WUTC DOCKET: UE-190882
EXHIBIT: RJR-5
ADMIT ☑ W/D ☐ REJECT ☐

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of the Investigation of **AVISTA CORPORATION d/b/a AVISTA UTILITIES, PUGET SOUND ENERGY, and PACIFIC POWER & LIGHT COMPANY** **Regarding Prudency of Outage and Replacement Power Costs**	**DOCKET UE-190822**

FIRST EXHIBIT (NONCONFIDENTIAL) TO THE PREFILED REBUTTAL TESTIMONY OF

RONALD J. ROBERTS

ON BEHALF OF PUGET SOUND ENERGY

JANUARY 23, 2020

TALEN ENERGY

Stephen J. Christian • Manager, Environmental Compliance • Talen Montana, LLC
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August 20, 2018

Mr. Hoby Rash
Air Compliance Section
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

RE: 2018 Second Quarter MATS Filterable Particulate Matter (FPM) Test Report
Colstrip Units 3 & 4

Dear Mr. Rash:

Please find enclosed the Test Report for Colstrip Units 3 and 4 for MATS filterable particulate matter (FPM) tests performed during the Second Quarter 2018. Results from these tests were used to update correlation curves for the PM monitors on Colstrip Units 3 and 4.

This report contains all calibrations, sampling data, lab analyses data, and calculations required by 40 CFR 60, Appendix A, Reference Methods 1-5, to determine particulate emissions from new source fossil fuel-fired steam generators.

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. I certify that the statements and information are to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

We trust that this report satisfies your needs, however if any questions arise, please contact me at your earliest convenience.

Sincerely,

Stephen J. Christian
Manager, Environmental Compliance

cc: w/attachment - Bob Gallagher - Region 8 EPA, Helena
ecc: John Raty – MDEQ, Billings
David Millegan / OnBase

w/o attachment – Gordon Criswell / Neil Dennehy / Jim Parker

Talen Montana LLC
Colstrip Steam Electric Station
Environmental Compliance Department

Montana Air Quality Permit #OP0513-13

Colstrip Steam Electric Station
Units 3 & 4
2018 2nd Quarter MATS Test Report
Filterable Particulate Matter (FPM)

June 2018

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Talen Montana, LLC
Colstrip Steam Electric Station
Environmental Compliance Department

Compliance Test Statement of Completeness

Facility: CSES Units 3 & 4

Dates: June 2018

Results and Data contained in this report:

Method 1 - Sample and velocity traverses for stationary sources.
Method 2 - Stack gas velocity and volumetric flow rate.
Method 3 - Gas analysis for carbon dioxide, oxygen, excess air, and dry molecular weight.
Method 4 - Determination of moisture content in stack gases.
Method 5 - Determination of particulate emissions from stationary sources.
Plant operating data
Coal analysis data
Date of MDEQ Approval of Talen Energy Source Test Protocol: December 16, 2015

This report contains all field test, laboratory, calibration, and calculated data required insuring accuracy and authenticity of these test results.

I hereby certify that the calibrations, sampling, analyses, and results reported herein were performed as per 40 CFR 60, Appendix A, as modified by appropriate Montana Department of Environmental Quality regulations; and based on information and belief formed after reasonable inquiry, the statements and information contained herein are true, accurate, and complete.

Signature _____ Date 8/20/2018

David R. Millegan
Senior Environmental Compliance Professional

Signature _____ Date 8/20/2018

Stephen J. Christian
Manager, Environmental Compliance
Alternate Responsible Official

1.0 Introduction

The Talen Montana LLC Environmental Compliance Department conducted MATS filterable particulate matter (FPM) emissions tests of Unit 3 on June 21, 2018 and Unit 4 on June 26, 2018 at the Colstrip Steam Electric Station (CSES) located in Colstrip, MT. CSES Units 1 and 2 were not tested due to each being operated less than 168 hours during the quarter per 40 CFR 63 10021 (d) (1). These tests fulfilled Talen Montana's quarterly filterable particulate matter (FPM) performance testing obligations for Units 3 and 4 as specified in 40 CFR 63 Subpart UUUUU. Additionally, all test results are used to update the CSES Units 3 and 4 PM monitor correlation curves utilized in CSES's PM Compliance Assurance Monitoring (CAM) program.

Test procedures were conducted as per 40 CFR 60, Appendix A, Reference Methods 1-5, as amended on May 25, 1983, agreements with Montana Department of Environmental Quality (MDEQ) and Region 8 EPA, and requirements of 40 CFR 63 Subpart UUUUU. Appropriate elements of the Talen Montana Source Test Protocol, QA Plan, and AETB Manual were also incorporated into all aspects of the testing. The tests were performed at the 380-foot level of the Units 3 and 4 stacks.

1.1 Test History

CSES Units 3 and 4 were scheduled for MATS FPM testing during the Second Quarter of 2018. The EPA and MDEQ were notified of this schedule by Mr. David Millegan, Talen Montana in a letter dated April 19, 2018 to Mr. Dan Walsh MDEQ-Helena, Mr. John Raty MDEQ-Billings, Mr. Bob Gallagher EPA-Helena, and Ms. Sara Loiacono EPA-Denver. Mr. Raty was kept apprised of schedule changes as they occurred. There were no outside observers present for the testing activities. All Talen Environmental Compliance Department personnel associated with the testing activities are listed in Appendix D of this report.

The general set up of the MATS FPM test series consisted of three valid Reference Methods 1-5 sample runs of 72 minutes duration on Units 3 & 4. Each run was conducted along a four port 24-point traverse of perpendicular stack diameters. Orsat analysis was done according to the multi-point integrated bag procedure of Reference Method 3. Table 1.1 lists the unit test dates, average plant load (GMW) and opacity (%) data.

Table 1.1 – Particulate Test Dates & Plant Data

Unit	Date	GMW	%Opacity
3	6/21/18	733.4	13.8
4	6/26/18	740.5	15.5

2.0 Summary of Results

CSES Units 3 & 4 are designated as new source fossil fuel-fired steam generators falling under the NSPS set forth in 40 CFR 60, Subpart D, as amended by the Colstrip 3 and 4 Federal PSD operational permit and Section III of Montana Air Quality Permit #OP0513-13. Quarterly particulate tests are required to fulfill compliance requirements with the MATS FPM limits in 40 CFR 63.9991 (Table 2).

Results of the MATS FPM test series performed on CSES Units 3 and 4, which are used to calculate the site-wide rolling 30-day average emission, are summarized in the below table. Table 2.0 also contains the test results obtained in the 1st Quarter 2018.

Table 2.0 – Particulate Test Results

Unit	1st Quarter 2018	2nd Quarter 2018
	Lb./mmBtu	Lb./mmBtu
1	0.021	
2	0.035	
3	0.027	0.043
4	0.034	0.051

Complete run by run results of the MATS FPM test series performed on CSES Units 3 and 4 are summarized in Appendices A and B. Appendices A, B and F contain process and fuel data. Appendices C-E contain source test calibration and quality assurance data, project participants/qualifications, and correspondence.

Talen is conducting an ongoing investigation to address the higher MATS FPM emissions. MDEQ is being kept apprised of these activities through ongoing verbal and written communications, Both Units' MATS FPM test results differed from their PM CEMS initial correlation/calibration by more than 25%, so the initial correlation/calibration will be repeated.

All stack testing, data collection, lab analyses, calibrations, and calculations were completed by Talen Montana, CSES, Environmental Compliance Department personnel. Standard Laboratories, Inc. in Colstrip, Montana conducted the coal analyses.

3.0 Facility and Emission Source Operation

Process and control system descriptions can be found in the previously submitted Talen Montana Source Test Protocol. Copies of this report are on file at the MDEQ and in the CSES Environmental Compliance Department library.

4.0 Sampling and Analysis Procedures

During these test series, there were no deviations from Talen Montana, CSES, Environmental Compliance Department's normal protocol for source testing. Information on sample port location, sample point locations, and sample train descriptions can be found in the Talen Montana Source Test Protocol submitted to the MDEQ and on file in the CSES Environmental Compliance Department library.

5.0 Test Methods and Calculations

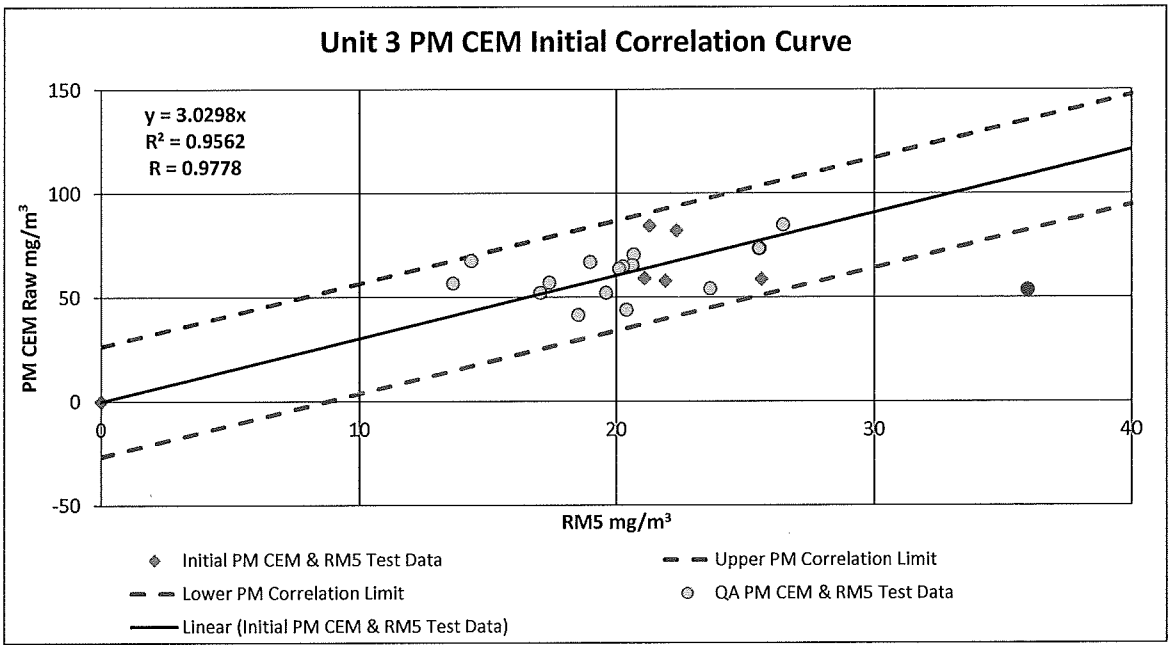
Complete descriptions of all test methods are described in 40 CFR 60, Appendix A, Reference Methods 1-5, 40 CFR 63 Subpart UUUUU, Talen Montana standard operating procedures, and the Talen Montana Source Test Protocol. These documents are contained on file at Colstrip and, as well, have been previously submitted to Region 8 EPA and the MDEQ. Therefore, they are not contained in this report.

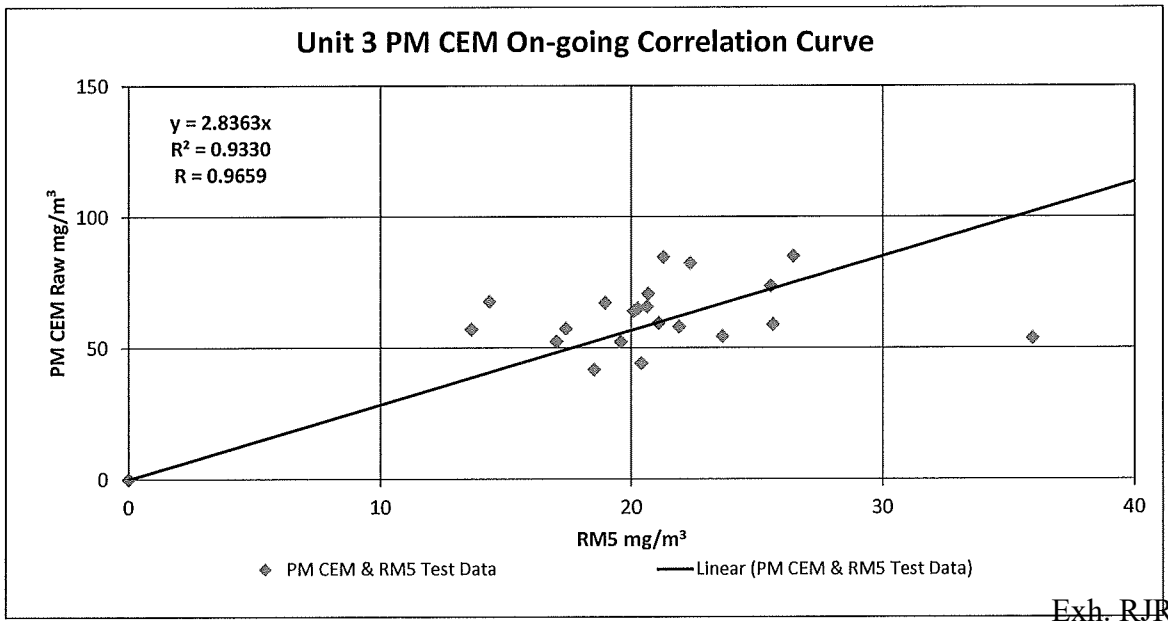
All raw data reduction was completed using Microsoft Excel software. Step by step calculations of run data are provided in the respective Appendix (A or B) for each unit tested.

APPENDIX A

Field, Lab, and Operational Data; and Calculations - Unit 3

Colstrip Unit 3 RM5 Test Data													Calc. Metric	PM CEM 3_PM_RAW
Date	Time (MST)	Run	GMW	lb/MMBtu	gr/DSCF	gr/ASCF	lb/HR	%ISO	%CO2	%O2	%H2O	%Op	mg/m³	mg/m³
Zero Data Pt.													0	0
7/10/14	08:19-09:52	1	806.4	0.028	0.0132	0.0112	235.9	95.7	12.1	7.0	15.3	13.4	25.62	58.84
7/10/14	10:52-12:16	2	811.7	0.024	0.0113	0.0096	202.1	96.3	12.2	7.1	15.7	13.5	21.88	58.02
7/10/14	13:21-14:46	3	812.0	0.023	0.0109	0.0092	194.6	97.0	12.1	7.2	15.7	14.3	21.07	59.33
7/15/14	07:00-08:23	4	811.7	0.026	0.0114	0.0097	203.4	95.7	11.9	7.9	14.7	17.4	22.31	82.28
7/15/14	09:12-10:36	5	811.2	0.025	0.0109	0.0093	203.4	94.0	11.8	7.9	15.0	17.6	21.26	84.61
12/3/14	12:46-14:12	1	810.7	0.020	0.0097	0.0083	166.8	99.1	12.1	7.0	14.4	16.8	18.96	67.14
2/4/15	3 Run Avg		813.6	0.023	0.0105	0.0090	192.5	98.1	12.0	7.5	14.4	16.4	20.65	70.65
6/17/15	08:05-09:28	1	803.6	0.016	0.0074	0.0063	127.2	101.9	12.8	7.2	15.1	15.8	14.35	67.70
8/18/15	11:11-12:34	1	804.8	0.023	0.0105	0.0090	182.6	101.4	12.1	7.5	14.5	15.6	20.60	65.66
11/18/15	09:04-10:27	1	786.6	0.019	0.0088	0.0076	148.2	106.4	11.9	7.5	14.0	16.2	17.40	57.31
2/3/16	3 Run Avg		802.8	0.028	0.0130	0.0111	219.6	103.8	12.0	7.3	14.0	14.3	25.53	73.60
2/19/16	09:25-10:49	1	761.5	0.028	0.0134	0.0115	224.0	100.3	11.1	7.0	14.0	15.8	26.44	85.03
6/2/16	11:12-12:34	1	798.6	0.016	0.0070	0.0060	117.6	105.1	11.6	7.7	14.7	12.6	13.63	57.03
8/9/16	3 Run Avg		791.2	0.023	0.0104	0.0088	178.7	100.9	11.9	7.5	15.2	14.3	20.24	65.03
10/11/16	3 Run Avg		795.1	0.022	0.0102	0.0088	172.9	96.8	12.2	7.4	14.2	14.9	20.09	63.95
1/25/17	3 Run Avg		769.4	0.020	0.0086	0.0074	149.0	95.8	11.7	8.0	14.0	15.1	17.03	52.37
4/25/17	3 Run Avg		752.5	0.021	0.0094	0.0081	159.5	99.2	11.6	7.9	14.2	12.3	18.51	41.64
7/25/17	3 Run Avg		744.3	0.022	0.0100	0.0086	160.2	100.7	11.7	7.8	14.6	13.7	19.58	52.34
10/24/17	3 Run Avg		751.8	0.023	0.0104	0.0089	166.6	99.3	11.8	7.8	14.2	11.6	20.37	44.18
2/7/18	3 Run Avg		770.7	0.027	0.0121	0.0103	197.0	100.8	12.1	7.6	15.0	14.0	23.61	54.32
6/21/18	3 Run Avg		733.4	0.043	0.0185	0.0157	301.5	100.2	11.5	8.2	15.2	13.8	35.95	53.60
													X	Y





Talen Montana
CSES Unit 3 Stack

Particulate Compliance Tests Data Summary
EPA MATS Modified Reference Method 5

Date	Time (MST)	Run	Load (GMW)	Reference Method 5				%ISO	%CO_2	%O_2	%H2O	%OP
				lb/mmBtu	gr/DSCF	gr/ASCF	lb/HR					
6/21/18	09:31-10:51	1	733.1	0.042	0.0180	0.0153	292.3	100.9	11.3	8.3	15.1	13.6
6/21/18	11:32-12:53	2	733.9	0.041	0.0180	0.0153	293.3	99.8	11.5	8.1	15.2	13.8
6/21/18	13:32-14:54	3	733.2	0.045	0.0195	0.0166	318.9	100.0	11.6	8.1	15.2	14.0
Average			733.4	0.043	0.0185	0.0157	301.5	100.2	11.5	8.2	15.2	13.8

Metric Units

Date	Time (MST)	Run	Load (GMW)	Reference Method 5				%ISO	%CO_2	%O_2	%H2O	%OP
				ng/Joule	g/DSCM	mg/m^3	kg/HR					
6/21/18	09:31-10:51	1	733.1	18.0	0.0412	34.99	132.6	100.9	11.3	8.3	15.1	13.6
6/21/18	11:32-12:53	2	733.9	17.8	0.0412	34.94	133.0	99.8	11.5	8.1	15.2	13.8
6/21/18	13:32-14:54	3	733.2	19.2	0.0448	37.93	144.7	100.0	11.6	8.1	15.2	14.0
Average			733.4	18.3	0.0424	35.95	136.8	100.2	11.5	8.2	15.2	13.8

Talen Montana

Colstrip Steam Electric Station

Environmental Compliance Department

EPA MATS Modified Reference Method 5 (Particulate)

Unit Tested	3	Sample Date	06/21/18
Acetone Blank			
Final Wt., g	86.3960		
Initial Wt., g	86.3960		
*Net Wt., g	**0.0000**		
Wash Vol., ml	200		
	Run 1	**Run 2**	**Run 3**
Filter Mass			
Filter Number	1454	1457	1458
Final Weight, g	0.4400	0.4430	0.4450
Initial Weight, g	0.3760	0.3770	0.3770
Net Weight, g	**0.0640**	**0.0660**	**0.0680**
Probe Wash Mass			
Probe Wash Bottle No.	1A	1B	1C
Lab Beaker No.	31P	42P	34P
Final Weight, g	99.7555	104.2730	99.4590
Initial Weight, g	99.7520	104.2720	99.4540
Net Weight, g	**0.0035**	**0.0010**	**0.0050**
Wash Volume, ml	210	210	215
Total Part. Mass, Mn	**0.0675**	**0.0670**	**0.0730**
% Mass Filter	**94.8**	**98.5**	**93.2**
% Mass Probe Wash	**5.2**	**1.5**	**6.8**
Analysis By:	SLB	**Date:**	6/25/2018

* When blank is +/- 0.0005 gm it is counted as zero.

Source	3		
Date	06/21/18		
Field Data	Run 1	Run 2	Run 3
Sample Time (MST)	09:31-10:51	11:325-12:53	13:32-14:54
Volume Metered	68.436	68.780	69.508
Delta P - in. H_2O	3.231	3.270	3.290
Delta H - in. H_2O	2.346	2.363	2.388
Avg. Meter Temp. - F	86.6	92.7	96.0
Avg. Stack Temp. - F	193.9	194.4	194.8
Abs. Stack Press. - in. Hg	26.07	26.04	25.99
Bar. Press. - in. Hg	26.35	26.32	26.28
% CO_2	11.3	11.5	11.6
% O_2	8.3	8.1	8.1
% N_2	80.4	80.4	80.3
Cp	0.8089	0.8089	0.8089
Y - Meter Cal Factor	0.9874	0.9874	0.9874
Stack Area - Sq. Ft.	452.39	452.39	452.39
Impingers - gms H_2O	218.3	218.6	219.9
Mn	0.0675	0.0670	0.0730
Test Time - Minutes	72	72	72
Nozzle Diam. - inches	0.1867	0.1867	0.1867
Results			
VMstd, DSCF	57.871	57.457	57.637
Vmstd, ASCF	68.164	67.764	68.006
Bws	0.151	0.152	0.152
MD, lb/lb Mol	30.14	30.16	30.18
MS, lb/lb Mol	28.31	28.31	28.32
VS, Ft/Sec	117.0	117.8	118.3
QS, DSCF/Hr	113774347	114193328	114325667
QACT, ACF/Hr	190494817	191811355	192602793
% ISO.	100.9	99.8	100.0
Particulate Emissions			
PMR, Lb/Hr	292.3	293.3	318.9
CS, gr/DSCF	0.0180	0.0180	0.0195
CS, gr/ASCF	0.0153	0.0153	0.0166
E, Lb/mmBtu	0.042	0.041	0.045
Fo	1.115	1.113	1.106
Data Entered By:	DRM	Checked By:	SJC
Date:	06/21/18	Date:	6/30/18

Talen MT Environmental Department - Particulate Analysis Weight Sheet				
Unit Tested	3	**Test Date**	6/21/18	**Acetone Blank**
RM5 Test #	**1**	**2**	**3**	
Wash Bottle #	1A	1B	1C	AB3
Beaker #	31P	42P	34P	10P
Wash Volumes (mls)	200	200	200	200
	10	10	15	
Total	**210**	**210**	**215**	**200**
Gross Weights	99.7555	104.2730	99.4590	86.3960
	99.7555	104.2730	99.4590	86.3960
	99.7555	104.2730	99.4590	86.3960
Average	**99.7555**	**104.2730**	**99.4590**	**86.3960**
Tare Weights	99.7520	104.2720	99.4540	86.3960
	99.7520	104.2720	99.4540	86.3960
	99.7520	104.2720	99.4540	86.3960
Average	**99.7520**	**104.2720**	**99.4540**	**86.3960**
Filter #	1454	1457	1458	
Gross Weights	0.4400	0.4430	0.4450	
	0.4400	0.4430	0.4450	
	0.4400	0.4430	0.4450	
Average	**0.4400**	**0.4430**	**0.4450**	
Tare Weights	0.3760	0.3770	0.3770	
	0.3760	0.3770	0.3770	
	0.3760	0.3770	0.3770	
Average	**0.3760**	**0.3770**	**0.3770**	
Analysis Completed by:	SLB	**Date Analysis Completed**		6/25/18

Reference Method 2 Calculations
Stack Velocity & Volumetric Flow Rate

Date: 6/21/18 **Run # 1** **Source: 3**

2-1 Average Stack Gas Velocity (Feet/Sec.): Vs

Avg. Vs = KpCp*[Sq.Rt(Ts-459.7)/PsMs]*[Sq.Rt. Dp]

$$Vs = (85.48\ ft/S) * 0.8089 * Sq.Rt.\left|\frac{653.6}{26.07 * 28.31}\right| * Sq.Rt.(\ 3.231\ )$$

Vs = **117.0** **Ft/Sec**

2-2 Avg. Stack Gas Volumetric Flow Rate (Dry Std. Conditions): Qs

Avg. Qs = (3600 S/hr)(Vs)(As)(1-Bws)(Tstd/Pstd)[Ps/(Ts+459.7)]

$$Qs = 3600 * 117.0 * 452.39 * 0.849 * \left|\frac{527.7}{29.92}\right| * \left|\frac{26.07}{653.6}\right|$$

