-12	11:33am	11-6-12	11:32am	6	9	M-M	11-11-12	KN
11-12-12	1:33pm	11-12-12	13:32pm	9	19	M-M	11-17-12	KN
11-19-12	10:53am	11-19-12	10:52am	19	13	M-M	11-23-12	KN
11-26-12	10:08	11-26-12	10:08	13	16	M-M	11-29-12	KN/JKSR
11-26-12	10:08	11-26-12	10:08	17	17	Blank	—	KN/JKSR
11-30-12	1:29pm	11-30-12	13:27	16	6	M-M	12-5-12	KN
12-6-12	10:51am	12-6-12	10:37am	6	20	Field Blank	12-6-12	KN
12-6-12	10:42am	12-6-12	10:41am	20	7	M-M	12-11-12	KN
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
12-18-12	9:49	12-18-12	9:47	7	15	M-M	12-23-12	KN
12-24-12	13:09	12-24-12	13:07	15	18	M-M	12-29-12	KN
12-31-12	12:12	12-31-12	12:10	18	7	M-M	1-4-12	KN

Set for Time change

Over ran stop time month had not been changed to Nov, still Oct.

Start Oct 11? No Run

29th sample ran 18 hrs

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10-29-12	12:33	105	105	Pass	KN	Cleaned Monitor Venturi, downtube, etc
11-30-12	1:31pm	98	97	Pass	KN	Cleaned venturi downtube, etc.
12-31-12	12:14	101	98	Pass	KN	Cleaned Venturi, downtube etc

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
10-29-12	12:36	16.71	595	596	17.4 c	17.7 c	13.67	16.99	-1.645	KN
11-30-12	1:34pm	16.70	591	5925	7.5 c	8.0 c	14.13	17.12	-2.45	KN
12-31-12	12:17pm	16.72	587	588	-3.6 c	-3.2 c	14.99	17.53		

APPENDIX E

Independent PM_{10} Sampler Performance Audit Report

AUDIT REPORT FOR

ALTON COAL DEVELOPMENT MONITORING PROJECT
ALTON, UTAH

FOURTH QUARTER 2012

Prepared by

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December 12, 2012

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1.0 AUDIT SUMMARY

Alton Coal Development is operating three (3) Federal Reference Method (FRM) PM_{10} particulate samplers and a meteorological station at the Coal Hollow Mine near Alton, Utah. Air Resources Specialists, Inc. (ARS) conducted a performance audit of the monitoring systems on October 16, 2012. 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*

At the time of the audit, all three (3) FRM particulate samplers and all of the meteorological systems were operating within EPA and project accuracy goals, with the exception of the wind direction linearity. Air quality audit results are summarized by parameter in Table 1-1.

Table 1-1

Summary of Air Quality Audit Results

Parameter	Manufacturer/Instrument	Within Accuracy Goal
Particulate Sampler		
PM_{10}	BGI PQ200 – Background	Yes
PM_{10}	BGI PQ200 – East Collocated	Yes
PM_{10}	BGI PQ200 – West Collocated	Yes
Meteorological Equipment		
Wind Speed/Direction	Met One 034B	No
Temperature	Campbell Scientific CS	Yes
Precipitation	Hydrological Services TB4	Yes

Details of the audit are presented in the following sections:

Section 2.0	Audit Methods
Section 3.0	Audit Equipment
Section 4.0	Audit Results
Appendix A	Audit Data Sheets
Appendix B	Audit Standards Certifications

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

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2.0 AUDIT METHODS

Audit procedures, audit challenge ranges, and acceptance criteria are described below. These ranges and limits exceed or conform to the Alton Coal Quality Assurance Project Plan prepared by JBR. Audit results were verbally communicated to the Alton Coal Development Environmental Manager prior to departure from the site. Audit data forms are provided in Appendix A.

