Alton Coal Development, LLC.

Summary of PM_{10} Data
Collected at Coal Hollow Mine, Utah
Annual Report, 2015

Submitted to:
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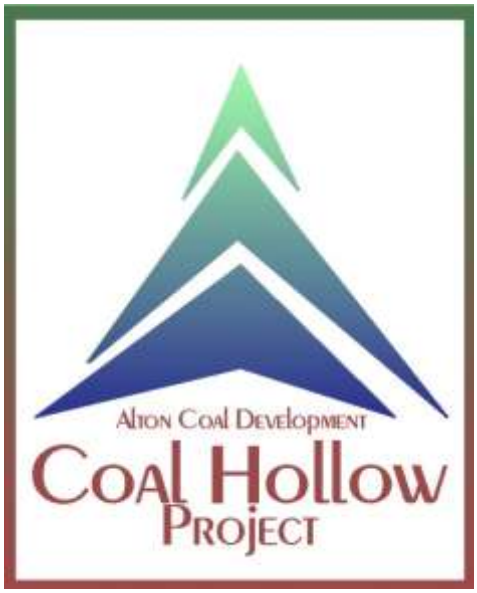

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1.0 INTRODUCTION

This report summarizes measurements of Particulate Matter less than 10 microns nominal aerodynamic diameter (PM_{10}) collected and processed by Alton Coal Development, LLC, 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 year of 2015.

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 37º 24' 5.04" North Latitude, 112º 27' 20.91" West Longitude, WGS84 Datum. The background monitor coordinates are 37º 24' 21.96" North Latitude, 112º 25' 59.97" West Longitude, WGS84 Datum.

Figure 1 - Site Location Map

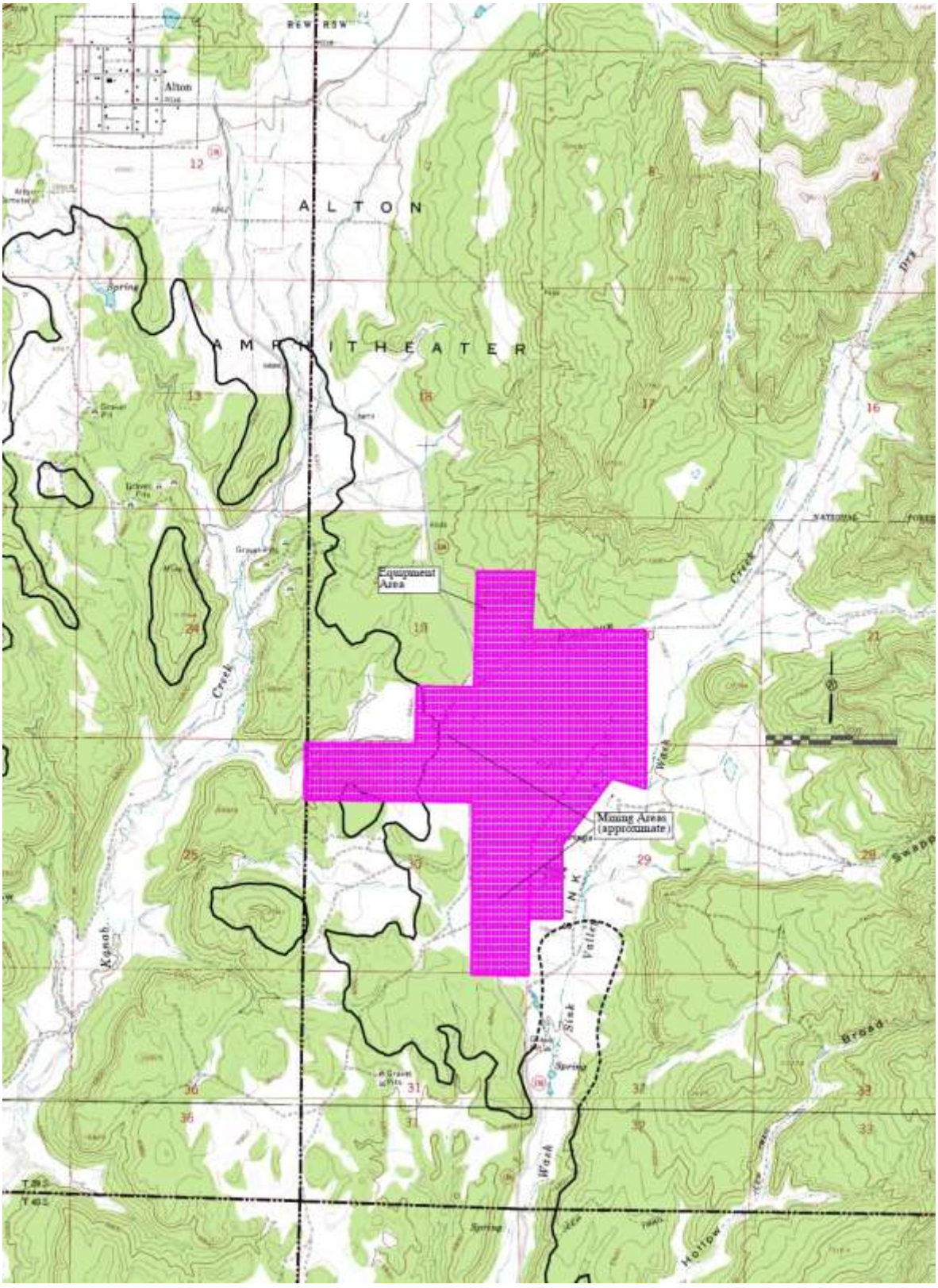


Figure 2 - Satellite View of Monitoring Locations

3.0 AIR QUALITY DATA SUMMARIES

A 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, 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 was used.

The highest 24-hour mean PM_{10} concentrations measured during the year 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 $\mu g/m^3$ with the exception of the sample date of June 29th. The 29th sample was 161.3 $\mu g/m^3$ for the compliance monitor. Data for each monitor has been graphed and analyzed for 2015. These graphs are presented in Appendix B. PM10

pollution from an active mine site relies greatly on current weather conditions and the persistence of the operator to control particulate matter.

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. However, permitting has been completed for the North Private Lease (NPL) area of the Coal Hollow Mine. Monitors located at the CHM are not sufficient to monitor activities at the NPL. Prior to initiation of disturbances at the NPL, two additional BGI PQ200 PM_{10} monitors will be installed at a location modeled to monitor the highest PM10 concentrations for activities in the NPL.

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

RANK	DATE	PM_{10} CONCENTRATION
Highest	8/22/2015	19.9
2nd Highest	6/29/2015	17.2
Annual Mean	1/1/15-12/31/15 (55 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	6/29/2015	161.3
2nd Highest	6/5/2015	111.2
Annual Mean	1/1/15-12/31/15 (54 valid samples)	24.5

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

RANK	DATE	PM_{10} CONCENTRATION
Highest	8/4/2015	104.6

2nd Highest	6/5/2015	93
Annual Mean	1/1/15-12/31/15 (32 valid samples)	22.5

Table IV – Mean Annual Wind Speed

	Annual 2015
Mean Wind Speed (m/s)	2.51

4.0 DATA RECOVERY AND QUALITY ASSURANCE

4.1 Data Recovery

Monitor 962A

Monitor 962A collected 55 of the 60 samples during the quarter. The percent recovery for this quarter is 92%. For the sample date of Jan. 6th the start for the monitor was inadvertently set for Jan. 7th. For the sample date of Jan. 30th there was no errors, the monitor did not run.
Monitor 962A collected 15 of the 15 samples during the quarter. The percent recovery for this quarter is 100. For the sample date of August 4th the monitor overran the stop time and continued to run for 61:07 hrs. For the sample date of August 10th the monitor overran the stop time and continued to run for 34:13 hrs. For the sample date of September 3rd the monitor overran the stop time and continued to run for 130:30 hrs.

Monitor 963B

Monitor 963B collected 54 of the 60 samples during the quarter. The percent recovery for this quarter is 90%. For the sample date of April 24th no data file was downloaded. For the sample date of April 30th a filter used during maintenance was inadvertently left in the monitor. For the sample date of August 28th the pump failed after start-up while parts where ordered, ACD continued to try and run the monitor on September 3rd, September 9th, and September 15th, but the pump would not function during a programed run.

Monitor 964C

Monitor 964C collected 32 of the 60 samples during the quarter. The percent recovery for this quarter is 53%. For the sample date of Jan 6th the monitor ran 13:32 hours and shut down

with errors indicating a leak, no leak as found. For the sample date of Jan 18th the monitor ran 3 seconds and shut down with Q and T errors. For the sample date of Jan 24th the monitor ran 3 seconds and shut down with Q and T errors. For the sample date of Feb 5th the monitor ran 12:06 hours and shut down with errors indicating a leak, no leak as found. For the sample date of Feb 11th the monitor ran 3 seconds and shut down with Q and T errors. For the sample date of Mar 7th the monitor ran for 3 seconds and shut down with Q and T errors.

Monitor 964C collected 6 of the 15 samples during the quarter. The percent recovery for this quarter is 40%. For the sample date of Apr. 6th the monitor ran 00:03 hours and shut down with Q and T errors. For the sample date of Apr. 12th the monitor ran 3 seconds and shut down with Q and T errors. For the sample date of Apr. 18th the monitor ran 14:42 hours and shut down with Q and T errors. For the sample date of Apr. 24th the monitor ran 00:03 hours and shut down with Q and T errors. For the sample date of Apr. 30th and May 6th the monitor was removed for maintenance. For the sample date of Jun. 17th, 23rd, and 29th the monitor ran for 2 minutes and shut down with Q and T errors. For the sample date of July 11th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of July 29th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of August 16th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of September 15th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of Oct. 21st the monitor ran 04:49 hours and shut down with Q and T errors. For the sample date of Oct. 27th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of Nov. 2nd the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of Nov. 8th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of Nov. 14th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of Nov. 20th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of Nov. 26th the monitor ran 00:02 hours and shut down with Q and T errors. For the sample date of Dec. 2nd the monitor was taken out of service for repairs. A new mass flow sensor was installed. For the sample date of Dec. 8th the monitor ran 01:52 hours and shut down with T errors due to the operator not reconnecting the back-up power supply. The 964C has run all successive date without a problem since replacement of mass flow sensor.

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	60	55	92%

963B	60	54	90%
964C	60	32	53%

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 22 valid pairs of co-located monitoring data during the year. Single point precision based on *40 CFR, Part 58,* Appendix A Equation 10 ranged from -40.0% to 68.5% with the 55% 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 27.45%. This value is above the 10% goal for aggregate CV. The value for the year CV was significantly impacted by the three outlier values of 61.6%, 63.9% and 68.5%.

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 March 18, 2015, June 3, 2015, July 22, 2015 and

October 22, 2015. 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 VI - Audit Summary

	SAMPLER	AUDIT % DIFFERENCE	LIMIT*	DESIGN % DIFFERENCE	LIMIT*
1st Quarter	962A	-9.2	±4%	9.9	± 5%
	963B	-0.7	±4%	0.7	± 5%
	964C	-4.7	±4%	4.9	± 5%
2nd Quarter	962A	-1.9	±4%	2.0	± 5%
	963B	0.7	±4%	0.0	± 5%
	964C	-1.3	±4%	1.3	± 5%
3rd Quarter	962A	-2.1	±4%	2.2	± 5%
	963B	0.2	±4%	-0.2	± 5%
	964C	0.3	±4%	-0.3	± 5%
4th Quarter	962A	-2.1	±4%	2.2	± 5%
	963B	-0.8	±4%	0.8	± 5%
	964C	4.5	±4%	0.3	± 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

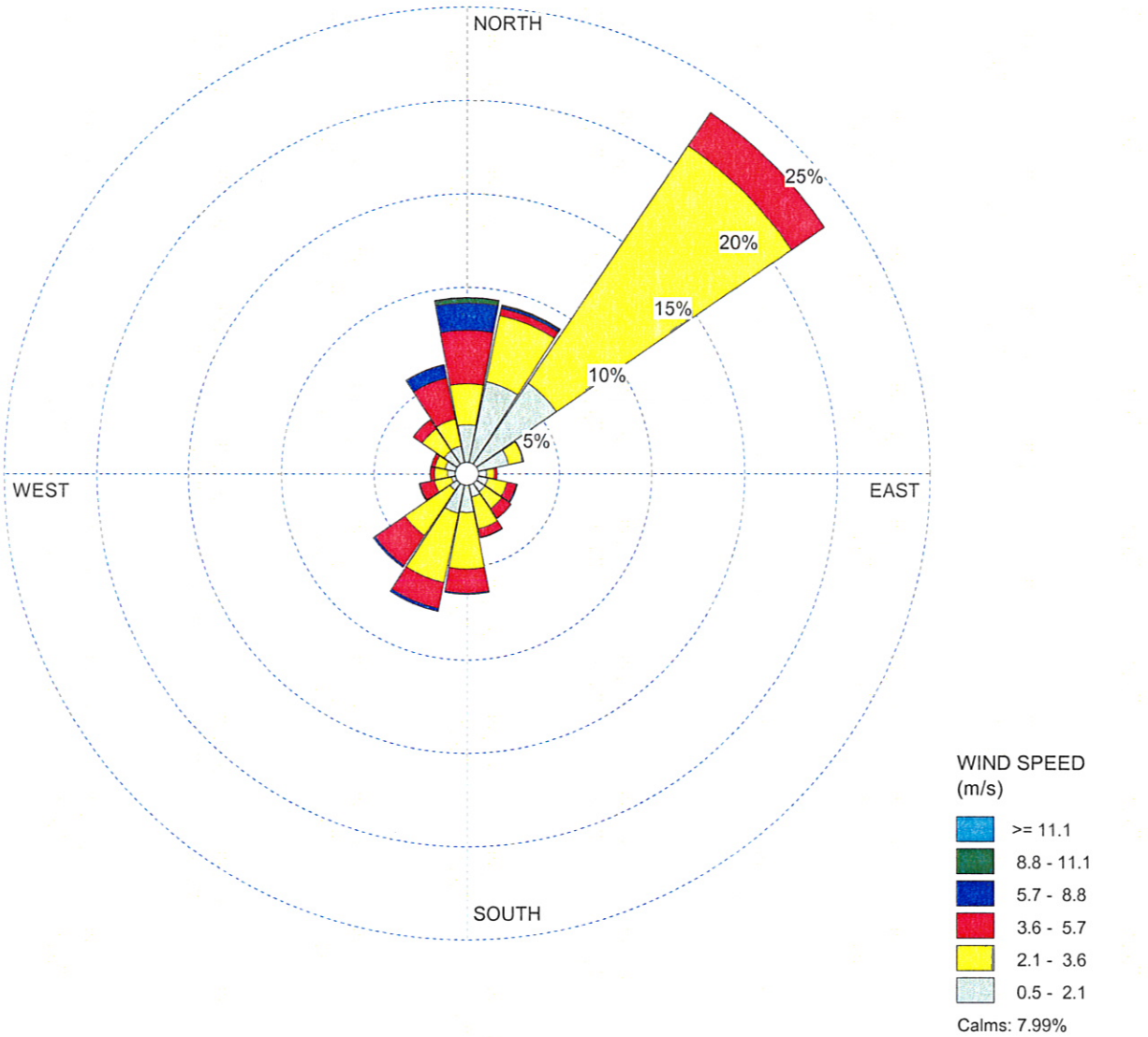
Windrose

WIND ROSE PLOT:

Alton Coal Development , Alton, Utah
2015 Annual

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/2015 - 00:00 **End Date: 12/31/2015 - 23:00**	**Alton Coal Development, LLC - Coal Hollow Mine**	
		MODELER: **K. Nicholes**	
	CALM WINDS: **7.99%**	TOTAL COUNT: **8760 hrs.**	
	AVG. WIND SPEED: **2.51 m/s**	DATE: **2/24/2016**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Station ID: 1 Run ID:
Start Date: 1/1/2015 - 00:00
End Date: 12/31/2015 - 23:00