Qs = **113774347** **DSCF/Hr**

2-3 Avg. Stack Gas Volumetric Flow Rate (Wet Conditions): Qact

Avg. Qact= (Ts/527.7)(29.92"Hg/Ps)(100/100-%H_2O)(Qs)

$$Qact = \left|\frac{653.6}{527.7}\right| * \left|\frac{29.92}{26.07}\right| * \left|\frac{100}{100 - 15.1}\right| * 113774347$$

Qact = **190494817** **AWCF/Hr**

Reference Method 4 Calculations
Moisture & Molecular Weight

Date: 6/21/18 **Run # 1** **Source: 3**

4-1 Standard Volume Metered: Vstd

Vstd = K1*Vm*Y*{[Pb+(Dh/13.6)]/Tm+459.7}

$$Vstd = \frac{17.64 * 68.436 * 0.9874 * (26.35 + (2.346 / 13.6))}{546.3}$$

Vstd = **57.871 DCSF**

4-2 Moisture Content of Stack gas: Bws

Vwc = K2 * (Wf - Wi)

Vwc = (0.04715)(218.3)

Vwc = 10.2928 SCF

$$Bws = \frac{Vwc}{Vwc + Vstd}$$

$$Bws = \frac{10.293}{10.293 + 57.871}$$

Bws = **0.151**

4-3 Dry Molecular Weight of Stack Gas: Md

Md = (0.44 * %CO_2) + (0.32 * %O_2) + (0.28 * %N_2)

Md = (0.44 * 11.3) +
(0.32 * 8.3) +
(0.28 * 80.4)

Md = **30.14 Lb./Lb.-mole**

4-4 Wet Molecular Weight of Stack Gas: Ms

Ms = [Md*(1-Bws)] + [18*Bws]

Ms = [(30.14) * (1- 0.151)] + [18 (0.151)]

Ms = **28.31 Lb./Lb.-mole**

Reference Method 5 Calculations
Particulate Emissions

Date: 6/21/18 **Run # 1** **Source: 3**

5-1 Pollutant Mass Rate: PMR

$$PMR = \left| \frac{Ms}{Vstd} \right| * (Qs) * \frac{1}{454 \text{ mg/lb.}}$$

$$PMR = \left| \frac{28.31}{57.871} \right| * (113774347) * \left| \frac{1}{454} \right|$$

PMR = **292.3 Lb./Hr**

5-2 Particulate Concentration: Cs

$$Cs = \frac{Mn * (15.43 \text{ gr/gm})}{Vstd}$$

$$Cs = \frac{0.0675 * (15.43 \text{ gr/gm})}{57.871}$$

Cs = **0.0180 gr/DSCF**

5-3 Particulate Emissions: E

$$E = \left| \frac{Cs}{7000 \text{ gr/Lb.}} \right| * Fd * \left| \frac{20.9}{20.9 - \%O_2} \right|$$

$$E = \left| \frac{0.0180}{7000 \text{ gr/Lb.}} \right| * 9820 * \left| \frac{20.9}{20.9 - 8.3} \right|$$

E = **0.042 lb/mmBtu**

5-4 % Isokinetic Variation

$$\%I = \frac{Ts * Vstd * Pstd * 100}{An * @ * Vs * Ps * Tstd * (60 \text{ sec/min}) * (1 - Bws)}$$

$$\%I = \frac{653.6 * 57.871 * 29.92 * 100}{1.901E\text{-}04 * 72 * 117.0 * 26.07 * 527.7 * 60 * 0.849}$$

%I = **100.9**

Talen MT Environmental Department - PM Analysis Weight Sheet				
Unit Tested	3	Test Date	6-21-18	Acetone Blank
Run #	1	2	3	
Wash Bottle #	1A	1B	1C	AB3
Beaker #	31P	42P	34P	10P
Wash Volumes (ml)	200	200	200	200
	10	10	15	-
	-	-	-	-
Total	210	210	215	200
Gross Weights (g)	99.756	104.273	99.459	86.396
	99.756	104.273	99.459	86.396
	99.756	104.273	99.459	86.396
Average	99.756	104.273	99.459	
Tare Weights (g)	99.752	104.272	99.454	86.396
	99.752	104.272	99.454	86.396
	99.752	104.272	99.454	86.396
Average	99.752	104.272	99.454	86.396
Filter #	1454	1457	1458	
Gross Weights (g)	.440	.443	.445	
	.440	.443	.445	
	.440	.443	.445	
Average	.440	.443	.445	
Tare Weights (g)	.376	.377	.377	
	.376	.377	.377	
	.376	.377	.377	
Average	.376	.377	.377	
Analysis By	SB	Date Analysis Completed		6-25-18

Talen Energy Environmental Department
Sample Chain of Custody
Reference Method 5

Test Date	6-21-18			
Unit	3 (?)			
Run #	**1**	**2**	**3**	**4**
Filter #	1454	1457	1458	
Wash Bottle #	1A	1B	1C	
Acetone Blank Bottle #	AB3	→	→	
Sample Recovery				
Filter by	DM			
Probe Wash	DM			
Sample Analysis				
Date/Time rec'd at lab	16:40			
Wash volume levels checked?	✓			
Analyzed by	SB			
Filter Storage & Disposal				
Stored By				
Date				
Disposed By	Seana			
Date	7-2-18			
Approval				
Date				
Comments	Dave Colley AECOM for analysis 1454 1458			

Talen Montana
Environmental Compliance Department
Particulate Field Data

Source	CSES UNIT 3	Meter Box #	7	Probe Length - ft	11'	Meter Box Operator	CLC	Bar. Press. - in. Hg	26.35		
Run #	1	Delta H @	1.7421	Nozzle Dia. - in.	0.1867	Asst. Tester(s)	DM/SB	Abs. Press. - in. Hg	26.07		
Date	6/21/18	Y Factor	0.9874	Heater Set Pt. - F	325°F	Filter Number	1454	Leak Rate	Rate	in. Hg	
Sample Time	09:31 - 10:51	Pitot Cal. - Cp	0.8089	Ambient Temp. - F	76°F	Probe Wash Bot. #	1A	Pre Test	∅	15.5	
# Trav. Pts	24	K Factors	0.72	Probe #	1311463	Imp. Wash Bot. #	----	Post Test	∅	15.0	
		Filter Thermo. #	D2	Hot Box #	7	Strain Relief #	Aux 1				

Port No.	Point No.	Time	Dry Gas Meter CF	Pitot Delta P In H2O	Orifice Delta H In. H2O Desired	Orifice Delta H In. H2O Actual	Pump Vacuum In. Hg	Stack Temp. F	Probe Temp. F	Hot Box Temp. F	Impinger Temp. F Inlet	Impinger Temp. F Outlet	Dry Gas Meter Temp. F Inlet	Dry Gas Meter Temp. F Outlet	Stack Pressure In. H2O
E	1	09:31	189.872	3.25	2.34	2.3	5.0	193	327	328	134	68	77	77	-4.1
	2	09:34		3.35	2.41	2.4	5.5	193	339	333	230	60	78	77	-4.4
	3	09:37		3.35	2.41	2.4	5.6	193	331	334	270	55	79	77	-4.4
	4	09:40		3.40	2.44	2.4	5.9	193	332	332	288	54	81	77	-4.4
	5	09:43		3.35	2.41	2.4	6.2	194	331	332	295	56	83	78	-3.8
	6	09:46		2.60	1.87	1.9	5.4	194	331	330	300	58	85	78	-2.1
	Stop	09:49	206.865												
S	1	09:52	206.865	3.55	2.55	2.6	6.5	194	329	332	300	59	85	79	-4.4
	2	09:55		3.45	2.48	2.5	6.6	194	337	329	311	57	87	79	-4.4
	3	09:58		3.30	2.37	2.4	6.6	194	330	329	310	57	90	80	-4.0
	4	10:01		3.15	2.26	2.3	6.6	194	331	329	307	60	91	80	-3.6
	5	10:04		2.75	1.98	2.0	6.2	194	331	329	305	61	93	81	-3.5
	6	10:07		2.05	1.47	1.5	5.2	193	329	329	304	61	93	81	-1.6
	Stop	10:10	223.509												
W	1	10:13	223.509	3.65	2.62	2.6	7.2	194	329	332	296	63	91	82	-4.2
	2	10:16		3.70	2.66	2.7	7.6	194	331	329	306	58	94	83	-4.0
	3	10:19		3.65	2.62	2.6	7.6	194	331	328	306	59	96	83	-4.8
	4	10:22		3.75	2.70	2.7	8.0	195	330	330	306	61	97	84	-5.0
	5	10:25		3.75	2.70	2.7	8.2	194	331	329	306	61	98	85	-4.5
	6	10:28		3.05	2.19	2.2	7.4	194	330	329	306	62	99	85	-2.4
	Stop	10:31	241.665												
N	1	10:33	241.665	3.45	2.48	2.5	8.0	194	329	329	303	64	97	86	-4.0
	2	10:36		3.45	2.48	2.5	8.2	194	332	330	308	61	98	86	-4.6
	3	10:39		3.45	2.48	2.5	8.4	194	329	330	307	61	99	87	-4.4
	4	10:42		3.30	2.37	2.4	7.8	195	330	329	306	63	100	87	-4.2
	5	10:45		3.00	2.16	2.2	7.5	194	330	330	306	64	100	88	-3.5
	6	10:48		2.20	1.58	1.6	6.5	194	330	330	307	64	100	88	-1.8
	End	10:51	258.308												
		Total 72	68.436	3.231 Avg.		2.346 Avg.		193.9 Avg.					Avg. 86.6		-3.84 Avg.

Comments

Observer(s)

Orsat Analysis				
Gas	1	2	3	Avg.
CO2	11.2	11.4	11.4	11.3
O2	8.4	8.2	8.2	8.3
N2				

Impinger Wts			Gain
Imp #	Post	937.9	
8A	Pre	835.2	102.7
Imp #	Post	880.4	
8B	Pre	798.3	82.1
Imp #	Post	605.9	
8C	Pre	597.5	8.4
Imp #	Post	917.2	
8D	Pre	892.1	25.1
Total			218.3

Date	6-21-18	
Filter #	1454	
Run #	1	
Bottle #	1A	
Time		
Unit	3	

https://talenenergy.sharepoint.com/teams/MTServices/Environmental/EnvCEMStaff/CEM Misc/Forms/RM5 Impinger wts

Average Values Report
Generated: 6/21/2018 16:11

Company: Talen Energy
Plant: Colstrip Generating Station
City/St: Colstrip, MT 59323
Source: unit_3_stack, plant_comp_3, ,unit_3_stack

Period Start: 6/21/2018 09:31
Period End: 6/21/2018 10:51
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
06/21/2018 09:31	10.38	121705	192.0	56.85	18.56	13.6	737.6	862	2.856
06/21/2018 09:32	10.37	121750	192.1	56.23	18.36	13.8	736.7	861	2.857
06/21/2018 09:33	10.32	122096	192.2	55.16	18.09	13.8	735.4	855	2.875
06/21/2018 09:34	10.34	122347	192.1	50.38	16.39	13.5	735.8	854	2.884
06/21/2018 09:35	10.37	121622	192.0	54.44	17.87	13.6	735.0	854	2.848
06/21/2018 09:36	10.37	122263	192.0	53.27	17.42	13.4	734.2	860	2.882
06/21/2018 09:37	10.37	122392	192.0	53.81	17.58	13.4	733.2	861	2.889
06/21/2018 09:38	10.35	122526	191.9	48.60	15.85	13.1	733.7	861	2.893
06/21/2018 09:39	10.33	123815	191.9	47.30	15.41	13.0	734.3	861	2.955
06/21/2018 09:40	10.34	122855	191.9	47.41	15.44	13.1	734.0	861	2.912
06/21/2018 09:41	10.29	122754	191.9	47.44	15.48	13.0	734.0	861	2.904
06/21/2018 09:42	10.30	123201	191.9	47.51	15.51	13.2	734.2	861	2.925
06/21/2018 09:43	10.30	123502	192.0	51.02	16.65	13.2	734.3	861	2.940
06/21/2018 09:44	10.29	123636	192.2	61.41	20.07	13.7	733.7	861	2.948
06/21/2018 09:45	10.24	124032	192.2	58.87	19.20	13.6	732.6	858	2.966
06/21/2018 09:46	10.24	124367	192.2	57.03	18.70	13.6	733.7	857	2.982
06/21/2018 09:47	10.24	123441	192.1	52.17	17.05	13.4	734.3	857	2.938
06/21/2018 09:48	10.18	123569	191.9	53.35	17.50	13.3	733.4	857	2.943
06/21/2018 09:49	10.19	122905	191.9	60.28	19.78	13.6	732.5	857	2.911
06/21/2018 09:50	10.21	123446	191.9	60.48	19.74	13.6	732.3	857	2.937
06/21/2018 09:51	10.20	123865	192.1	60.71	19.78	13.5	731.7	857	2.957
06/21/2018 09:52	10.23	123647	192.1	50.58	16.58	13.3	731.9	861	2.949
06/21/2018 09:53	10.22	123865	192.0	55.85	18.26	13.6	731.7	863	2.958
06/21/2018 09:54	10.16	124864	192.2	56.13	18.28	13.7	731.4	863	3.005
06/21/2018 09:55	10.17	124434	192.2	54.98	17.95	13.6	730.6	863	2.983
06/21/2018 09:56	10.10	124445	192.2	51.43	16.77	13.5	730.7	863	2.986
06/21/2018 09:57	10.15	124791	192.2	52.13	17.02	13.5	731.5	858	3.003
06/21/2018 09:58	10.17	124222	192.3	56.29	18.33	13.6	732.4	857	2.976
06/21/2018 09:59	10.18	124166	192.3	54.35	17.77	13.5	732.3	857	2.973
06/21/2018 10:00	10.21	124467	192.5	53.49	17.46	13.5	731.8	857	2.988
06/21/2018 10:01	10.15	124473	192.5	50.75	16.56	13.5	731.8	857	2.989
06/21/2018 10:02	10.17	124384	192.4	52.38	17.08	13.5	731.7	857	2.984
06/21/2018 10:03	10.18	125204	192.5	55.29	18.05	13.6	732.1	857	3.021
06/21/2018 10:04	10.18	124702	192.5	53.85	17.69	13.6	733.0	857	3.005
06/21/2018 10:05	10.20	124652	192.5	52.25	17.04	13.5	734.0	863	3.000
06/21/2018 10:06	10.15	124746	192.4	48.93	15.96	13.4	734.0	864	3.001
06/21/2018 10:07	10.19	124451	192.2	47.87	15.63	13.2	735.0	864	2.985
06/21/2018 10:08	10.19	125020	192.3	47.65	15.55	13.3	735.9	864	3.015
06/21/2018 10:09	10.23	125031	192.3	48.64	15.86	13.6	735.9	864	3.015

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
06/21/2018 10:10	10.25	124746	192.3	48.47	15.79	13.4	735.4	864	3.001
06/21/2018 10:11	10.16	124507	192.3	56.88	18.58	13.8	735.6	864	2.989
06/21/2018 10:12	10.20	124853	192.4	59.18	19.35	13.8	734.6	864	3.007
06/21/2018 10:13	10.17	125065	192.5	56.04	18.32	13.7	732.7	864	3.015
06/21/2018 10:14	10.15	125182	192.5	52.44	17.15	13.7	732.1	864	3.023
06/21/2018 10:15	10.10	124875	192.5	50.65	16.54	13.8	732.0	865	3.008
06/21/2018 10:16	10.10	124356	192.3	49.37	16.07	13.8	732.6	865	2.982
06/21/2018 10:17	10.12	124066	192.2	49.28	16.03	13.7	732.4	865	2.966
06/21/2018 10:18	10.18	124161	192.3	48.37	15.76	13.7	732.8	865	2.973
06/21/2018 10:19	10.17	124992	192.4	48.38	15.77	13.6	732.0	865	3.016
06/21/2018 10:20	10.17	124836	192.5	49.48	16.16	13.9	732.4	865	3.006
06/21/2018 10:21	10.17	124278	192.5	57.16	18.65	14.2	731.9	860	2.979
06/21/2018 10:22	10.14	124049	192.6	58.89	19.22	14.2	730.9	859	2.969
06/21/2018 10:23	10.15	124975	192.7	55.76	18.32	14.0	729.9	859	3.009
06/21/2018 10:24	10.13	124758	192.7	56.55	18.73	14.1	729.6	859	3.003
06/21/2018 10:25	10.13	124735	192.5	52.47	17.01	13.9	729.9	859	3.001
06/21/2018 10:26	10.15	125154	192.5	58.58	19.07	14.2	730.3	859	3.021
06/21/2018 10:27	10.21	124713	192.5	58.63	19.18	14.2	731.1	864	2.994
06/21/2018 10:28	10.16	125070	192.6	55.07	18.02	14.0	732.5	864	3.018
06/21/2018 10:29	10.20	124886	192.6	49.73	16.25	13.8	732.0	864	3.009
06/21/2018 10:30	10.17	124825	192.6	53.41	17.44	13.7	733.7	864	3.006
06/21/2018 10:31	10.15	125042	192.7	53.95	17.62	13.6	734.4	859	3.017
06/21/2018 10:32	10.18	124696	192.7	56.10	18.32	13.7	734.0	859	2.994
06/21/2018 10:33	10.19	125226	192.7	51.74	16.92	13.7	733.4	859	3.026
06/21/2018 10:34	10.16	125070	192.6	50.27	16.22	13.5	733.7	859	3.023
06/21/2018 10:35	10.14	124914	192.5	58.47	19.11	13.8	734.5	859	3.010
06/21/2018 10:36	10.16	124746	192.7	57.92	18.93	13.7	734.7	863	3.001
06/21/2018 10:37	10.20	125137	192.8	55.35	18.13	13.6	733.3	864	3.022
06/21/2018 10:38	10.17	124925	192.8	55.13	17.94	13.8	734.0	864	3.012
06/21/2018 10:39	10.14	124752	192.7	51.66	16.85	13.7	733.1	864	3.003
06/21/2018 10:40	10.16	124858	192.8	55.42	18.07	13.7	733.0	864	3.008
06/21/2018 10:41	10.15	125461	192.8	54.35	17.73	13.7	733.0	864	3.038
06/21/2018 10:42	10.15	124880	192.8	53.99	17.63	13.6	732.7	864	3.010
06/21/2018 10:43	10.10	124674	192.7	50.49	16.47	13.5	732.3	864	3.000
06/21/2018 10:44	10.12	124769	192.5	48.72	15.88	13.5	732.4	864	3.003
06/21/2018 10:45	10.17	125282	192.5	48.71	15.87	13.7	733.1	864	3.028
06/21/2018 10:46	10.19	125143	192.5	48.88	15.93	13.7	733.4	865	3.016
06/21/2018 10:47	10.21	125087	192.7	48.69	15.85	13.6	733.2	865	3.023
06/21/2018 10:48	10.19	124663	192.6	49.29	16.07	13.8	733.2	865	2.998
06/21/2018 10:49	10.19	124133	192.6	50.80	16.58	14.0	732.8	865	2.973
06/21/2018 10:50	10.18	123965	192.6	49.99	16.32	14.0	733.3	860	2.965
06/21/2018 10:51	10.19	124417	192.8	51.05	16.64	13.9	732.2	860	2.987
Final Average*	**10.20**	**124254**	**192.4**	**53.12**	**17.34**	**13.6**	**733.1**	**861**	**2.978**
Maximum*	**10.38**	**125461**	**192.8**	**61.41**	**20.07**	**14.2**	**737.6**	**865**	**3.038**
	06/21/2018 9:31	06/21/2018 10:41	06/21/2018 10:51	06/21/2018 9:44	06/21/2018 9:44	06/21/2018 10:27	06/21/2018 9:31	06/21/2018 10:49	06/21/2018 10:41
Minimum*	**10.10**	**121622**	**191.9**	**47.30**	**15.41**	**13.0**	**729.6**	**854**	**2.848**
	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
	10:43	9:35	9:50	9:39	9:39	9:41	10:24	9:35	9:35

* Does not include Invalid Averaging Periods ("N/A")

Talen Montana
Environmental Compliance Department
Particulate Field Data

Source	CSES UNIT 3	Meter Box #	7	Probe Length - ft	11'	Meter Box Operator	CLC	Bar. Press. - in. Hg	26.32		
Run #	2	Delta H @	1.7421	Nozzle Dia. - in.	0.1867	Asst. Tester(s)	DM/SB	Abs. Press. - in. Hg	26.04		
Date	6/21/18	Y Factor	0.9874	Heater Set Pt. - F	325°F	Filter Number	1457	Leak Rate	Rate	in. Hg	
Sample Time	11:32 - 12:53	Pitot Cal. - Cp	0.8089	Ambient Temp. - F	87°F	Probe Wash Bot. #	13	Pre Test	ø	15.0	
# Trav. Pts	24	K Factors	0.72	Probe #	1311463	Imp. Wash Bot. #	----	Post Test	ø	15.0	
		Filter Thermo. #	D2	Hot Box #	7	Strain Relief #	Aux 1				

Port No.	Point No.	Time	Dry Gas Meter CF	Pitot Delta P In H2O	Orifice Delta H In. H2O		Pump Vacuum In. Hg	Stack Temp. F	Probe Temp. F	Hot Box Temp. F	Impinger Temp. F		Dry Gas Meter Temp. F		Stack Pressure In. H2O
					Desired	Actual					Inlet	Outlet	Inlet	Outlet	
2	1	11:32	258.536	3.40	2.44	2.4	5.4	194	334	331	132	69	88	87	-4.2
	2	11:35		3.45	2.48	2.5	5.9	194	333	334	219	57	88	87	-4.4
	3	11:38		3.35	2.41	2.4	6.0	194	331	333	255	52	89	87	-4.4
	4	11:41		3.30	2.37	2.4	6.4	194	331	332	271	52	91	87	-3.8
	5	11:44		2.95	2.12	2.1	6.0	194	330	330	280	53	92	87	-3.3
	6	11:47		2.25	1.62	1.6	5.2	194	331	331	284	54	93	87	-1.8
	Stop	11:50	275.328												
3	1	11:53	275.328	3.65	2.62	2.6	7.4	194	330	331	274	57	92	87	-3.4
	2	11:56		3.65	2.62	2.6	7.5	194	331	330	292	52	95	87	-4.0
	3	11:59		3.75	2.70	2.7	8.0	194	330	329	292	53	97	88	-5.0
	4	12:02		3.75	2.70	2.7	8.2	194	331	330	291	54	97	88	-5.1
	5	12:05		3.80	2.73	2.7	8.5	194	330	329	290	56	98	88	-4.6
	6	12:08		3.15	2.26	2.3	7.6	194	330	330	290	57	99	89	-2.4
	Stop	12:11	293.532												
5	1	12:14	293.532	3.65	2.62	2.6	8.5	195	325	330	277	60	96	89	-4.9
	2	12:17		3.55	2.55	2.6	8.9	194	336	330	298	57	98	89	-4.7
	3	12:20		3.45	2.48	2.5	8.9	195	330	330	299	58	99	89	-4.6
	4	12:23		3.20	2.30	2.3	8.5	195	331	330	297	61	100	90	-3.8
	5	12:26		2.75	1.98	2.0	8.0	194	330	330	295	62	100	90	-3.0
	6	12:29		2.10	1.51	1.5	6.8	194	330	329	293	62	100	90	-1.6
	Stop	12:32	310.488												
6	1	12:35	310.488	3.30	2.37	2.4	9.0	195	328	330	279	64	98	90	-3.5
	2	12:38		3.40	2.44	2.4	9.4	195	335	330	296	58	100	91	-4.3
	3	12:41		3.45	2.48	2.5	9.2	195	331	329	296	59	101	91	-4.8
	4	12:44		3.55	2.55	2.6	9.6	195	330	330	294	61	101	91	-4.8
	5	12:47		3.50	2.52	2.5	9.6	195	330	330	292	62	102	91	-4.1
	6	12:50		2.55	1.83	1.8	8.0	195	330	329	291	63	102	92	-2.0
	End	12:53	327.316												
		Total 72	68.780	3.270 Avg.		2.363 Avg.		194.4 Avg.					92.7 Avg.		-3.86 Avg.