2.1 PARTICULATE SAMPLERS

Three (3) volumetric flow FRM PM_{10} particulate samplers were audited. ARS audited the sampler with a BIOS Definer 220 instrument which measures flow, ambient temperature, and barometric pressure. After conducting the flow audit, a system leak check was performed. During a leak check, the Model PQ200 FRM sampler will not measure flow rate; therefore, a change in vacuum over a two-minute period is used to identify a leak. The instrument manufacturer states in the operation manual, a measurement of $\geq$5 cm of water in a two-minute period is considered a leak. This value will be used to identify if a leak is present. The observed volumetric operational flow and design flow of the sampler were compared to the audit flows measured by the ARS BIOS. Differences between the operational sampler flow and audit flow that are greater than ±4% are considered out of tolerance. Differences between the designated design flow and the audit flow greater than ±5% are considered out of tolerance as indicated in 40 CFR Part 58 Appendix A. In addition to the flow audits, the FRM's observed ambient temperature and barometric pressure sensors were also audited by comparison to the BIOS values. A temperature difference greater than ±2.0°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

FRM PM_{10} Particulate Samplers
Audit Methods and Acceptance Criteria

Parameter	Audit Method	Acceptance Criteria
Leak Check	Change in vacuum of closed inlet in 2 minutes	< 5 cm H_2O in 2 min*
Actual Volumetric Sampler Flow	DeltaCal audit flow to actual sampler flow (volumetric)	$\leq$ ±4%
Designated Design Flow	Designated design flow to audit flow (volumetric)	$\leq$ ±5%
Ambient Temperature (°C)	Audit temperature to sampler temperature	$\leq$ ±2°C
Barometric Pressure (mm Hg)	Audit barometric pressure to sampler pressure	$\leq$ ±10mm Hg

*As suggested by manufacturer.

2.2 METEOROLOGICAL PARAMETERS

Meteorological measurement systems were audited in accordance with the EPA's *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV – Meteorological Measurements*, (March 2008). Accuracy goals for the meteorological parameters were obtained

from the EPA's *On-Site Meteorological Program Guidance for Regulatory Modeling Applications*. ARS used National Institute of Standards and Technologies (NIST)-traceable test equipment for all meteorological parameters. Audit ranges and acceptable criteria for each parameter are summarized in Table 2-2. Meteorological audit procedures follow.

Table 2-2

Meteorological Sensors
Audit Ranges and Acceptance Criteria

Sensor	Parameter	Audit Challenge Ranges	Acceptance Criteria
Wind Speed (Horizontal)	• Speed Accuracy	Three (3) RPM Values	0.447 mph + 5% of Observed
	• Starting Threshold	Starting Torque	≤0.2 gm-cm (horizontal) ≤2.0 gm-cm (vertical)
Wind Direction	• Orientation Accuracy	To and From Two (2) Landmarks	±5° in Any Direction
	• Response Threshold	Starting Torque	≤7.0 gm-cm
Temperature and	• Accuracy and Linearity	Three (3) Temperature Baths: 0°C, Near Ambient, and Near Full-Scale	Temperature ±0.5°C
Precipitation	• Accuracy	Compared to Three (3) Known Amounts of Introduced Water	±10% of Observed
	• Tip Response	Manual Tips	One (1) contact closure per tip

Wind Speed - Dynamic tests of the horizontal wind speed sensors were performed using an R.M. Young model 18810 pulsed motor wind speed calibrator. Each sensor was tested at zero plus three (3) shaft revolution speeds (300, 600, and 900 rpm). The equivalent wind speed was calculated corresponding to the manufacturer's specified values for shaft rpm versus wind velocity and compared to readings obtained from the on-site datalogger and backup strip chart recorder.

Wind Direction - Wind direction sensor audits included the verification of sensor orientation, linearity, and bearing integrity. ARS established two (2) reference landmarks separated by approximately 90°. Accuracy of the landmarks was verified by use of a Brunton compass mounted on a tripod and knowledge of the site location in terms of latitude and longitude. A computer program was used to establish the declination of the site. Once the compass was oriented based on the magnetic declination, wind direction references were established. The sensor orientation was checked by aligning the direction vane to and from each landmark reference.

Potentiometer linearity was tested by verifying the accuracy of the measured wind direction towards and away from the two (2) designated landmarks. If the checks are within ±5 degree accuracy, the linearity is also valid. The linearity checked failed one of the eight points tested.