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	230	192	251	128	22	2	825
11.25-33.75	441	315	35	11	5	0	807
33.75-56.25	513	1342	189	0	0	0	2044
56.25-78.75	203	70	3	0	0	0	276
78.75-101.25	93	37	15	0	0	0	145
101.25-123.75	101	93	45	5	0	0	244
123.75-146.25	103	97	53	1	0	0	254
146.25-168.75	113	151	41	3	0	0	308
168.75-191.25	183	265	112	5	0	0	565
191.25-213.75	190	332	124	14	0	0	660
213.75-236.25	95	257	170	10	0	0	532
236.25-258.75	75	81	69	4	0	0	229
258.75-281.25	92	60	20	1	0	0	173
281.25-303.75	106	48	18	0	0	0	172
303.75-326.25	131	123	51	0	0	0	305
326.25-348.75	134	127	198	61	1	0	521
Total	2803	3590	1394	243	28	2	8760

Frequency of Calm Winds: 700
Average Wind Speed: 2.51 m/s

Station ID: 1 Run ID:
Start Date: 1/1/2015 - 00:00
End Date: 12/31/2015 - 23:00

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	0.026256	0.021918	0.028653	0.014612	0.002511	0.000228	0.094178
11.25-33.75	0.050342	0.035959	0.003995	0.001256	0.000571	0.000000	0.092123
33.75-56.25	0.058562	0.153196	0.021575	0.000000	0.000000	0.000000	0.233333
56.25-78.75	0.023174	0.007991	0.000342	0.000000	0.000000	0.000000	0.031507
78.75-101.25	0.010616	0.004224	0.001712	0.000000	0.000000	0.000000	0.016553
101.25-123.75	0.011530	0.010616	0.005137	0.000571	0.000000	0.000000	0.027854
123.75-146.25	0.011758	0.011073	0.006050	0.000114	0.000000	0.000000	0.028995
146.25-168.75	0.012900	0.017237	0.004680	0.000342	0.000000	0.000000	0.035160
168.75-191.25	0.020890	0.030251	0.012785	0.000571	0.000000	0.000000	0.064498
191.25-213.75	0.021689	0.037900	0.014155	0.001598	0.000000	0.000000	0.075342
213.75-236.25	0.010845	0.029338	0.019406	0.001142	0.000000	0.000000	0.060731
236.25-258.75	0.008562	0.009247	0.007877	0.000457	0.000000	0.000000	0.026142
258.75-281.25	0.010502	0.006849	0.002283	0.000114	0.000000	0.000000	0.019749
281.25-303.75	0.012100	0.005479	0.002055	0.000000	0.000000	0.000000	0.019635
303.75-326.25	0.014954	0.014041	0.005822	0.000000	0.000000	0.000000	0.034817
326.25-348.75	0.015297	0.014498	0.022603	0.006963	0.000114	0.000000	0.059475
Total	0.319977	0.409817	0.159132	0.027740	0.003196	0.000228	0.920091

Frequency of Calm Winds: 7.99%
Average Wind Speed: 2.51 m/s

APPENDIX B

Listing of PM_{10} Concentrations

Background Monitor 962A

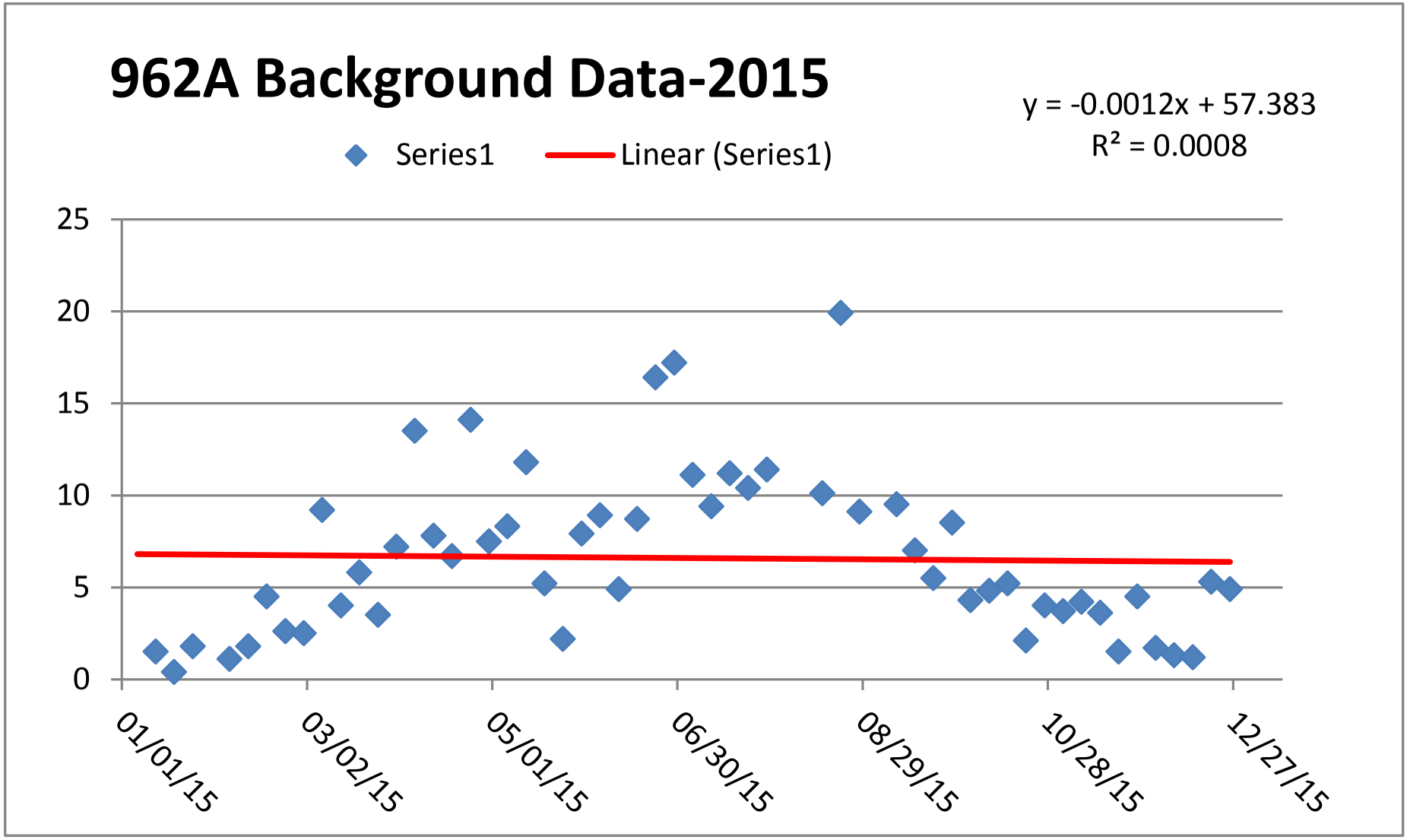
PM_{10} Sampler Summary

January 1, 2015 - December 31, 2015

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
01/06/15	P2916478	**Invalid - BJ**	**Invalid - BJ**	13:11	13.2	11.0	370.684	370.710	0.026	SP	Wrong start date
01/12/15	P2916481	**1.3**	**1.5**	23:59	24.0	20.1	372.914	372.946	0.032		
01/18/15	P2916765	**0.4**	**0.4**	23:59	24.0	20.1	372.043	372.053	0.010		
01/24/15	P2916767	**1.5**	**1.8**	23:59	24.0	20.1	370.324	370.362	0.038		
01/30/15	P2916770	**Invalid - AN**	**Invalid - AN**	0:00		0.0	369.868	369.867	-0.001	SP,NM	
02/05/15	P2918610	**0.9**	**1.1**	23:59	24.0	19.8	361.947	361.970	0.023		
02/11/15	P2918614	**1.5**	**1.8**	23:59	24.0	20.1	367.087	367.124	0.037		
02/17/15	P2918893	**3.8**	**4.5**	24:00	24.0	20.3	364.686	364.779	0.093		
02/23/15	P2918890	**2.2**	**2.6**	23:59	24.0	20.3	362.007	362.061	0.054		
03/01/15	P2919163	**2.1**	**2.5**	23:59	24.0	20.2	366.682	366.734	0.052		
03/07/15	P2919166	**7.7**	**9.2**	23:59	24.0	20.1	373.113	373.300	0.187		
03/13/15	P2919169	**3.3**	**4.0**	23:59	24.0	19.9	364.253	364.333	0.080		
03/19/15	P2919513	**4.7**	**5.8**	24:00	24.0	19.6	366.232	366.346	0.114		
03/25/15	P2919516	**2.9**	**3.5**	23:59	24.0	19.9	370.697	370.768	0.071		
03/31/15	P2919857	**5.9**	**7.2**	23:59	24.0	19.5	363.267	363.409	0.142		
04/06/15	P2919860	**10.9**	**13.5**	23:59	24.0	19.5	366.657	366.921	0.264		
04/12/15	P2920158	**6.3**	**7.8**	23:59	24.0	19.5	367.401	367.554	0.153		
04/18/15	P2920161	**5.4**	**6.7**	23:59	24.0	19.7	360.880	361.012	0.132		
04/24/15	P2920164	**11.5**	**14.1**	23:59	24.0	19.6	363.615	363.892	0.277		
04/30/15	P2920503	**6.0**	**7.5**	24:00	24.0	19.3	365.678	365.824	0.146		
05/06/15	P2920505	**6.6**	**8.3**	23:59	24.0	19.4	365.767	365.928	0.161		
05/12/15	P2920507	**9.4**	**11.8**	23:59	24.0	19.2	369.183	369.410	0.227		
05/18/15	P2920762	**4.3**	**5.2**	23:59	24.0	19.7	367.343	367.447	0.104		
05/24/15	P2920765	**1.8**	**2.2**	23:59	24.0	19.6	363.272	363.317	0.045		
05/30/15	P2921327	**6.3**	**7.9**	23:59	24.0	19.2	381.295	381.447	0.152		
06/05/15	P2921330	**7.1**	**8.9**	24:00	24.0	19.3	377.865	378.037	0.172		
06/11/15	P2921620	**3.9**	**4.9**	23:59	24.0	19.3	381.798	381.893	0.095		
06/17/15	P2921624	**6.8**	**8.7**	23:59	24.0	19.0	378.910	379.075	0.165		
06/23/15	P2921084	**12.8**	**16.4**	23:59	24.0	18.9	364.832	365.142	0.310		
06/29/15	P2921078	**13.4**	**17.2**	23:59	24.0	18.8	367.735	368.058	0.323		
07/05/15	P2921083	**8.7**	**11.1**	23:59	24.0	18.9	364.910	365.121	0.211		
07/11/15	P2923696	**7.5**	**9.4**	23:59	24.0	19.2	377.971	378.153	0.182	TD	
07/17/15	P2923699	**8.8**	**11.2**	23:59	24.0	18.9	383.223	383.435	0.212		
07/23/15	P2924062	**8.3**	**10.4**	24:00	24.0	19.1	384.853	385.053	0.200	TD	
07/29/15	P2924066	**9.0**	**11.4**	23:59	24.0	18.9	377.649	377.866	0.217		
08/04/15	P2924462	**Invalid - AG**	**Invalid - AG**	61:07	61.2	48.3	387.765	388.144	0.379		
08/10/15	P2924463	**Invalid - AG**	**Invalid - AG**	34:13	34.3	27.1	386.233	386.465	0.232		
08/16/15	P2922747	**7.9**	**10.1**	23:59	24.0	18.8	374.422	374.613	0.191		
08/22/15	P2922750	**15.6**	**19.9**	23:59	24.0	18.9	385.108	385.485	0.377	TD	
08/28/15	P2922754	**7.1**	**9.1**	23:59	24.0	19.0	378.659	378.832	0.173		
09/03/15	P2924550	**Invalid - AG**	**Invalid - AG**	130:30	130.7	103.9	385.594	386.595	1.001		
09/09/15	P2924553	**7.5**	**9.5**	23:59	24.0	19.0	381.033	381.214	0.181		
09/15/15	P2924556	**5.6**	**7.0**	23:59	24.0	19.3	377.440	377.577	0.137		
09/21/15	P2924862	**4.4**	**5.5**	23:59	24.0	19.1	386.496	386.602	0.106		
09/27/15	P2924865	**6.7**	**8.5**	24:00	24.0	19.2	384.181	384.344	0.163		
10/03/15	P2925402	**3.4**	**4.3**	23:59	24.0	19.3	383.774	383.858	0.084		
10/09/15	P2925405	**3.9**	**4.8**	23:59	24.0	19.4	378.354	378.448	0.094		
10/15/15	P2925673	**4.2**	**5.2**	23:59	24.0	19.2	380.279	380.380	0.101		
10/21/15	P2925676	**1.7**	**2.1**	23:59	24.0	19.7	385.623	385.666	0.043		
10/27/15	P2925821	**3.2**	**4.0**	23:59	24.0	19.7	381.088	381.167	0.079		
11/02/15	P2925818	**2.9**	**3.7**	24:00	24.0	19.5	383.707	383.779	0.072		
11/08/15	P2925997	**3.4**	**4.2**	23:59	24.0	19.8	378.045	378.129	0.084		
11/14/15	P2926001	**3.0**	**3.6**	23:59	24.0	20.1	380.767	380.841	0.074		
11/20/15	P2925823	**1.2**	**1.5**	23:59	24.0	20.0	385.435	385.466	0.031	XT,TD	
11/26/15	P2926218	**3.8**	**4.5**	23:59	24.0	20.3	372.823	372.915	0.092		
12/02/15	P2926221	**1.4**	**1.7**	23:59	24.0	20.4	374.032	374.068	0.036		
12/08/15	P2926451	**1.1**	**1.3**	23:59	24.0	19.9	381.167	381.194	0.027		
12/14/15	P2926454	**1.0**	**1.2**	23:59	24.0	20.2	381.989	382.015	0.026		
12/20/15	P2926659	**4.5**	**5.3**	23:59	24.0	20.2	381.298	381.407	0.109		
12/26/15	P2926665	**4.3**	**4.9**	23:59	24.0	20.9	378.735	378.839	0.104	TD	
02/11/15	P2918613		**Field Blank**				368.396	368.401	0.005		
05/28/15	P2920769		**Field Blank**				364.719	364.730	0.011		
07/01/15	P2921082		**Field Blank**				364.717	364.735	0.018		
07/27/15	P2924065		**Field Blank**				380.181	380.187	0.006		
11/17/15	P2925822		**Field Blank**				379.095	379.110	0.015	XT	

# Valid	Recovery	Average	St. Dev.	Max	Min
55	**92%**	**6.6**	**4.4**	**19.9**	**0.4**


962A Background Data-2015
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R² = 0.0008
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Linear (Series1)
25
20
15
10
5
0
01/01/15
03/02/15
05/01/15
06/30/15
08/29/15
10/28/15
12/27/15