Comments

Observer(s)

Orsat Analysis				
Gas	1	2	3	Avg.
CO2	11.6	11.4	11.4	11.47
O2	8.0	8.2	8.2	8.13
N2				

Impinger Wts			Gain
Imp #	Post	948.2	142.4
3A	Pre	805.8	
Imp #	Post	872.9	49.1
3B	Pre	823.8	
Imp #	Post	624.2	5.4
3C	Pre	618.8	
Imp #	Post	920.0	21.7
3D	Pre	898.3	
Total		218.6	

Date	6-21-18	
Filter #	1457	
Run #	2	
Bottle #	1B	
Time		
Unit	3	

https://talenenergy.sharepoint.com/teams/MTServices/Environmental/EnvCEMStaff/CEM Misc/Forms/RM5 Impinger wts

Average Values Report
Generated: 6/21/2018 16:12

Company: Talen Energy
Plant: Colstrip Generating Station
City/St: Colstrip, MT 59323
Source: unit_3_stack, plant_comp_3, ,unit_3_stack

Period Start: 6/21/2018 11:32
Period End: 6/21/2018 12:53
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
06/21/2018 11:32	10.13	124752	192.7	48.75	15.92	13.9	733.3	867	3.002
06/21/2018 11:33	10.20	124161	192.8	49.47	16.11	14.0	732.0	867	2.975
06/21/2018 11:34	10.22	125115	192.8	49.24	16.06	13.8	731.9	867	3.021
06/21/2018 11:35	10.20	125215	192.8	48.76	15.91	13.6	731.9	864	3.026
06/21/2018 11:36	10.19	124897	192.9	49.12	15.99	13.7	733.0	862	3.011
06/21/2018 11:37	10.19	124780	192.9	49.06	16.00	13.5	734.2	866	3.003
06/21/2018 11:38	10.23	124311	192.8	49.22	16.01	13.5	733.8	867	2.982
06/21/2018 11:39	10.20	124869	192.8	49.92	16.29	13.7	733.6	867	3.009
06/21/2018 11:40	10.16	124908	192.8	55.85	18.22	13.8	733.5	867	3.011
06/21/2018 11:41	10.16	124998	192.8	56.37	18.41	13.8	733.8	867	3.015
06/21/2018 11:42	10.19	124183	192.8	57.46	18.73	13.9	733.9	867	2.976
06/21/2018 11:43	10.10	123949	192.8	55.12	17.99	13.7	732.8	864	2.965
06/21/2018 11:44	10.15	124094	192.8	51.30	16.67	13.5	733.3	862	2.972
06/21/2018 11:45	10.20	124880	192.9	54.18	17.67	13.8	733.9	862	3.009
06/21/2018 11:46	10.21	124066	193.0	54.23	17.70	13.8	734.4	867	2.972
06/21/2018 11:47	10.18	124534	192.9	53.17	17.36	13.8	734.1	868	2.995
06/21/2018 11:48	10.19	124361	192.8	49.62	16.19	13.6	733.9	868	2.985
06/21/2018 11:49	N/A	124345	192.8	60.86	19.92	14.1	734.5	868	2.984
06/21/2018 11:50	N/A	125025	192.9	65.30	21.32	14.1	734.3	868	3.017
06/21/2018 11:51	N/A	124540	192.9	59.01	19.28	13.9	735.2	868	2.996
06/21/2018 11:52	N/A	124959	192.8	55.35	18.06	13.7	736.5	868	3.016
06/21/2018 11:53	N/A	124897	192.7	51.10	16.67	13.6	735.1	868	3.008
06/21/2018 11:54	10.16	124373	192.8	57.76	18.87	13.9	734.3	868	2.985
06/21/2018 11:55	10.17	124384	192.8	57.48	18.79	13.9	733.9	862	2.980
06/21/2018 11:56	10.21	124730	192.8	54.94	17.96	13.8	733.3	861	3.003
06/21/2018 11:57	10.18	124802	192.8	53.09	17.36	13.7	732.9	861	3.006
06/21/2018 11:58	10.15	123921	192.5	55.87	18.04	13.7	732.9	861	2.966
06/21/2018 11:59	10.14	124462	192.6	64.27	21.00	14.0	733.8	861	2.988
06/21/2018 12:00	10.19	124663	192.7	58.63	19.11	13.9	733.6	867	2.999
06/21/2018 12:01	10.18	124875	192.8	57.61	18.80	13.9	733.6	868	3.009
06/21/2018 12:02	10.18	124953	192.8	51.76	16.88	13.8	733.4	868	3.013
06/21/2018 12:03	10.15	124529	192.8	54.97	17.94	13.7	734.2	868	2.997
06/21/2018 12:04	10.16	124674	192.8	56.41	18.45	13.8	734.4	868	3.000
06/21/2018 12:05	10.19	124490	192.8	54.49	17.81	13.7	734.7	868	2.991
06/21/2018 12:06	10.15	124640	192.8	50.79	16.68	13.6	734.6	868	2.999
06/21/2018 12:07	10.16	124211	192.8	53.02	17.10	13.7	735.7	868	2.977
06/21/2018 12:08	10.20	124423	192.8	58.24	19.01	13.8	735.7	868	2.988
06/21/2018 12:09	10.19	124043	193.0	54.85	17.88	13.7	734.5	866	2.970
06/21/2018 12:10	10.10	124797	193.1	55.29	18.04	13.7	734.6	866	3.010

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
06/21/2018 12:11	10.15	124423	193.0	51.13	16.65	13.6	733.3	866	2.990
06/21/2018 12:12	10.12	125187	193.0	53.05	17.31	13.7	734.0	866	3.025
06/21/2018 12:13	10.14	125249	193.0	55.36	18.06	13.8	733.3	866	3.028
06/21/2018 12:14	10.17	125171	193.0	52.70	17.20	13.7	732.8	866	3.022
06/21/2018 12:15	10.15	125254	193.0	52.12	16.94	13.7	733.6	866	3.029
06/21/2018 12:16	10.19	125444	192.8	48.84	15.95	13.5	735.0	866	3.037
06/21/2018 12:17	10.19	124986	192.7	59.60	19.44	14.0	736.5	866	3.015
06/21/2018 12:18	10.22	124986	192.6	71.93	23.54	14.6	736.1	869	3.014
06/21/2018 12:19	10.19	124730	192.7	62.04	20.35	14.2	735.1	871	3.002
06/21/2018 12:20	10.14	124808	192.8	57.13	18.77	13.9	734.5	866	3.005
06/21/2018 12:21	10.12	124758	192.8	51.77	16.80	13.7	733.8	863	3.004
06/21/2018 12:22	10.16	124278	192.9	57.60	18.83	13.9	734.6	863	2.984
06/21/2018 12:23	10.18	124836	193.0	56.19	18.38	13.8	733.7	869	3.009
06/21/2018 12:24	10.17	125277	193.1	55.94	18.23	13.8	733.3	870	3.030
06/21/2018 12:25	10.15	124797	193.1	51.16	16.69	13.7	731.9	870	3.008
06/21/2018 12:26	10.10	124668	192.8	49.17	16.03	13.7	732.4	870	3.000
06/21/2018 12:27	10.13	125176	192.8	49.41	16.14	13.6	732.0	870	3.024
06/21/2018 12:28	10.11	125187	192.8	49.13	16.00	13.7	733.2	870	3.024
06/21/2018 12:29	10.12	124389	192.8	49.56	16.14	13.6	733.0	870	2.984
06/21/2018 12:30	10.14	124652	192.8	49.94	16.28	13.7	733.1	870	3.000
06/21/2018 12:31	10.15	124635	193.1	56.40	18.36	13.9	732.7	870	2.999
06/21/2018 12:32	10.16	124289	193.1	57.43	18.72	14.0	733.3	865	2.983
06/21/2018 12:33	10.13	124763	193.1	56.44	18.43	13.9	732.6	862	3.005
06/21/2018 12:34	10.16	125059	193.1	51.47	16.75	13.7	733.9	862	3.020
06/21/2018 12:35	10.17	124467	192.9	51.65	16.85	13.9	734.2	867	2.990
06/21/2018 12:36	10.16	124802	192.9	57.19	18.67	14.1	735.9	868	3.007
06/21/2018 12:37	10.23	125344	193.0	56.19	18.33	14.2	735.7	868	3.033
06/21/2018 12:38	10.21	124501	193.1	58.84	19.32	14.3	736.2	868	2.993
06/21/2018 12:39	10.18	124272	193.1	52.14	16.92	13.9	734.6	868	2.981
06/21/2018 12:40	10.17	125081	193.0	53.20	17.35	14.1	734.4	868	3.022
06/21/2018 12:41	10.20	124534	193.1	55.96	18.26	14.2	735.4	868	2.995
06/21/2018 12:42	10.18	125070	193.1	54.97	17.92	14.1	734.9	868	3.023
06/21/2018 12:43	10.19	124613	193.1	52.10	17.02	14.0	734.2	868	2.998
06/21/2018 12:44	10.14	125288	193.1	50.06	16.34	13.8	734.5	868	3.031
06/21/2018 12:45	10.17	125171	193.1	59.97	19.57	14.2	735.5	870	3.025
06/21/2018 12:46	10.16	125003	193.1	59.46	19.38	14.2	734.5	870	3.017
06/21/2018 12:47	10.19	125198	193.1	55.89	18.20	14.1	734.5	870	3.027
06/21/2018 12:48	10.12	124473	193.2	52.70	17.26	14.0	733.1	870	2.993
06/21/2018 12:49	10.08	124518	193.1	52.41	17.08	14.0	732.3	865	2.991
06/21/2018 12:50	10.17	124590	193.1	54.98	17.96	13.9	733.0	864	2.998
06/21/2018 12:51	10.15	124959	193.3	52.00	16.97	13.8	732.0	864	3.018
06/21/2018 12:52	10.18	125126	193.3	52.33	17.09	13.9	732.9	869	3.020
06/21/2018 12:53	10.13	125277	193.2	50.68	16.50	13.9	732.6	870	3.030
Final Average*	**10.17**	**124733**	**192.9**	**54.39**	**17.75**	**13.8**	**733.9**	**867**	**3.003**
Maximum*	**10.23**	**125444**	**193.3**	**71.93**	**23.54**	**14.6**	**736.5**	**871**	**3.037**
	06/21/2018 12:37	06/21/2018 12:16	06/21/2018 12:52	06/21/2018 12:18	06/21/2018 12:18	06/21/2018 12:18	06/21/2018 12:17	06/21/2018 12:19	06/21/2018 12:16
Minimum*	**10.08**	**123921**	**192.5**	**48.75**	**15.91**	**13.5**	**731.9**	**861**	**2.965**

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
	06/21/2018 12:49	06/21/2018 11:58	06/21/2018 11:58	06/21/2018 11:32	06/21/2018 11:35	06/21/2018 12:16	06/21/2018 12:25	06/21/2018 11:59	06/21/2018 11:43

* Does not include Invalid Averaging Periods ("N/A")

Talen Montana
Environmental Compliance Department
Particulate Field Data

Source	CSES UNIT 4	Meter Box #	5	Probe Length - ft	11'	Meter Box Operator	CLC	Bar. Press. - in. Hg	26.22		
Run #	3	Delta H @	1.7873	Nozzle Dia. - in.	0.1867	Asst. Tester(s)	DM/SB	Abs. Press. - in. Hg	26.00		
Date	6/26/18	Y Factor	0.9819	Heater Set Pt. - F	325°F	Filter Number	1462	Leak Rate	Rate	in. Hg	
Sample Time	13:43 - 15:06	Pitot Cal. - Cp	0.7988	Ambient Temp. - F	86°F	Probe Wash Bot. #	4C	Pre Test	ø	15.0	
# Trav. Pts	24	K Factors	0.70	Probe #	1311064	Imp. Wash Bot. #	----	Post Test	ø	15.6	
		Filter Thermo. #	Aux 2021	Hot Box #	5	Strain Relief #	6555				

Port No.	Point No.	Time	Dry Gas Meter CF	Pitot Delta P In H2O	Orifice Delta H In. H2O Desired	Orifice Delta H In. H2O Actual	Pump Vacuum In. Hg	Stack Temp. F	Probe Temp. F	Hot Box Temp. F	Impinger Temp. F Inlet	Impinger Temp. F Outlet	Dry Gas Meter Temp. F Inlet	Dry Gas Meter Temp. F Outlet	Stack Pressure In. H2O
E	1	13:43	824.213	3.65	2.55	2.6	3.5	194	335	327	165	64	86	86	-3.0
	2	13:46		3.70	2.59	2.6	4.5	195	334	331	266	55	87	86	-3.2
	3	13:49		3.65	2.55	2.6	5.0	195	333	331	295	53	89	86	-3.3
	4	13:52		3.70	2.59	2.6	5.2	195	332	331	308	54	90	86	-3.5
	5	13:55		3.65	2.55	2.6	5.6	195	332	331	314	55	92	86	-3.3
	6	13:58		2.85	1.99	2.0	4.8	195	331	329	318	56	93	87	-1.7
	Stop	14:01	842.268												
S	1	14:05	842.268	3.65	2.55	2.6	6.2	196	331	328	297	57	91	86	-3.1
	2	14:08		3.70	2.59	2.6	6.6	195	330	328	322	53	93	87	-3.2
	3	14:11		3.65	2.55	2.6	7.0	195	330	328	322	55	95	87	-3.3
	4	14:14		3.55	2.48	2.5	7.0	196	329	329	320	58	96	88	-3.3
	5	14:17		3.00	2.10	2.1	6.4	195	329	327	319	59	96	88	-2.7
	6	14:20		2.30	1.61	1.6	5.2	196	330	327	319	60	96	88	-1.6
	Stop	14:23	859.978												
W	1	14:26	859.978	3.90	2.73	2.7	8.0	196	332	327	306	58	94	88	-3.8
	2	14:29		3.85	2.69	2.7	8.4	196	329	332	320	59	96	88	-3.7
	3	14:32		3.90	2.73	2.7	8.8	196	329	329	317	63	97	89	-3.7
	4	14:35		4.00	2.80	2.8	9.4	196	329	329	314	65	98	89	-4.0
	5	14:38		4.00	2.80	2.8	9.6	196	330	326	313	61	98	89	-3.6
	6	14:41		3.10	2.17	2.2	8.2	196	328	328	311	62	98	89	-2.0
	Stop	14:44	878.865												
N	1	14:48	878.865	3.55	2.48	2.5	7.6	196	330	326	288	60	94	89	-3.2
	2	14:51		3.55	2.48	2.5	8.0	196	329	333	316	56	95	90	-3.2
	3	14:54		3.60	2.45	2.5	8.4	196	329	328	316	60	97	90	-3.2
	4	14:57		3.30	2.31	2.3	8.0	196	329	328	315	61	97	90	-3.2
	5	15:00		2.90	2.03	2.0	7.4	196	329	328	315	62	98	90	-2.6
	6	15:03		2.10	1.47	1.5	6.2	196	330	328	315	63	97	90	-1.5
	End	15:06	894.512												
		Total 72	70.299	3.426 Avg.		2.425 Avg.		195.6 Avg.					Avg. 91.1		-3.04 Avg.

Comments

Observer(s)

Orsat Analysis				
Gas	1	2	3	Avg.
CO2	12	11.7	11.7	11.87
O2	7.6	7.8	7.8	7.7
N2				

Impinger Wts			Gain
Imp # 9A	Post	926.6	147.1
	Pre	779.5	
Imp # 9B	Post	819.9	64.6
	Pre	755.3	
Imp # 9C	Post	610.2	6.2
	Pre	604.0	
Imp # 9D	Post	~~926.8~~ 921.6	23.3
	Pre	898.3	
Total		241.2	

Date	6-26-18	
Filter #	14627	
Run #	3	
Bottle #	4C	
Time		
Unit	4	

https://talenenergy.sharepoint.com/teams/MTServices/Environmental/EnvCEMStaff/CEM Misc/Forms/RM5 Impinger wts

Average Values Report
Generated: 6/21/2018 16:14

Company: Talen Energy
Plant: Colstrip Generating Station
City/St: Colstrip, MT 59323
Source: unit_3_stack, plant_comp_3, ,unit_3_stack

Period Start: 6/21/2018 13:32
Period End: 6/21/2018 14:54
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
06/21/2018 13:32	10.17	125494	193.1	50.14	16.36	14.6	734.5	871	3.041
06/21/2018 13:33	10.18	125031	193.3	49.73	16.20	14.2	733.6	871	3.019
06/21/2018 13:34	10.13	125176	193.3	49.18	16.04	14.0	733.9	871	3.026
06/21/2018 13:35	10.16	125405	193.4	48.56	15.80	13.8	734.4	871	3.037
06/21/2018 13:36	10.19	125427	193.3	49.36	16.08	14.1	735.4	871	3.035
06/21/2018 13:37	10.11	125020	193.3	50.04	16.33	14.3	734.1	871	3.020
06/21/2018 13:38	10.11	125176	193.3	49.44	16.10	14.1	732.3	871	3.024
06/21/2018 13:39	10.12	124830	193.3	48.94	15.95	13.8	733.0	871	3.011
06/21/2018 13:40	10.10	125628	193.2	49.04	15.95	14.1	733.5	870	3.045
06/21/2018 13:41	10.13	125198	193.2	49.83	16.26	14.2	734.4	870	3.027
06/21/2018 13:42	10.17	125606	193.3	48.92	15.93	14.0	733.5	870	3.043
06/21/2018 13:43	10.18	125377	193.3	49.67	16.21	14.2	732.7	870	3.036
06/21/2018 13:44	10.12	125154	193.3	49.04	15.94	13.8	731.4	867	3.025
06/21/2018 13:45	10.11	125232	193.3	48.46	15.78	13.8	730.8	865	3.029
06/21/2018 13:46	10.19	124970	193.4	49.51	16.15	13.9	732.3	865	3.017
06/21/2018 13:47	10.16	125260	193.3	49.18	16.02	13.8	732.2	865	3.031
06/21/2018 13:48	10.16	125042	193.3	51.36	16.77	14.5	732.3	865	3.020
06/21/2018 13:49	10.16	124657	193.1	50.85	16.54	13.9	732.1	865	3.000
06/21/2018 13:50	10.14	125210	193.2	56.42	18.42	14.0	733.3	865	3.033
06/21/2018 13:51	10.19	125483	193.2	55.96	18.21	14.1	734.1	865	3.038
06/21/2018 13:52	10.15	124769	193.2	55.38	18.06	14.1	732.9	865	3.006
06/21/2018 13:53	10.14	125299	193.3	50.52	16.48	13.8	732.6	865	3.029
06/21/2018 13:54	10.10	124680	193.1	52.74	17.14	13.9	732.4	865	3.002
06/21/2018 13:55	10.17	125260	193.2	55.77	18.24	14.2	733.1	865	3.030
06/21/2018 13:56	10.18	125081	193.1	54.22	17.72	14.0	732.6	869	3.021
06/21/2018 13:57	10.13	125338	193.1	52.17	17.04	13.8	732.3	870	3.033
06/21/2018 13:58	10.12	125014	193.1	51.10	16.64	13.8	732.6	870	3.018
06/21/2018 13:59	10.12	125517	193.4	57.15	18.66	14.1	732.9	866	3.043
06/21/2018 14:00	10.13	124618	193.4	59.14	19.31	14.1	733.0	865	3.000
06/21/2018 14:01	10.11	125282	193.4	55.57	18.13	14.0	733.7	865	3.032
06/21/2018 14:02	10.11	125355	193.3	53.54	17.47	13.8	732.5	865	3.035
06/21/2018 14:03	10.13	124936	193.1	53.90	17.57	14.1	733.1	865	3.011
06/21/2018 14:04	10.15	124456	193.1	56.26	18.37	14.2	733.3	869	2.991
06/21/2018 14:05	10.18	124624	193.3	54.74	17.84	14.0	732.5	870	2.999
06/21/2018 14:06	10.18	125031	193.3	53.74	17.53	13.9	732.8	870	3.019
06/21/2018 14:07	10.18	125132	193.2	49.92	16.25	13.6	732.7	870	3.024
06/21/2018 14:08	10.20	124797	193.1	60.49	19.78	14.2	733.0	870	3.007
06/21/2018 14:09	10.15	124869	193.1	62.36	20.39	14.4	731.9	870	3.011
06/21/2018 14:10	10.17	125327	193.2	58.54	19.11	14.4	731.7	870	3.033

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
06/21/2018 14:11	10.13	125282	193.4	56.87	18.51	14.2	731.2	865	3.031
06/21/2018 14:12	10.15	124897	193.3	52.31	17.05	14.0	731.8	864	3.013
06/21/2018 14:13	10.12	125109	193.3	56.83	18.50	14.2	732.7	869	3.023
06/21/2018 14:14	10.14	125444	193.4	58.09	18.96	14.2	731.8	870	3.040
06/21/2018 14:15	10.15	125243	193.4	56.28	18.36	14.3	732.0	870	3.030
06/21/2018 14:16	10.10	125600	193.4	51.54	16.81	14.1	732.7	870	3.047
06/21/2018 14:17	10.18	125450	193.4	57.03	18.56	14.2	732.9	870	3.046
06/21/2018 14:18	10.15	125193	193.6	59.59	19.47	14.3	732.2	870	3.028
06/21/2018 14:19	10.11	125639	193.7	56.74	18.52	14.2	731.9	870	3.050
06/21/2018 14:20	10.14	126058	193.8	57.77	18.90	14.3	733.1	870	3.072
06/21/2018 14:21	10.10	125902	193.5	51.72	16.86	14.0	733.8	870	3.060
06/21/2018 14:22	10.07	125929	193.5	55.96	18.27	14.2	733.2	870	3.062
06/21/2018 14:23	10.10	125455	193.8	56.60	18.48	14.3	732.9	870	3.042
06/21/2018 14:24	10.08	124903	193.6	53.88	17.57	13.9	731.9	868	3.012
06/21/2018 14:25	10.10	125505	193.5	53.90	17.54	14.0	732.1	868	3.042
06/21/2018 14:26	10.13	125081	193.3	50.60	16.49	13.9	733.1	868	3.027
06/21/2018 14:27	10.18	125690	193.1	50.08	16.35	13.9	733.3	874	3.055
06/21/2018 14:28	10.17	125327	193.1	50.52	16.45	13.9	733.8	875	3.033
06/21/2018 14:29	10.13	125053	193.1	50.30	16.41	13.8	734.0	875	3.018
06/21/2018 14:30	10.13	125053	193.3	50.36	16.43	13.8	733.3	868	3.020
06/21/2018 14:31	10.20	124713	193.1	62.93	20.55	14.3	733.4	868	3.003
06/21/2018 14:32	10.18	125422	193.3	60.12	19.68	14.1	733.0	868	3.038
06/21/2018 14:33	10.13	124947	193.4	55.13	17.99	13.9	732.3	868	3.018
06/21/2018 14:34	10.13	125193	193.4	54.48	17.75	13.8	731.6	868	3.028
06/21/2018 14:35	10.15	125371	193.3	48.92	15.95	13.7	732.2	874	3.036
06/21/2018 14:36	10.17	125198	193.3	49.13	15.99	13.6	734.3	875	3.031
06/21/2018 14:37	10.18	125009	193.3	49.66	16.18	13.8	734.7	875	3.012
06/21/2018 14:38	10.20	125182	193.3	49.31	16.08	13.8	735.0	875	3.027
06/21/2018 14:39	10.16	125505	193.4	48.92	15.93	13.6	734.5	866	3.043
06/21/2018 14:40	10.13	125796	193.4	51.00	16.66	13.8	734.4	866	3.057
06/21/2018 14:41	10.15	125639	193.8	56.58	18.46	13.8	733.9	866	3.051
06/21/2018 14:42	10.11	124813	193.8	55.13	17.99	13.8	734.1	866	3.011
06/21/2018 14:43	10.15	125667	193.8	54.43	17.75	13.9	734.6	866	3.050
06/21/2018 14:44	10.17	126058	193.7	53.15	17.36	13.9	734.8	872	3.071
06/21/2018 14:45	10.15	124970	193.4	54.25	17.61	13.9	735.3	873	3.017
06/21/2018 14:46	10.09	125193	193.4	56.26	18.36	13.9	734.5	873	3.029
06/21/2018 14:47	10.11	124880	193.8	56.35	18.37	13.9	734.1	873	3.009
06/21/2018 14:48	10.13	125600	193.8	53.81	17.55	13.7	735.0	873	3.049
06/21/2018 14:49	N/A	125048	193.5	50.56	16.42	13.7	734.1	873	3.021
06/21/2018 14:50	N/A	125784	193.4	54.37	17.74	14.0	733.6	873	3.056
06/21/2018 14:51	N/A	125444	193.5	54.50	17.77	13.9	733.8	873	3.037
06/21/2018 14:52	N/A	124919	193.6	52.77	17.24	13.8	734.4	873	3.019
06/21/2018 14:53	N/A	124283	193.6	49.59	16.19	13.5	734.3	873	2.984
06/21/2018 14:54	10.18	125126	193.4	52.92	17.13	13.8	733.6	873	3.026
Final Average*	**10.14**	**125221**	**193.4**	**53.28**	**17.37**	**14.0**	**733.2**	**869**	**3.029**
Maximum*	**10.20**	**126058**	**193.8**	**62.93**	**20.55**	**14.6**	**735.4**	**875**	**3.072**
	06/21/2018 14:38	06/21/2018 14:44	06/21/2018 14:48	06/21/2018 14:31	06/21/2018 14:31	06/21/2018 13:32	06/21/2018 13:36	06/21/2018 14:38	06/21/2018 14:20