Temperature- The temperature sensor was audited by immersion in three (3) temperature baths with NIST-traceable thermometers. The temperature tests were performed at 0°C, ambient (approximately 20°C), and as near to full-scale as possible. Bath temperature readings obtained with the NIST-traceable thermometer were compared to the on-site datalogger output.

Precipitation - The tipping bucket precipitation gauge was audited by using a volumetric precipitation gauge calibrator and transferring a known amount of water through the gauge orifice at a rate equivalent to 2.0 inches/hour of precipitation. The tip response of the on-site datalogger was verified, and the total datalogger values were compared to the actual introduced volumes.

3.0 AUDIT EQUIPMENT

All audit equipment and reference standards were in current calibration and traceable to the NIST or other authoritative references. Table 3-1 lists the specific audit equipment used and recertification dates. Copies of standards certifications for the equipment used in the audit are provided in Appendix C.

Table 3-1

Audit Equipment

References	Manufacturer	Model Number	Serial Number	Recertification Date
FRM Audit	BIOS	Definer 220	117874	12/15/2012
Precipitation Calibrator	Novalynx	2600	N/A	N/A
Temperature	Eutechnics	4400	308288	1/30/2013
Wind Speed	R.M. Young	18802	CA 03806	12/13/2012

4.0 AUDIT RESULTS

Detailed Alton Coal Development monitoring system audit results for the particulate samplers are shown in Tables 4-1 through 4-3; meteorological results are in Table 4-4. Audit findings and recommendations are discussed below.

4.1 AUDIT FINDINGS

Performance Audit Results

- All three (3) PM_{10} samplers were operating within project accuracy goals.
- The meteorological station was operating within project accuracy goals, with the exception of wind direction linearity.

System Audit Results

- No system problems.

Table 4-1
Summary of Audit Findings
Background FRM Sampler
Alton Coal Development
Alton, Utah
October 16, 2012

Parameter	Manufacturer	Instrument Serial No.	Designated Audit Value	Sampler Observed	Accuracy Goal (±)	Difference	Within Accuracy Goal
FRM PM_{10}	**BGI**	**PQ200S-N962A**					
Lk Ck External							
Flow (Volumetric)			17.3	16.7	5.0	-3.4	Y
Flow (Design)							
Ambient Temperature			19.4	19.1	2.0	-0.26	Y
Filter Temperature							
Ambient Pressure			584.0	584.0	10.0	0.0	Y

* PM10 measurement quality objectives were taken from CFR Part 58 Appendix A, Section 10.2.

*Leak check accuracy goals are based on < 5 cm vacuum drop in two minutes, as suggested by manufacturer.

Table 4-2
Summary of Audit Findings
West Collocated FRM Sampler
Alton Coal Development
Alton, Utah
October 16, 2012

Parameter	Manufacturer	Instrument Serial No.	Designated Audit Value	Sampler Observed	Accuracy Goal (±)	Difference	Within Accuracy Goal
FRM PM_{10}	**BGI**	**PQ200S-N964C**					
Lk Ck External			103.0	102.0	15.0	-1.0	Y
Flow (Volumetric)			16.9	16.7	5.0	-1.3	Y
Flow (Design)			16.7	16.7	4.0	-0.2	Y
Ambient Temperature			19.7	19.5	2.0	-0.21	Y
Filter Temperature			21.1	20.8	2.0	-0.28	Y
Ambient Pressure			591.0	589.0	10.0	-2.0	Y

* PM10 measurement quality objectives were taken from CFR Part 58 Appendix A, Section 10.2.

*Leak check accuracy goals are based on < 5 cm vacuum drop in two minutes, as suggested by manufacturer.