Compliance Monitor 963B

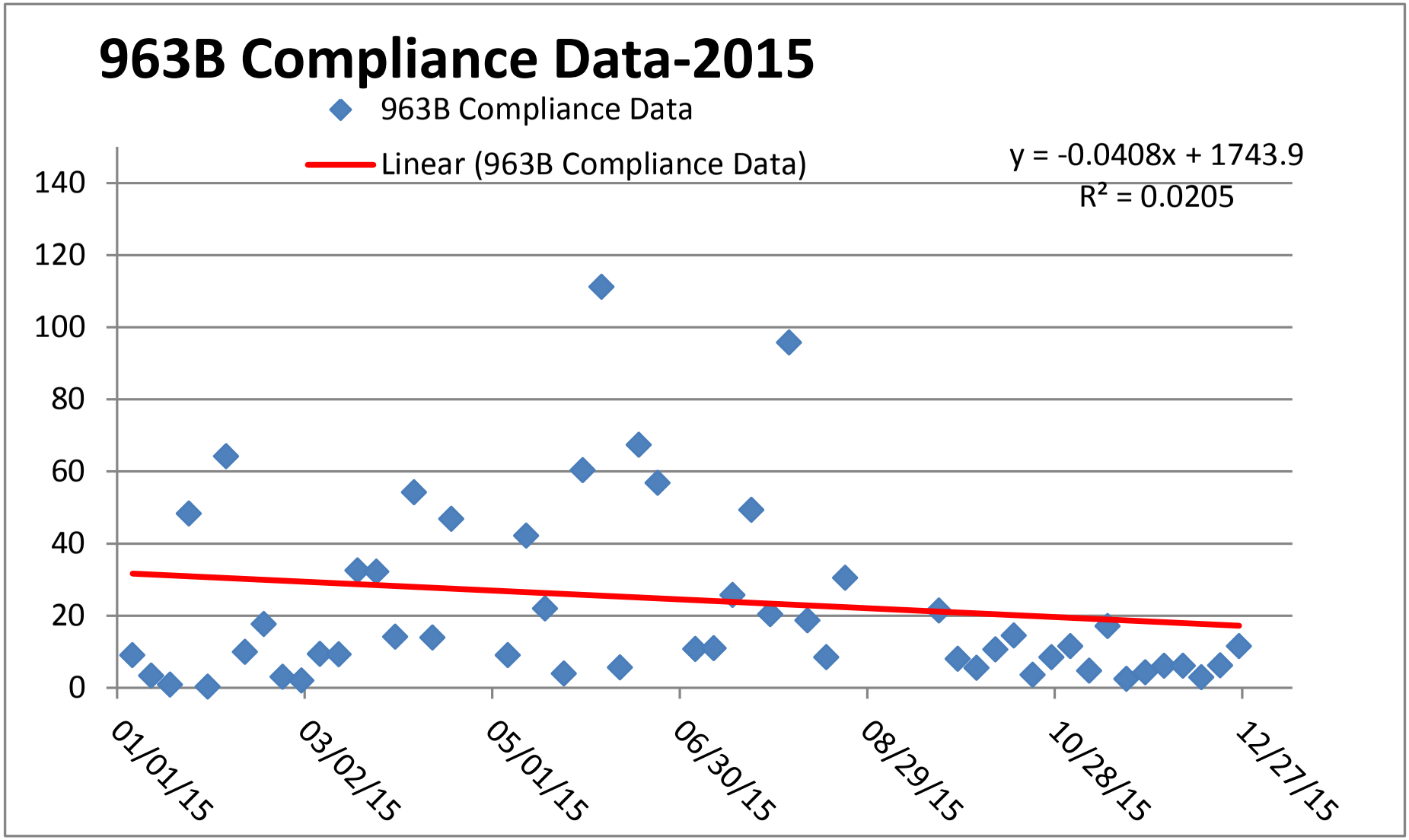
PM_{10} Sampler Summary

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
01/06/15	P2916479	**7.6**	**9.0**	23:59	24.0	20.3	368.071	368.255	0.184		
01/12/15	P2916483	**2.7**	**3.3**	24:00	24.0	20.3	376.940	377.007	0.067		
01/18/15	P2916766	**0.7**	**0.8**	23:59	24.0	20.3	369.975	369.992	0.017		
01/24/15	P2916768	**40.7**	**48.3**	23:59	24.0	20.2	368.196	369.175	0.979		
01/30/15	P2916771	**0.3**	**0.3**	23:59	23.9	20.1	372.320	372.328	0.008		
02/05/15	P2918611	**53.7**	**64.2**	23:59	24.0	20.1	365.630	366.920	1.290		
02/11/15	P2918615	**8.3**	**9.9**	23:59	24.0	20.2	364.892	365.093	0.201		
02/17/15	P2918895	**14.9**	**17.6**	23:59	24.0	20.4	364.373	364.733	0.360		
02/23/15	P2918891	**2.6**	**3.0**	23:59	24.0	20.4	361.508	361.571	0.063		
03/01/15	P2919164	**1.7**	**2.0**	23:59	24.1	20.4	369.871	369.912	0.041		
03/07/15	P2919167	**7.9**	**9.3**	23:59	24.1	20.2	370.767	370.957	0.190		
03/13/15	P2919170	**7.6**	**9.2**	23:59	24.0	20.0	364.923	365.107	0.184		
03/19/15	P2919514	**26.7**	**32.5**	23:59	24.0	19.8	368.353	368.995	0.642		
03/25/15	P2919517	**26.8**	**32.2**	23:59	24.0	20.0	365.943	366.587	0.644		
03/31/15	P2919858	**11.5**	**14.1**	23:59	24.0	19.6	371.094	371.371	0.277		
04/06/15	P2919861	**44.3**	**54.2**	23:59	24.0	19.6	366.370	367.435	1.065		
04/12/15	P2920159	**11.4**	**13.9**	23:59	24.0	19.7	366.589	366.863	0.274		
04/18/15	P2920162	**38.5**	**46.8**	23:59	24.0	19.7	364.538	365.463	0.925		
04/24/15	P2920165	**Invalid - AI**	**Invalid - AI**				366.821	367.172	0.351		No sampler data
04/30/15	P2920504	**Invalid - AN**	**Invalid - AN**	23:59	24.0	19.5	369.150	369.165	0.015		Wrong filter in monitor
05/06/15	P2920506	**7.3**	**9.0**	23:59	24.0	19.5	367.772	367.949	0.177		
05/12/15	P2920508	**33.9**	**42.1**	23:59	24.0	19.4	370.581	371.398	0.817		
05/18/15	P2920763	**18.1**	**21.9**	23:59	24.0	19.8	367.284	367.719	0.435		
05/24/15	P2920766	**3.2**	**3.9**	23:59	24.0	19.8	361.612	361.691	0.079		
05/30/15	P2921328	**48.5**	**60.3**	23:59	24.0	19.3	375.995	377.160	1.165		
06/05/15	P2921323	**90.1**	**111.2**	24:00	24.0	19.4	376.452	378.613	2.161		
06/11/15	P2921621	**4.5**	**5.6**	23:59	24.0	19.4	372.854	372.964	0.110		
06/17/15	P2921626	**53.5**	**67.4**	23:59	24.0	19.0	384.369	385.653	1.284		
06/23/15	P2921325	**45.0**	**56.8**	23:59	23.9	19.0	376.611	377.689	1.078	XT	
06/29/15	P2921079	**126.8**	**161.3**	23:59	24.0	18.9	361.471	364.513	3.042		
07/05/15	P2923694	**8.4**	**10.7**	23:59	24.0	19.0	384.952	385.156	0.204		
07/11/15	P2923697	**8.9**	**11.0**	23:59	23.9	19.3	381.105	381.318	0.213		
07/17/15	P2923700	**20.3**	**25.7**	23:59	24.0	18.9	384.336	384.823	0.487		
07/23/15	P2924063	**39.4**	**49.3**	24:00	23.9	19.1	373.597	374.541	0.944		
07/29/15	P2924068	**16.1**	**20.4**	23:59	24.0	18.9	380.581	380.968	0.387		
08/04/15	P2924461	**76.0**	**95.7**	23:59	24.0	19.1	386.935	388.759	1.824		
08/10/15	P2924464	**14.9**	**18.7**	23:59	24.0	19.2	384.424	384.783	0.359		
08/16/15	P2922748	**6.7**	**8.5**	23:59	24.0	18.9	377.692	377.854	0.162		
08/22/15	P2922751	**24.2**	**30.5**	23:59	24.0	19.0	371.080	371.661	0.581		
08/28/15	P2922755	**Invalid - AG**	**Invalid - AG**	1:18	1.3	1.0	376.638	376.697	0.059		
09/03/15	P2924551	**Invalid - AN**	**Invalid - AN**				379.614	379.621	0.007		
09/09/15	P2924554	**Invalid - AN**	**Invalid - AN**				388.042	388.051	0.009		
09/15/15	P2924859	**Invalid - AN**	**Invalid - AN**				381.088	381.090	0.002		
09/21/15	P2924863	**17.2**	**21.4**	23:59	24.0	19.3	384.745	385.159	0.414		
09/27/15	P2925400	**6.4**	**8.0**	23:59	24.0	19.3	388.482	388.638	0.156		
10/03/15	P2925403	**4.4**	**5.5**	23:59	24.0	19.4	379.956	380.063	0.107		
10/09/15	P2925406	**8.6**	**10.6**	23:59	24.0	19.6	376.825	377.034	0.209		
10/15/15	P2925674	**11.7**	**14.5**	23:59	24.0	19.4	376.384	376.667	0.283		
10/21/15	P2925677	**3.0**	**3.6**	23:59	24.0	19.8	386.751	386.824	0.073		
10/27/15	P2925679	**6.9**	**8.4**	23:59	24.0	19.9	388.633	388.801	0.168		
11/02/15	P2925819	**9.4**	**11.5**	23:59	24.0	19.6	384.758	384.984	0.226		
11/08/15	P2925999	**3.9**	**4.7**	23:59	24.0	20.2	372.040	372.136	0.096		
11/14/15	P2926002	**14.4**	**17.1**	23:59	24.0	20.3	377.862	378.210	0.348		
11/20/15	P2925824	**2.0**	**2.4**	23:59	24.0	20.2	380.344	380.393	0.049	XT	
11/26/15	P2926219	**3.5**	**4.2**	23:59	24.0	20.5	374.047	374.133	0.086		
12/02/15	P2926222	**5.2**	**6.1**	23:59	24.0	20.6	382.626	382.753	0.127		
12/08/15	P2926452	**5.1**	**6.1**	23:59	24.0	20.1	382.075	382.199	0.124		
12/14/15	P2926455	**2.4**	**2.9**	23:59	24.0	20.3	379.891	379.950	0.059		
12/20/15	P2926664	**5.2**	**6.2**	23:59	24.0	20.4	384.095	384.222	0.127		
12/26/15	P2926666	**10.1**	**11.5**	23:59	24.0	21.1	381.019	381.262	0.243		
01/12/15	P2916482		**Field Blank**				378.607	378.613	0.006		
04/01/15	P2919863		**Field Blank**				365.698	365.694	-0.004		
06/01/15	P2921331		**Field Blank**				380.245	380.251	0.006		
06/12/15	P2921326		**Field Blank**				388.626	388.628	0.002		
07/13/15	P2923702		**Field Blank**				386.681	386.691	0.010		
07/27/15	P2924067		**Field Blank**				385.085	385.092	0.007	XT	

# Valid	Recovery	Average	St. Dev.	Max	Min


963B Compliance Data-2015
963B Compliance Data
Linear (963B Compliance Data)
y = -0.0408x + 1743.9
R² = 0.0205
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120
100
80
60
40
20
0
01/01/15
03/02/15
05/01/15
06/30/15
08/29/15
10/28/15
12/27/15