Period Start:	Average 3 CO2 %	Average 3StkFl-hr kscfh	Average 3 Stk Temp deg F	Average 3_PM_RAW mgacm	Average 3_PM mgacm	Average 3 Opacity %	Average 3 UnitLoad MWG	Average 3 CoalFlow kp/h	Average 3 StkDltaP H2O
Minimum*	10.07	124283	193.1	48.46	15.78	13.5	730.8	864	2.984
	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018	06/21/2018
	14:22	14:53	14:31	13:45	13:45	14:53	13:45	14:12	14:53

* Does not include Invalid Averaging Periods ("N/A")

UNIT 3 PLANT DATA
GENERAL PARAMETERS

DATE AND TIME	GMW	Calculated Fuel Flow (KLB/HR)	Boiler Efficiency (%)	Opacity (%)	Sootblower Steam Pressure (psig)
6/21/2018 0:00	651.40	775.19	85.65	15.02	600.00
6/21/2018 1:00	440.78	545.49	85.63	14.96	600.00
6/21/2018 2:00	402.13	498.93	85.61	14.89	600.00
6/21/2018 3:00	283.13	375.67	85.60	14.49	600.00
6/21/2018 4:00	275.01	365.28	85.73	14.78	600.00
6/21/2018 5:00	336.56	415.68	85.91	14.97	599.69
6/21/2018 6:00	689.37	787.47	86.09	13.96	598.90
6/21/2018 7:00	731.31	848.35	86.23	13.14	600.00
6/21/2018 8:00	731.96	846.11	86.10	13.78	600.00
6/21/2018 9:00	728.37	854.81	85.92	13.36	600.00
6/21/2018 10:00	731.58	860.69	85.73	13.51	600.00
6/21/2018 11:00	731.46	859.75	85.55	13.75	600.00
6/21/2018 12:00	732.03	863.50	85.41	13.79	600.00
6/21/2018 13:00	732.62	867.25	85.28	13.89	600.00
6/21/2018 14:00	731.48	870.53	85.15	14.06	600.00
6/21/2018 15:00	731.63	872.18	85.06	13.96	600.00
6/21/2018 16:00	732.29	871.59	85.07	15.14	600.00
6/21/2018 17:00	708.49	846.77	85.10	16.98	600.00
6/21/2018 18:00	669.20	801.13	85.12	17.13	600.00
6/21/2018 19:00	654.53	783.56	85.17	16.86	600.00
6/21/2018 20:00	635.28	761.15	85.29	17.12	600.00
6/21/2018 21:00	552.27	667.15	85.42	16.62	600.00
6/21/2018 22:00	491.15	593.50	85.54	15.60	600.00
6/21/2018 23:00	404.66	510.13	85.52	14.85	598.21

UNIT 3 PLANT DATA
SCRUBBER ID FAN AMPERAGE

DATE AND TIME	SA 1 (amps)	SA 2 (amps)	SA 3 (amps)	SA 4 (amps)	SA 5 (amps)	SA 6 (amps)	SA 7 (amps)	SA 8 (amps)
6/21/2018 0:00	211.47	216.05	215.39	219.73	0.00	211.60	158.95	205.94
6/21/2018 1:00	10.64	30.02	219.39	219.31	0.00	208.42	163.52	211.85
6/21/2018 2:00	0.22	0.00	217.14	215.66	0.00	205.29	154.34	210.10
6/21/2018 3:00	0.13	0.00	219.24	216.16	0.00	205.95	153.42	20.87
6/21/2018 4:00	0.04	0.00	217.15	213.05	0.00	202.47	152.33	53.67
6/21/2018 5:00	62.94	0.00	208.26	203.18	0.00	192.32	156.51	158.70
6/21/2018 6:00	220.03	196.07	221.56	226.92	0.00	229.42	222.80	224.46
6/21/2018 7:00	212.11	210.45	215.73	220.73	0.00	225.41	214.48	218.49
6/21/2018 8:00	207.38	209.70	212.37	216.27	0.00	220.45	211.05	213.57
6/21/2018 9:00	214.89	217.85	218.81	224.17	0.00	227.88	221.39	224.14
6/21/2018 10:00	213.50	216.64	217.69	222.99	0.00	226.85	219.28	222.24
6/21/2018 11:00	216.90	220.08	220.86	227.09	0.00	229.39	223.99	227.97
6/21/2018 12:00	215.80	219.63	220.35	226.42	0.00	228.97	222.89	227.38
6/21/2018 13:00	216.42	219.99	220.83	226.85	0.00	229.19	223.78	228.24
6/21/2018 14:00	217.18	221.13	221.85	228.37	0.00	229.35	224.69	229.53
6/21/2018 15:00	217.87	221.82	222.43	228.74	0.00	230.22	225.99	230.91
6/21/2018 16:00	218.17	222.05	222.47	228.83	0.00	230.18	225.27	229.95
6/21/2018 17:00	209.42	213.31	213.79	218.60	0.00	222.20	212.99	216.02
6/21/2018 18:00	200.59	203.15	207.82	209.40	0.00	214.28	201.47	204.93
6/21/2018 19:00	199.20	201.95	208.25	209.16	0.00	214.41	191.14	203.40
6/21/2018 20:00	193.75	196.33	209.74	210.20	0.00	214.31	180.74	204.22
6/21/2018 21:00	94.55	169.63	213.42	213.44	0.00	217.60	166.69	205.36
6/21/2018 22:00	0.19	170.57	207.42	204.98	0.00	211.85	156.16	195.65
6/21/2018 23:00	0.13	6.04	214.52	212.17	0.00	212.34	160.75	200.62

UNIT 3 PLANT DATA
SCRUBBER DATA

DATE AND TIME	3-1 Plumb Bob ΔP	3-2 Plumb Bob ΔP	3-3 Plumb Bob ΔP	3-4 Plumb Bob ΔP	3-5 Plumb Bob ΔP	3-6 Plumb Bob ΔP	3-7 Plumb Bob ΔP	3-8 Plumb Bob ΔP	Average Plum Bob ΔP
6/21/18 0:00	28.59	28.240	28.541	28.458	N/A	28.868	30.645	28.104	28.778
6/21/18 1:00	N/A	N/A	28.660	28.567	N/A	28.873	32.529	28.537	29.433
6/21/18 2:00	N/A	N/A	28.555	28.455	N/A	28.864	28.393	28.085	28.471
6/21/18 3:00	N/A	N/A	28.636	28.549	N/A	28.872	28.496	N/A	28.638
6/21/18 4:00	N/A	N/A	28.549	28.463	N/A	28.819	28.382	N/A	28.553
6/21/18 5:00	N/A	N/A	28.609	28.558	N/A	28.882	28.685	28.379	28.623
6/21/18 6:00	29.14	25.552	28.899	28.887	N/A	29.270	28.821	28.588	28.452
6/21/18 7:00	30.22	29.896	30.083	30.017	N/A	30.381	29.905	29.665	30.024
6/21/18 8:00	30.26	29.936	30.098	30.044	N/A	30.367	29.994	29.687	30.055
6/21/18 9:00	30.24	29.880	30.063	30.024	N/A	30.362	29.952	29.710	30.033
6/21/18 10:00	30.23	29.901	30.086	29.991	N/A	30.385	29.974	29.718	30.040
6/21/18 11:00	30.26	29.935	30.042	30.001	N/A	30.350	29.989	29.698	30.039
6/21/18 12:00	30.27	29.886	30.081	30.007	N/A	30.357	29.946	29.690	30.034
6/21/18 13:00	30.24	29.887	30.060	29.992	N/A	30.370	29.959	29.698	30.029
6/21/18 14:00	30.24	29.934	30.068	30.010	N/A	30.371	29.996	29.699	30.046
6/21/18 15:00	30.26	29.942	30.078	29.998	N/A	30.364	29.979	29.702	30.047
6/21/18 16:00	29.59	29.264	29.413	29.363	N/A	29.684	29.306	29.027	29.378
6/21/18 17:00	28.71	28.425	28.542	28.470	N/A	28.878	28.438	28.162	28.518
6/21/18 18:00	28.75	28.387	28.559	28.445	N/A	28.853	28.444	28.195	28.519
6/21/18 19:00	28.71	28.411	28.585	28.456	N/A	28.863	28.386	28.193	28.515
6/21/18 20:00	28.55	28.263	28.558	28.479	N/A	28.858	28.483	28.223	28.489
6/21/18 21:00	18.83	28.500	28.592	28.490	N/A	28.876	28.379	28.196	27.124
6/21/18 22:00	N/A	28.232	28.562	28.448	N/A	28.865	28.414	28.170	28.448
6/21/18 23:00	N/A	N/A	28.561	28.523	N/A	28.796	28.488	28.218	28.517

UNIT 3 PLANT DATA
COAL MILLS FEED RATE (KLB/HR)

DATE AND TIME	Coal FR Mill A (Klb/hr)	Coal FR Mill B (Klb/hr)	Coal FR Mill C (Klb/hr)	Coal FR Mill D (Klb/hr)	Coal FR Mill E (Klb/hr)	Coal FR Mill F (Klb/hr)	Coal FR Mill G (Klb/hr)	Coal FR Mill H (Klb/hr)
6/21/2018 0:00	59.89	60.74	60.04	60.11	0.07	58.90	56.20	0.14
6/21/2018 1:00	49.96	51.05	50.08	49.79	0.08	49.27	0.01	0.13
6/21/2018 2:00	47.15	48.12	46.82	47.05	0.08	43.95	0.01	0.12
6/21/2018 3:00	54.72	55.46	54.59	8.10	0.08	0.43	0.01	0.14
6/21/2018 4:00	59.17	59.65	59.00	0.84	0.08	0.97	0.02	0.24
6/21/2018 5:00	58.37	58.79	58.17	25.19	0.08	16.06	3.34	0.34
6/21/2018 6:00	58.27	58.87	58.00	58.37	0.08	56.90	57.36	46.25
6/21/2018 7:00	57.72	58.21	57.53	57.81	0.08	56.32	57.94	58.07
6/21/2018 8:00	57.88	58.13	57.28	57.60	0.08	56.90	57.82	58.00
6/21/2018 9:00	57.59	58.42	57.78	57.40	0.08	55.82	57.59	57.61
6/21/2018 10:00	57.65	58.52	57.50	57.34	0.08	56.57	58.15	57.57
6/21/2018 11:00	57.40	58.74	57.88	58.01	0.07	56.80	57.85	57.64
6/21/2018 12:00	57.31	58.91	57.72	58.34	0.06	57.11	57.76	57.73
6/21/2018 13:00	57.30	58.98	58.06	58.59	0.05	57.17	58.09	57.80
6/21/2018 14:00	57.61	58.97	58.04	58.17	0.05	57.06	58.10	58.34
6/21/2018 15:00	57.95	59.32	58.25	58.26	0.05	57.36	58.17	58.19
6/21/2018 16:00	58.30	59.43	58.27	58.34	0.05	57.59	58.23	58.73
6/21/2018 17:00	56.60	57.59	56.63	56.63	0.05	55.76	56.24	53.20
6/21/2018 18:00	54.12	54.99	54.24	54.23	0.05	53.05	54.10	50.11
6/21/2018 19:00	54.95	55.87	54.85	55.10	0.05	53.94	54.74	35.95
6/21/2018 20:00	59.63	60.42	59.32	59.49	0.05	58.24	59.42	0.19
6/21/2018 21:00	54.98	55.49	54.60	54.44	0.05	53.19	39.63	0.17
6/21/2018 22:00	55.86	56.90	55.96	56.63	0.05	51.86	0.00	0.14
6/21/2018 23:00	58.76	59.57	58.68	58.64	0.05	0.10	0.00	0.12

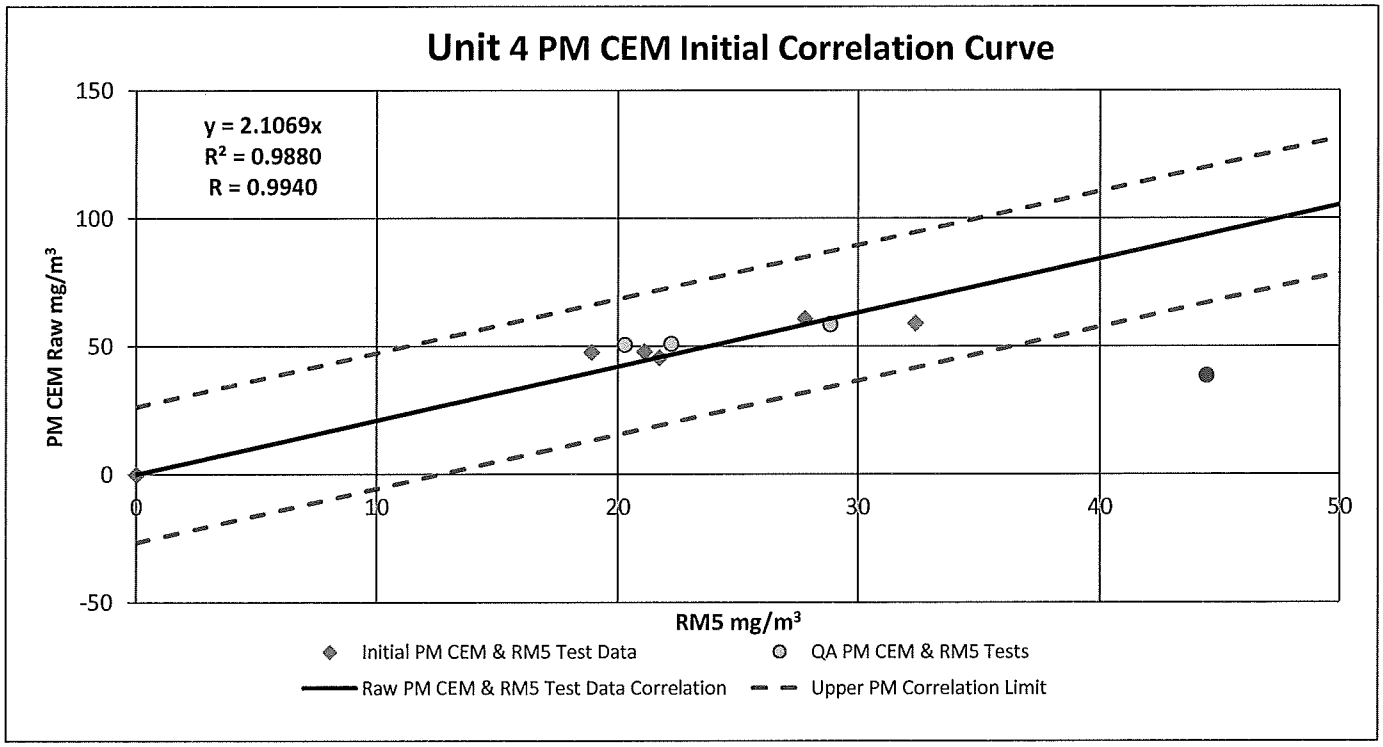
UNIT 3 PLANT DATA
BOILER PARAMETERS

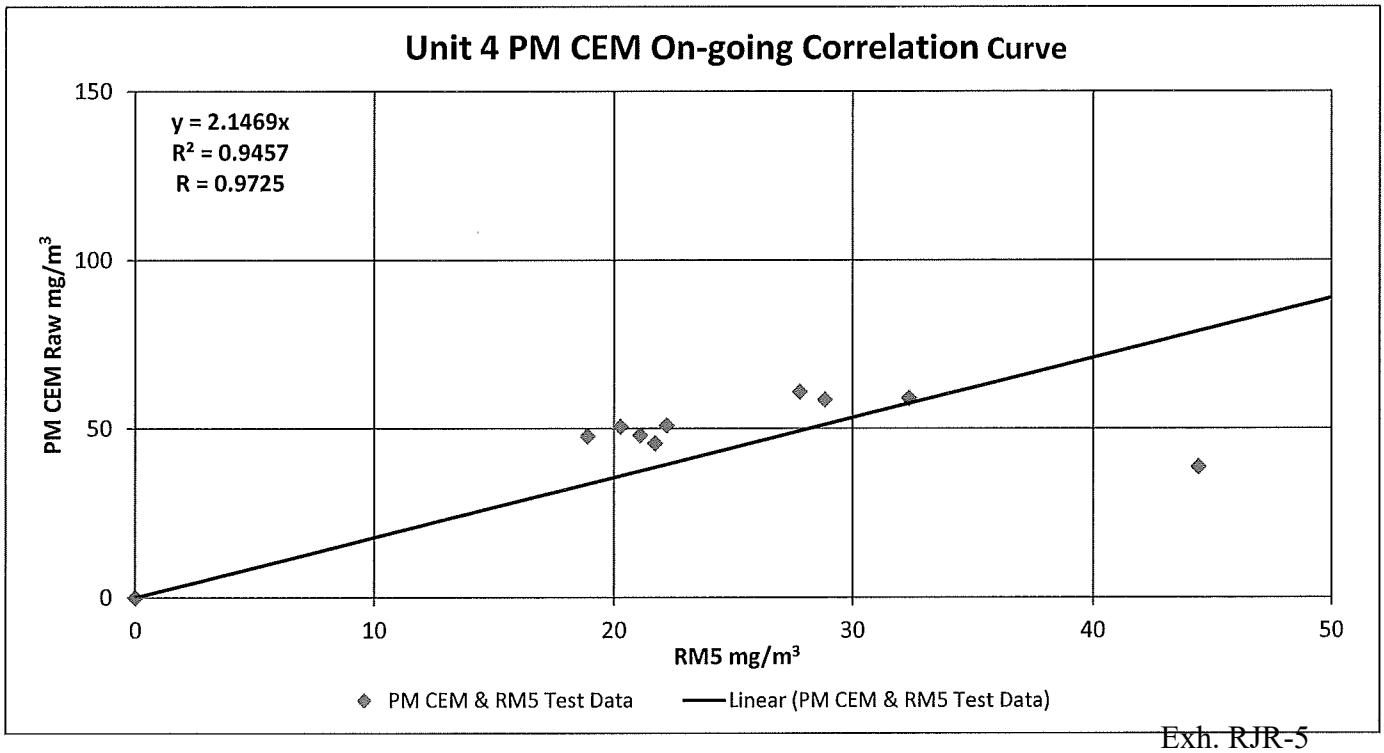
DATE AND TIME	Flue Gas O2 (%)	Furn Press SH/RH	Furn Press Fin/SH	Econ SH ΔP	Stack SO_2 lbs/10^6 BTU	Stack NOx lbs/10^6 BTU
6/21/2018 0:00	4.94	0.316	0.354	1.06	0.053	0.185
6/21/2018 1:00	5.77	0.168	0.192	0.50	0.039	0.147
6/21/2018 2:00	5.91	0.154	0.174	0.43	0.037	0.153
6/21/2018 3:00	6.79	0.111	0.121	0.23	0.040	0.129
6/21/2018 4:00	6.69	0.109	0.125	0.24	0.030	0.108
6/21/2018 5:00	6.36	0.135	0.165	0.38	0.031	0.119
6/21/2018 6:00	4.85	0.340	0.415	1.29	0.078	0.182
6/21/2018 7:00	4.33	0.341	0.401	1.26	0.050	0.157
6/21/2018 8:00	4.09	0.338	0.390	1.22	0.051	0.136
6/21/2018 9:00	4.51	0.356	0.410	1.29	0.053	0.169
6/21/2018 10:00	4.36	0.355	0.406	1.28	0.050	0.149
6/21/2018 11:00	4.32	0.364	0.416	1.31	0.050	0.166
6/21/2018 12:00	4.33	0.364	0.413	1.30	0.050	0.175
6/21/2018 13:00	4.41	0.366	0.411	1.30	0.050	0.167
6/21/2018 14:00	4.34	0.366	0.409	1.31	0.052	0.173
6/21/2018 15:00	4.37	0.368	0.406	1.31	0.061	0.209
6/21/2018 16:00	4.39	0.370	0.400	1.31	0.057	0.168
6/21/2018 17:00	4.48	0.349	0.367	1.22	0.052	0.172
6/21/2018 18:00	4.66	0.322	0.335	1.11	0.043	0.196
6/21/2018 19:00	4.88	0.315	0.326	1.08	0.044	0.191
6/21/2018 20:00	5.03	0.307	0.318	1.04	0.047	0.172
6/21/2018 21:00	5.35	0.239	0.254	0.79	0.056	0.188
6/21/2018 22:00	5.45	0.192	0.206	0.61	0.043	0.134
6/21/2018 23:00	5.84	0.159	0.168	0.43	0.038	0.113

APPENDIX B

Field, Lab, and Operational Data; and Calculations - Unit 4

Colstrip Unit 4 RM5 Test Data (Rev. 1)													Calc. Metric	PM CEM 4_PM_RAW
Date	Time (MST)	Run	GMW	lb/MMBtu	gr/DSCF	gr/ASCF	lb/HR	%ISO	%CO2	%O2	%H2O	%Op	mg/m^3	mg/m^3
Zero Data Pt.													0	0
5/16/17	07:40-09:00	1	752.0	0.025	0.0111	0.0095	177.1	103.2	11.6	8.0	14.6	13.4	21.69	45.66
5/16/17	09:39-11:00	2	752.3	0.022	0.0097	0.0083	154.1	104.6	11.7	7.8	14.8	14.1	18.90	47.78
5/16/17	11:38-12:58	3	751.5	0.024	0.0108	0.0092	171.4	104.2	11.7	7.9	14.7	14.0	21.08	48.07
5/18/17	07:36-08:57	1	749.6	0.037	0.0164	0.0141	278.3	98.5	11.5	8.0	13.9	18.9	32.36	59.07
5/18/17	09:30-10:51	2	748.6	0.032	0.0141	0.0121	239.1	98.3	11.8	7.8	14.3	19.7	27.76	60.95
7/27/17	3 Runs		746.3	0.026	0.0115	0.0097	179.0	102.1	11.7	7.8	15.5	14.5	22.18	51.01
10/31/17	3 Runs		810.0	0.022	0.0104	0.0089	173.1	100.1	12.6	7.1	14.9	15.6	20.27	50.62
2/14/18	3 Runs		761.4	0.034	0.0148	0.0126	238.7	101.8	11.6	8.0	14.7	14.0	28.81	58.54
6/26/18	3 Runs	3	740.5	0.051	0.0232	0.0194	377.6	100.1	11.9	7.7	16.2	15.5	44.43	38.63
													X	Y





Talen Montana
CSES Unit 4 Stack

Particulate Compliance Tests Data Summary
EPA MATS Modified Reference Method 5

Date	Time (MST)	Run	Load (GMW)	Reference Method 5				%ISO	%CO_2	%O_2	%H_2O	%OP
				lb/mmBtu	gr/DSCF	gr/ASCF	lb/HR					
6/26/18	09:35-10:56	1	740.5	0.048	0.0214	0.0180	351.5	102.3	11.9	7.7	16.1	14.5
6/26/18	11:37-13:00	2	740.6	0.049	0.0221	0.0185	358.7	96.3	11.9	7.7	16.1	15.3
6/26/18	13:43-15:06	3	740.5	0.058	0.0260	0.0217	422.5	101.6	11.9	7.7	16.3	16.7
Average			740.5	0.051	0.0232	0.0194	377.6	100.1	11.9	7.7	16.2	15.5

Metric Units

Date	Time (MST)	Run	Load (GMW)	Reference Method 5				%ISO	%CO_2	%O_2	%H_2O	%OP
				ng/Joule	g/DSCM		kg/HR					
6/26/18	09:35-10:56	1	740.5	20.5	0.0491		159.5	102.3	11.9	7.7	16.1	14.5
6/26/18	11:37-13:00	2	740.6	21.1	0.0505		162.7	96.3	11.9	7.7	16.1	15.3
6/26/18	13:43-15:06	3	740.5	24.8	0.0595		191.6	101.6	11.9	7.7	16.3	16.7
Average			740.5	22.1	0.0530		171.3	100.1	11.9	7.7	16.2	15.5