Table 4-3
Summary of Audit Findings
West FRM Sampler
Alton Coal Development
Alton, Utah
October 16, 2012

Parameter	Manufacturer	Instrument Serial No.	Designated Audit Value	Sampler Observed	Accuracy Goal (±)	Difference	Within Accuracy Goal
FRM PM_{10}	**BGI**	**PQ200-N963B**					
Lk Ck External			99.0	97.0	5.0	-1.0	Y
Flow (Volumetric)			17.3	16.7	5.0	-3.8	Y
Flow (Design)			16.7	16.7	4.0	0.0	Y
Ambient Temperature			20.6	20.5	2.0	-0.11	Y
Filter Temperature			21.9	21.6	2.0	-0.3	Y
Ambient Pressure			590.0	589.0	10.0	-1.0	Y

* PM10 measurement quality objectives were taken from CFR Part 58 Appendix A, Section 10.2.

*Leak check accuracy goals are based on < 5 cm vacuum drop in two minutes, as suggested by manufacturer.

Table 4-4
Summary of Meteorological Parameters Calibrations
Alton Coal Development
Alton, Utah
October 16, 2012

Network: Alton Coal	**Location: Alton, Utah**	**Site: Coal Hollow**
Date: 10/16/12	**Last Site Visit: 08/15/12**	**Field Specialist: Mike Slate**

Parameter		Criteria	Accuracy Goal	Calibration Results					
				Pre-Maintenance			Post Maintenance		
				Mfg, Model # & Serial #	Value	Pass/Fail	Mfg, Model # & Serial #	Value	Pass/Fail
Precipitation		max error	<= ± 10.0%	Hydrological Services TB4 05-94	5.4%	PASS	Hydrological Services TB4 05-94		
Temperature		max error	<= ± 2.0° C	Campbell Scientific CS N/A	0.1°	PASS	Campbell Scientific CS N/A		
Wind Direction	*Alignment*	max error	<= ± 5°	Met One 034B E2281	3°	PASS	Met One 034B E2281		
	Linearity	max error	<= ± 3°		5°	FAIL			
Wind Speed	*max Wind Speed <5*	max error	<= ± 0.2 m/s	Met One 034B E2281	N/A	N/A	Met One 034B E2281	N/A	N/A
	max Wind Speed >= 5	max error	<= ± 5%		0.1%	PASS		0.1%	PASS

APPENDIX A

Audit Data Sheets

FRM $PM_{2.5}$ Monitor Audit

Date: 10/16/2012 Network: Alton Coal Site: Background Site Auditor: Mike Slate

Manufacturer: BGI Model: PQ200 S/N: PQ200S-N962A

Audit Standards					
Flow Standard	Model BIOS Definer	S/N	117874	Cal. Date	12/15/2011
Temperature Std.	Model Eutechnics 4400	S/N	308288	Cal. Date	1/30/2012
BP Standard	Model BIOS Definer	S/N	117874	Cal. Date	12/15/2011

Leak Check*			
	Start Vacuum	End Vacuum	Difference
Lk Ck Ext. (<5.0")	98.0	97.0	-1

Flow Audit lpm			
	Reference/Std	FRM Observed	% Difference
Flow (Volumetric)	17.26	16.67	-3.4
Flow (Design)	17.26	16.70	-3.2

Temperature °C			
	Reference/Std	FRM Observed	Difference
Ambient Temperature	19.36	19.1	-0.26
Filter Temperature	21.25	21.0	-0.3

Barometric Pressure mmHg			
	Reference/Std	FRM Observed	Difference
Ambient Pressure	584	584.0	0

FRM $PM_{2.5}$ Monitor Audit

Date: 10/16/2012 Network: Alton Coal Site: East Collocated Auditor: Mike Slate

Manufacturer: BGI Model: PQ200 S/N: PQ200-N963B

Audit Standards					
Flow Standard	Model BIOS Definer	S/N	117874	Cal. Date	12/15/2011
Temperature Std.	Model Eutechnics 4400	S/N	308288	Cal. Date	1/30/2012
BP Standard	Model BIOS Definer	S/N	117874	Cal. Date	12/15/2011

Leak Check*			
	Start Vacuum	End Vacuum	Difference
Lk Ck Ext. (<5.0")	103.0	102.0	-1

Flow Audit lpm			
	Reference/Std	FRM Observed	% Difference
Flow (Volumetric)	16.89	16.67	-1.3
Flow (Design)	16.70	16.67	-0.2