Collocated Monitor 964C

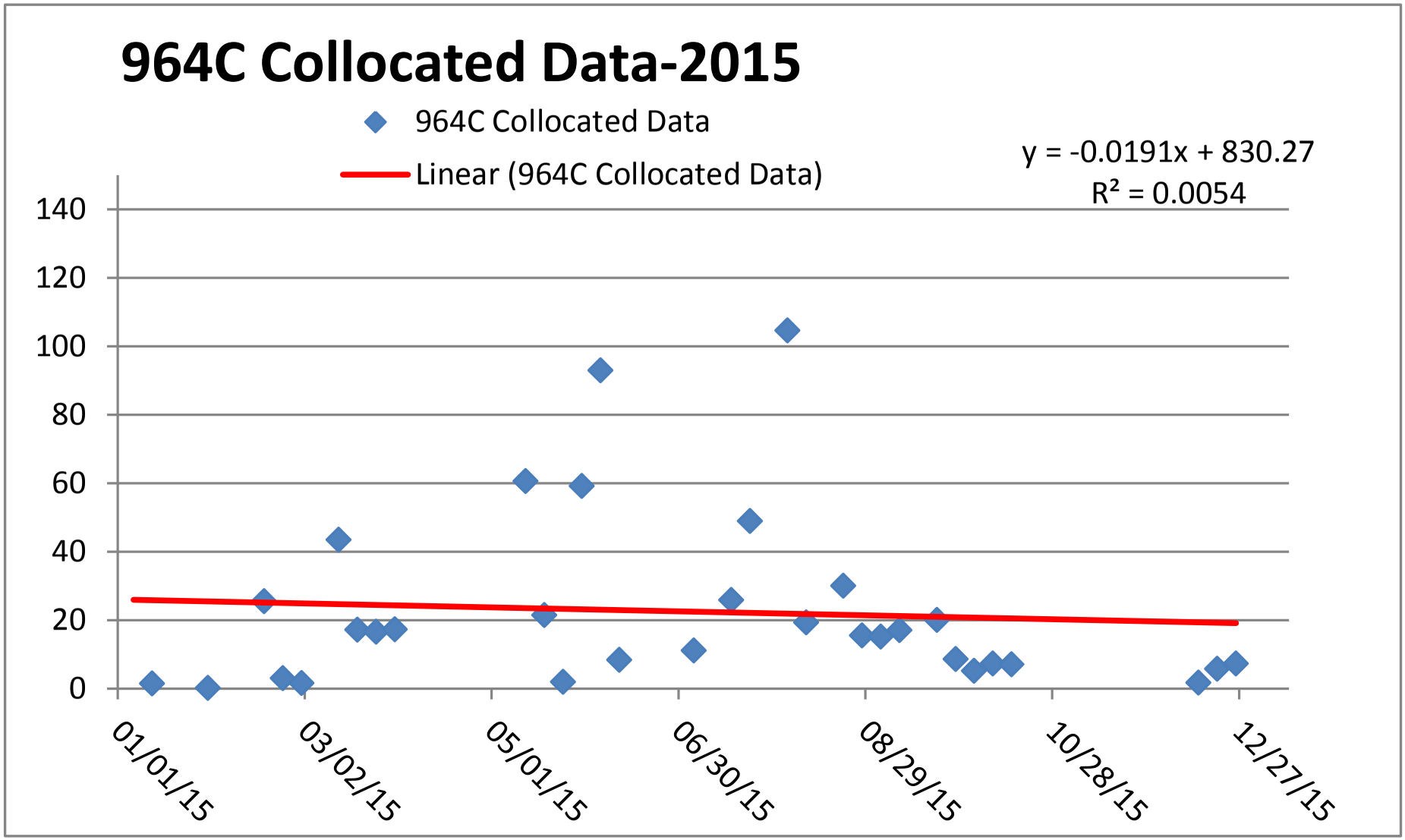
PM_{10} Sampler Summary

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)	Mass (mg) Tare	Gross	Net	Flag	Comments
01/06/15	P2916480	**Invalid - AN**	**Invalid - AN**	13:32	13.6	11.5	367.288	367.363	0.075	SP	QT max load exceeded
01/12/15	P2916484	**1.3**	**1.5**	24:00	24.0	20.5	374.192	374.224	0.032		
01/18/15	P2916773	**Invalid - AN**	**Invalid - AN**	0:03			376.069	376.065	-0.004	SP,NM	
01/24/15	P2916769	**Invalid - AN**	**Invalid - AN**	0:03			372.826	372.839	0.013	SP	
01/30/15	P2916772	**0.2**	**0.2**	23:59	24.0	20.2	375.167	375.172	0.005		
02/05/15	P2918612	**Invalid - AG**	**Invalid - AG**	12:06	12.1	10.3	367.657	368.693	1.036	SP	
02/11/15	P2918616	**Invalid - AN**	**Invalid - AN**	0:03			367.922	368.036	0.114	SP	
02/17/15	P2918896	**21.7**	**25.5**	23:59	24.0	20.5	366.841	367.364	0.523		
02/23/15	P2918892	**2.5**	**3.0**	23:59	24.0	20.5	365.332	365.394	0.062		
03/01/15	P2919165	**1.4**	**1.6**	23:59	24.0	20.2	366.529	366.563	0.034		
03/07/15	P2919168	**Invalid - AN**	**Invalid - AN**	0:03			363.003	363.015	0.012		
03/13/15	P2919171	**36.4**	**43.5**	23:59	24.0	20.1	365.536	366.412	0.876		Filter darker
03/19/15	P2919515	**14.2**	**17.2**	24:00	24.0	19.9	368.261	368.603	0.342		
03/25/15	P2919519	**13.9**	**16.6**	23:59	24.0	20.1	361.936	362.271	0.335		
03/31/15	P2919859	**14.2**	**17.3**	23:59	24.0	19.7	373.080	373.422	0.342		
04/06/15	P2919862	**Invalid - AN**	**Invalid - AN**	0:03			365.603	365.619	0.016	SP	
04/12/15	P2920160	**Invalid - AN**	**Invalid - AN**	0:03			370.458	370.472	0.014	SP	
04/18/15	P2920163	**Invalid - AG**	**Invalid - AG**	14:42	14.7	12.3	364.589	364.782	0.193	SP	
04/24/15	P2920166	**Invalid - AN**	**Invalid - AN**	0:03			363.020	363.042	0.022	SP	QT errors
04/30/15		**Invalid - AI**	**Invalid - AI**								Out for Maintenance
05/06/15		**Invalid - AI**	**Invalid - AI**								
05/12/15	P2920509	**49.0**	**60.6**	23:59	24.0	19.5	371.130	372.310	1.180		
05/18/15	P2920764	**17.8**	**21.5**	23:59	24.0	19.9	364.406	364.835	0.429		
05/24/15	P2920767	**1.5**	**1.9**	23:59	24.0	19.8	363.149	363.187	0.038		
05/30/15	P2921329	**47.7**	**59.2**	23:59	24.0	19.4	384.788	385.937	1.149		
06/05/15	P2921324	**75.6**	**93.0**	24:00	24.0	19.5	376.502	378.321	1.819		
06/11/15	P2921622	**6.8**	**8.4**	23:59	24.0	19.5	375.013	375.177	0.164		
06/17/15	P2921625	**Invalid - AN**	**Invalid - AN**	0:02			376.243	376.250	0.007	SP	
06/23/15	P2921623	**Invalid - AN**	**Invalid - AN**	0:02			372.070	372.077	0.007	SP, XT	
06/29/15	P2921080	**Invalid - AN**	**Invalid - AN**	0:02			359.401	359.414	0.013	SP	
07/05/15	P2923695	**8.9**	**11.1**	23:59	24.0	19.1	379.648	379.862	0.214		
07/11/15	P2923698	**Invalid - AN**	**Invalid - AN**				383.804	383.820	0.016		
07/17/15	P2923701	**20.4**	**25.8**	23:59	24.0	19.1	390.124	390.616	0.492		
07/23/15	P2924064	**39.2**	**48.9**	23:59	24.0	19.3	381.703	382.646	0.943	PI	
07/29/15	P2924459	**Invalid - AN**	**Invalid - AN**				382.197	382.208	0.011		
08/04/15	P2924460	**83.3**	**104.6**	23:59	24.0	19.1	390.177	392.181	2.004		
08/10/15	P2924465	**15.5**	**19.3**	23:59	24.0	19.3	388.528	388.901	0.373		
08/16/15	P2922749	**Invalid - AN**	**Invalid - AN**				388.814	388.821	0.007		
08/22/15	P2922752	**23.8**	**30.0**	23:59	24.0	19.1	378.274	378.848	0.574		
08/28/15	P2922753	**12.4**	**15.5**	23:59	24.0	19.3	378.160	378.460	0.300		
09/03/15	P2924552	**12.1**	**15.2**	23:59	24.0	19.2	387.973	388.266	0.293		
09/09/15	P2924555	**13.6**	**17.0**	23:59	24.0	19.3	378.989	379.318	0.329		
09/15/15	P2924860	**Invalid - AN**	**Invalid - AN**				382.934	383.109	0.175		
09/21/15	P2924864	**16.1**	**20.0**	23:59	24.0	19.4	385.179	385.567	0.388		
09/27/15	P2925401	**6.9**	**8.6**	24:00	24.0	19.4	379.463	379.630	0.167		
10/03/15	P2925404	**4.1**	**5.1**	23:59	24.0	19.5	384.666	384.766	0.100		
10/09/15	P2925407	**6.0**	**7.3**	23:59	24.0	19.6	381.638	381.783	0.145		
10/15/15	P2925675	**5.7**	**7.1**	23:59	24.0	19.5	389.299	389.438	0.139		
10/21/15	P2925678	**Invalid - AG**	**Invalid - AG**	4:49	4.8	4.0	378.312	378.324	0.012		Q T errors
10/27/15	P2925408	**Invalid - AN**	**Invalid - AN**	0:02			385.742	385.732	-0.010		Q T errors
11/02/15	P2925820	**Invalid - AN**	**Invalid - AN**	0:02			375.606	375.614	0.008		Q T errors
11/08/15	P2926000	**Invalid - AN**	**Invalid - AN**	0:02			371.363	371.376	0.013		Q T errors
11/14/15	P2925998	**Invalid - AN**	**Invalid - AN**	0:02			376.526	376.546	0.020		Q T errors
11/20/15	P2926217	**Invalid - AN**	**Invalid - AN**	0:02			380.744	380.762	0.018		Q T errors
11/26/15	P2926220	**Invalid - AN**	**Invalid - AN**	0:02			374.744	374.759	0.015		Q T errors
12/02/15	P2926223	**Invalid - AN**	**Invalid - AN**				381.572	381.653	0.081		
12/08/15	P2926453	**Invalid - AN**	**Invalid - AN**	1:52	1.9	1.6	379.371	379.392	0.021		Incomplete run
12/14/15	P2926456	**1.4**	**1.7**	23:59	24.0	20.4	380.060	380.096	0.036		
12/20/15	P2926667	**4.9**	**5.7**	23:59	24.0	20.5	379.972	380.090	0.118		
12/26/15	P2926660	**6.4**	**7.3**	23:59	24.0	21.2	376.503	376.658	0.155		
02/20/15	P2918894		**Field Blank**				364.770	364.778	0.008		
03/20/15	P2919518		**Field Blank**				364.762	364.766	0.004		
06/25/15	P2921081		**Field Blank**				363.831	363.836	0.005		
09/10/15	P2924861		**Field Blank**				382.006	382.013	0.007		

# Valid	Recovery	Average	St. Dev.	Max	Min
32	**53%**	**22.5**	**25.6**	**104.6**	**0.2**


964C Collocated Data-2015
964C Collocated Data
Linear (964C Collocated Data)
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R² = 0.0054
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120
100
80
60
40
20
0
01/01/15
03/02/15
05/01/15
06/30/15
08/29/15
10/28/15
12/27/15

APPENDIX C

Precision and Single-Point Flow Rate Checks

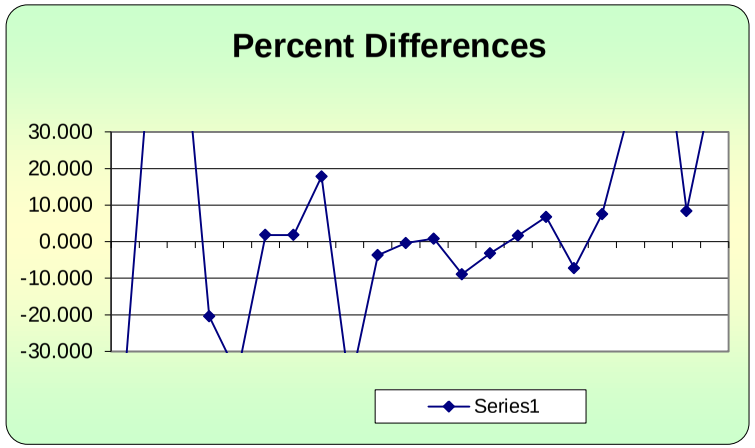
Alton Coal Development, LLC - Coal Hollow Mine

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|	$\|d\|^2$	
17.6	25.3	-35.897	-6.339	1288.626	35.897	1288.626	
32.5	17.2	61.569	75th Percentile	3790.793	61.569	3790.793	
32.2	16.6	63.934	15.470	4087.611	63.934	4087.611	
14.1	17.3	-20.382		415.433	20.382	415.433	
42	60.6	-36.257		1314.593	36.257	1314.593	
21.9	21.5	1.843		3.398	1.843	3.398	
60.3	59.2	1.841		3.389	1.841	3.389	
111.2	93	17.826		317.754	17.826	317.754	
5.6	8.4	-40.000		1600.000	40.000	1600.000	
10.7	11.1	-3.670		13.467	3.670	13.467	
25.7	25.8	-0.388		0.151	0.388	0.151	
49.3	48.9	0.815		0.664	0.815	0.664	
95.7	104.6	-8.887		78.973	8.887	78.973	
18.7	19.3	-3.158		9.972	3.158	9.972	
30.5	30	1.653		2.732	1.653	2.732	
21.4	20	6.763		45.742	6.763	45.742	
8	8.6	-7.229		52.257	7.229	52.257	
5.5	5.1	7.547		56.960	7.547	56.960	
10.6	7.3	36.872		1359.508	36.872	1359.508	
14.5	7.1	68.519		4694.787	68.519	4694.787	
6.2	5.7	8.403		70.616	8.403	70.616	
11.5	7.3	44.681		1996.378	44.681	1996.378	

n	$\Sigma\|d\|$	$\Sigma\|d\|^2$
22	478.135	21203.804
n-1	**Σd**	**Σd^2**
21	166.398	21203.804

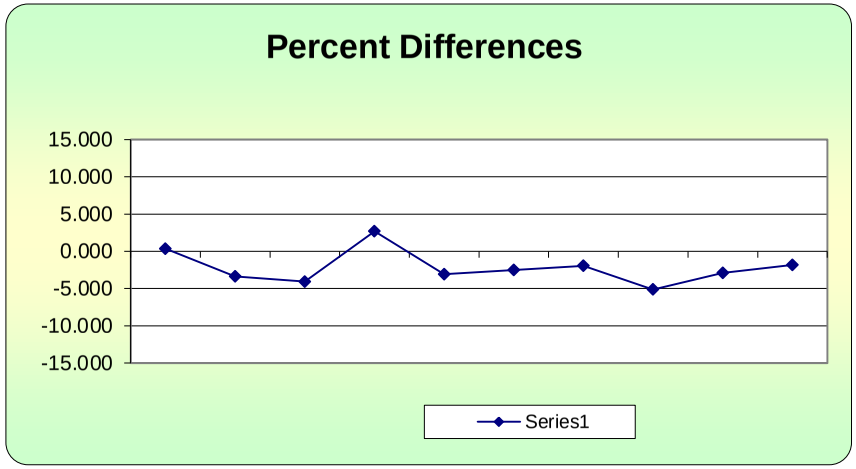
CV (%) (Eqn 11)
27.45



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	16.64	0.361	-3.286	0.130	0.361	0.130			
16.7	17.28	-3.356	**75th Percentile**	11.266	3.356	11.266	**n**	**$\Sigma\|d\|$**	**"AB" (Eqn 4)**
16.72	17.43	-4.073	-1.851	16.593	4.073	16.593	10	27.864	2.786
16.7	16.26	2.706		7.323	2.706	7.323	**n-1**	**$\Sigma\|d\|^2$**	**"AS" (Eqn 5)**
16.7	17.23	-3.076		9.462	3.076	9.462	9	92.751	1.296
16.7	17.13	-2.510		6.301	2.510	6.301			
16.7	17.03	-1.938		3.755	1.938	3.755	**Bias (%) (Eqn 3)**		Both Signs Positive
16.7	17.6	-5.114		26.149	5.114	26.149	3.54		FALSE
16.7	17.2	-2.907		8.451	2.907	8.451	**Signed Bias (%)**		Both Signs Negative
16.7	17.01	-1.822		3.321	1.822	3.321	-3.54		TRUE

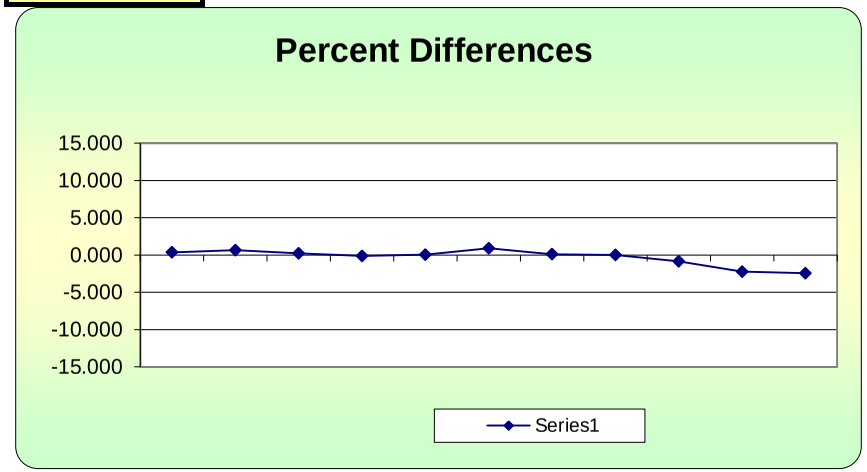


Alton Coal Development, LLC - Coal Hollow Mine

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	16.64	0.361	-0.475	0.130	0.361	0.130			
16.7	16.59	0.663	75th Percentile	0.440	0.663	0.440	n	$\Sigma\|d\|$	"AB" (Eqn 4)
16.7	16.66	0.240	0.300	0.058	0.240	0.058	11	7.979	0.725
16.7	16.72	-0.120		0.014	0.120	0.014	n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
16.7	16.69	0.060		0.004	0.060	0.004	10	13.141	0.857
16.7	16.55	0.906		0.821	0.906	0.821			
16.7	16.68	0.120		0.014	0.120	0.014			
16.7	16.7	0.000		0.000	0.000	0.000			
16.7	16.84	-0.831		0.691	0.831	0.691			
16.7	17.08	-2.225		4.950	2.225	4.950			
16.7	17.12	-2.453		6.019	2.453	6.019			

Bias (%) (Eqn 3)	Both Signs Positive
1.19	FALSE
Signed Bias (%)	Both Signs Negative
+/-1.19	FALSE

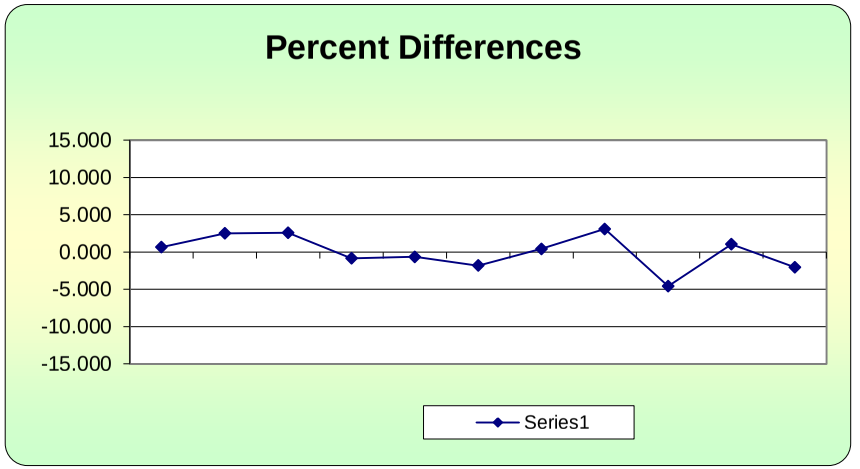


Alton Coal Development, LLC - Coal Hollow Mine

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	$\|d\|$	$\|d\|^2$			
16.7	16.59	0.663	-1.327	0.440	0.663	0.440			
16.7	16.29	2.517	75th Percentile	6.335	2.517	6.335	n	$\Sigma\|d\|$	"AB" (Eqn 4)
16.72	16.3	2.577	1.773	6.639	2.577	6.639	11	20.225	1.839
16.7	16.84	-0.831		0.691	0.831	0.691	n-1	$\Sigma\|d\|^2$	"AS" (Eqn 5)
16.7	16.81	-0.654		0.428	0.654	0.428	10	53.727	1.286
16.7	17.01	-1.822		3.321	1.822	3.321			
16.7	16.63	0.421		0.177	0.421	0.177			
16.7	16.2	3.086		9.526	3.086	9.526			
16.7	17.5	-4.571		20.898	4.571	20.898			
16.7	16.53	1.028		1.058	1.028	1.058			
16.7	17.05	-2.053		4.214	2.053	4.214			