Source	4		
Date	06/26/18		
Field Data	**Run 1**	**Run 2**	**Run 3**
Sample Time (MST)	**09:35-10:56**	**11:37-13:00**	**13:43-15:06**
Volume Metered	70.325	66.390	70.299
Delta P - in. H_2O	3.471	3.410	3.426
Delta H - in. H_2O	2.463	2.417	2.425
Avg. Meter Temp. - F	82.7	89.5	91.1
Avg. Stack Temp. - F	195.0	194.8	195.6
Abs. Stack Press. - in. Hg	25.99	26.01	26.00
Bar. Press. - in. Hg	26.22	26.24	26.22
% CO_2	11.9	11.9	11.9
% O_2	7.7	7.7	7.7
% N_2	80.4	80.4	80.4
Cp	0.7988	0.7988	0.7988
Y - Meter Cal Factor	0.9819	0.9819	0.9819
Stack Area - Sq. Ft.	452.39	452.39	452.39
Impingers - gms H_2O	241.7	225.9	241.2
Mn	0.0824	0.0791	0.0983
Test Time - Minutes	72	72	72
Nozzle Diam. - inches	0.1867	0.1867	0.1867
Results			
VMstd, DSCF	59.290	55.314	58.358
Bws	0.161	0.161	0.163
MD, lb/lb Mol	30.21	30.21	30.21
MS, lb/lb Mol	28.24	28.24	28.22
VS, Ft/Sec	120.1	119.0	119.4
QS, DSCF/Hr	114906038	113925915	113919919
QACT, ACF/Hr	195662174	193841303	194520057
% ISO.	102.3	96.3	101.6
Particulate Emissions			
PMR, Lb/Hr	351.5	358.7	422.5
CS, gr/DSCF	0.0214	0.0221	0.0260
CS, gr/ASCF	0.0180	0.0185	0.0217
E, Lb/mmBtu	0.048	0.049	0.058
Fo	1.109	1.109	1.109
Data Entered By:	DRM	Checked By:	SJC
Date:	06/27/18	Date:	6/30/18

Talen Montana

Colstrip Steam Electric Station

Environmental Compliance Department

EPA MATS Modified Reference Method 5 (Particulate)

Unit Tested	4	Sample Date	06/26/18
Acetone Blank			
Final Wt., g	101.7170		
Initial Wt., g	101.7170		
*Net Wt., g	**0.0000**		
Wash Vol., ml	200		
	Run 1	**Run 2**	**Run 3**
Filter Mass			
Filter Number	1460	1461	1462
Final Weight, g	0.4551	0.4551	0.4670
Initial Weight, g	0.3770	0.3770	0.3770
Net Weight, g	**0.0781**	**0.0781**	**0.0900**
Probe Wash Mass			
Probe Wash Bottle No.	4A	4B	4C
Lab Beaker No.	11P	8P	12P
Final Weight, g	99.1563	101.5540	101.8553
Initial Weight, g	99.1520	101.5530	101.8470
Net Weight, g	**0.0043**	**0.0010**	**0.0083**
Wash Volume, ml	500	380	400
Total Part. Mass, Mn	**0.0824**	**0.0791**	**0.0983**
Analysis By:	SLB	**Date:**	6/30/2018

*** When blank is ± 0.0005 gm it is counted as zero. Blank should not be > 0.001**

Talen MT Environmental Department - Particulate Analysis Weight Sheet				
Unit Tested	4	**Test Date**	6/26/18	**Acetone**
RM5 Test #	**1**	**2**	**3**	**Blank**
Wash Bottle #	4A	4B	4C	AB4
Beaker #	11P	8P	12P	AB1
Wash Volumes (mls)	200 200 100	200 180	200 200	200
Total	**500**	**380**	**400**	**200**
Gross Weights	99.1580 99.1560 99.1550 99.1560	101.5540 101.5540 101.5540 101.5540	101.8560 101.8560 101.8550 101.8540	101.7170 101.7170 101.7170
Average	**99.1563**	**101.5540**	**101.8553**	**101.7170**
Tare Weights	99.1520 99.1520 99.1520	101.5530 101.5530 101.5530	101.8470 101.8470 101.8470	101.7170 101.7170 101.7170
Average	**99.1520**	**101.5530**	**101.8470**	**101.7170**
Filter #	1460	1461	1462	
Gross Weights	0.4551 0.4550 0.4552	0.4551 0.4550 0.4551	0.4670 0.4670 0.4670	
Average	**0.4551**	**0.4551**	**0.4670**	
Tare Weights	0.3770 0.3770 0.3770	0.3770 0.3770 0.3770	0.3770 0.3770 0.3770	
Average	**0.3770**	**0.3770**	**0.3770**	
Analysis Completed by:	SLB	**Date Analysis Completed**		6/30/18

Reference Method 2 Calculations
Stack Velocity & Volumetric Flow Rate

Date: 6/26/18 **Run # 1** **Source: 4**

2-1 Average Stack Gas Velocity (Feet/Sec.): Vs

Avg. Vs = KpCp*[Sq.Rt(Ts-459.7)/PsMs]*[Sq.Rt. Dp]

$$Vs = (85.48\ ft/S) * 0.7988 * Sq.Rt.\left|\frac{654.7}{25.99 * 28.24}\right| * Sq.Rt.(\ 3.471\ )$$

Vs = **120.1** **Ft/Sec**

2-2 Avg. Stack Gas Volumetric Flow Rate (Dry Std. Conditions): Qs

Avg. Qs = (3600 S/hr)(Vs)(As)(1-Bws)(Tstd/Pstd)[Ps/(Ts+459.7)]

$$Qs = 3600 * 120.1 * 452.39 * 0.839 * \left|\frac{527.7}{29.92}\right| * \left|\frac{25.99}{654.7}\right|$$

Qs = **114906038** **DSCF/Hr**

Avg. Qact= (Ts/527.7)(29.92"Hg/Ps)(100/100-%H_2O)(Qs)

$$Qact = \left|\frac{654.7}{527.7}\right| * \left|\frac{29.92}{25.99}\right| * \left|\frac{100}{100 - 16.1}\right| * 114906038$$

Qact = **195662174** **AWCF/Hr**

Reference Method 4 Calculations
Moisture & Molecular Weight

Date: 6/26/18 **Run # 1** **Source: 4**

4-1 Standard Volume Metered: Vstd

Vstd = K1*Vm*Y*{[Pb+(Dh/13.6)]/Tm+459.7}

$$Vstd = 17.64 * 70.325 * 0.9819 * \frac{26.22 + (2.463 / 13.6)}{542.4}$$

Vstd = **59.290 DCSF**

4-2 Moisture Content of Stack gas: Bws

Vwc = K2 * (Wf - Wi)

Vwc = (0.04715)(241.7)

Vwc = 11.3962 SCF

$$Bws = \frac{Vwc}{Vwc + Vstd}$$

$$\frac{11.396}{11.396 + 59.290}$$

Bws = **0.161**

4-3 Dry Molecular Weight of Stack Gas: Md

Md = (0.44 * %CO_2) + (0.32 * %O_2) + (0.28 * %N_2)

Md = (0.44 * 11.9) +
(0.32 * 7.7) +
(0.28 * 80.4)

Md = **30.21 Lb./Lb.-mole**

4-4 Wet Molecular Weight of Stack Gas: Ms

Ms = [Md*(1-Bws)] + [18*Bws]

Ms = [(30.21) * (1- 0.161)] + [18 (0.161)]

Ms = **28.24 Lb./Lb.-mole**

Reference Method 5 Calculations
Particulate Emissions

Date: 6/26/18 **Run # 1** **Source:** **4**

5-1 Pollutant Mass Rate: PMR

$$PMR = \left| \frac{Ms}{Vstd} \right| * (Qs) * \frac{1}{454 \text{ mg/lb.}}$$

$$PMR = \left| \frac{28.24}{59.290} \right| * (114906038) * \left| \frac{1}{454} \right|$$

PMR = **351.5 Lb./Hr**

5-2 Particulate Concentration: Cs

$$Cs = \frac{Mn * (15.43 \text{ gr/gm})}{Vstd}$$

$$Cs = \frac{0.0824 * (15.43 \text{ gr/gm})}{59.290}$$

Cs = **0.0214 gr/DSCF**

$$E = \left| \frac{Cs}{7000 \text{ gr/Lb.}} \right| * Fd * \left| \frac{20.9}{20.9 - \%O_2} \right|$$

$$E = \left| \frac{0.0214}{7000 \text{ gr/Lb.}} \right| * 9820 * \left| \frac{20.9}{20.9 - 7.7} \right|$$

E = **0.048 lb/mmBtu**

5-4 % Isokinetic Variation

$$\%I = \frac{Ts * Vstd * Pstd * 100}{An * @ * Vs * Ps * Tstd * (60 \text{ sec/min}) * (1 - Bws)}$$

$$\%I = \frac{654.7 * 59.290 * 29.92 * 100}{1.901E\text{-}04 * 72 * 120.1 * 25.99 * 527.7 * 60 * 0.839}$$

%I = **102.3**

Talen MT Environmental Department - PM Analysis Weight Sheet				
Unit Tested	4	Test Date	6-26-18	Acetone Blank
Run #	1	2	3	
Wash Bottle #	4A	4B	4C	AB 4
Beaker #	11P	8P	12P	AB1
Wash Volumes (ml)	200	200	200	200
	200	180	200	
	100			
Total	500	380	400	200
Gross Weights (g)	99.1580	101.5540	101.8560	101.7170
	99.1560	101.5540	101.8560	101.7170
	99.1550	101.5540	101.8550	101.7170
	99.1560	101.5540	101.8540	
Average	99.1563	101.5540	101.8553	101.7170
Tare Weights (g)	99.1520	101.5530	101.8470	101.7170
	99.1520	101.5530	101.8470	101.7170
	99.1520	101.5530	101.8470	101.7170
Average	99.1520	101.5530	101.8470	101.7170
Filter #	1460	1461	1462	
Gross Weights (g)	0.4551	0.4551	0.4670	
	0.4550	0.4550	0.4670	
	0.4552	0.4551	0.4670	
Average	0.4551	0.4551	0.4670	
Tare Weights (g)	0.3770	0.3770	0.3770	
	0.3770	0.3770	0.3770	
	0.3770	0.3770	0.3770	
Average	0.3770	0.3770	0.3770	
Analysis By	[signature]	Date Analysis Completed		6/30/18

Talen Energy Environmental Department
Sample Chain of Custody
Reference Method 5

Test Date	6-26-18			
Unit	4			
Run #	1	2	3	4
Filter #	1460	1461	1462	
Wash Bottle #	4A	4B	4C	
Acetone Blank Bottle #	AB4			
Sample Recovery				
Filter by	DM			
Probe Wash	DM			
Sample Analysis				
Date/Time rec'd at lab	12:16			
Wash volume levels checked?	✓			
Analyzed by	SB			
Filter Storage & Disposal				
Stored By				
Date				
Disposed By				
Date				
Approval				
Date				
Comments				

Talen Montana
Environmental Compliance Department
Particulate Field Data

Source	CSES UNIT 4	Meter Box #	5	Probe Length - ft	11'	Meter Box Operator	CLC	Bar. Press. - in. Hg	26.22		
Run #	1	Delta H @	1.7873	Nozzle Dia. - in.	0.1867	Asst. Tester(s)	DM/SB	Abs. Press. - in. Hg	25.99		
Date	6/26/18	Y Factor	0.9819	Heater Set Pt. - F	325°F	Filter Number	1460	Leak Rate	Rate	in. Hg	
Sample Time	09:35 - 10:56	Pitot Cal. - Cp	0.7888	Ambient Temp. - F	71°F	Probe Wash Bot. #	4A	Pre Test	∅	15.0	
# Trav. Pts	24	K Factors	0.70	Probe #	13110604	Imp. Wash Bot. #	----	Post Test	∅	15.0	
		Filter Thermo. #	Aug 2021	Hot Box #	5	Strain Relief #	6555				

Port No.	Point No.	Time	Dry Gas Meter CF	Pitot Delta P In H2O	Orifice Delta H In. H2O		Pump Vacuum In. Hg	Stack Temp. F	Probe Temp. F	Hot Box Temp. F	Impinger Temp. F		Dry Gas Meter Temp. F		Stack Pressure In. H2O
					Desired	Actual					Inlet	Outlet	Inlet	Outlet	
E	1	09:35	687.030	3.65	2.55	2.6	4.5	194	327	327	253	253	74	73	-3.1
	2	09:38		3.65	2.55	2.6	4.8	195	329	329	292	50	75	73	-3.1
	3	09:41		3.70	2.59	2.6	5.1	195	323	329	299	48	77	74	-3.5
	4	09:44		3.70	2.59	2.6	5.4	195	330	329	301	48	79	74	-3.5
	5	09:47		3.65	2.55	2.6	5.8	195	330	329	302	50	81	75	-3.2
	6	09:50		2.75	1.92	1.9	4.6	195	330	328	303	52	83	75	-1.7
	Stop	09:53	705.020												
S	1	09:56	705.020	3.65	2.55	2.6	6.2	194	330	328	284	54	82	76	-3.2
	2	09:59		3.65	2.55	2.6	6.5	195	329	329	306	51	85	76	-3.4
	3	10:02		3.65	2.55	2.6	6.8	195	329	328	308	51	87	77	-3.5
	4	10:05		3.60	2.52	2.5	7.0	195	329	328	307	53	88	77	-3.4
	5	10:08		3.35	2.34	2.3	6.6	195	330	328	306	55	89	78	-2.8
	6	10:11		2.40	1.68	1.7	5.4	195	330	327	306	56	89	78	-1.6
	Stop	10:14	722.726												
W	1	10:17	722.726	3.95	2.76	2.8	8.2	195	328	329	289	55	87	79	-3.5
	2	10:20		3.95	2.76	2.8	8.6	195	328	328	308	52	89	79	-3.5
	3	10:23		3.95	2.76	2.8	8.9	195	330	328	308	55	91	80	-4.0
	4	10:26		4.00	2.80	2.8	9.2	195	329	328	306	57	92	81	-4.0
	5	10:29		4.00	2.80	2.8	9.5	195	329	330	306	58	92	81	-3.6
	6	10:32		3.10	2.17	2.2	8.0	196	330	328	306	61	92	82	-1.9
	Stop	10:35	741.624												
N	1	10:38	741.624	3.80	2.66	2.7	8.0	195	331	328	286	58	89	82	-3.3
	2	10:41		3.65	255	2.6	8.0	195	329	327	305	55	91	83	-3.5
	3	10:44		3.55	248	2.5	8.0	195	329	328	305	58	92	83	-3.4
	4	10:47		3.30	2.31	2.3	7.6	195	330	328	305	60	93	83	-3.1
	5	10:50		2.95	2.06	2.1	7.4	195	329	328	305	61	93	84	-2.6
	6	10:53		2.15	1.50	1.5	6.0	195	330	328	305	60	93	84	-1.6
	End	10:56	757.355												
		Total	70.325	3.471 Avg.		2.463 Avg.		195.0 Avg.					Avg. 82.7		-3.08 Avg.

Comments

Observer(s)

Orsat Analysis				
Gas	1	2	3	Avg.
CO2	11.8	12.0	11.8	11.9
O2	7.8	7.6	7.8	7.7
N2				

Impinger Wts			Gain
Imp # 9A	Post	923.8	111.5
	Pre	812.3	
Imp # 9B	Post	886.4	100.6
	Pre	785.8	
Imp # 9C	Post	611.0	6.3
	Pre	604.7	
Imp # 9D	Post	976.8	23.3
	Pre	953.5	
Total		241.7	

Date	6-26-18	
Filter #	14600	
Run #	1	
Bottle #	4A	
Time		
Unit	4	

https://talenenergy.sharepoint.com/teams/MTServices/Environmental/EnvCEMStaff/CEM Misc/Forms/RM5 Impinger wts

Average Values Report
Generated: 6/27/2018 07:11

Company: Talen Energy
Plant: Colstrip Generating Station
City/St: Colstrip, MT 59323
Source: 4, ,4

Period Start: 6/26/2018 09:35
Period End: 6/26/2018 10:56
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
06/26/2018 09:35	N/A	128647	198.7	38.62	18.25	15.5	740.2	904	3.223
06/26/2018 09:36	N/A	128954	198.7	38.46	18.21	16.6	739.9	904	3.238
06/26/2018 09:37	N/A	128892	198.7	39.03	18.54	15.7	740.6	904	3.235
06/26/2018 09:38	N/A	128837	198.8	41.55	19.52	16.2	741.0	904	3.233
06/26/2018 09:39	N/A	129283	198.9	35.41	16.79	14.2	740.1	898	3.247
06/26/2018 09:40	N/A	128909	198.9	37.73	17.86	15.0	740.6	898	3.230
06/26/2018 09:41	N/A	128848	198.9	36.85	17.48	14.8	740.7	898	3.234
06/26/2018 09:42	N/A	127799	198.9	36.27	17.20	14.7	741.2	898	3.182
06/26/2018 09:43	N/A	128184	198.8	36.10	17.14	14.5	740.0	898	3.201
06/26/2018 09:44	N/A	127475	198.7	34.28	16.25	14.3	740.0	898	3.165
06/26/2018 09:45	10.49	128100	198.7	38.64	17.49	15.1	740.2	898	3.196
06/26/2018 09:46	10.53	128680	198.8	36.66	17.34	14.6	740.6	898	3.224
06/26/2018 09:47	10.54	128106	198.7	35.94	17.03	14.4	740.8	898	3.172
06/26/2018 09:48	10.58	127509	198.6	35.32	16.75	14.1	740.6	898	3.166
06/26/2018 09:49	10.60	128680	198.6	35.35	16.73	14.2	740.7	900	3.224
06/26/2018 09:50	10.60	128039	198.6	36.35	17.19	14.5	740.7	900	3.192
06/26/2018 09:51	10.59	127961	198.6	40.74	19.05	14.9	740.5	900	3.188
06/26/2018 09:52	10.62	128240	198.6	36.01	17.07	14.5	740.7	900	3.202
06/26/2018 09:53	10.61	128295	198.4	34.93	16.55	14.3	740.4	900	3.204
06/26/2018 09:54	10.61	129266	198.4	35.71	16.95	14.4	740.5	900	3.253
06/26/2018 09:55	10.64	128664	198.5	35.97	17.07	14.6	740.4	900	3.233
06/26/2018 09:56	10.54	128887	198.5	35.16	16.72	14.2	740.6	894	3.237
06/26/2018 09:57	10.55	128240	198.8	35.56	16.89	14.3	740.3	894	3.185
06/26/2018 09:58	10.56	128195	198.9	35.88	17.01	14.4	740.7	894	3.197
06/26/2018 09:59	10.59	127587	199.1	36.23	17.17	14.5	740.7	900	3.169
06/26/2018 10:00	10.56	128055	199.1	38.71	18.26	15.1	740.7	900	3.199
06/26/2018 10:01	10.63	128686	199.1	36.87	17.47	14.7	740.4	900	3.229
06/26/2018 10:02	10.59	129205	199.1	35.69	16.91	14.4	740.4	900	3.257
06/26/2018 10:03	10.54	128541	199.1	35.60	16.88	14.3	741.2	900	3.220
06/26/2018 10:04	10.60	128943	199.0	35.77	16.97	14.3	740.8	900	3.244
06/26/2018 10:05	10.55	129026	199.1	37.03	17.38	14.6	740.8	900	3.240
06/26/2018 10:06	10.56	129177	199.1	36.22	17.18	14.4	740.3	900	3.252
06/26/2018 10:07	10.57	128474	199.1	34.96	16.59	14.1	740.7	900	3.216
06/26/2018 10:08	10.57	128301	199.1	36.25	17.23	14.5	740.7	900	3.208
06/26/2018 10:09	10.55	128050	198.9	36.18	17.13	14.5	741.0	900	3.194
06/26/2018 10:10	10.52	129043	198.9	35.51	16.86	14.3	740.4	900	3.244
06/26/2018 10:11	10.63	128463	198.8	35.55	16.86	14.3	740.8	900	3.233
06/26/2018 10:12	10.61	128440	198.9	35.01	16.57	14.4	740.4	900	3.225
06/26/2018 10:13	10.67	127726	198.9	36.38	17.23	14.6	740.0	900	3.182

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
06/26/2018 10:14	10.65	127927	199.0	36.46	17.35	14.5	741.0	900	3.182
06/26/2018 10:15	10.61	128920	199.1	35.37	16.77	14.4	740.6	900	3.239
06/26/2018 10:16	10.60	129473	199.1	34.99	16.54	14.3	741.4	894	3.266
06/26/2018 10:17	10.59	128178	198.9	35.71	16.94	14.4	740.6	894	3.208
06/26/2018 10:18	10.58	128775	199.0	36.22	17.18	14.5	740.3	901	3.224
06/26/2018 10:19	10.57	127670	198.9	35.63	16.94	14.5	740.5	901	3.165
06/26/2018 10:20	10.56	127051	198.8	35.19	16.66	14.3	741.4	901	3.144
06/26/2018 10:21	10.58	127955	198.6	34.05	16.14	14.3	740.8	901	3.188
06/26/2018 10:22	10.51	128496	198.7	34.32	16.26	14.4	740.6	901	3.216
06/26/2018 10:23	10.54	127704	198.9	35.46	16.81	14.3	740.6	901	3.177
06/26/2018 10:24	10.58	127855	198.9	35.38	16.80	14.4	739.9	901	3.184
06/26/2018 10:25	10.57	129032	198.9	35.58	16.82	14.4	740.1	901	3.243
06/26/2018 10:26	10.58	129523	198.8	37.12	17.60	14.5	740.0	901	3.268
06/26/2018 10:27	10.59	128831	198.9	37.62	17.84	14.6	740.6	901	3.233
06/26/2018 10:28	10.56	127553	199.0	36.12	17.13	14.5	740.4	901	3.171
06/26/2018 10:29	10.59	129462	199.0	35.72	16.88	14.4	740.9	897	3.266
06/26/2018 10:30	10.62	128022	198.9	35.38	16.82	14.3	740.5	897	3.193
06/26/2018 10:31	10.58	127899	198.9	37.64	17.85	14.4	740.4	897	3.185
06/26/2018 10:32	10.56	128418	199.1	36.81	17.44	14.4	740.8	897	3.214
06/26/2018 10:33	10.57	128044	199.2	36.10	17.07	14.3	740.7	903	3.195
06/26/2018 10:34	10.62	127101	199.1	35.92	17.01	14.6	740.6	903	3.148
06/26/2018 10:35	10.60	127358	198.9	35.65	16.93	14.3	740.0	903	3.174
06/26/2018 10:36	10.67	128094	199.1	36.04	17.07	14.4	740.4	908	3.197
06/26/2018 10:37	10.65	129456	199.2	35.97	17.07	14.6	741.1	908	3.266
06/26/2018 10:38	10.69	129333	199.1	35.35	16.76	14.4	740.7	908	3.265
06/26/2018 10:39	10.67	129534	198.9	34.96	16.56	14.3	740.3	902	3.265
06/26/2018 10:40	10.54	129590	198.9	35.74	16.93	14.3	740.5	902	3.271
06/26/2018 10:41	10.58	128915	199.2	35.28	16.70	14.3	740.8	896	3.217
06/26/2018 10:42	10.53	128664	199.2	35.95	17.03	14.4	740.5	896	3.234
06/26/2018 10:43	10.59	128318	199.1	35.48	16.82	14.4	740.4	896	3.209
06/26/2018 10:44	10.58	128217	199.0	35.48	16.81	14.4	740.8	903	3.203
06/26/2018 10:45	10.55	127977	198.9	38.66	18.32	14.5	740.6	903	3.191
06/26/2018 10:46	10.59	127112	198.9	37.75	17.86	14.5	740.3	903	3.148
06/26/2018 10:47	10.53	127576	199.1	36.33	17.23	14.4	740.2	903	3.172
06/26/2018 10:48	10.58	127179	199.1	35.87	17.00	14.4	741.1	903	3.152
06/26/2018 10:49	10.60	127810	199.0	36.08	17.08	14.5	740.4	903	3.182
06/26/2018 10:50	10.52	128920	199.0	38.14	18.08	14.6	740.4	903	3.238
06/26/2018 10:51	10.57	128429	199.1	37.24	17.65	14.6	739.7	903	3.214
06/26/2018 10:52	10.59	127793	199.0	37.18	17.64	14.6	739.5	903	3.182
06/26/2018 10:53	10.62	128134	199.0	36.37	17.27	14.6	739.9	903	3.199
06/26/2018 10:54	10.57	128273	199.0	40.82	19.35	14.9	739.9	897	3.209
06/26/2018 10:55	10.63	128993	199.2	40.82	19.35	14.9	739.8	897	3.243
06/26/2018 10:56	10.58	128892	199.2	40.32	19.06	14.9	740.3	897	3.238
Final Average*	**10.58**	**128401**	**198.9**	**36.45**	**17.26**	**14.5**	**740.5**	**900**	**3.212**
Maximum*	**10.69**	**129590**	**199.2**	**41.55**	**19.52**	**16.6**	**741.4**	**908**	**3.271**
	06/26/2018 10:38	06/26/2018 10:40	06/26/2018 10:56	06/26/2018 9:38	06/26/2018 9:38	06/26/2018 9:36	06/26/2018 10:20	06/26/2018 10:38	06/26/2018 10:40
Minimum*	**10.49**	**127051**	**198.4**	**34.05**	**16.14**	**14.1**	**739.5**	**894**	**3.144**