Temperature °C			
	Reference/Std	FRM Observed	Difference
Ambient Temperature	19.71	19.5	-0.21
Filter Temperature	21.08	20.8	-0.3

Barometric Pressure mmHg			
	Reference/Std	FRM Observed	Difference
Ambient Pressure	591	589.0	-2

FRM $PM_{2.5}$ Monitor Audit

Date: 10/16/2012 Network: Alton Coal Site: West Collocated Auditor: Mike Slate

Manufacturer: BGI Model: PQ200 S/N: PQ200-N963C

Audit Standards					
Flow Standard	Model BIOS Definer	S/N	117874	Cal. Date	12/15/2011
Temperature Std.	Model Eutechnics 4400	S/N	308288	Cal. Date	1/30/2012
BP Standard	Model BIOS Definer	S/N	117874	Cal. Date	12/15/2011

Leak Check*			
	Start Vacuum	End Vacuum	Difference
Lk Ck Ext. (<5.0")	99.0	97.0	-2

Flow Audit lpm			
	Reference/Std	FRM Observed	% Difference
Flow (Volumetric)	17.32	16.67	-3.8
Flow (Design)	16.70	16.70	0.0

Temperature °C			
	Reference/Std	FRM Observed	Difference
Ambient Temperature	20.61	20.5	-0.11
Filter Temperature	21.9	21.6	-0.3

Barometric Pressure mmHg			
	Reference/Std	FRM Observed	Difference
Ambient Pressure	590.0	589.0	-1

Air Resource Specialists, Inc.

PRECIPITATION AND BAROMETRIC PRESSURE CALIBRATION FORM

Network: Alton Coal	Location: Alton, Utah	Site: Coal Hollow	Date: 10/16/12	Date of Last Site Visit: 08/15/12
				Field Specialist: Mike Slate

Barometric Pressure Reference S/N: N/A		Calibration Date:
Precipitation Reference S/N: N/A	Calibration Volume: 450 ml	Calibration Date:

PRECIPITATION

SENSOR IDENTIFICATION

	Pre-Maintenance	Post Maintenance
Mfg.	Hydrological Services	Hydrological Services
Model #	TB4	TB4
Serial #	05-94	05-94
Inlet Diameter	8.00"	

Reference

Calibration Volume	Inlet Diameter	mm	mm/tip
900 cc	6.06	48.3	4.73
	8.00	27.8	8.23
	9.66	19.0	4.73
	Novalynx 260-2500	27.8	8.24
936 cc	6.06	50.3	4.73
	8.00	28.9	8.23
	9.66	19.8	4.73
	Novalynx 260-2500	28.9	8.24

PRE-MAINTENANCE					POST MAINTENANCE				
Cal Volume (ml)	Designated value in mm	mm	% Difference	Pass/Fail	Cal Volume (ml)	Designated value in mm	mm	% Difference	Pass/Fail
450	0.56	0.59	5.4%	PASS	450				

Pre-Maint Precipitation Comments:	Data logger reports in inches, 14.99 inches (14.99/25.4 mm/inch=0.59 mm)
Post Maint Precipitation Comments:	

BAROMETRIC PRESSURE

SENSOR IDENTIFICATION

	PRE-MAINTENANCE	POST MAINTENANCE
Mfg.		
Model #		
Serial #		

SENSOR RESPONSE

PRE-MAINTENANCE					POST MAINTENANCE				
Reference	DVM (Volts)	DAS (mm Hg)	Difference	Pass/Fail	Reference	DVM (Volts)	DAS (mm Hg)	Difference	Pass/Fail
Maximum:					Maximum:				

Pre-Maint Barometric Pressure Comments:	
Post Maint Barometric Pressure Comments:	

Air Resource Specialists, Inc.