Bias (%) (Eqn 3)	Both Signs Positive
2.54	FALSE
Signed Bias (%)	Both Signs Negative
+/-2.54	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	
1-2-15	10:25	1-2-15	10:24	IML 11	7	M-M	1-6-15	KN	
1-7-15	13:16	1-7-15	13:14	7	10	M-M	1-12-15	KN	
01-14-15	0747	01-14-15	0747	10	4	M-M	01-18-15	JKSR	
01-20-15	1004	01-20-15	1004	4	6	M-M	01-24-15	JKSR	
01-26-15	14:22	01-26-15	14:20	6	14	M-M	01-30-15	KN	
02-02-15	0652	02-02-15	0652	14	7	M-M	02-05-15	JKSR	Did Not Run Field Blank
02-06-15	13:28	02-06-15	13:24	7	11	13:28	02-06-15	KN	
02-06-15	13:39	02-06-15	13:31	11	15	M-M	02-01-15	KN	
02-12-15	0948	02-12-15	0948	15	16	M-M	02-17-15	JKSR	
02-20-15	0910	02-20-15	0910	16	4	M-M	02-23-15	JKSR	
02-25-15	0926	02-25-15	0926	4	6	M-M	03-01-15	JKSR/KN	
03-05-15	1532	03-05-15	1528	6	9	M-M	03-07-15	JKSR	
03-09-15	0926	03-09-15	0826	9	13	M-M	03-13-15	JKSR	
03-16-15	0946 ~~1000~~	03-16-15	0946	13	15	M-M	03-19-15	JKSR	
03-20-15	12:25	3/20/15	12:25	15	19	M-M	03-25-15	KN	
03-26-15	15:37	03/26/15	15:37	19	4	M-M	03-31-15	KN	
04-01-15	1407	04-01-15	1402	4	7	M-M	04-06-15	JKSR	
04-07-15	0856	04-07-15	0856	7	9	M-M	04-12-15	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
1-9-15	12:24	100	99	Pass	KN	Cleaned downtube venturi
2-17-15	14:24	103	102	Pass	KN	Cleaned downtube, venturi
3-07-15	8:50am	98	98	Pass	KN	Cleaned downtube, venturi

Table III - Monthly Flow Rate Verification

Date	Time	Monitor Flow (Q Lpm)	Monitor Baro Pressure (mmHg)	Delta Cal Baro Pressure (mmHg)	Monitor Temp (A)	Delta Cal Temp (Ta)	Delta Cal Flow (Qs)	Delta Cal Flow (Qa)	Accuracy	Initials
1-19-15	12:24	16.70	590	592	10.9	11.4	13:58	16.64	0.36	
2-13-15	14:28	16.70	589	590	17.4	17.7	14:55	17.28	-3.4	
3-11-15	9:22am	16.72	582	585	3.1°C	3.2°C	14.47	17.43	-4.1	

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	
4-1-15	1407	04-01-15	14:02	4	7	M-M	04-06-15	JKSR	
4-07-15	0856	04-07-15	08:56	7	9	M-M	04-12-15	JKSR	
04-15-15	1425	04-15-15	1425	9	13	M-M	04-18-15	JKSR	
04-20-15	14:07	04-20-15	1407	13	16	M-M	04-24-15	KN	
04-28-15	15:06	04-28-15	14:59	16	4	M-M	04-30-15	KN	
05-1-15	19:38	05-1-15	14:39	4	6	M-M	05-06-15	KN	
05-08-15	14:35	05-08-15	14:36	6	20	M-M	05-12-15	KN	
05-13-15	15:31	05-13-15	15:30	20	1	M-M	05-18-15	KN	
05-19-15	1325	05-19-15	1325	1	4	M-M	05-24-15	JKSR	
05-27-15	9:30	05-27-15	9:30	4	7	M-M	05-27-15	KN	Field Blank
05-27-15	9:39	05-27-15	9:39	7	11	M-M	05-30-15	KN	
06-01-15	15:11	06-01-15	15:11	11	14	M-M	06-05-15	KN	
06/06/15	0727	06/06/15	07:26	14	4	m-m	06-11-15	JKSR	
6/12/15	11:49	6/12/15	11:48	4	18	m-m	6/17/15	JKSR	
06-19-15	1452	06-19-15	1452	18	7	M-M	06-23-15	JKSR	
06-25-15	0802	06-25-15	0802	7	1	M-M	06-29-15	JKSR	
07-01-15	9:49	07-01-15	9:49	1	5	9:49	07-01-15	KN	Field Blank
07-01-15	10:29	07-01-15	10:29	5	6	M-M	07-05-15	KN	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
4-28-15	15:05	98	98	Pass	KN	
05-27-15	9:39	101	100	Pass	KN	cleaned Desiccant manifold.
07-01-15	9:53	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
4-28-15	15:10	16.70	586	588.5	18.6	18.6	13.34	16.84	-0.83	KN
05-27-15	9:48	16.70	586	588	15.2	15.8	13.41	16.81	-0.65	KN
07-01-15	10:25	16.70	588	589.5	27.8	28.2	13.06	17.01	-1.8	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	
07-01-15	09:49	07-01-15	09:49	1	5	09:49	07-01-15	KN	Field Blank
07-01-15	10:29	07-01-15	10:29	5	6	M-M	0705-15	KN	
07-08-15	0852	07-08-15	0750	6	11	M-M	07-11-15	JKSR	Reset clock F
07-13-15	1249	07-13-15	1249	11	14	M-M	07-17-15	JKSR	
07-20-15	1325	07-20-15	1325	14	4	M-M	07-23-15	JKSR	
07-27-15	11:27	07-27-15	11:27	4	7	11:27	07-27-15	KN	Field Blank
07-27-15	11:30	07-27-15	11:30	7	9	M-M	07-29-15	KN	
07-30-15	1306	07-30-15	1306	9	JBR1	M-M	08-04-15	JKSR/KN	
08-06-15	1310	08-06-15	1310	JBR1	JBR2	M-M	08-10-15	JKSR	Still Running when I got here
08-11-15	1017	08-11-15	1016	JBR2	11	M-M	08-16-15	JKSR	Still Running when I got here
08-17-15	1517	08-17-15	1418	11	14	M-M	08-22-15	JKSR	
08-25-15	1058	08-25-15	0958	14	JBR	M-M	08-28-15	KN	
08-31-15	1608	08-31-15	1507	JBR5	4	M-M	09-03-15	JKSR	
09-08-15	1135	09-08-15	1034	4	7	M-M	09-09-15	JKSR	still Running when I got here
09-10-15	0942	09-10-15	0841	7	10	M-M	09-15-15	JKSR	
09-17-15	1030	09-17-15	0929	10	17	M-M	09-21-15	JKSR	
09-23-15	1048	09-23-15	0947	17	1JBR	M-M	09-27-15	JKSR	
	~~1124~~		~~1023~~						
09-28-15	1029	09-28-15	928	1JBR	11	M-M	10-03-15	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
07-27-15	11:33	104	104	Pass	KN	Cleaned Down tube & Manifold
09-10-15	0844	095	093	Pass	JKSR	

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
07-27-15	11:39	16.70	586	587	22.7	22.7	13.32	17.13	-2.5	KN
09-10-15	0850	16.70	588	590	21.8	22.0	13.32	17.03	-1.9	JKSR

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	
10-05-15	1052	10-05-15	0952	11	14	M-M	10-09-15	JKSR	
10-12-15	0952	10-12-15	0851	14	4	M-M	10-15-15	JKSR	
10-16-15	1015	10-16-15	0914	4	7	M-M	10-21-15	JKSR	
10-21-15	1240	10-21-15	1139	7	IML1	M-M	10-27-15	JKSR	
10-29-15	1054	10-29-15	0953	IML-1	11	M-M	11-2-15	KN	
11-03-15	0922	11-03-15	0921	11	17	M-M	11-06-15	JKSR	
11-09-15	1319	11-09-15	1318	17	JBR 7	M-M	11/14/15	KN	
11-17-15	13:24	11-17-15	1323	JBR 7	IML4	13:24	11/17/15	KN	Field Blank
11-17-15	1323	11-17-15	15:26	IML4	IML5	M-M	11/20/15	KN	
11-23-15	0957	11-23-15	0955	IML5	5	M-5	11/26/15	KN	
11-30-15	1000	11-30-15	0957	5	8	M-M	12/2/15	KN	
12-04-15	1055	12-04-15	1053	8	10	M-M	12-09-15	JKSR	
12-10-15	1218	12-10-15	1216	10	13	M-M	12-14-15	JKSR	
12-15-15	1107	12-15-15	1105	13	4	M-M	12-20-15	JKSR	
12-21-15	1351	12-21-15	1348	4	JBR 7	M-M	12-26-15	JKSR	
12-28-15	10:38	12-28-15	10:35	JBR7	18	M-M	01-01-15	KN	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10-22-15		100	99	Pass	JKSR	
11-30-15	1005	106	102	Pass	KN	
12-28-15	10:44	97	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
10-22-15		16.70	588.0	584.	11.6	12.3		17.6		JKSR
11-30-15	1008	16.70	55.3	584	-02.9	-09.1	14.45	17.20		KN
12-28-15	10:49	16.70	577	577	-2.5	-2.1	14.20	17.01		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	
1-2-15	10:55	1-2-2015	10:54	15	8	M-M	1-6-15	KN	
1-7-15	13:38	1-7-15	13:36	8	11	13:40	1-7-15	KN	Blank
1-7-15	13:41	1-7-15	13:39	11	16	M-M	1-12-15	KN	
01-14-15	0810	01-14-15	0810	16	5	M-M	01-18-15	JKSR	
01-20-15	1020	01-20-15	1020	5	12	M-M	01-24-15	JKSR	
01-26-15	14:20	01-26-15	14:38	12	18	M-M	01-30-15	KN	
02-02-15	0707	02-02-15	0707	18	8	M-M	02-05-15	JKSR	
02-06-15	14:23	02-06-15	14:21	8	17	M-M	02-11-15	KN	
02-12-15	1022	02-12-15	1022	17	IML4	M-M	02-17-15	JKSR	
02-20-15	0930	02-20-15	0930	IML4	~~18~~ 5	M-M	02-23-15	JKSR	
02-25-15	0948	02-25-15	0945	5	7	M-M	03-01-15	JKSR/KN	
03-04-15	1443	03-04-15	1440	7	11	M-M	03-07-15	JKSR	
03-09-15	1006	03-09-15	0903	11	14	M-M	03-13-15	JKSR	
03-16-15	1005	03-16-15	1005	14	16	M-M	03-19-15	JKSR	
03-20-15	12:56	03-20-15	12:56	16	20	M-M	03-25-15	KN	
03-26-15	15:59	03-26-15	15:59	20	5	M-M	03-31-15	KN	
04-01-15	1422	04-01-15	1422	5	8	M-M	04-06-15	JKSR	
04-01-15	1424	04-01-15	1424	IML-5		Field Blank	—	JKSR	
04-07-15	0910	04-07-15	0910	8	11		04-12-15	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
1-9-15	13:24	108	107	Pass	KN	In6, cleand downtube etc
2-13-15	14:58	97	97	Pass	KN	Cleand downtube etc
3-11-15	9:47	102	101	Pass	KN	cleand Manifold + 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
1-9-15	13:29	16.70	590	592	10.9	11.5	13.58	16.64	0.36	KN
2-13-15	15:06	16.70	595	596	16.7	17.5	13.36	16.59	0.66	KN
3-11-15	9:51	16.70	589	591	4.4°C	5.0°C	13.89	16.66	0.24	

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
04-01-15	1424	04-01-15	1424	IML-5		Field Blank	—	JKSR
04-07-15	0910	04-07-15	0910	8	11		04-12-15	JKSR
04-15-15	1441	04-15-15	1441	11	14	M-M	04-18-15	JKSR
04-20-15	14:33	04-20-15	14:33	14	17	M-M	04-24-15	KN
04-28-15	15:32	04-28-15	15:32	17	5	M-M	04-30-15	KN
05-01-15	14:59	05-01-15	14:58	5	19	M-M	05-06-15	KN
05-06-15	15:32	05-01-15	15:31	19	IML-4	M-M	05-12-15	KN
05-13-15	15:46	05-13-15	15:45	IML-4	2	M-M	05-16-15	KN
05-21-15	1337	05-21-15	1337	2	5	M-M	05-24-15	JKSR
05-27-15	10:22	05-27-15	10:22	5	12	M-M	05-30-15	KN
06-01-15	15:29	06-01-15	15:29	12	15	M-M 15:29	06-01-15	KN
06-01-15	15:31	06-01-15	15:32	15	7	M-M	06-05-15	KN
06/06/15	07:47	06/06/15	07:46	7	5	m-m	06-11-15	JKS
6/12/15	12:28	6/12/15	12:27	5	6	m-m	6/17/15	JKS
06-19-15	1507	06-19-15	1507	6	9	M-M	06-23-15	JKS
06-25-15	0818	06-25-15	0818	9	2	M-M	06-29-15	JKSR
07-01-15	11:18	07-01-15	11:17	2	8	M-M	07-05-15	KN

Filter 5 not installed after Monthly check

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
04-28-15	15:40	106	105	Pass	KN	
05-27-15	10:32	95	93	Pass	KN	Cleaned dust tube & Manifold
07-01-15	11:21	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
04-28-15	15:45	16.70	591	592	20.7°C	20.8°C	13.22	16.72	-0.17	KN
05-27-15	10:35	16.70	592	593	17.0	17.6	13.34	16.69	0.06	KN
07-01-15	11:24	16.70	594	595	30.8	31.0	12.67	16.55	0.91	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	
07-01-15	11:18	07-01-15	11:17	2	8	M-M	07-[illegible]-15	KN	
07-08-15	0837	07-08-15	0837	8	12	M-M	07-11-15	JKSR	
07-13-15	1204	07-13-15	1204	12	15	M-M	07-17-15	JKSR	
07-13-15	1206	07-13-15	1206	20	20	Blank	07-13-15	JKSR	Field Blank
07-20-15	1343	07-20-15	1243	15	5	M-M	07-23-15	JKSR	Reset clock
07-27-15	12:10	07-27-15	11:09	5	17	~~11:09~~	07-27-15	KN	Field Blank
07-27-15	12:12	07-27-15	12:11	17	18	M-M	07-29-15	KN	
07-30-15	1320	07-30-15	1220	18	19	M-M	08-04-15	JKSR/KN	
08-06-15	1322	08-06-15	1322	19	JBR 3	M-M	AR-10-15	JKSR	
08-11-15	1129	08-11-15	1027	JBR 3	12	M-M	08-16-15	JKSR	
08-17-15	1532	08-17-15	1431	12	15	M-M	08-22-15	JKSR	
08-25-15	1145	08-25-15	10:44	15	JBR 6	M-M	08-28-15	KN	
08-31-15	1630	08-31-15	1530	JBR 6	5	M-M	09-03-15	JKSR	~~No data~~ spl.
09-08-15	—	09-08-15	—	5	8	M-M	09-09-15	JKSR	No data -
09-10-15	1011	09-10-15	0910	8	11	M-M	09-15-15	JKSR	QT
09-17-15	1046	09-17-15	0946	11	18	M-M	09-21-15	JKSR	QT
09-23-15	1124	09-23-15	1023	18	7	M-M	09-27-15	JKSR	
09-28-15	1050	09-28-15	0949	7	12	M-M	10-03-15	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance	
07-27-15	1215	97	95	Pass	KN		Swapped Battery and Started
09-10-15	1018			Fail	JKSR	Not Pumping	
09-17-15	1056	116	115	Pass	JKSR	Took apart and Rebuilt pump	