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
	06/26/2018 9:45	06/26/2018 10:20	06/26/2018 9:54	06/26/2018 10:21	06/26/2018 10:21	06/26/2018 10:07	06/26/2018 10:52	06/26/2018 10:17	06/26/2018 10:20

* Does not include Invalid Averaging Periods ("N/A")

Talen Montana
Environmental Compliance Department
Particulate Field Data

Source	CSCS UNIT 4	Meter Box #	5	Probe Length - ft	11'	Meter Box Operator	CLC	Bar. Press. - in. Hg	26.24		
Run #	2	Delta H @	1.7873	Nozzle Dia. - in.	0.1867	Asst. Tester(s)	DM/SB	Abs. Press. - in. Hg	26.01		
Date	6/26/18	Y Factor	0.9819	Heater Set Pt. - F	325°F	Filter Number	1461	Leak Rate	Rate	in. Hg	
Sample Time	11:37 - 13:00	Pitot Cal. - Cp	0.7988	Ambient Temp. - F	84°F	Probe Wash Bot. #	4B	Pre Test	∅	15.0	
# Trav. Pts	24	K Factors	0.70	Probe #	1311064	Imp. Wash Bot. #	----	Post Test	∅	15.0	
		Filter Thermo. #	Aux 2021	Hot Box #	5	Strain Relief #	6555				

Port No.	Point No.	Time	Dry Gas Meter CF	Pitot Delta P In H2O	Orifice Delta H In. H2O Desired	Orifice Delta H In. H2O Actual	Pump Vacuum In. Hg	Stack Temp. F	Probe Temp. F	Hot Box Temp. F	Impinger Temp. F Inlet	Impinger Temp. F Outlet	Dry Gas Meter Temp. F Inlet	Dry Gas Meter Temp. F Outlet	Stack Pressure In. H2O
2	1	11:37	757.584	3.65	2.55	2.6	3.5	194	335	330	185	59	84	83	-3.5
	2	11:40		3.60	2.52	2.5	4.2	194	334	331	249	53	85	84	-3.4
	3	11:43		3.50	2.45	2.5	4.4	194	333	330	277	50	87	84	-3.4
	4	11:46		3.35	2.34	2.3	4.2	195	332	329	290	50	89	84	-3.1
	5	11:49		2.90	2.03	2.0	3.9	195	332	329	296	52	90	84	-2.7
	6	11:52		2.15	1.50	1.5	3.0	195	332	328	300	52	91	84	-1.7
	Stop	11:55	774.652												
3	1	11:58	774.652	3.65	2.55	2.6	4.4	195	331	328	295	52	90	85	-3.1
	2	12:01		3.80	2.66	2.7	4.6	195	330	328	307	53	92	85	-3.5
	3	12:04		3.80	2.66	2.7	4.8	195	330	329	306	54	94	85	-3.5
	4	12:07		3.90	2.73	2.7	5.0	195	330	328	306	53	94	86	-3.6
	5	12:10		3.90	2.73	2.7	5.0	195	330	328	306	54	95	86	-3.3
	6	12:13		3.00	2.10	2.1	4.4	195	329	328	306	57	95	86	-2.0
	Stop	12:16	791.464												
5	1	12:20	791.464	3.65	2.55	2.6	5.0	194	330	326	284	58	92	86	-3.4
	2	12:23		3.65	2.55	2.6	5.2	195	330	328	307	55	94	87	-3.4
	3	12:26		3.65	2.55	2.6	5.5	195	329	328	307	56	95	87	-3.6
	4	12:29		3.55	2.48	2.5	5.5	195	329	328	307	58	96	87	-3.5
	5	12:32		3.10	2.17	2.2	5.0	195	329	328	306	61	96	88	-3.0
	6	12:35		2.40	1.68	1.7	4.4	195	329	329	306	61	96	88	-1.5
	Stop	12:38	807.494												
6	1	12:42	807.494	3.65	2.55	2.6	6.0	195	330	328	286	61	93	88	-3.0
	2	12:45		3.65	2.55	2.6	6.4	195	329	328	308	58	95	88	-3.4
	3	12:48		3.65	2.55	2.6	6.5	195	329	327	307	59	96	88	-3.4
	4	12:51		3.70	2.59	2.6	6.8	195	329	328	306	63	96	88	-3.7
	5	12:54		3.65	2.55	2.6	6.8	194	329	327	305	66	97	89	-3.3
	6	12:57		2.75	1.92	1.9	5.6	194	330	328	305	68	97	89	-1.5
	End	13:00	823.974												
		Total	66.390	3.410 Avg.		2.417 Avg.		194.8 Avg.					89.5 Avg.		-3.06 Avg.

Comments

Observer(s)

Orsat Analysis				
Gas	1	2	3	Avg.
CO2	11.8	11.8	12.0	11.87
O2	7.8	7.8	7.6	7.7
N2				

Impinger Wts			Gain
Imp # 4A	Post	944.5	125.2
	Pre	819.3	
Imp # 4B	Post	820.8	73.5
	Pre	747.3	
Imp # 4C	Post	615.2	5.0
	Pre	610.2	
Imp # 4D	Post	933.5	22.2
	Pre	911.3	
Total		225.9	

2

Date	6-26-18	
Filter #	1461	
Run #	2	
Bottle #	4B	
Time		
Unit	4	

https://talenenergy.sharepoint.com/teams/MTServices/Environmental/EnvCEMStaff/CEM Misc/Forms/RM5 Impinger wts

Average Values Report
Generated: 6/27/2018 07:13

Company: Talen Energy
Plant: Colstrip Generating Station
City/St: Colstrip, MT 59323
Source: 4, ,4

Period Start: 6/26/2018 11:37
Period End: 6/26/2018 13:00
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
06/26/2018 11:37	10.55	128407	198.8	37.25	17.65	14.6	741.1	900	3.225
06/26/2018 11:38	10.52	128937	198.6	37.03	17.54	14.6	741.0	900	3.237
06/26/2018 11:39	10.47	129116	198.5	38.16	18.02	15.1	741.0	900	3.247
06/26/2018 11:40	10.46	128368	198.6	37.53	17.76	14.9	741.1	906	3.208
06/26/2018 11:41	10.55	128234	198.6	37.42	17.73	14.8	740.7	906	3.202
06/26/2018 11:42	10.60	128474	198.6	37.53	17.80	14.9	740.5	906	3.214
06/26/2018 11:43	10.55	128189	198.6	36.15	17.08	14.6	740.6	906	3.200
06/26/2018 11:44	10.53	128223	198.6	42.29	19.97	16.4	740.4	906	3.201
06/26/2018 11:45	10.51	128759	198.8	39.28	18.58	15.8	740.9	900	3.229
06/26/2018 11:46	10.51	128061	198.7	40.16	19.15	16.6	740.9	900	3.194
06/26/2018 11:47	10.51	128452	198.9	37.39	17.78	15.4	740.4	900	3.214
06/26/2018 11:48	10.44	128546	198.9	37.27	17.59	15.1	740.5	900	3.213
06/26/2018 11:49	10.46	128613	198.9	39.33	18.61	15.6	740.4	900	3.227
06/26/2018 11:50	10.42	128697	198.9	37.11	17.53	15.2	740.7	900	3.226
06/26/2018 11:51	10.48	128106	198.8	37.21	17.63	15.3	741.0	900	3.196
06/26/2018 11:52	10.45	128625	198.7	36.60	17.35	14.9	740.3	905	3.222
06/26/2018 11:53	10.50	128184	198.8	37.44	17.74	15.3	739.7	905	3.213
06/26/2018 11:54	10.56	129322	198.8	38.13	18.04	15.6	739.8	905	3.244
06/26/2018 11:55	10.47	128870	198.8	38.34	18.15	15.4	739.9	905	3.236
06/26/2018 11:56	10.51	128586	198.9	38.38	18.16	15.3	740.8	900	3.199
06/26/2018 11:57	10.56	128496	198.9	37.78	17.90	15.0	740.3	899	3.213
06/26/2018 11:58	10.51	128346	198.8	38.19	18.07	15.1	741.0	894	3.208
06/26/2018 11:59	10.45	127983	198.8	38.34	18.17	15.1	741.9	894	3.190
06/26/2018 12:00	N/A	128167	198.8	38.76	18.41	15.0	741.5	894	3.200
06/26/2018 12:01	N/A	128809	198.7	38.38	18.20	15.0	741.7	894	3.228
06/26/2018 12:02	N/A	127810	198.6	36.90	17.47	14.9	741.3	901	3.181
06/26/2018 12:03	N/A	126744	198.6	37.14	17.56	14.8	741.2	906	3.128
06/26/2018 12:04	N/A	127815	198.6	37.59	17.77	15.1	740.6	906	3.182
06/26/2018 12:05	N/A	128385	198.8	36.92	17.48	15.0	740.9	906	3.210
06/26/2018 12:06	10.61	128463	198.7	36.57	17.32	14.8	740.5	906	3.214
06/26/2018 12:07	10.66	128708	198.9	38.16	18.04	15.4	740.0	906	3.227
06/26/2018 12:08	10.60	128167	199.0	39.94	18.97	15.9	740.3	904	3.211
06/26/2018 12:09	10.60	128128	199.1	38.53	18.23	15.4	740.4	896	3.207
06/26/2018 12:10	10.65	128173	199.0	37.94	17.97	15.3	740.4	895	3.212
06/26/2018 12:11	10.59	128346	198.9	37.30	17.68	15.1	740.7	890	3.209
06/26/2018 12:12	10.56	129021	199.0	38.30	18.16	15.3	741.3	890	3.243
06/26/2018 12:13	10.52	127442	199.1	39.40	18.68	15.3	741.2	890	3.165
06/26/2018 12:14	10.50	128184	198.9	36.92	17.52	15.0	741.2	896	3.201
06/26/2018 12:15	10.49	128256	198.9	37.94	17.94	15.1	741.3	902	3.195

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
06/26/2018 12:16	10.53	127709	198.7	37.32	17.67	15.1	740.0	911	3.177
06/26/2018 12:17	10.56	128022	198.6	38.35	18.12	15.3	740.4	911	3.191
06/26/2018 12:18	10.59	127743	198.7	37.94	17.97	15.2	740.7	916	3.171
06/26/2018 12:19	10.58	129277	198.6	37.78	17.89	15.3	739.5	916	3.254
06/26/2018 12:20	10.59	128915	198.6	36.96	17.41	15.2	739.2	909	3.236
06/26/2018 12:21	10.53	128731	198.8	38.64	18.20	15.4	738.8	900	3.228
06/26/2018 12:22	10.55	128920	198.8	39.00	18.48	15.7	739.4	893	3.238
06/26/2018 12:23	10.56	129467	198.9	38.96	18.43	15.6	739.1	893	3.265
06/26/2018 12:24	10.55	128502	199.0	38.39	18.19	15.6	740.5	893	3.217
06/26/2018 12:25	10.53	128586	199.1	38.01	18.03	15.3	740.8	893	3.222
06/26/2018 12:26	10.54	127927	199.1	40.53	19.20	15.8	740.5	893	3.189
06/26/2018 12:27	10.52	128284	199.2	38.50	18.22	15.4	740.5	899	3.207
06/26/2018 12:28	10.50	127631	199.2	37.96	17.96	15.2	741.0	899	3.174
06/26/2018 12:29	10.53	127994	199.1	37.53	17.77	15.1	740.1	905	3.197
06/26/2018 12:30	10.53	128357	199.0	37.38	17.67	15.4	740.8	905	3.209
06/26/2018 12:31	10.55	127721	199.1	37.43	17.74	15.4	740.4	905	3.186
06/26/2018 12:32	10.53	128340	199.0	37.39	17.67	15.3	740.9	905	3.201
06/26/2018 12:33	10.48	128636	199.1	38.59	18.24	15.5	740.4	905	3.235
06/26/2018 12:34	10.50	128385	199.2	38.21	18.13	15.5	740.6	899	3.200
06/26/2018 12:35	10.49	128971	199.2	40.90	19.30	15.5	741.1	899	3.239
06/26/2018 12:36	10.53	128920	199.2	40.01	18.94	15.5	739.9	899	3.239
06/26/2018 12:37	10.48	128429	199.2	38.40	18.15	15.4	740.8	899	3.205
06/26/2018 12:38	N/A	127352	199.1	38.55	18.25	15.4	740.9	899	3.154
06/26/2018 12:39	N/A	127782	198.9	38.36	18.16	15.3	740.6	899	3.180
06/26/2018 12:40	N/A	128256	199.1	39.85	18.89	15.5	740.3	899	3.214
06/26/2018 12:41	N/A	129054	199.1	39.54	18.70	15.3	740.9	899	3.245
06/26/2018 12:42	N/A	128519	199.1	38.47	18.21	15.5	740.1	899	3.219
06/26/2018 12:43	N/A	129088	199.0	37.98	17.97	15.5	740.4	899	3.247
06/26/2018 12:44	N/A	127782	199.0	38.78	18.33	15.4	740.5	899	3.181
06/26/2018 12:45	N/A	129205	199.2	39.11	18.51	15.4	740.3	900	3.254
06/26/2018 12:46	N/A	127871	199.2	37.97	17.98	15.4	740.6	900	3.187
06/26/2018 12:47	N/A	127855	199.0	38.02	17.99	15.4	740.3	900	3.185
06/26/2018 12:48	N/A	128558	198.8	37.19	17.61	15.4	740.6	900	3.219
06/26/2018 12:49	N/A	128223	198.8	37.92	17.96	15.4	740.6	900	3.202
06/26/2018 12:50	N/A	128619	199.1	37.92	17.96	15.5	740.7	900	3.224
06/26/2018 12:51	N/A	128909	199.1	37.75	17.88	15.6	741.0	900	3.238
06/26/2018 12:52	N/A	129160	199.1	38.01	17.99	15.5	740.7	900	3.251
06/26/2018 12:53	N/A	127955	198.8	39.20	18.56	15.5	740.8	900	3.189
06/26/2018 12:54	N/A	128664	198.9	41.33	19.56	15.7	740.4	900	3.225
06/26/2018 12:55	N/A	127631	199.1	40.22	19.03	15.6	740.9	905	3.172
06/26/2018 12:56	N/A	127815	198.9	39.02	18.49	15.6	741.1	905	3.169
06/26/2018 12:57	N/A	128385	198.9	38.65	18.27	15.5	740.5	905	3.215
06/26/2018 12:58	N/A	127749	198.9	39.20	18.56	15.6	740.5	899	3.181
06/26/2018 12:59	N/A	127670	198.9	39.48	18.73	15.5	741.3	899	3.177
06/26/2018 13:00	N/A	128078	198.9	38.84	18.36	15.6	740.5	899	3.196
Final Average*	**10.53**	**128355**	**198.9**	**38.29**	**18.13**	**15.3**	**740.6**	**901**	**3.209**
Maximum*	**10.66**	**129467**	**199.2**	**42.29**	**19.97**	**16.6**	**741.9**	**916**	**3.265**
	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
	12:07	12:23	12:46	11:44	11:44	11:46	11:59	12:19	12:23
Minimum*	**10.42**	**126744**	**198.5**	**36.15**	**17.08**	**14.6**	**738.8**	**890**	**3.128**
	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018
	11:50	12:03	11:39	11:43	11:43	11:43	12:21	12:13	12:03

* Does not include Invalid Averaging Periods ("N/A")

Talen Montana
Environmental Compliance Department
Particulate Field Data

Source	CCES UNIT 3	Meter Box #	7	Probe Length - ft	11'	Meter Box Operator	CLC	Bar. Press. - in. Hg	26.28		
Run #	3	Delta H @	1.7421	Nozzle Dia. - in.	0.1867	Asst. Tester(s)	DM/SB	Abs. Press. - in. Hg	25.99		
Date	6/21/18	Y Factor	0.9874	Heater Set Pt. - F	325°F	Filter Number	1458	Leak Rate	Rate	in. Hg	
Sample Time	13:32 - 14:54	Pitot Cal. - Cp	0.8089	Ambient Temp. - F	94°F	Probe Wash Bot. #	1C	Pre Test	Ø	15.0	
# Trav. Pts	24	K Factors	0.72	Probe #	1311463	Imp. Wash Bot. #	----	Post Test	Ø	15.0	
		Filter Thermo. #	D2	Hot Box #	7	Strain Relief #	Aux 1				

Port No.	Point No.	Time	Dry Gas Meter CF	Pitot Delta P In H2O	Orifice Delta H In. H2O Desired	Orifice Delta H In. H2O Actual	Pump Vacuum In. Hg	Stack Temp. F	Probe Temp. F	Hot Box Temp. F	Impinger Temp. F Inlet	Impinger Temp. F Outlet	Dry Gas Meter Temp. F Inlet	Dry Gas Meter Temp. F Outlet	Stack Pressure In. H2O
E	1	13:32	327.532	3.35	2.41	2.4	5.2	194	334	331	128	78	91	90	-3.5
	2	13:35		3.45	2.48	2.5	5.6	195	332	332	222	61	91	90	-4.2
	3	13:38		3.55	2.55	2.6	6.0	195	331	333	260	54	92	90	-4.6
	4	13:41		3.55	2.55	2.6	6.2	195	331	332	276	54	93	90	-4.6
	5	13:44		3.50	2.52	2.5	6.2	195	330	330	286	55	95	90	-4.2
	6	13:47		2.60	1.87	1.9	5.4	195	331	330	290	55	97	90	-2.1
	Stop	13:50	345.295												
S	1	13:54	345.295	3.60	2.59	2.6	6.5	195	325	330	280	60	95	90	-4.8
	2	13:57		3.50	2.52	2.5	6.6	194	336	330	305	53	98	90	-4.6
	3	14:00		3.45	2.48	2.5	6.8	195	328	330	306	54	100	91	-4.5
	4	14:03		3.20	2.30	2.3	6.6	195	330	330	303	56	101	91	-4.0
	5	14:06		2.85	2.05	2.1	6.5	195	331	329	301	57	101	91	-3.2
	6	14:09		2.10	1.51	1.5	5.4	194	331	329	300	58	102	92	-1.7
	Stop	14:12	362.256												
W	1	14:15	362.256	3.70	2.66	2.7	7.6	195	331	330	291	60	100	92	-4.5
	2	14:18		3.75	2.70	2.7	8.0	195	330	329	300	56	102	92	-5.2
	3	14:21		3.75	2.70	2.7	8.0	195	330	329	298	57	103	92	-5.0
	4	14:24		3.80	2.73	2.7	8.4	195	330	329	297	59	104	93	-5.0
	5	14:27		3.85	2.77	2.8	8.6	195	330	329	297	61	105	93	-5.0
	6	14:30		3.05	2.19	2.2	7.5	194	330	330	296	62	105	94	-2.2
	Stop	14:32	380.760												
N	1	14:36	380.760	3.35	2.41	2.4	7.6	195	330	330	288	63	102	94	-3.6
	2	14:39		3.45	2.48	2.5	8.0	195	331	330	300	59	103	94	-4.2
	3	14:42		3.35	2.41	2.4	8.0	195	329	330	299	60	104	94	-4.1
	4	14:45		3.25	2.34	2.3	8.0	195	330	330	298	62	105	95	-4.2
	5	14:48		3.00	2.16	2.2	7.8	195	330	329	297	62	105	95	-3.6
	6	14:51		2.35	1.69	1.7	7.0	195	331	329	298	64	105	95	-1.7
	End	14:54	397.040												
		72 Total	69.508	3.290 Avg.		2.388 Avg.		194.8 Avg.					96.0 Avg.		-3.93 Avg.

Comments

Observer(s)

Orsat Analysis				
Gas	1	2	3	Avg.
CO2	11.6	11.4	11.4	11.6
O2	~~8.0~~	~~8.2~~	~~8.2~~	8.07
N2				

11.6 11.6 11.6
8 8 8.2

Impinger Wts			Gain
Imp # 8A	Post	935.7	113.8
	Pre	821.9	
Imp # 8B	Post	904.6	80.9
	Pre	823.7	
Imp # 8C	Post	600.1	4.1
	Pre	596.0	
Imp # 8D	Post	916.4	21.1
	Pre	895.3	
Total		219.9	

Date	6-21-18	
Filter #	14588	
Run #	3	
Bottle #	1C	
Time		
Unit	3	

https://talenenergy.sharepoint.com/teams/MTServices/Environmental/EnvCEMStaff/CEM Misc/Forms/RM5 Impinger wts

Average Values Report
Generated: 6/27/2018 07:15

Company: Talen Energy
Plant: Colstrip Generating Station
City/St: Colstrip, MT 59323
Source: 4, ,4

Period Start: 6/26/2018 13:43
Period End: 6/26/2018 15:06
Validation Type: 1/1 min
Averaging Period: 1 min
Type: Block Avg

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
06/26/2018 13:43	N/A	128039	199.1	39.99	18.91	16.4	739.5	922	3.183
06/26/2018 13:44	N/A	129255	199.1	42.62	20.19	16.5	739.0	922	3.261
06/26/2018 13:45	N/A	128128	199.2	40.48	19.17	16.4	738.6	911	3.200
06/26/2018 13:46	N/A	128664	199.4	43.26	20.51	16.6	739.4	893	3.227
06/26/2018 13:47	N/A	127598	199.5	44.23	20.88	16.8	740.6	887	3.174
06/26/2018 13:48	N/A	128485	199.7	42.25	20.01	16.6	740.6	880	3.220
06/26/2018 13:49	N/A	127631	199.6	41.52	19.68	16.6	741.1	880	3.166
06/26/2018 13:50	N/A	128100	199.5	40.89	19.32	16.5	741.7	885	3.200
06/26/2018 13:51	N/A	127453	199.5	41.98	19.86	16.4	741.2	892	3.166
06/26/2018 13:52	N/A	128050	199.4	41.68	19.75	16.3	741.3	904	3.197
06/26/2018 13:53	N/A	127648	199.4	41.23	19.50	16.3	740.3	910	3.177
06/26/2018 13:54	N/A	128005	199.2	39.73	18.78	16.3	740.8	916	3.194
06/26/2018 13:55	N/A	127832	199.1	40.66	19.23	16.8	740.5	916	3.184
06/26/2018 13:56	N/A	128680	199.1	39.99	18.92	16.9	739.1	916	3.227
06/26/2018 13:57	N/A	128273	199.2	39.88	18.88	16.8	739.1	916	3.207
06/26/2018 13:58	N/A	128055	199.2	40.42	19.13	16.8	738.5	906	3.196
06/26/2018 13:59	N/A	129317	199.3	40.23	19.05	16.5	739.3	894	3.260
06/26/2018 14:00	N/A	129060	199.4	42.02	19.90	17.6	740.6	894	3.247
06/26/2018 14:01	N/A	128173	199.5	40.91	19.38	17.4	741.0	887	3.203
06/26/2018 14:02	N/A	127905	199.5	41.37	19.57	17.6	740.6	887	3.184
06/26/2018 14:03	N/A	128457	199.4	40.05	18.96	16.9	741.4	887	3.217
06/26/2018 14:04	N/A	127855	199.4	40.31	19.13	16.9	741.8	896	3.187
06/26/2018 14:05	N/A	128859	199.6	40.71	19.29	17.1	740.9	908	3.238
06/26/2018 14:06	N/A	128502	199.5	39.99	18.93	16.8	739.8	908	3.220
06/26/2018 14:07	N/A	127966	199.5	40.74	19.35	16.9	740.6	915	3.179
06/26/2018 14:08	N/A	129121	199.3	39.94	18.86	16.6	739.7	915	3.243
06/26/2018 14:09	N/A	129104	199.2	41.25	19.52	17.0	739.6	915	3.256
06/26/2018 14:10	N/A	128563	199.4	40.95	19.38	17.2	739.2	903	3.222
06/26/2018 14:11	N/A	129400	199.4	41.41	19.67	17.0	739.5	898	3.264
06/26/2018 14:12	N/A	128128	199.4	40.67	19.28	17.0	741.2	892	3.201
06/26/2018 14:13	N/A	128000	199.5	40.38	19.12	16.8	741.5	885	3.195
06/26/2018 14:14	N/A	128111	199.6	41.74	19.80	17.0	740.8	885	3.201
06/26/2018 14:15	N/A	127877	199.5	40.87	19.32	16.9	741.9	891	3.189
06/26/2018 14:16	N/A	127073	199.5	39.91	18.86	16.7	741.6	897	3.149
06/26/2018 14:17	N/A	127977	199.5	39.45	18.63	16.4	741.5	897	3.193
06/26/2018 14:18	N/A	127871	199.5	40.07	18.96	16.5	741.0	904	3.188
06/26/2018 14:19	N/A	127938	199.5	39.92	18.90	16.6	740.8	912	3.191
06/26/2018 14:20	N/A	127972	199.5	40.35	19.14	16.8	740.6	912	3.193
06/26/2018 14:21	N/A	128948	199.5	41.06	19.43	16.7	739.9	912	3.242