TEMPERATURE AND RELATIVE HUMIDITY CALIBRATION FORM

Network: Alton Coal	Location: Alton, Utah	Site: Coal Hollow	Date: 10/16/12	Date of Last Site Visit: 08/15/12
				Field Specialist: Mike Slate

Reference Thermometer S/N: 308288		Calibration Date: 01/30/12
Relative Humidity Reference Sensor S/N: N/A		Calibration Date:

TEMPERATURE

SENSOR IDENTIFICATION

	Pre-Maintenance	Post Maintenance
Mfg.	Campbell Scientific	Campbell Scientific
Model #	CS	CS
Serial #	N/A	N/A
Transistor Serial #	N/A	N/A

PRE-MAINTENANCE SENSOR RESPONSE

REF. TEMP (°C)	TEMPERATURE		Difference (°C)	Pass/Fail
	DVM (volts)	DAS (°C)		
0.2		0.2	0.0	PASS
22.9		22.8	-0.1	PASS
45.7		45.6	-0.1	PASS
	Maximum Difference:		0.1	PASS

POST MAINTENANCE SENSOR RESPONSE

REF. TEMP (°C)	TEMPERATURE		Difference (°C)	Pass/Fail
	DVM (volts)	DAS (°C)		
	Maximum Difference:			

Pre-Maint Temperature Comments:	
Post Maint Temperature Comments:	

RELATIVE HUMIDITY

SENSOR IDENTIFICATION

	Pre-Maintenance	Post Maintenance
Mfg.		
Model #		
Serial #		

PRE-MAINTENANCE SENSOR RESPONSE

HOUR	DAS	T.STD	Difference	Pass/Fail
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
Average ABS % Difference:				
Maximum % Difference:				

POST MAINTENANCE SENSOR RESPONSE

HOUR	DAS	T.STD	Difference	Pass/Fail
10:00				
11:00				
12:00				
13:00				
14:00				
15:00				
Average ABS % Difference:				
Maximum % Difference:				

Screen dirty/clogged on RH pre-maintenance sensor? (check one):	☐ Yes ☐ No

Pre-Maint Relative Humidity Comments:	
Post Maint Relative Humidity Comments:	

Air Resource Specialists, Inc.

WIND DIRECTION CALIBRATION FORM

Network: Alton Coal	Location: Alton, Utah	Site: Coal Hollow	Date: 10/16/12	Date of Last Site Visit: 08/15/12
				Field Specialist: Mike Slate

To Landmark #1: 251 Degrees True	From Landmark #1: 71	LM Description:	Tallest tower to the west
To Landmark #2: 119 Degrees True	From Landmark #2: 299	LM Description:	Lone pine of ridge east of dome
Declination: Degrees			
Wind Direction Reference S/N: 5040791146		Calibration Date:	

WIND DIRECTION

SENSOR IDENTIFICATION

	PRE-MAINTENANCE	POST MAINTENANCE
Mfg.	Met One	Met One
Model #	034B	034B
Serial #	E2281	E2281
Translator Serial #	N/A	N/A

WIND DIRECTION ALIGNMENT

Land Mark Reference	PRE-MAINTENANCE				POST MAINTENANCE			
	DVM (volts)	DAS (degrees)	Degrees Difference	Pass/Fail	DVM (volts)	DAS (degrees)	Degrees Difference	Pass/Fail
To 1		251	0	PASS				
From 1		74	3	PASS				
To 2		116	-3	PASS				
From 2		297	-2	PASS				
	Average Difference:		2	PASS	Average Difference:			
	Maximum Difference:		3	PASS	Maximum Difference:			

WIND DIRECTION LINEARITY

Check Point	PRE-MAINTENANCE				POST MAINTENANCE			
	DVM (volts)	DAS (degrees)	Degrees Difference	Pass/Fail	DVM (volts)	DAS (degrees)	Degrees Difference	Pass/Fail
1		353	5	FAIL				
2		36	-2	PASS				
3		83	2	PASS				
4		127	-1	PASS				
5		170	-2	PASS				
6		216	1	PASS				
7		258	-3	PASS				
8		303	0	PASS				
	Average Difference:		2	PASS	Average Difference:			
	Maximum Difference:		5	FAIL	Maximum Difference:			

Pre-Maint Wind Direction Comments:	Sent replacement bearings and potentiometer.
Post Maint Wind Direction Comments:	

Air Resource Specialists, Inc.