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	
07-27-15	~~16:20~~ 12:23	16.70	592	593	24.4	24.6	12.95	16.68	0.1120	KN	
09-10-15	1021	16.90	595	595	23.2	23.9	13.40	16.90	0.000	JKSR	Fluctuating

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	
10-05-15	1118	10-05-15	1016	12	15	M-M	10-09-15	JKSR	
10-12-15	1009	10-12-15	0907	15	5	M-M	10-15-15	JKSR	
10-16-15	1031	10-16-15	0930	5	8	M-M	10-21-15	JKSR	
10-21-15	1304	10-21-15	1203	8	10	M-M	10-27-15	JKSR	
10-29-15	11:23	10-29-15	10:21	10	12	M-M	11-2-15	KN	
11-03-15	0939	11-03-15	0937	12	19	M-M	11-08-15	JKSR	Set Time
11-09-15	1341	11-09-15	1341	19	8	M-M	11-14-15	KN	
11-17-15	1353	11-17-15	1352	8	IML8	M-M	11-20-15	KN	
11-23-15	1018	11-23-15	1019	IML8	86	M-M	11-26-15	KN	
11-30-15	1101	11-30-15	1103	6	9	M-M	12-2-15	KN	
12-04-15	1112	12-04-15	1111	9	11	M-M	12-08-15	JKSR	
12-10-15	1233	12-10-15	1232	11	15	M-M	12-14-15	JKSR	
12-15-15	1123	12-15-15	1122	15	JBR1	M-M	12-20-15	JKSR	
12-21-15	1403	12-21-15	1402	JBR1	JBR8	M-M	12-26-15	JKSR	
12-28-15		12-28-15		8	19	M-M	1-1-15	KN	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/22/15		105	101	Pass	JKSR	
11/30/15	1115	113	110	Pass	KN	
12/28/15	1131	117	114	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
10/22/15		16.80	590	590	12.3	13.8		16.84		JKSR
11/30/15	1119	16.70	590	591	1.8	2.2	14.23	17.08		KN
12/28/15	1138	16.70	583	583	-3.8	-2.6	14.49	17.12		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	
1-2-15	11:01	1-2-15	10:57	17	9	M-M	1-6-15	KN	QT
1-7-15	13:47	1-7-15	13:47	9	IML-32	M-M	1-12-15	KN	
01-14-15	0814	01-14-15	0815	IML-32	20	M-M	01-18-15	JKSR	Ran not connected to the External battery and solar panel
01-20-15	1022	01-20-15	1023	20	13	M-M	01-24-15	JKSR	QT
01-26-15	14:51	01-26-15	14:51	13	19	M-M	01-30-15	KN	Ran without Internal Battery
02-02-15	0710	02-02-15	0712	19	9	M-M	02-05-15	JKSR	
02-06-15	04:31	02-06-15	14:30	9	IML1	M-M	02-11-15	KN	
02-12-15	1025	02-12-15	1027	IML 1	IML 32	M-M	02-17-15	JKSR	QT
02-20-15	0931	02-20-15	0931	20	Blank	Blank	02-20-15	JKSR	Blank
02-20-15	0934	02-20-15	0936	IML 32	10	M-M	02-23-15	JKSR	
02-25-15	0950	02-25-15	0950	10	8	M-M	03-01-15	JKSR/KN	
03-04-15	1446	03-04-15	1444	8	12	M-M	03-07-15	JKSR	
03-09-15	1007	03-09-15	0906	12	18	M-M	03-13-15	JKSR	QT
03-16-15	1007	03-16-15	1007	18	17	M-M	03-19-15	JKSR	
03-20-15	13:03	03-20-15	13:02	17	IML-1	13:03	03-20-15	KN	Field Blank
03-20-15	13:04	03-20-15	13:05	IML-1	IML-4	M-M	03-25-15	KN	
03-26-15	16:04	03-26-15	16:03	IML-4	6				
04-01-15	1426	04-01-15	1425	6	10	M-M	04-06-15	JKSR	
04-07-15	0911	04-07-15	0911	10	12	M-M	04-12-15	JKSR	QT

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
1-9-15	13:10	100	100	Pass	KN	Grease Fitting, cleaned downtube
2-13-15	15:10	97	97	Pass	KN	Cleaned downtube, Man. fold
3-11-15	9:51	95	95	Pass	KN	cleaned downtube, Manifold, 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
1-9-15	1:13	16.7	592	592	11.2°C	11.8°C	13.53	16.59	KN	0.663
2-13-15	15:15	16.7	596	596	16.2°C	16.7°C	13.14	16.29	2.52	KN
3-11-15	9:58	16.72	591	590.5	4.6°C	4.8°C	13.58	16.70	2.08	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	
04-01-15	1426	04-01-15	1425	6	10	M-M	04-06-15	JKSR	
04-07-15	0911	04-07-15	0911	10	12	M-M	04-12-15	JKSR	QT
04-15-15	1444	04-15-15	1444	12	15	M-M	04-18-15	JKSR	QT
04-20-15	1441	04-20-15	14:39	15	18	M-M	04-24-15	KN	QT
04-08-15	15:35	05-08-15	15:35	18	FML-5	M-M	05-12-15	KN	→ Out for repairs
05-13-15	15:51	05-13-15	15:50	FML-5	3	M-M	05-15-15	KN	
05-21-15	1339	05-21-15	1339	3	6	M-M	05-24-15	JKSR	
05-27-15	10:41	05-27-15	10:41	6	17	M-M	05-30-15	KN	
06-01-15	15:41	06-01-15	15:40	13	8	M-M	06-05-15	KN	
06/06/15	07:59	06/xx/15	07:58	8	16	m-m	06-11-15	JM	
~~06/12/15~~	~~11:49~~	~~6/12/15~~	~~11:48~~						
6/12/15	12:18	6/12/15	12:16	16	19	m-m	6/17/15	JM	
06-19-15	1509	06-19-15	1506	19	17	M-M	06-23-15	JM & [illegible]	QT
06-25-15	0820	06-25-15	0820	17	3	M-M	06-29-15	JM & [illegible]	QT
07-01-15	11:40	07-01-15	11:40	3	10	M-M	07-05-15	KN	QT

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
						Out for Repairs
05-27-15	10:45	93	91	Pass	KN	Clean down take filter out
07-01-15	11:39	95	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
05-27-15	10:48	16.7	594	594	16.9	17.1	13.03	16.26	2.7	KN
07-01-15	11:42	16.70	595	595	30.2	30.5	13.23	17.23	-3.1	KN

Co-located Monitor 964C

Table I - Every 6th Day Sampling

Date	Time	Displayed Date	Displayed Time	Collected Filter ID#	New Filter ID#	Sample Start Time	Sample Start Date	Sampler Initials	
07-01-15	11:40	07-01-15	11:40	3	10	M-M	07-05-15	KN	QT
07-08-15	0840	07-08-15	0840	10	13	M-M	07-11-15	JKSR	
07-11-15	1207	07-11-15	1207	13	16	M-M	0717-15	JKSR	QT
07-20-15	1345	07-20-15	1245	16	6	M-M	07-23-15	JKSR	Reset clock
07-27-15	12:17	07-27-15	1125	6	8	M-M	07-29-15	KN	
07-30-15	1324	07-30-15	1222	8	10	M-M	08-04-15	JKSR/KN	QT
08-06-15	1323	08-06-15	1324	10	JBR4	M-M	08-10-15	JKSR	
08-11-15	1131	08-11-15	1028	JBR4	13	M-M	08-16-15	JKSR	
08-17-15	1535	08-17-15	1431	13	16	M-M	08-22-15	JKSR	QT
08-25-15	11:55	08-25-15	1052	16	20	M-M	0828-15	KN	
08-31-15	1641	08-31-15	1538	20	6	M-M	09-03-15	JKSR	
09-08-15	1152	08-09-15	1049	6	9	M-M	09-09-15	JKSR	
09-10-15		~~09-10-15~~		9	13	Blank	09-10-15	JKSR	Blank
09-10-15	1013	09-10-15	0910	13	12	M-M	09-15-15	JKSR	
09-17-15	1047	09-17-15	0945	12	19	M-M	09-21-15	JKSR	
09-23-15	1127	09-~~23~~-15	1024	19	8	M-M	09-27-15	JKSR	
09-28-15	1052	09-28-15	0949	8	13	M-M	10-03-15	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance	
7-27-15	12:25	114	113	Pass	KN		Swapped Battery & Clean Nozzle
09-10-15	1026	111	107	Pass	JKSR		

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
7-27-15	12:35	16.70	593	593	25.4	25.7	12.96	16.63	0.421	KN
09-10-15	1028	16.70	596	595	~~23.8~~	~~23.9~~	12.69	16.20	3.086	JKSR
					24.5	24.8				

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	
10-05-15	1121	10-05-15	1018	13	16	M-M	10-09-15	JKSR	
10-12-15	1011	10-12-15	0908	16	6	M-M	10-15-15	JKSR	
10-16-15	1036	10-16-15	0933	6	9	M-M	10-21-15	JKSR	
10-21-15	1307	10-21-15	1204	9	20	M-M	10-27-15	JKSR	QT 04:45
10-25-15	11:28	10-29-15	1025	20	13	M-M	11-02-15	KN	
11-03-15	0941	11-03-15	0937	13	JBR1	M-M	11-08-15	JKSR	QT set time
11-09-15	1353	11-09-15	1353	7	18	M-M	11-14-15	KN	QT
11-17-15	1404	11-17-15	1404	18	4	M-M	11-20-15	KN	QT unplugged Batteries
11-23-15	1028	11-23-15	1026	4	7	M-M	11-26-15	KN	QT
11-30-15	11:15	11-30-15	11:18	7	14	M-M	12-07-15	KN	QT
12-04-15		12-04-15		14	~~15~~	M-M	12-08-15	JKSR	did NOT RUN
12-10-15	1234	12-10-15	1231	~~15~~ 14	16	M-M	12-14-15	JKSR	T low battery shutdown
12-15-15	1125	12-15-15	1122	16	JBR11	M-M	12-20-15	JKSR	
12-21-15	1405	12-21-15	1402	JBR11	17	M-M	12-26-15	JKSR	
12-28-15	11:46	12-28-15	11:44	17	20	M-M	1/1/15	KN	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/22/15		105	103	Pass	JKSR	
11/30/15	11:24	106	104	Pass	KN	
12/28/15	1146	114	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
10/22/15		16.7	591	590	12.7	12.2		17.50		JKSR
11/30/15	11:26	16.7	592	590	2.5	3.2	13.86	16.53		KN
12/28/15	11:48	16.7	582	583	-1.9	-0.8	14.38	17.05		KN

APPENDIX E

Independent PM_{10} Sampler Performance Audit Report

AUDIT REPORT

FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
FIRST QUARTER 2015

Prepared for

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Prepared by

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Site Audited: March 18, 2015

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Air Resources Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on March 18, 2015. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

	Primary	Background	Meteorological
Latitude	37° 24' 5.0" N	37° 24' 20.9" N	37° 23' 53.2" N
Longitude	112° 27' 21.0" W	112° 26' 1.1" W	112° 26' 43.1" W
UTM	12S 371147 4140396	12S 373119 4140856	12S 372073 4140018
Elevation	6,890 feet MSL	7,158 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	PM_{10}	BGI PQ200S	Yes

Table 1-3

Summary of Meteorological Audit Results

Parameter	**Sensor**	**Within Accuracy Goal**
Wind Speed	Climatronics 100075	Yes
Wind Direction	Climatronics 100076	No
Temperature	Climatronics 100093	Yes
Precipitation	Texas Electronics TR-525I-HT	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:

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2.0 AUDIT METHODS

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

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

- 40 CFR 58, Appendix 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	$\leq \pm 4\%$
	Design criteria flow to audit flow	$\leq \pm 5\%$
	Audit temperature to sampler temperature	$\leq \pm 2\,^{o}C$
	Audit temperature to sampler filter temperature	$\leq \pm 2\,^{o}C$
	Audit barometric pressure to sampler pressure	$\leq$ ±10mm Hg

Table 2-2

Particulate Samplers
Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
FRM Flow	BGI	DeltaCal	1237	1/19/2016

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.

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	$\leq \pm 5^{o}$
	Linearity	$\leq \pm 5^{o}$
	Starting threshold with torque gauge	Manufacturer specs
Ambient Temperature (non-immersible sensor)	Accuracy via collocation in ambient conditions	$\leq \pm 0.5^{o}$
Ambient Temperature (immersible sensor)	Accuracy via collocation in three water baths	$\leq \pm 0.5^{o}$
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	5/28/2015
Wind Speed (low rpm)	R.M. Young	18811	CA03912	1/6/2016
Wind Direction Orientation	Brunton	Transit	5103212072	N/A
Temperature (immersible)	Eutechnics	4400	307365	5/27/2015
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

- Although the wind direction measurement passed the audit, the linearity check indicates that the sensor potentiometer may need to be replaced or the data logger scaling of the wind direction may need to be optimized.
- The precipitation measurement was found outside of audit requirements. This result is very similar to the previous audit.
- Although the background site PM_{10} instrument passed audit requirements, the flow rate of the instrument appeared to very high (+9%). This was confirmed by comparing the audit result to the most recent monthly flow verification performed by Alton Coal Development, LLC. This should be addressed to prevent any future audit failures.
- It appears all of the PM_{10} instruments are set to local daylight time as opposed to the standard convention of local standard time. Additionally, the collocated PM_{10} instrument was a day behind. This was confirmed and corrected by the site operator.

APPENDIX A

AUDIT DATA FORMS

Air Resource Specialists, Inc.

TEMPERATURE / DELTA-TEMPERATURE SYSTEM AUDIT

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Temperature Reference	Eutechnics	4400	307635	5/27/2015

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										
0.01	0.17	0.16	PASS									
40.22	40.32	0.10	PASS									
16.26	16.46	0.20	PASS									
MAX ABS Difference		0.20	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, Inc.

WIND SPEED SENSOR AUDIT

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Wind Speed Reference	RM Young	18811	CA03912	1/16/2016
Wind Speed Torque Gauge	RM Young	18310		

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

Speed Conversion			
mph	m/s	m/s	mph
1.000	0.447	0.447	1.000

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 (m/s)	DAS (m/s)	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				
1800	48.220				

Starting Threshold	TORQUE
Torque <= 0.2 g-cm	

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

NOTES:

Air Resource Specialists, Inc.

WIND DIRECTION AUDIT

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

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

Manufacturer & Model	Met One - 035B
Sensor Serial #	E2281
Vane Serial #	N/A

Local Magnetic Declination (degrees)	0.0
Method	

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

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

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

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

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	339.8	1.8	
most building/barn t	158	157.0	-1.0	
er of right rock outcr	73	68.4	-4.6	
of right rock outcro	253	249.6	-3.4	
Total Alignment MAX ABS Diff			4.6	PASS

SENSOR LINEARITY

Point	DAS	Difference	
1	307.5	N/A	
2	352.9	0	PASS
3	31.8	-6	FAIL
4	79.7	3	PASS
5	123.9	-1	PASS
6	170.9	2	PASS
7	216.0	0	PASS
8	260.6	0	PASS
1	305.2	0	PASS
MAX Difference		6	

ACTION REQUIRED

Starting Threshold	TORQUE
Torque <= 6.5 g-cm	

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

NOTES: The meteorological site Lat/Long is 37°23'53.20"N, 112°26'43.07"W

Air Resource Specialists, Inc.