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
06/26/2018 14:22	N/A	128245	199.6	40.31	19.10	16.6	740.6	912	3.207
06/26/2018 14:23	N/A	128507	199.5	40.70	19.28	16.8	739.9	903	3.220
06/26/2018 14:24	N/A	128379	199.5	42.29	20.03	17.2	740.0	903	3.214
06/26/2018 14:25	N/A	129311	199.6	41.11	19.45	16.8	740.6	895	3.261
06/26/2018 14:26	N/A	128530	199.6	40.55	19.15	16.7	740.4	895	3.222
06/26/2018 14:27	N/A	128106	199.5	40.50	19.17	16.7	740.3	895	3.200
06/26/2018 14:28	N/A	128892	199.6	41.18	19.45	16.8	741.1	895	3.240
06/26/2018 14:29	N/A	127827	199.7	41.43	19.60	16.9	741.1	895	3.187
06/26/2018 14:30	N/A	128161	199.7	40.24	19.05	16.6	740.1	895	3.204
06/26/2018 14:31	N/A	127592	199.6	39.97	18.89	16.5	740.0	903	3.175
06/26/2018 14:32	N/A	127146	199.5	40.53	19.19	16.5	740.7	909	3.153
06/26/2018 14:33	N/A	128496	199.6	41.77	19.77	16.7	739.4	909	3.220
06/26/2018 14:34	N/A	127503	199.6	40.56	19.19	16.6	740.8	909	3.170
06/26/2018 14:35	N/A	127922	199.5	40.62	19.24	16.7	740.7	909	3.191
06/26/2018 14:36	N/A	128150	199.5	40.64	19.25	16.5	740.5	902	3.202
06/26/2018 14:37	N/A	128574	199.5	40.71	19.24	16.9	740.3	902	3.223
06/26/2018 14:38	N/A	128072	199.5	40.97	19.45	17.0	740.4	896	3.198
06/26/2018 14:39	N/A	128033	199.4	40.96	19.38	16.6	740.8	896	3.196
06/26/2018 14:40	N/A	128513	199.4	40.42	19.19	16.6	740.9	896	3.220
06/26/2018 14:41	N/A	127626	199.4	40.40	19.16	16.5	740.4	896	3.175
06/26/2018 14:42	N/A	128067	199.5	41.15	19.48	16.7	740.3	896	3.198
06/26/2018 14:43	N/A	128122	199.7	40.56	19.22	16.6	740.3	903	3.202
06/26/2018 14:44	N/A	127693	199.6	40.60	19.25	16.6	740.1	909	3.185
06/26/2018 14:45	N/A	128697	199.6	39.99	18.93	16.4	741.0	909	3.230
06/26/2018 14:46	N/A	128228	199.7	40.31	19.10	16.5	740.1	909	3.224
06/26/2018 14:47	N/A	128798	199.7	44.63	21.23	16.8	740.1	909	3.210
06/26/2018 14:48	N/A	129188	199.8	41.62	19.71	16.6	740.5	902	3.255
06/26/2018 14:49	N/A	128139	199.7	40.67	19.28	16.6	740.6	902	3.210
06/26/2018 14:50	N/A	128474	199.6	41.23	19.55	16.6	740.6	897	3.211
06/26/2018 14:51	N/A	128011	199.5	44.13	20.93	16.8	741.0	897	3.200
06/26/2018 14:52	N/A	128586	199.6	44.03	20.89	16.7	741.2	897	3.209
06/26/2018 14:53	N/A	128334	199.7	41.71	19.76	16.6	741.1	897	3.216
06/26/2018 14:54	N/A	127101	199.6	41.71	19.75	16.5	741.0	897	3.150
06/26/2018 14:55	N/A	127012	199.5	41.43	19.61	16.4	740.9	905	3.145
06/26/2018 14:56	N/A	127391	199.5	41.91	19.88	16.6	740.7	911	3.164
06/26/2018 14:57	N/A	127782	199.4	41.85	19.74	16.4	740.5	911	3.183
06/26/2018 14:58	N/A	128184	199.4	42.05	19.92	16.5	740.1	911	3.203
06/26/2018 14:59	N/A	127955	199.2	41.16	19.51	16.5	740.6	911	3.191
06/26/2018 15:00	N/A	128814	199.2	42.37	20.09	16.6	740.4	911	3.234
06/26/2018 15:01	N/A	128161	199.4	43.34	20.47	16.7	740.9	897	3.203
06/26/2018 15:02	N/A	128307	199.7	42.02	19.92	16.6	741.0	897	3.211
06/26/2018 15:03	N/A	127380	199.5	41.92	19.84	16.5	740.6	890	3.162
06/26/2018 15:04	N/A	127944	199.3	44.80	20.05	16.6	741.3	890	3.191
06/26/2018 15:05	N/A	127269	199.4	40.46	19.18	16.3	741.5	890	3.157
06/26/2018 15:06	N/A	126465	199.4	40.85	19.33	16.4	741.2	898	3.123
Final Average*	**N/A**	**128164**	**199.5**	**41.16**	**19.48**	**16.7**	**740.5**	**901**	**3.202**
Maximum*	**N/A**	**129400**	**199.8**	**44.80**	**21.23**	**17.6**	**741.9**	**922**	**3.264**
		06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018

Period Start:	Average 4 CO2 %	Average 4StkFl-hr kscfh	Average 4 Stk Temp deg F	Average 4_PM_RAW mgacm	Average 4_PM mgacm	Average 4 Opacity %	Average 4 UnitLoad MWG	Average 4 CoalFlow K #/hr	Average 4 StkFlwDP H2O
		14:11	14:48	15:04	14:47	14:02	14:15	13:44	14:11
Minimum*	**N/A**	**126465**	**199.1**	**39.45**	**18.63**	**16.3**	**738.5**	**880**	**3.123**
		06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018	06/26/2018
		15:06	13:56	14:17	14:17	15:05	13:58	13:49	15:06

* Does not include Invalid Averaging Periods ("N/A")

UNIT 4 PLANT DATA
GENERAL PARAMETERS

DATE AND TIME	GMW	Calculated Fuel Flow (KLB/HR)	Boiler Efficiency (%)	Opacity (%)	Sootblower Steam Pressure (psig)
6/26/2018 0:00	253.37	351.91	85.60	12.37	518.04
6/26/2018 1:00	258.91	355.76	85.61	12.73	515.90
6/26/2018 2:00	259.01	350.91	85.70	12.80	519.01
6/26/2018 3:00	259.04	356.61	85.91	12.89	518.11
6/26/2018 4:00	266.01	366.35	86.13	13.04	514.29
6/26/2018 5:00	512.79	616.55	86.22	13.94	519.44
6/26/2018 6:00	752.54	896.14	86.02	14.27	514.96
6/26/2018 7:00	756.62	909.70	85.82	14.73	519.96
6/26/2018 8:00	743.59	901.89	85.62	14.70	519.26
6/26/2018 9:00	739.55	897.13	85.45	14.61	518.43
6/26/2018 10:00	739.83	898.39	85.38	14.96	519.22
6/26/2018 11:00	739.94	904.11	85.30	14.48	519.53
6/26/2018 12:00	740.04	901.05	85.23	15.13	520.07
6/26/2018 13:00	740.03	900.40	85.17	15.36	520.75
6/26/2018 14:00	739.74	902.23	85.12	16.38	522.27
6/26/2018 15:00	740.10	901.91	85.07	16.76	520.08
6/26/2018 16:00	740.01	902.43	85.02	17.01	519.72
6/26/2018 17:00	692.67	848.47	85.01	18.61	520.16
6/26/2018 18:00	653.70	795.13	85.07	18.09	521.70
6/26/2018 19:00	748.51	907.84	85.13	18.43	514.44
6/26/2018 20:00	758.09	917.72	85.19	18.50	517.20
6/26/2018 21:00	767.31	928.91	85.25	19.42	517.40
6/26/2018 22:00	728.41	880.79	85.30	19.03	516.85
6/26/2018 23:00	647.65	786.48	85.36	18.04	515.78

UNIT 4 PLANT DATA
SCRUBBER ID FAN AMPERAGE

DATE AND TIME	SA 1 (amps)	SA 2 (amps)	SA 3 (amps)	SA 4 (amps)	SA 5 (amps)	SA 6 (amps)	SA 7 (amps)	SA 8 (amps)
6/26/2018 0:00	187.05	15.31	0.00	212.72	216.78	208.41	0.00	0.00
6/26/2018 1:00	199.70	0.65	0.00	218.05	222.21	214.51	0.00	0.00
6/26/2018 2:00	198.87	0.38	0.00	216.40	221.11	213.36	0.00	0.00
6/26/2018 3:00	198.14	0.12	0.00	216.49	220.64	213.10	0.00	0.00
6/26/2018 4:00	197.98	2.95	0.00	215.78	220.28	212.89	0.00	43.32
6/26/2018 5:00	214.24	175.31	0.00	218.86	222.08	216.90	128.91	158.18
6/26/2018 6:00	243.05	243.39	0.00	240.73	243.08	234.69	230.50	230.26
6/26/2018 7:00	245.63	246.97	0.00	244.16	247.90	236.96	237.42	232.99
6/26/2018 8:00	242.80	242.40	0.00	241.67	244.55	235.04	235.93	230.43
6/26/2018 9:00	238.14	237.40	0.00	237.99	238.79	231.90	233.63	228.60
6/26/2018 10:00	240.94	240.70	0.00	241.00	242.14	233.50	234.52	229.00
6/26/2018 11:00	242.00	242.27	0.00	241.83	243.41	233.96	234.67	228.85
6/26/2018 12:00	241.82	242.22	0.00	242.21	244.17	234.15	235.42	228.81
6/26/2018 13:00	242.72	242.77	0.00	242.25	244.25	234.50	235.90	228.74
6/26/2018 14:00	243.42	244.74	0.00	243.59	246.51	234.75	234.97	227.55
6/26/2018 15:00	246.18	247.31	0.00	245.44	249.48	235.90	235.23	226.97
6/26/2018 16:00	241.52	241.13	0.00	241.58	242.67	232.71	234.13	225.40
6/26/2018 17:00	223.74	221.90	0.00	225.62	221.68	222.52	225.92	187.95
6/26/2018 18:00	215.73	213.59	0.00	218.44	212.13	217.47	221.79	162.97
6/26/2018 19:00	244.20	244.04	0.00	244.43	245.16	239.01	239.98	221.24
6/26/2018 20:00	240.47	239.39	0.00	241.42	235.88	237.01	238.48	220.77
6/26/2018 21:00	250.41	250.63	0.00	249.72	250.92	244.01	244.08	222.44
6/26/2018 22:00	241.72	240.44	0.00	241.13	238.83	236.63	238.30	189.05
6/26/2018 23:00	213.49	210.98	0.00	214.85	203.33	215.43	218.05	199.42

UNIT 4 PLANT DATA
SCRUBBER DATA

DATE AND TIME	4-1 Plumb Bob ΔP	4-2 Plumb Bob ΔP	4-3 Plumb Bob ΔP	4-4 Plumb Bob ΔP	4-5 Plumb Bob ΔP	4-6 Plumb Bob ΔP	4-7 Plumb Bob ΔP	4-8 Plumb Bob ΔP	Average Plum Bob ΔP
6/26/18 0:00	28.21	N/A	N/A	28.069	28.004	27.984	N/A	N/A	28.068
6/26/18 1:00	28.03	N/A	N/A	28.025	28.014	28.049	N/A	N/A	28.029
6/26/18 2:00	28.01	N/A	N/A	28.052	28.015	27.983	N/A	N/A	28.016
6/26/18 3:00	28.02	N/A	N/A	28.048	28.008	28.043	N/A	N/A	28.029
6/26/18 4:00	28.02	N/A	N/A	28.022	27.986	28.046	N/A	N/A	28.017
6/26/18 5:00	28.11	26.028	N/A	28.005	28.014	27.991	20.283	27.373	26.543
6/26/18 6:00	28.25	28.269	N/A	28.389	28.272	28.279	28.400	28.343	28.315
6/26/18 7:00	29.99	29.997	N/A	30.080	29.977	29.953	30.041	30.111	30.022
6/26/18 8:00	29.99	29.959	N/A	30.003	30.022	30.008	29.969	30.398	30.050
6/26/18 9:00	30.00	30.003	N/A	30.038	29.993	30.003	30.021	30.590	30.093
6/26/18 10:00	30.03	29.979	N/A	29.996	30.014	29.995	30.002	30.717	30.105
6/26/18 11:00	30.00	30.001	N/A	30.104	30.003	30.014	29.999	30.848	30.139
6/26/18 12:00	30.03	29.998	N/A	30.127	30.010	30.032	29.992	30.872	30.152
6/26/18 13:00	30.02	29.971	N/A	30.136	30.008	30.012	30.002	30.995	30.163
6/26/18 14:00	29.98	30.023	N/A	30.171	29.996	30.028	30.023	31.033	30.180
6/26/18 15:00	30.01	30.009	N/A	30.085	30.005	30.016	30.034	31.156	30.187
6/26/18 16:00	29.61	29.611	N/A	29.721	29.612	29.537	29.644	31.048	29.827
6/26/18 17:00	27.96	27.962	N/A	28.024	27.961	28.027	28.013	28.351	28.043
6/26/18 18:00	28.03	27.994	N/A	28.111	28.021	27.990	28.047	28.313	28.072
6/26/18 19:00	26.55	26.524	N/A	26.447	26.553	26.533	26.510	29.768	26.984
6/26/18 20:00	25.48	25.505	N/A	25.702	25.492	25.496	25.515	29.571	26.109
6/26/18 21:00	25.47	25.493	N/A	25.732	25.491	25.583	25.488	29.916	26.167
6/26/18 22:00	26.89	26.884	N/A	26.989	26.890	26.939	26.935	26.580	26.872
6/26/18 23:00	27.93	27.943	N/A	27.974	27.953	27.979	27.973	28.897	28.092

UNIT 4 PLANT DATA
COAL MILLS FEED RATE (KLB/HR)

DATE AND TIME	Coal FR Mill A (Klb/hr)	Coal FR Mill B (Klb/hr)	Coal FR Mill C (Klb/hr)	Coal FR Mill D (Klb/hr)	Coal FR Mill E (Klb/hr)	Coal FR Mill F (Klb/hr)	Coal FR Mill G (Klb/hr)	Coal FR Mill H (Klb/hr)
6/26/2018 0:00	0.04	1.79	53.24	52.60	56.35	0.03	0.01	0.12
6/26/2018 1:00	0.04	0.00	55.29	54.95	59.22	0.04	0.00	0.11
6/26/2018 2:00	0.05	0.00	55.17	54.83	58.73	0.04	0.07	0.11
6/26/2018 3:00	0.44	0.01	55.05	54.54	58.05	0.05	0.26	0.10
6/26/2018 4:00	1.30	7.61	54.65	54.15	57.90	0.18	0.45	0.10
6/26/2018 5:00	46.34	55.36	54.65	54.09	58.01	35.14	10.53	0.10
6/26/2018 6:00	60.19	61.66	60.68	60.33	64.86	65.87	63.84	0.10
6/26/2018 7:00	59.55	60.51	59.48	58.91	63.87	64.98	63.44	0.10
6/26/2018 8:00	58.41	59.58	58.55	58.25	62.73	63.83	62.75	0.11
6/26/2018 9:00	57.87	58.91	58.78	58.21	62.51	63.63	62.81	0.12
6/26/2018 10:00	58.27	59.00	59.24	58.12	62.35	63.63	63.13	0.13
6/26/2018 11:00	59.05	59.07	59.18	57.94	62.59	64.12	63.20	0.13
6/26/2018 12:00	58.88	59.91	58.54	58.06	62.90	64.02	63.13	0.13
6/26/2018 13:00	58.19	59.44	59.20	58.42	62.78	64.26	62.52	0.13
6/26/2018 14:00	58.60	60.11	59.52	58.75	63.06	64.50	63.53	0.13
6/26/2018 15:00	59.25	60.21	59.53	59.61	63.15	64.84	63.55	0.13
6/26/2018 16:00	58.93	60.69	59.95	59.67	63.45	64.66	63.75	0.13
6/26/2018 17:00	58.83	60.01	59.13	58.54	63.02	64.40	34.83	0.13
6/26/2018 18:00	60.60	61.47	60.64	60.39	64.43	65.63	8.77	0.13
6/26/2018 19:00	60.06	61.03	60.43	60.02	64.45	65.69	64.76	0.13
6/26/2018 20:00	60.67	61.08	60.47	59.98	64.47	65.88	64.66	0.13
6/26/2018 21:00	60.64	61.58	61.31	60.55	64.92	66.46	65.86	0.13
6/26/2018 22:00	57.01	58.08	57.64	57.10	61.19	62.82	61.31	0.13
6/26/2018 23:00	52.36	53.17	52.26	52.00	55.76	57.73	46.50	0.13

UNIT 4 PLANT DATA
BOILER PARAMETERS

DATE AND TIME	Flue Gas O2 (%)	Furn Press SH/RH	Furn Press Fin/SH	Econ SH ΔP	Stack SO_2 lbs/10^6 BTU	Stack NOx lbs/10^6 BTU
6/26/2018 0:00	7.65	0.117	0.056	0.65	0.044	0.180
6/26/2018 1:00	7.68	0.129	0.067	0.69	0.148	0.225
6/26/2018 2:00	7.69	0.129	0.069	0.69	0.166	0.271
6/26/2018 3:00	7.70	0.130	0.063	0.70	-0.050	0.172
6/26/2018 4:00	7.51	0.137	0.070	0.72	0.037	0.283
6/26/2018 5:00	5.28	0.383	0.226	1.47	0.074	0.171
6/26/2018 6:00	3.71	0.711	0.419	2.42	0.095	0.163
6/26/2018 7:00	3.46	0.696	0.400	2.37	0.118	0.166
6/26/2018 8:00	3.55	0.677	0.390	2.32	0.069	0.195
6/26/2018 9:00	3.58	0.661	0.384	2.30	0.089	0.177
6/26/2018 10:00	3.61	0.671	0.390	2.32	-0.697	0.580
6/26/2018 11:00	3.56	0.673	0.394	2.33	0.099	0.174
6/26/2018 12:00	3.54	0.678	0.396	2.34	0.101	0.176
6/26/2018 13:00	3.57	0.681	0.401	2.34	0.140	0.221
6/26/2018 14:00	3.57	0.691	0.409	2.36	0.176	0.645
6/26/2018 15:00	3.53	0.704	0.416	2.37	0.152	0.204
6/26/2018 16:00	3.50	0.715	0.425	2.38	0.194	0.355
6/26/2018 17:00	3.93	0.647	0.384	2.16	0.121	0.182
6/26/2018 18:00	4.17	0.595	0.355	2.00	0.093	0.179
6/26/2018 19:00	3.83	0.813	0.490	2.58	0.088	0.310
6/26/2018 20:00	3.76	0.826	0.499	2.58	0.133	6.381
6/26/2018 21:00	3.85	0.878	0.535	2.70	0.110	0.208
6/26/2018 22:00	4.15	0.813	0.496	2.51	0.035	0.475
6/26/2018 23:00	4.69	0.667	0.407	2.12	0.130	0.524

APPENDIX C

Equipment Calibrations and Quality Assurance Data

TALEN MT SOURCE TESTING EQUIPMENT PROBE THERMOCOUPLE CALIBRATIONS						
Instrument	Sensor	Ambient Reference	Thermo.	Difference	±1.0% Absolute Diff	Date
1311461	STACK	47.0	48.0	-1.0	5.1	02/21/18
	PROBE	49.0	47.0	2.0	5.1	
1311462	STACK	49.0	50.0	-1.0	5.1	02/22/18
	PROBE	45.0	44.0	1.0	5.1	
1311463	STACK	80.0	78.0	2.0	5.4	02/22/18
	PROBE	73.0	70.0	3.0	5.3	
1311064	STACK	71.4	71.0	0.4	5.3	02/27/18
	PROBE	67.1	63.0	4.1	5.3	
1311065	STACK					
	PROBE					
1311459	STACK	66.7	63.0	3.7	5.3	02/27/18
	PROBE	67.1	70.0	-2.9	5.3	
JEC	STACK	74.0	70.0	4.0	5.3	02/22/18
	PROBE	74.0	70.0	4.0	5.3	
1311066	STACK	49.0	50.0	-1.0	5.1	2/22/2018
	PROBE	49.0	49.0	0.0	5.1	
PROBE	STACK					
	PROBE					
PROBE	STACK					
	PROBE					
PROBE	STACK					
	PROBE					
PROBE	STACK					
	PROBE					
Acceptance Criterea		Alternate Method 2 EMTIC GD-028				

Reference Thermometer H-B Instrument Cat. No. 602020100 -20/+110 °C

TALEN MT SOURCE TESTING EQUIPMENT HOT BOX THERMOCOUPLE CALIBRATIONS					
Instrument	**Ambient Reference**	**Thermo.**	**Difference**	**±1.0% Absolute Diff**	**Date**
3					
4					
5	83.7	84.0	-0.3	5.4	02/27/18
6	47.0	48.0	-1.0	5.1	02/21/18
7	85.0	84.0	1.0	5.5	02/22/18
8	49.0	50.0	-1.0	5.1	02/22/18
HOTBOX	85.0			5.5	
Acceptance Criterea	Alternate Method 2 EMTIC GD-028				

Reference Thermometer H-B Instrument Cat. No. 602020100 -20/+110 °C

TALEN MT SOURCE TESTING EQUIPMENT FILTER / IMPINGER INLET THERMOCOUPLE CALIBRATIONS					
Instrument	**Ambient Reference**	**Thermo.**	**Difference**	**±1.0% Absolute Diff**	**Date**
6340					
6381	49.0	48.0	1.0	5.1	02/22/18
6392	77.9	77.7	0.2	5.4	02/27/18
D1	47.0	46.0	1.0	5.1	02/21/18
D2	86.0	84.0	2.0	5.5	02/22/18
578					
FILTER					
Acceptance Criterea		Alternate Method 2 EMTIC GD-028			

Reference Thermometer H-B Instrument Cat. No. 602020100 -20/+110 °C

Talen MT SOURCE TESTING EQUIPMENT IMPINGER OUTLET THERMOCOUPLE CALIBRATIONS					
Instrument	**Ambient Reference**	**Thermo.**	**Difference**	**±1.0% Absolute Diff**	**Date**
6555	78.3	77.0	1.3	5.4	02/27/18
IO OLD/AUX #1	88.0	84.0	4.0	5.5	02/22/18
IO NEW/AUX #2	47.0	45.0	2.0	5.1	02/21/18
6551	49.0	48.0	1.0	4.6	02/22/18
Acceptance Criterea	Alternate Method 2 EMTIC GD-028				