WIND SPEED CALIBRATION FORM

Network: Alton Coal	Location: Alton, Utah	Site: Coal Hollow	Date: 10/16/12	Date of Last Site Visit: 08/15/12
				Field Specialist: Mike Slate

Wind Speed Reference S/N: CA 03806		Calibration Date: 12/13/11

WIND SPEED

SENSOR IDENTIFICATION

	PRE-MAINTENANCE	POST MAINTENANCE
Mfg.	Met One	Met One
Model #	034B	034B
Serial #	E2281	E2281
Translator Serial #	N/A	N/A

Motor Speed (rpm)		WIND SPEED PRE-MAINTENANCE					WIND SPEED POST MAINTENANCE				
	Met-One (m/s)	DVM (volts)	DAS (m/s)	Difference (m/s)	% Difference	Pass/Fail	DVM (volts)	DAS (m/s)	Difference (m/s)	% Difference	Pass/Fail
300	8.27		8.27	0.00	0.0%	PASS		8.27	0.00	0.0%	PASS
600	16.27		16.26	-0.01	-0.1%	PASS		16.26	-0.01	-0.1%	PASS
900	24.25										
1200	32.24										
1800	48.22										
Maximum ABS Difference (use if Wind Speed <5):				0.010					0.010		
Maximum ABS % Difference (use if Wind Speed >=5):					0.1%	PASS				0.1%	PASS

Pre-Maint Wind Speed Comments:	Performed checks in both clockwise and counter clockwise direction.
Post Maint Wind Speed Comments:	

APPENDIX B

Audit Standards Certifications

MesaLabs

NVLAP Lab Code 200661

Calibration Certificate

Certificate No.	5010692	**Sold to:**	Air Resource Specialists - Fort Collins
Product	Definer 220 High Flow		1901 Sharp Point Drive, Suite E
Serial No.	117874		Fort Collins, CO 80525
Cal. Date	12/15/2011		USA

All calibrations are performed in accordance with ISO 17025 at Bios International, a division of Mesa Laboratories, Inc., 10 Park Place, Butler, NJ, 07405, 800-663-4977, an ISO 17025:2005 - accredited laboratory through NVLAP. This report shall not be reproduced except in full without the written approval of the laboratory. Results only relate to the items calibrated. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

All units tested in accordance with our test number PR18-13 using high-purity nitrogen or filtered laboratory air.

As Received Calibration Data

Technician Sonia Otero

Lab. Pressure 766 mmHg
Lab. Temperature 22.4 °C

Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation	As Received
500.04 sccm	500.665 sccm	-0.12%	1.00%	In Tolerance
5017.4 sccm	5005.15 sccm	0.24%	1.00%	In Tolerance
30171 sccm	30057 sccm	0.38%	1.00%	In Tolerance
21.6 °C	22 °C	-0.4°C	±0.8°C	In Tolerance
766 mmHg	765 mmHg	1 mmHg	±3.5mmHg	In Tolerance

Bios International Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML-800-44	103521	11/15/2011	11/14/2012
Precision Thermometer	305460	8/15/2011	8/14/2012
Precision Barometer	2981392	5/27/2011	5/26/2012

Bios International, a division of Mesa Laboratories Inc. 10 Park Place Butler, NJ 07405 USA
(973) 492-8400 FAX (973) 492-8270 www.biosint.com www.mesalabs.com Symbol "MLAB" on the NASDAQ

MesaLabs

NVLAP®
NVLAP Lab Code 200661

As Shipped Calibration Data

Certificate No. 5010692
Technician Sonia Otero

Lab. Pressure 755 mmHg
Lab. Temperature 22.5 °C

Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation	As Shipped
503.07 sccm	501.82 sccm	0.25%	1.00%	In Tolerance
5014.1 sccm	5004.95 sccm	0.18%	1.00%	In Tolerance
30151 sccm	30036.5 sccm	0.38%	1.00%	In Tolerance
22.1 °C	22.1 °C	-	±0.8°C	In Tolerance
755 mmHg	755 mmHg	-	±3.5mmHg	In Tolerance