PRECIPITATION SENSOR AUDIT

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

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

Manufacturer	Hydrological Services
Model	TB4
Serial Number	05-94

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

	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	32.51	11.4%	FAIL

Heater functional?	☐ Yes ☐ No ☑ N/A
Sensor found level?	☐ Yes ☐ No
Sensor found clean?	☐ Yes ☐ No

NOTES:

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	Deltacal	1237	1/19/2016
PM Temperature Standard #1	BGI	Deltacal	1237	1/19/2016
PM Barometric Pressure Standard #1	BGI	Deltacal	1237	1/19/2016

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 / 2 min	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.81	16.70	-0.7%	0.7%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	13.2	12.8	-0.4	PASS

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

FILTER TEMPERATURE SENSOR (°C)				
	Reference	Instrument	Difference	
	14.0	13.1	-0.9	PASS

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

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	590.0	589.0	-1.0	PASS

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

NOTES: Lat/Long 37°24'4.99"N, 112°27'20.98"W Time = MDT

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	Deltacal	1237	1/19/2016
PM Temperature Standard #1	BGI	Deltacal	1237	1/19/2016
PM Barometric Pressure Standard #1	BGI	Deltacal	1237	1/19/2016

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N964C

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

SETTINGS	
Total Flow	16.70

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

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	17.52	16.70	-4.7%	4.9%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
13.1	12.9	-0.2	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
13.8	14.4	0.6	PASS

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

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

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

NOTES: Lat/Long 37°24'4.99"N, 112°27'20.98"W Time = MDT

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	Deltacal	1237	1/19/2016
PM Temperature Standard #1	BGI	Deltacal	1237	1/19/2016
PM Barometric Pressure Standard #1	BGI	Deltacal	1237	1/19/2016

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N962A

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 / 2 min	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	18.36	16.67	-9.2%	9.9%	PASS

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

AMBIENT TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
12.5	12.5	0.0	PASS

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

FILTER TEMPERATURE SENSOR (°C)			
Reference	Instrument	Difference	
12.1	11.6	-0.5	PASS

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

PRESSURE SENSOR (mmHg)			
Reference	Instrument	Difference	
584.5	584.0	-0.5	PASS

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

NOTES: Lat/Long 37°24'20.91"N, 112°26'1.07"W, Time = MDT

Air Resource Specialists, Inc.

SITE INFORMATION

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
NETWORK TYPE		PSD					

		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: Lat/Long listed above is for office at the Coal Hollow Mine

Air Resource Specialists, Inc.

CALIBRATION AND VERIFICATION STANDARDS

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	C.Kirk	DATE	3/18/2015
SITE NAME		Alton Coal					
Network type		PSD					

	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	5/27/2015
AT/RH Sensor Reference	Vaisala	HMP155	H4970003	2/3/2016
Barometric Pressure Reference				
Wind Speed Reference	RM Young	18811	CA03912	1/16/2016
Wind Speed Torque Gauge	RM Young	18310		
Wind Direction Alignment Reference	Brunton	Transit	5103212072	
Wind Direction Linearity Reference				
Wind Direction Torque Gauge				
Solar Radiation Reference				
Multiplier	Eppley	PSP	29282F3	12/23/2015
UV Radiation Reference				
Multiplier				
Precipitation Reference				
Volume 946 mL	Novalynx	260-2595	N/A	N/A

PM Flow Standard #1	BGI	Deltacal	1237	1/19/2016
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	BGI	Deltacal	1237	1/19/2016
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	BGI	Deltacal	1237	1/19/2016
PM Barometric Pressure Standard #2				
PM Barometric Pressure Standard #3				
PM Barometric Pressure Standard #4				

TEOM MTV Standard				

APPENDIX B

AUDIT STANDARDS CERTIFICATIONS

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

Certificate of Calibration

Date: May 27, 2014 **Cert No. 220081222138835**

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

MPC Control #:	AX7278	Work Order #:	SAC-70065869
Asset ID:	N/A	Purchase Order #:	A28492
Gage Type:	DIGITAL THERMOMETER	Serial Number:	307635
Manufacturer:	EUTECHNICS	Department:	N/A
Model Number:	4400	Performed By:	BARRY MORRIS
Size:	N/A	Received Condition:	IN TOLERANCE
Temp/RH:	68.8°F / 34.5 %	Returned Condition:	IN TOLERANCE
		Cal. Date:	May 27, 2014
		Cal. Interval:	12 MONTHS
		Cal. Due Date:	May 27, 2015

Calibration Notes:

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CL7456	STANDARD PLATINUM RESISTANCE THERMOMETER PROBE	5681	1595	FLUKE	Dec 4, 2015	A7B16006
CR6700	DOUBLE WELL BATH	7013	79006	HART	Oct 8, 2014	220081202163455

Procedures Used in this Event

Procedure Name	Description
NAVAIR 17-20ST-183	Digital ThermometersÂ

Calibrating Technician: Barry Morris BARRY MORRIS

QC Approval: B. 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, ISO 9001:2008, 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.

VAISALA Certificate of Calibration

Certificate #:	2011517-150203-HMP155-H4970003
Calibration Date:	February 3, 2015
Type:	Vaisala Humidity & Temperature Probe
Model #:	HMP155
Serial #:	H4970003
SR #:	303090

Customer:
Air Resource Specialists Inc
1901 Sharp Point Drive
Suite E
Fort Collins, CO 80525

Condition: The instrument was operational upon receipt.

Action Taken: The instrument was calibrated. No adjustment was necessary.

Due Date: * February 3, 2016

RH Calibrated By:
Justin Walsh
Calibration Technician

Approved By:

The measurement results on the certificate are traceable to national or international standards. The results of this calibration relate only to the items being calibrated. This certificate may not be reproduced, except in full, without the prior written approval of the issuing laboratory. Vaisala is ISO 9001:2008 certified. Vaisala's calibration system complies with the requirements of ANSI/NCSL Z540-1-1994.

The calibration laboratory is controlled at 22 °C ± 3 °C and 40 %RH ± 20 %RH.

Special Limitations: None.

*Any due date given is based on a customer provided calibration interval. A number of factors may cause drift prior to the due date. Monitor all devices and calibrate when measurement error is suspected.

Vaisala Inc. | Boston Office
10-D Gill Street, Woburn, MA 01801, USA
Phone +1 781 933 4500 | Fax +1 781 933 8029
www.vaisala.com

VAISALA Certificate of Calibration

Certificate #: 2011517-150203-HMP155-H4970003
Calibration Date: February 3, 2015
Type: Vaisala Humidity & Temperature Probe
Model #: HMP155
Serial #: H4970003
SR #: 303090

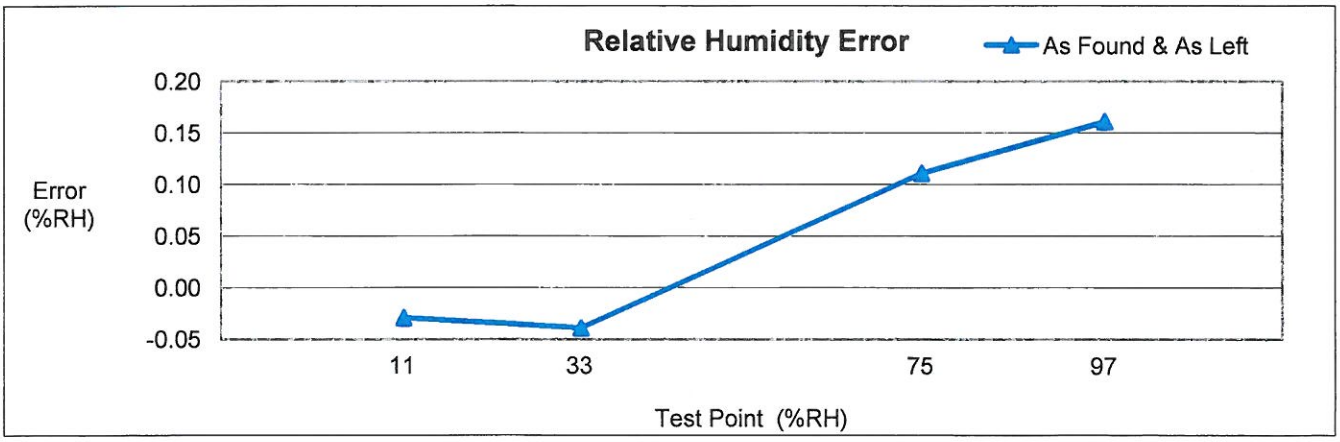
Relative Humidity Calibration

Procedure #: PI213851 Rev. F
Instrument Range: 0 to 100 %RH
Lab Environment: Relative Humidity 49.5 %RH, Temperature 21.3 °C

As Found & As Left Data

Out Of Tolerance As Received: NO

Relative Humidity, %RH				
Reference	**Unit Under Test**	**Error**	**± Tolerance**	**± Uncertainty**
11.32	11.29	-0.03	1.00	0.92
32.97	32.93	-0.04	1.00	1.01
74.67	74.78	0.11	1.00	1.02
97.24	97.40	0.16	1.70	1.50
Temperature, °C				
Reference	**Unit Under Test**	**Error**	**± Tolerance**	**± Uncertainty**
21.36	21.37	0.01	0.18	0.12



Reference Standards Calibration Information: Station 3A				
Model	**Serial Number**	**Asset Number**	**Calibration Date**	**Due Date**
Vaisala DMT348	C3040013	3011-0315	Mar. 11, 2014	Mar. 11, 2015
Fluke 45	7781003	3011-0264	Aug. 20, 2014	Aug. 20, 2016
Vaisala HMK13B	V324	3011-0270	N/A	N/A
Vaisala HMT333	E0230023	3011-0323	Dec. 04, 2014	Mar. 04, 2015
Vaisala HMT333	E0230024	3011-0324	Dec. 04, 2014	Mar. 04, 2015

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10-D Gill Street, Woburn, MA 01801, USA
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www.vaisala.com

VAISALA Certificate of Calibration

Certificate #:	2011517-150203-HMP155-H4970003
Calibration Date:	February 3, 2015
Type:	Vaisala Humidity & Temperature Probe
Model #:	HMP155
Serial #:	H4970003
SR #:	303090

Description

The calibration was performed in the Standard Laboratory of Vaisala, Inc. The instrument was first allowed to equilibrate to the laboratory environmental conditions for a period of at least 8 hours.

Relative Humidity Calibration: The sensor of the instrument was placed inside a Vaisala HMK13B calibrator along with two Vaisala HMT333 probes. Each reference value is the average of the two HMT333 readings. The instrument was allowed to stabilize inside the chamber for at least 30 minutes at each testpoint.

References

The chambers of the Vaisala HMK13B generate RH testpoints in the air above saturated salt solutions. The Vaisala HMT333 measures RH using a capacitive polymer sensor and temperature using an RTD.

The Vaisala DMT348 measures dewpoint using a capacitive polymer sensor and temperature using an RTD. It calculates RH from the dewpoint and temperature readings.

In or Out of Tolerance Decision Rule

Out of tolerance conditions are determined by the product specification only. The calibration uncertainty is not tied in with the instrument's accuracy.

Uncertainty

The reported expanded uncertainty of the measurement is stated as the standard uncertainty of the measurement multiplied by the coverage factor of k=2, which corresponds to a coverage probability of approximately 95%. The standard uncertainty of the measurement has been determined in accordance with the ISO Guide to the Expression of Uncertainty in Measurement.

DOC228428 Rev. B

Vaisala Inc. | Boston Office
10-D Gill Street, Woburn, MA 01801, USA
Phone +1 781 933 4500 | Fax +1 781 933 8029
www.vaisala.com

CERTIFICATE OF CALIBRATION AND TESTING

MODEL: **18811** (Comprised of Models 18820A Control Unit & 18831A Motor Assembly)
SERIAL NUMBER: CA03912

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	☐ As Found
	☑ No Calibration Adjustments Required	☐ As Left

Traceable frequency meter used in calibration Model: 34405A SN: 53070093

Date of inspection 1-16-15
Inspection Interval One Year

Tested By RP

EPLAB

THE EPPLEY LABORATORY, INC.

12 Sheffield Avenue, PO Box 419, Newport, Rhode Island USA 02840
Phone: 401.847.1020 Fax: 401.847.1031 Email: info@eppleylab.com

Calibration Certificate

Instrument: Precision Spectral Pyranometer, Model PSP, Serial Number 29282F3

Procedure: This pyranometer was compared in Eppley's Integrating Hemisphere according to procedures described in ***ISO 9847 Section 5.3.1*** and Technical Procedure, TP01 of The Eppley Laboratory, Inc.'s Quality Assurance Manual on Calibrations.

Transfer Standard: Eppley Precision Spectral Pyranometer, Model PSP, Serial Number 21231F3

Results:

Sensitivity: **$S = 7.43\ \mu V / Wm^{-2}$**
Uncertainty: $U_{95} = \pm 0.91\%$ (95% confidence level, k=2)
Resistance: 717 Ω at 23°C

Date of Test: December 23, 2014

Traceability: This calibration is traceable to the World Radiation Reference (WRR) through comparisons with Eppley's AHF standard self-calibrating cavity pyrheliometers which participated in the Eleventh International Pyrheliometric Comparisons (IPC XI) at Davos, Switzerland in September-October 2010. Unless otherwise stated in the remarks section below or on the Sales Order, the results of this calibration are "AS FOUND / AS LEFT".

Due Date: Eppley recommends a minimum calibration cycle of five (5) years but encourages annual calibrations for highest measurement accuracy.

Customer: Air Resource Specialist, Inc.
Ft. Collins, CO

Signatures: In Charge of Test: Reviewed by:

Eppley SO: 64297

Date of Certificate: December 23, 2014

Remarks:

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: 12-Jan-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: 23.0 °C
Brand: Accu-Safe Serial Number: 254881
NIST Traceability No. 516837
deltaCal:
Ambient Temperature (set): 23.0 °C
Aux (filter) Temperature (set): 23.0 °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): 759 mm of Hg

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

Q= 3.86319 ΔP ^ 0.52084 Overall Uncertainty: 0.35%

Date Placed In Service 1/19/15
(To be filled in by operator upon receipt)

Recommended Recalibration Date 1/19/16
(12 months from date placed in service)

Revised: October 2014
Cal102-01T2 Rev A

To Check a deltaCal 12-Jan-15 P.Pitty

1.5-19.5 VER 3.41P

BP= 759 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	198.8	23.0	6.46	6.50	**0.56**
	263.7	23.0	8.65	8.64	**-0.08**
	350.8	23.0	11.58	11.56	**-0.15**
	459.4	23.0	15.23	15.23	**0.02**
	578.2	23.0	19.22	19.28	**0.30**
				Average %	**0.13**

AUDIT REPORT
FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
SECOND QUARTER 2015

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: June 3, 2015

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on June 3, 2015. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

	Primary	Background	Meteorological
Latitude	37° 24' 5.0" N	37° 24' 20.9" N	37° 23' 53.2" N
Longitude	112° 27' 21.0" W	112° 26' 1.1" W	112° 26' 43.1" W
UTM	12S 371147 4140396	12S 373119 4140856	12S 372073 4140018
Elevation	6,890 feet MSL	7,158 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	PM_{10}	BGI PQ200S	Yes

Table 1-3

Summary of Meteorological Audit Results

Parameter	**Sensor**	**Within Accuracy Goal**
Wind Direction	Met One 034B	Yes
Precipitation	Texas Electronics TR-525I-HT	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 Manager
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	1/19/2016

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 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.

2.2.2 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 Direction	Accuracy with compass	$\leq \pm 5^{\circ}$
Precipitation	Accuracy via known volume of water	$\leq \pm 10\%$

Table 2-4

Meteorological Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
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

There were no performance audit failures during this audit.

Other Audit Findings

All PM_{10} instruments appear to be set to local daylight time rather than the standard convention of local standard time.

Other Work Performed

Alton Coal contracted with ARS to rebuild and test the Met One 034B wind sensor in ARS' laboratory. During the audit, ARS reinstalled the sensor and confirmed proper alignment by use of known landmarks to verify direction.

Alton Coal also requested that ARS adjust and verify the calibration on the precipitation gauge at the meteorological station.