Bios International Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML-800-44	101897	11/3/2011	11/2/2012
Precision Thermometer	305460	8/15/2011	8/14/2012
Precision Barometer	2981392	5/27/2011	5/26/2012

Calibration Notes

Bios is an ISO 17025-accredited metrology laboratory. Each Bios primary gas flow standard is dynamically verified by comparing it to one of our laboratory standards, which is a Proven DryCal® Technology volumetric piston prover of much higher accuracy (±0.25 % or less) but of similar operating principles. For this purpose, a flow generator of ±0.10 % or less stability is used. Our laboratory standards are qualified by direct measurement of their dimensions (diameter, length and time) using NIST-traceable precision gauges and instruments, such as depth micrometers and laser micrometers. Calibration Certificates for these gauges and instruments are available upon request. Rigorous analyses of our laboratory standards' uncertainties have been performed, in accordance with The Guide to the Expression of Uncertainty in Measurement (the GUM), assuring their traceable accuracy.
Flow readings in sccm performed at STP of 21.1°C and 760 mmHg.

Technician Notes: _____

David W. Wilson, Chief Metrologist

Bios International, a division of Mesa Laboratories Inc. 10 Park Place Butler, NJ 07405 USA
(973) 492-8400 FAX (973) 492-8270 www.biosint.com www.mesalabs.com Symbol "MLAB" on the NASDAQ

MICRO PRECISION CALIBRATION INC.

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

Certificate of Calibration

Date: 1/30/2012 **Certificate #: 1661633**

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

Purchase Order: A25785
Work Order: 145249

MPC Control #: CJ6336
Asset ID: N/A
Gage Type: DIGITAL THERMOMETER
Manufacturer: EUTECHNICS
Model Number: 4400
Size: N/A
Temp./RH: 22 °C / 34 %

Serial Number: 308288
Department: N/A
Performed By: ANDREW BORICH
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal Date: January 30, 2012
Cal. Interval: 12 MONTHS
Cal. Due Date: January 30, 2013

Found conditions meet or exceed manufacturer specifications.

***Calibration Notes:**

Test Points

Description	Standard	Tolerance -	Tolerance +	As Found	As Left	UOM	Result
TEMPERTATURE	0.00	-0.03	0.03	0.00	0.00	°C	Pass
TEMPERTATURE	22.00	21.97	22.03	22.01	22.01	°C	Pass
TEMPERTATURE	100.00	99.97	100.03	99.99	99.99	°C	Pass

Standards Used To Calibrate Equipment

I.D.	Description	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AG7135	RTDTHERMOMETER	A1011	T1019-7090	AZONIX	11/21/2012	1590511
AV2077	MICRO-BATH W/AV2076	7012 & 2083	A83355	HART SCIENTIFIC	2/22/2012	1264248
CE4731	TEMPERATURE CALIBRATOR	D55	911552	JOFRA	11/3/2012	1585988

Procedures Used In This Event:

Procedure Name	Description

Calibrating Technician: ANDREW BORICH

QC Approval: BRIAN GOLD

Unless Otherwise Noted, Uncertainty Estimated at >= 4 to 1. Uncertainties have been estimated at a 95 percent confidence level (k=2). Services rendered comply with ISO 17025:2005, ISO 9001:2008, ANSI/NCSL Z540-3, 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 the National Institute of Standards and Technology (NIST). Services rendered include proper manufacturer's service instructions and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in whole without the prior written approval of the issuing MPC lab.

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

Certificate of Calibration

Date: 1/30/2012
THERMOMETER DIGITAL

THERMOMETER, DIG 17-20ST-183 (GEN)

Certificate #: 1661633

Calibrating Technician: ANDREW BORICH

QC Approval: BRIAN GOLD

Unless Otherwise Noted, Uncertainty Estimated at >= 4 to 1. Uncertainties have been estimated at a 95 percent confidence level (k=2). Services rendered comply with ISO 17025:2005, ISO 9001:2008, ANSI/NCSL Z540-3, MPC Quality Manual, MPC CSO 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.

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