APPENDIX A

AUDIT DATA FORMS

WIND DIRECTION AUDIT

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	M. Farinacci	DATE	6/3/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Direction Alignment Reference				
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	

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

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

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

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

Reference Alignment Error (degrees)	0.0	PASS

SENSOR ALIGNMENT

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

OR

SENSOR ALIGNMENT

Landmark	Degrees	DAS	Difference	
most building barn t	338	339.5	1.5	
ost building barn to	158	160.6	2.6	
r of right rock outcro	73	73.3	0.3	
er of right rock outcr	253	255.7	2.7	
Total Alignment MAX ABS Diff			2.7	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:

PRECIPITATION SENSOR AUDIT

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	M. Farinacci	DATE	6/3/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Precipitation Reference	Nova Lynx	260-2595	n/a	n/a

Manufacturer	Hydrological Services
Model	TB4
Serial Number	05-94

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

	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	30.23	3.6%	PASS

Heater functional?	☐ Yes ☐ No ☑ N/A
Sensor found level?	☑ Yes ☐ No
Sensor found clean?	☑ Yes ☐ No

NOTES:

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	M. Farinacci	DATE	6/3/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Temperature Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Barometric Pressure Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	962A

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

SETTINGS	
Total Flow	16.70

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

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	17.03	16.70	-1.9%	2.0%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	17.8	17.7	-0.1	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	19.1	18.3	-0.8	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	584.0	583.0	-1.0	PASS

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

NOTES:

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	M. Farinacci	DATE	6/3/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Temperature Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Barometric Pressure Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	963B

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

SETTINGS	
Total Flow	16.70

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

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.70	16.82	0.7%	0.0%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	21.0	20.6	-0.4	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	21.7	20.4	-1.3	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	589.5	589.0	-0.5	PASS

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

NOTES:	

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	M. Farinacci	DATE	6/3/2015
SITE NAME		Alton Coal					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Temperature Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Barometric Pressure Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	964C

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

SETTINGS	
Total Flow	16.70

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

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.92	16.70	-1.3%	1.3%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	20.0	19.4	-0.6	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	21.1	21.0	-0.1	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	589.5	591.0	1.5	PASS

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

NOTES:	

SITE INFORMATION

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	M. Farinacci	DATE	6/3/2015
SITE NAME		Alton Coal					
NETWORK TYPE		PSD					

		Deg	Min	Sec
LATITUDE	North	34	24	22.1
LONGITUDE	West	112	27	15.5

--CALCULATE->

Decimal
34.4061
112.4543

Decimal

--CALCULATE->

Deg	Min	Sec

	Meters
ELEVATION	

--CALCULATE->

Feet

Feet

--CALCULATE->

Meters

Please verify site standards used by the site operator

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

NOTES: Coordinates are for the office at the Coal Hollow Mine

CALIBRATION AND VERIFICATION STANDARDS

ABBR.	N/A	CLIENT	Alton Coal	AUDITOR	M. Farinacci	DATE	6/3/2015
SITE NAME		Alton Coal					
Network type		PSD					

	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				
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 946 mL	Nova Lynx	260-2595	n/a	n/a

PM Flow Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	Mesa Labs	DeltaCal	1237	1/19/2016
PM Barometric Pressure Standard #2				
PM Barometric Pressure Standard #3				
PM Barometric Pressure Standard #4				

TEOM MTV Standard				

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: 12-Jan-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: 23.0 °C
Brand: Accu-Safe Serial Number: 254881
NIST Traceability No. 516837
deltaCal:
Ambient Temperature (set): 23.0 °C
Aux (filter) Temperature (set): 23.0 °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): 759 mm of Hg

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

Q= 3.86319 ΔP ^ 0.52084 Overall Uncertainty: 0.35%

Date Placed In Service 1/19/15
(To be filled in by operator upon receipt)

Recommended Recalibration Date 1/19/16
(12 months from date placed in service)

Revised: October 2014
Cal102-01T2 Rev A

To Check a deltaCal 12-Jan-15 P.Pitty

1.5-19.5 VER 3.41P

BP= 759 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	198.8	23.0	6.46	6.50	**0.56**
	263.7	23.0	8.65	8.64	**-0.08**
	350.8	23.0	11.58	11.56	**-0.15**
	459.4	23.0	15.23	15.23	**0.02**
	578.2	23.0	19.22	19.28	**0.30**
				Average %	**0.13**

AUDIT REPORT
FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
THIRD QUARTER 2015

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: July 22, 2015

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on July 22, 2015. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

	Primary	Background	Meteorological
Latitude	37° 24' 5.0" N	37° 24' 20.9" N	37° 23' 53.2" N
Longitude	112° 27' 21.0" W	112° 26' 1.1" W	112° 26' 43.1" W
UTM	12S 371147 4140396	12S 373119 4140856	12S 372073 4140018
Elevation	6,890 feet MSL	7,158 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	PM_{10}	BGI PQ200S	Yes
	PM_{10} (collocated)	BGI PQ200S	Yes
Background	PM_{10}	BGI PQ200S	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 Manager
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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	Mesa Labs	deltaCal	141170	4/17/2016

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 audit.

Other Audit Findings

The flow on the primary sampler was found to be fluctuating by about 0.5 LPM. It is recommended that the pump be rebuilt or replaced.

APPENDIX A

AUDIT DATA FORMS

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	7/22/2015
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	MesaLabs	deltaCal	141170	4/17/2016
PM Temperature Standard #1	MesaLabs	deltaCal	141170	4/17/2016
PM Barometric Pressure Standard #1	MesaLabs	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/2 min	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	17.06	16.70	-2.1%	2.2%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	19.8	18.5	-1.3	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	20.6	20.2	-0.4	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	586.0	587.5	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	7/22/2015
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollow					

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

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	963B

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/2 min	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.66	16.70	0.2%	-0.2%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	22.7	21.5	-1.2	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	22.2	21.8	-0.4	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	593.0	593.0	0.0	PASS

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

NOTES: fluctuating flow

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	N/A	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	7/22/2015
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollow					

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

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	964C

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/2 min	PASS

FLOW VERIFICATION					
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.65	16.70	0.3%	-0.3%	PASS

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

AMBIENT TEMPERATURE SENSOR (^oC)				
	Reference	Instrument	Difference	
	22.5	22.0	-0.5	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (^oC)	2

FILTER TEMPERATURE SENSOR (^oC)				
	Reference	Instrument	Difference	
	23.2	23.0	-0.2	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (^oC)	2

PRESSURE SENSOR (mmHg)				
	Reference	Instrument	Difference	
	593.0	594.0	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	7/22/2015
SITE NAME		Coal Hollow					
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	7/22/2015
SITE NAME		Coal Hollow					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL #	Calibration Expiration Date
Ozone Transfer Standard				
Gas Dilution Transfer Standard				
MFC High Flow Reference				
MFC Low Flow Reference				
Temperature Reference				
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	MesaLabs	deltaCal	141170	4/17/2016
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

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

PM Barometric Pressure Standard #1	MesaLabs	deltaCal	141170	4/17/2016
PM Barometric Pressure Standard #2				
PM Barometric Pressure Standard #3				
PM Barometric Pressure Standard #4				

TEOM MTV Standard				

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: 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
FOURTH QUARTER 2015

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: October 22, 2015

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LIST OF TABLES

1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on October 22, 2015. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

	Primary	Background	Meteorological
Latitude	37° 24' 5.0" N	37° 24' 20.9" N	37° 23' 53.2" N
Longitude	112° 27' 21.0" W	112° 26' 1.1" W	112° 26' 43.1" W
UTM	12S 371147 4140396	12S 373119 4140856	12S 372073 4140018
Elevation	6,890 feet MSL	7,158 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	PM_{10}	BGI PQ200S	Yes

Table 1-3

Summary of Meteorological Audit Results

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

*Wind speed audit not completed

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

Christian A. Kirk
Quality Assurance Officer / Lead Auditor
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Fort Collins, Colorado 80525
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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:

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- 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	$\leq \pm 4\%$
	Design criteria flow to audit flow	$\leq \pm 5\%$
	Audit temperature to sampler temperature	$\leq \pm 2\,^{o}C$
	Audit temperature to sampler filter temperature	$\leq \pm 2\,^{o}C$
	Audit barometric pressure to sampler pressure	$\leq$ ±10mm Hg

Table 2-2

Particulate Samplers
Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
FRM Flow	BGI	DeltaCal	1237	1/12/2016

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.

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	$\leq \pm 5^{o}$
	Linearity	$\leq \pm 5^{o}$
	Starting threshold with torque gauge	Manufacturer specs
Ambient Temperature (non-immersible sensor)	Accuracy via collocation in ambient conditions	$\leq \pm 0.5^{o}$
Ambient Temperature (immersible sensor)	Accuracy via collocation in three water baths	$\leq \pm 0.5^{o}$
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	CA 4104	4/10/2016
Wind Direction Orientation	Brunton	Transit	5060710523	N/A
Temperature (immersible)	Eutechnics	4600	99F101610	2/13/2016
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 wind speed sensor was not able to be audited due to a lack of necessary audit equipment.
- The collocated $PM_{2.5}$ sampler was found with a time discrepancy of 4 minutes. The flow on this sampler took approximately 2 minutes to stabilize and was found almost 5% high. Troubleshooting is recommended for the flow on this sampler.

APPENDIX A

AUDIT DATA FORMS

Air Resource Specialists, Inc.

TEMPERATURE / DELTA-TEMPERATURE SYSTEM AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Temperature Reference	Eutechnics	4600	99F101610	2/13/2016

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										
42.22	42.22	0.00	PASS									
26.28	26.29	0.01	PASS									
0.01	0.22	0.21	PASS									
MAX ABS Difference		0.21	PASS									

MAX ABS Difference						

Aspirator fan functional 2m?	☐ Yes ☐ No ☑ N/A	Each sensor was verified against its data channel ? ☑ Yes ☐ No ☐ N/A
	☐ Yes ☐ No ☐ N/A	
	☐ Yes ☐ No ☐ N/A	Each Temperature Difference = Upper - Lower ? ☐ Yes ☐ No ☐ N/A
	☐ Yes ☐ No ☐ N/A	

NOTES:	

Air Resource Specialists, Inc.

WIND SPEED SENSOR AUDIT

ABBR.	n/a	CLIENT	ALTON	FIELD SPECIALIST	M. Farinacci	DATE	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Wind Speed Reference	RM Young	18802	CA 4104	4/10/2016
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		N/A	N/A	N/A
100	2.943				
200	5.607				
300	8.270				
600	16.260				
1800	48.220				

Starting Threshold	TORQUE
Torque <= 0.2 g-cm	

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

NOTES:

Air Resource Specialists, Inc.

WIND DIRECTION AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Direction Alignment Reference	Brunton	Transit	5060710523	
Direction Linearity Reference				
Direction Torque Gauge				

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

Local Magnetic Declination (degrees)	9.5
Method	Last report

Mag. Dec. from NOAA (deg/min/sec)				
	10	48		10.80

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 outcrop, saddle	253

Reference Alignment Error (degrees)	2.0	PASS

SENSOR ALIGNMENT				
Reference	Degrees	DAS	Difference	
From the North	0			
From the South	180	181.5	1.5	
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	343.0	5.0	
most building/barn t	158	158.8	0.8	
er of right rock outcr	73	74.3	1.3	
ter of right outcrop,	253	253.4	0.4	
Total Alignment MAX ABS Diff			5.0	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, Inc.

PRECIPITATION SENSOR AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Precipitation Reference	Nova Lynx	260-2595	n/a	n/a

Manufacturer	Hydrological Services
Model	TB4
Serial Number	05-94

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

	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			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	29.21	0.1%	PASS

Heater functional?	☐ Yes ☐ No ☑ N/A
Sensor found level?	☑ Yes ☐ No
Sensor found clean?	☑ Yes ☐ No

NOTES:

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	1237	1/12/2016

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	963B

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/min	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.84	16.70	-0.8%	0.8%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	11.7	11.0	-0.7	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	13.8	12.3	-1.5	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	590.0	590.0	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	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	1237	1/12/2016

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
	2 cm/min	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.75	17.50	4.5%	0.3%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	11.5	11.4	-0.1	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	12.2	12.7	0.5	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	590.0	591.0	1.0	PASS

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

NOTES: Flow unstable

Air Resource Specialists, Inc.

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Temperature Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	1237	1/12/2016

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/min	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	17.06	16.70	-2.1%	2.2%	PASS

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

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	10.6	9.9	-0.7	PASS

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

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	12.3	11.6	-0.7	PASS

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

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	584.5	583.0	-1.5	PASS

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

NOTES:

Air Resource Specialists, Inc.

SITE INFORMATION

ABBR.	n/a	CLIENT	ALTON	AUDITOR	M. Farinacci	DATE	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
NETWORK TYPE		PSD					

		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	10/22/2015
SITE NAME		Alton Coal- Coal Hollow					
Network type		PSD					

	MANUFACTURER	MODEL	SERIAL #	Calibration Expiration Date
Ozone Transfer Standard				
Gas Dilution Transfer Standard				
MFC High Flow Reference				
MFC Low Flow Reference				
Temperature Reference	Eutechnics	4600	99F101610	2/13/2016
AT/RH Sensor Reference				
Barometric Pressure Reference				
Wind Speed Reference (high rpm)	RM Young	18802	CA 4104	4/10/2016
Wind Speed Reference (low rpm)				
Wind Speed Torque Gauge				
Wind Direction Alignment Reference	Brunton	Transit	5060710523	
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	Nova Lynx	260-2595	n/a	n/a

PM Flow Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	Mesa Labs	deltaCal	1237	1/12/2016
PM Barometric Pressure Standard #2				
PM Barometric Pressure Standard #3				
PM Barometric Pressure Standard #4				

TEOM MTV Standard				

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: Feb 13, 2015 **Cert No. 222008122407667**

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

MPC Control #:	AX8944
Asset ID:	N/A
Gage Type:	DIGITAL THERMOMETER
Manufacturer:	EUTECHNICS
Model Number:	4600
Size:	N/A
Temp/RH:	69°F / 40 %

Work Order #:	SAC-70069987
Purchase Order #:	A29242
Serial Number:	99F101610
Department:	N/A
Performed By:	JACK R. WERTZ III
Received Condition:	IN TOLERANCE
Returned Condition:	IN TOLERANCE
Cal. Date:	February 13, 2015
Cal. Interval:	12 MONTHS
Cal. Due Date:	February 13, 2016

Calibration Notes:

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CH2157	DUAL TEMPERATURE CALIBRATOR	9009	24590T	FLUKE	Sep 15, 2015	222008122242610
CL7456	STANDARD PLATINUM RESISTANCE THERMOMETER PROBE	5681	1595	FLUKE	Dec 4, 2015	A7B16006

Procedures Used in this Event

Procedure Name	Description
NAVAIR 17-20ST-95	Digital Thermometers

Calibrating Technician: Jack R Wertz III

JACK R. WERTZ III

QC Approval: B. 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: CA04104

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	10200	10200
12,600	2100	12600	12600
15,000	2500	15000	15000
☒ 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 10 Apr 2015
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: 12-Jan-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: 23.0 °C
Brand: Accu-Safe Serial Number: 254881
NIST Traceability No. 516837
deltaCal:
Ambient Temperature (set): 23.0 °C
Aux (filter) Temperature (set): 23.0 °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): 759 mm of Hg

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

Q= 3.86319 ΔP ^ 0.52084 Overall Uncertainty: 0.35%

Date Placed In Service 1/19/15
(To be filled in by operator upon receipt)

Recommended Recalibration Date 1/19/16
(12 months from date placed in service)

Revised: October 2014
Cal102-01T2 Rev A

To Check a deltaCal

12-Jan-15 P.Pitty

1.5-19.5

VER 3.41P

BP= 759 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	198.8	23.0	6.46	6.50	**0.56**
	263.7	23.0	8.65	8.64	**-0.08**
	350.8	23.0	11.58	11.56	**-0.15**
	459.4	23.0	15.23	15.23	**0.02**
	578.2	23.0	19.22	19.28	**0.30**
				Average %	**0.13**