Reference Thermometer H-B Instrument Cat. No. 602020100 -20/+110 °C

TALEN MT SOURCE TESTING EQUIPMENT PROBE THERMOCOUPLE CALIBRATIONS						
Instrument	Sensor	Ambient Reference	Thermo.	Difference	±1.0% Absolute Diff	Date
1311461	STACK		#DIV/0!	#DIV/0!	4.6	
	PROBE		#DIV/0!	#DIV/0!	4.6	
1311462	STACK		#DIV/0!	#DIV/0!	4.6	
	PROBE		#DIV/0!	#DIV/0!	4.6	
1311463	STACK	64.4	64.0	0.4	5.2	08/20/18
	PROBE	64.9	64.0	0.9	5.2	
1311064	STACK	73.6	73.0	0.6	5.3	08/20/18
	PROBE	68.4	70.0	-1.6	5.3	
1311065	STACK					
	PROBE					
1311459	STACK		#DIV/0!	#DIV/0!	4.6	
	PROBE		#DIV/0!	#DIV/0!	4.6	
JEC	STACK		#DIV/0!	#DIV/0!	4.6	
	PROBE		#DIV/0!	#DIV/0!	4.6	
1311066	STACK		#DIV/0!	#DIV/0!	4.6	
	PROBE		#DIV/0!	#DIV/0!	4.6	
1311464	STACK	83.1	83.0	0.1	5.4	8/1/2018
	PROBE	83.1	83.0	0.1	5.4	
1311464	STACK	62.4	63.0	-0.6	5.2	8/19/2018
	PROBE	62.4	63.0	-0.6	5.2	
PROBE	STACK					
	PROBE					
PROBE	STACK					
	PROBE					
Acceptance Criterea		Alternate Method 2 EMTIC GD-028				

TALEN MT SOURCE TESTING EQUIPMENT HOT BOX					
Instrument	Ambient Reference	Thermo.	Difference	±1.0% Absolute Diff	Date
3					
4					
5	64.2	65.0	-0.8	5.2	08/19/18
6		0.0	0.0	4.6	
7	68.7	70.0	-1.3	5.3	08/20/18
8		#DIV/0!	#DIV/0!	4.6	
HOTBOX				4.6	
Acceptance Criterea	Alternate Method 2 EMTIC GD-028				

Reference Thermometer Control Company S/N 101973695

TALEN MT SOURCE TESTING EQUIPMENT FILTER / IMPINGER INLET THERMOCOUPLE CALIBRATIONS					
Instrument	**Ambient Reference**	**Thermo.**	**Difference**	**±1.0% Absolute Diff**	**Date**
6340					
6381		#DIV/0!	#DIV/0!	4.6	
6392 (see 2021)	63.3	64.0	-0.7	5.2	08/19/18
D1		#DIV/0!	#DIV/0!	4.6	
D2	68.7	69.0	-0.3	5.3	08/20/18
578					
FILTER					
Acceptance Criterea		Alternate Method 2 EMTIC GD-028			

Reference Thermometer Control Company S/N 101973695

TALEN MT SOURCE TESTING EQUIPMENT FILTER / IMPINGER INLET THERMOCOUPLE CALIBRATIONS					
Instrument	**Ambient Reference**	**Thermo.**	**Difference**	**±1.0% Absolute Diff**	**Date**
6340					
6381		#DIV/0!	#DIV/0!	4.6	
6392 (see 6555)	63.1	63.0	0.1	5.2	08/19/18
D1		#DIV/0!	#DIV/0!	4.6	
D2	67.1	69.0	-1.9	5.3	08/20/18
578					
FILTER					
Acceptance Criterea		Alternate Method 2 EMTIC GD-028			

Reference Thermometer Control Company S/N 101973695

Talen Montana CSES Environmental Compliance Dept. Particulate Nozzle Calibration Tapered Leaf Gauge Method	
Nozzle #	1
Date	2/27/18
Tech	SLB
Trial #	**Diam. In.**
1	0.1840
2	0.1880
3	0.1850
4	0.1870
5	0.1880
6	0.1850
7	0.1880
8	0.1860
9	0.1880
10	0.1880
Average	**0.1867**

Talen Montana CSES Environmental Compliance Dept. Particulate Nozzle Calibration Tapered Leaf Gauge Method	
Nozzle #	1
Date	8/19/18
Tech	SLB
Trial #	**Diam. In.**
1	0.188
2	0.185
3	0.187
4	0.185
5	0.188
Average	**0.187**

Talen Montana CSES ECD
Meter Box Calibration Check
40CFR60 Appendix A, Method 5, Sec. 10.3
Test Orifice Method

						Initial Cal Data	
Date	2/27/2018	Technician	Seana Borsheim	Meterbox	5	Date	6/15/2017
Model #	C-5000	Barometric Press. ("Hg)	26.15	Orifice Set	ESC CO-1599s	Cal Fac, Y_i	0.9819
Serial #	2064	Theoretical Critical Vacuum ("Hg) *	12.33			ΔH@	1.7873

Dry Gas Meter Readings									Critical Orifice Readings				
ΔH ("H_2O)	Time (min.)	Volume (Ft^3)			Temps (°F)				Orifice Serial #	K' Orifice Coefficient **	Vacuum* ("Hg)	Amb.Temp. (°F)	
		Initial	Final	Total	Initial		Final					Initial	Final
					Inlet	Outlet	Inlet	Outlet					
1.2	8.28	180.800	186.302	5.502	83	83	83	83	18	0.5067	18.9	84	84
1.2	8.73	186.302	192.116	5.814	83	83	83	83	18	0.5067	18.9	84	84
1.2	8.28	192.116	197.616	5.500	83	83	83	83	18	0.5067	18.8	84	84

*For valid test results, the Vacuum should be >1 in. Hg greater than the Theoretical Critical Vacuum shown above.

**The Critical Orifice Coefficient, K', must be entered in English units.

Calibration Check Results								
Dry Gas Meter				Orifice				
Vol. Corr. (Ft^3), Vm_{std}	Cal Factor, Y_c		% Diff from Y_i	Vol. Corr. (Ft^3), Vcr_{std}	Vol. Nominal (Ft^3)	Cal Factor, $\Delta H@_c$		% Diff from ΔH@
	Value	Variation				Value	Variation	
4.690	1.0037	0.001		4.707	5.548	1.7765	-0.001	
4.956	1.0011	-0.002		4.961	5.851	1.7774	0.000	
4.688	1.0038	0.001		4.706	5.550	1.7774	0.000	
Average	1.0029	0.000	**2.09**	**Average**		1.7771	0.000	**-0.57**

Notes:

For Calibration Factor Y, the ratio of the orifice to the dry gas meter, acceptable tolerance of individual values from the average is±0.02.

For Orifice Calibration Factor ΔH@, the orifice ΔP in "H20 that equates to 0.75 cfm of air at 68°F & 29.92 "Hg, acceptable tolerance of individual values from the average is ±0.2.

Acceptance Criterea for %Difference from Y_i and $\Delta H@_i$ is ±5%.

Talen Montana CSES ECD
Meter Box Calibration Check
40CFR60 Appendix A, Method 5, Sec. 10.3
Test Orifice Method

						Initial Cal Data	
Date	2/22/2018	Technician	SB	Meterbox	7	Date	11/15/2017
Model #	C-5000	Barometric Press. ("Hg)	26.37	Orifice Set	ESC CO-1599s	Cal Fac, Y_i	0.9874
Serial #	2012	Theoretical Critical Vacuum ("Hg) *	12.44			ΔH@	1.7421

Dry Gas Meter Readings									Critical Orifice Readings				
ΔH ("H_2O)	Time (min.)	Volume (Ft^3)			Temps (°F)				Orifice Serial #	K' Orifice Coefficient **	Vacuum* ("Hg)	Amb.Temp. (°F)	
		Initial	Final	Total	Initial		Final					Initial	Final
					Inlet	Outlet	Inlet	Outlet					
1.2	8.17	966.100	971.602	5.502	92	89	92	90	18	0.5067	18.6	90.0	90.0
1.2	8.23	971.602	977.107	5.505	91	90	92	90	18	0.5067	18.6	90.0	91.0
1.2	8.15	977.107	982.607	5.500	92	90	93	91	18	0.5067	18.6	91.0	91.0

*For valid test results, the Vacuum should be >1 in. Hg greater than the Theoretical Critical Vacuum shown above.

**The Critical Orifice Coefficient, K', must be entered in English units.

Calibration Check Results								
Dry Gas Meter				Orifice				
Vol. Corr. (Ft^3), Vm_{std}	Cal Factor, Y_c		% Diff from Y_i	Vol. Corr. (Ft^3), Vcr_{std}	Vol. Nominal (Ft^3)	Cal Factor, $\Delta H@_c$		% Diff from ΔH@
	Value	Variation				Value	Variation	
4.663	0.9979	-0.002		4.653	5.501	1.7610	0.000	
4.665	1.0051	0.005		4.689	5.549	1.7610	0.000	
4.655	0.9967	-0.003		4.639	5.495	1.7610	0.000	
Average	0.9999	0.000	**1.25**	**Average**		**1.7610**	0.000	**1.07**

Notes:

For Calibration Factor Y, the ratio of the orifice to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For Orifice Calibration Factor ΔH@, the orifice ΔP in "H20 that equates to 0.75 cfm of air at 68°F & 29.92 "Hg, acceptable tolerance of individual values from the average is ±0.2.

Acceptance Criterea for %Difference from Y_i and $\Delta H@_i$ is ±5%.

Console Identification	5
Date	6/26/2018
Project Name	Unit 4 Meter Box Check
Average square root of ΔH ((√ΔH)avg)	1.56
Gas Molecular Weight (Dry) (Md) (g/g-mole)	30.2
Dry Gas Meter Calibration Check Value (YQA)	0.954
Deviation YQA to Yd (%)	-2.851

Console Identification	7
Date	6/21/2018
Project Name	Unit 3 Meter Box Check
Average square root of ΔH ((√ΔH)avg)	1.55
Gas Molecular Weight (Dry) (Md) (g/g-mole)	30.2
Dry Gas Meter Calibration Check Value (YQA)	0.973
Deviation YQA to Yd (%)	-1.415

UNIT 3
PROBE

APEX SOURCE TESTING EQUIPMENT INSTRUMENTS

Apex Instruments, Inc.
204 Technology Park Lane
Fuquay-Varina, NC 27526

S-TYPE PITOT TUBE CALIBRATION SHEET

Reference USEPA Reference Method 2 (40CFR60, App. A, Meth. 2)

PITOT SERIAL#	A4848	CALIBRATION DATE:	23-Oct-15
PITOT TYPE:	S	BAROMETRIC PRESSURE:	29.81 in Hg
STD. PITOT TYPE:	ELLIPSOIDAL	STATIC PRESSURE	-0.6 in H_2O
Cp(std):	0.990	BLOCKAGE %:	N/A
PROBE SERIAL#	N/A	CORRECTION FACTOR:	1.00

	SIDE "A" CALIBRATION			
RUN NO.	Δ Pstd in H_2O	Δ Ps in H_2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	0.559	0.838	0.809	-0.001
2	0.559	0.833	0.811	0.001
3	0.559	0.834	0.811	0.000
		"A" AVERAGE	0.810	0.0013
				(must be ≤ 0.01)

	SIDE "B" CALIBRATION			
RUN NO.	Δ Pstd in H_2O	Δ Ps in H_2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	0.561	0.841	0.809	0.001
2	0.561	0.843	0.808	0.000
3	0.561	0.844	0.807	-0.001
		"B" AVERAGE	0.808	0.0007
				(must be ≤ 0.01)

ACCEPTANCE CRITERIA

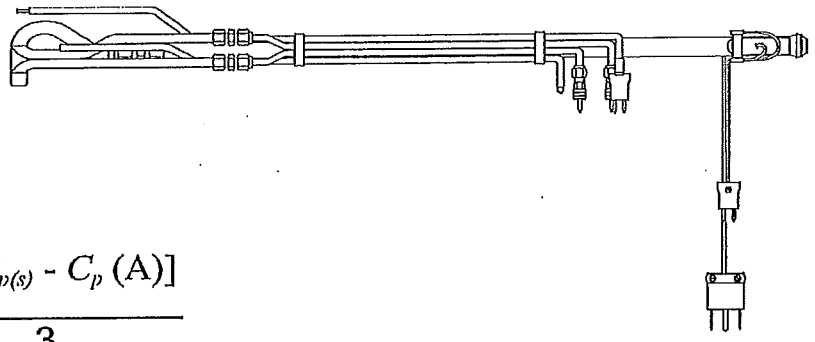
AVERAGE 0.0023 AVG. Cp (A) - AVG. Cp (B) must be ≤ 0.01

If the Average and both Deviation Averages "A" & "B" are ≤ 0.01, then the OVERALL AVERAGE below may be used.

*** If NOT, use the "A" Average OR "B" Average.**

OVERALL AVERAGE 0.8089

$$C_{p(s)} = C_{p(std)} \sqrt{\frac{\Delta p_{std}}{\Delta p_s}}$$



$$\text{Deviation} = C_{p(s)} - \overline{C_p}(A)$$

$$\text{Avg Dev} = \sigma(A) = \frac{\sum_{1}^{3} [C_{p(s)} - C_p(A)]}{3}$$

Method 2 Section 10.1.4.3 For a probe assembly constructed such that its pitot tube is always used in the same orientation, only one side of the pitot tube need be calibrated (the side which will face the flow). The pitot tube must still meet the alignment specifications of Figure 2-2 or 2-3, however, and must have an average deviation (σ) value of 0.01 or less (see section 10.1.4.4).

I certify that the above pitot tube was tested in accordance with the US EPA Method 2 standards.
See the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 2, Item 4.

Print Name: BO PRITCHARD

Signature: _____

Date 10/23/2015

UNIT 4
PROBE

APEX SOURCE TESTING EQUIPMENT INSTRUMENTS

Apex Instruments, Inc.
204 Technology Park Lane
Fuquay-Varina, NC 27526

S-TYPE PITOT TUBE CALIBRATION SHEET

Reference USEPA Reference Method 2 (40CFR60, App. A, Meth. 2)

PITOT SERIAL#	A4850	CALIBRATION DATE:	23-Oct-15	
PITOT TYPE:	S	BAROMETRIC PRESSURE:	29.81	in Hg
STD. PITOT TYPE:	ELLIPSOIDAL	STATIC PRESSURE	-0.6	in H_2O
Cp(std):	0.990	BLOCKAGE %:	N/A	
PROBE SERIAL#	N/A	CORRECTION FACTOR:	1.00	

	SIDE "A" CALIBRATION			
RUN NO.	Δ Pstd in H_2O	Δ Ps in H_2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	0.556	0.862	0.795	0.000
2	0.556	0.860	0.796	0.001
3	0.556	0.863	0.795	-0.001
		"A" AVERAGE	0.795	0.0007

(must be ≤ 0.01)

	SIDE "B" CALIBRATION			
RUN NO.	Δ Pstd in H_2O	Δ Ps in H_2O	Cp(s)	DEVIATION Cp(s) - avg.Cp(s)
1	0.556	0.844	0.804	0.001
2	0.556	0.847	0.802	0.000
3	0.556	0.849	0.801	-0.001
		"B" AVERAGE	0.802	0.0012

(must be ≤ 0.01)

ACCEPTANCE CRITERIA

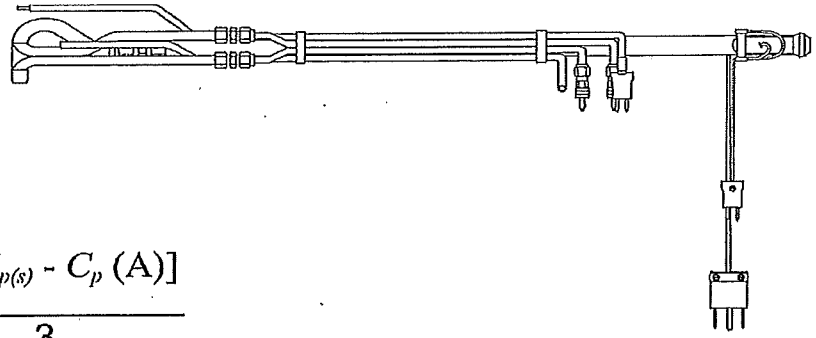
AVERAGE -0.0070 AVG. Cp (A) - AVG. Cp (B) must be ≤ 0.01

If the Average and both Deviation Averages "A" & "B" are ≤ 0.01, then the OVERALL AVERAGE below may be used.

* If NOT, use the "A" Average OR "B" Average.

OVERALL AVERAGE 0.7988

$$C_{p(s)} = C_{p(std)} \sqrt{\frac{\Delta p_{std}}{\Delta p_s}}$$



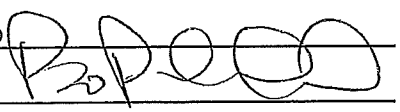
$$\text{Deviation} = C_{p(s)} - \overline{C_p}(\text{A})$$

$$\text{Avg Dev} = \sigma\,(\text{A}) = \frac{\sum_{1}^{3} [C_{p(s)} - C_p\,(\text{A})]}{3}$$

Method 2 Section 10.1.4.3 For a probe assembly constructed such that its pitot tube is always used in the same orientation, only one side of the pitot tube need be calibrated (the side which will face the flow). The pitot tube must still meet the alignment specifications of Figure 2-2 or 2-3, however, and must have an average deviation (σ) value of 0.01 or less (see section 10.1.4.4).

I certify that the above pitot tube was tested in accordance with the US EPA Method 2 standards.
See the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 2, Item 4.

Print Name: BO PRITCHARD

Signature: 

Date 10/23/2015

Talen Energy Environmental Compliance Department
Source Testing Sampling Activities QC Check Sheet

Unit:	4	
Date:	6-26-18	Comment
Instrument	Pre Test	
Dry Gas Meter (DGM)		
Pump oil level checked	✓	Add if needed
Leak checked (positive & negative)	✓	Repair if needed
Pretest calibration	✓	Cal factor must be 1.00 ±0.02
Thermocouples		
Impinger In	✓	±2°F
Impinger Out	✓	±2°F
DGM In	✓	±2°F
DGM Out	✓	±2°F
Stack gas	✓	±5.4°F
Probe	✓	±1.5% of absolute-value
Hot box	✓	±1.5% of absolute-value
Barometer	DM	Within +2.5 mm (0.1") Hg of reference barometer
Probe		
Liner cleaned	✓	
Leak checked	✓	
Heating properly	✓	Repair if needed
Sample points verified	✓	
Pitot Tubes		
Meets Specifications	✓	40CFR60, App. A, Method 2, Sec 10.1
Pitot tube cleaned	✓	
Leak checked	✓	
Hot Box		
Heating element working	✓	Repair if needed
Electrical system working	✓	
Orsat		
Sample bags leak checked	✓	
Leak checked & working properly	✓	Repair if needed
Glassware		
Cleaned & checked	✓	
Filter holders	✓	
Impingers	✓	
Umbilical / Sample Line		
Leak checked	✓	Repair if needed
Electrical system checked	✓	Repair if needed
Miscellaneous		
Ice machine operating	✓	Repair if needed
Stack Box supplies	✓	
Tool Box	✓	
Check Performed By:		Travis Bousheer

Talen Energy Environmental Compliance Department
Source Testing Sampling Activities QC Check Sheet

Unit:	3	
Date:	6-21-18	Comment
Instrument	Pre Test	
Dry Gas Meter (DGM)		
Pump oil level checked	✓	Add if needed
Leak checked (positive & negative)	✓	Repair if needed
Pretest calibration	✓	Cal factor must be 1.00 ±0.02
Thermocouples		
Impinger In	✓	±2°F
Impinger Out	✓	±2°F
DGM In	✓	±2°F
DGM Out	✓	±2°F
Stack gas	✓	±5.4°F
Probe	✓	±1.5% of absolute-value
Hot box	✓	±1.5% of absolute-value
Barometer	✓	Within +2.5 mm (0.1") Hg of reference barometer
Probe		
Liner cleaned	✓	
Leak checked	✓	
Heating properly	✓	Repair if needed
Sample points verified	✓	
Pitot Tubes		
Meets Specifications	✓	40CFR60, App. A, Method 2, Sec 10.1
Pitot tube cleaned	✓	
Leak checked	✓	
Hot Box		
Heating element working	✓	Repair if needed
Electrical system working	✓	
Orsat		
Sample bags leak checked	✓	
Leak checked & working properly	✓	Repair if needed
Glassware		
Cleaned & checked	✓	
Filter holders	✓	
Impingers	✓	
Umbilical / Sample Line		
Leak checked	✓	Repair if needed
Electrical system checked	✓	Repair if needed
Miscellaneous		
Ice machine operating	✓	Repair if needed
Stack Box supplies	✓	
Tool Box	✓	
Check Performed By:		Brandi Bonsheim

APPENDIX D

Project Participants, Titles, and QSTI Certifications

Steve Christian	Manager, Environmental Compliance, QSTI Groups 1,2, and 3.
Dave Millegan	Senior Environmental Compliance Professional, QSTI Groups 1, 2, 3 and 4.
Seana Borsheim	Environmental Compliance Technician
Cody Cole	Environmental Compliance Technician

Source Evaluation Society

P. O. Box 12124

Research Triangle Park
North Carolina 27709

May 22, 2018

Stephen J. Christian
Talen Energy Montana
P.O. Box 38
Colstrip, MT 59323

Subject: Qualified Source Tester Certificate No. 2008-145

Renewal Qualification Notice - Manual Gas Volume Measurements and Isokinetic Particulate Sampling Methods (exam date: 3/15/18)
Renewal Qualification Notice - Manual Gaseous Pollutants Source Sampling Methods (exam date: 3/15/18)
Renewal Qualification Notice - Gaseous Pollutants Instrumental Sampling Methods (exam date: 4/15/18)
Renewal Qualification Notice – Part 75 CEMS RATA Testing (exam date: 4/15/18)

Dear Mr. Christian:

It is my pleasure to inform you that you have satisfied the requirements of the Source Evaluation Society Qualified Source Test Individual program renewal for group exam(s) listed above. As a member of the successful candidates in this SES program, you should be proud of this distinction within the source emissions testing community. I am confident that you will continue to uphold the standards of technical excellence and ethical conduct embodied in the SES mission statement.

The enclosed Qualification Notice(s) and SES identification card are your permanent record of this achievement. This status is valid for the period shown on the Qualification Notices.

Congratulations on your achievement and I wish you continued success in your future endeavors.

Sincerely yours,

Peter R. Westlin
SES QSTI/QSTO Review Committee Chairman

cc: Glenn England, SES QSTI/QSTO Review Board Member
Karen D. Kajiya-Mills, SES QSTI/QSTO Review Board Member
Peter S. Pakalnis, SES QSTI/QSTO Review Board Member
Theresa M. Lowe, SES QSTI/QSTO Review Committee Administrator
Bruce C. Randall, SES QSTI/QSTO Review Board Member
J. Wade Bice, SES QSTI/QSTO Review Board Member
Gail Westlin, SES QSTI/QSTO Review Board Member

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

STEPHEN J. CHRISTIAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE SAMPLING METHODS

ISSUED THIS 15TH DAY OF MARCH 2018 AND EFFECTIVE UNTIL MARCH 14TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2008-145

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

STEPHEN J. CHRISTIAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GASEOUS POLLUTANTS SOURCE SAMPLING METHODS

ISSUED THIS 15TH DAY OF MARCH 2018 AND EFFECTIVE UNTIL MARCH 14TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2008-145

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

STEPHEN J. CHRISTIAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 15TH DAY OF APRIL 2018 AND EFFECTIVE UNTIL APRIL 14TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2008-145

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

STEPHEN J. CHRISTIAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

PART 75 CEMS RATA TESTING

ISSUED THIS 15TH DAY OF APRIL 2018 AND EFFECTIVE UNTIL APRIL 14TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2008-145

Source Evaluation Society

P. O. Box 12124

Research Triangle Park
North Carolina 27709

July 31, 2018

David R. Millegan
Talen Energy
PO Box 38
Colstrip, MT 59323

Subject: Qualified Source Tester Certificate No. 2012-750

Renewal Qualification Notice - Manual Gas Volume Measurements and Isokinetic Particulate Sampling Methods (exam date: 4/10/18)
Renewal Qualification Notice - Manual Gaseous Pollutants Source Sampling Methods (exam date: 4/21/17)
Renewal Qualification Notice - Gaseous Pollutants Instrumental Sampling Methods (exam date: 5/10/18)
Renewal Qualification Notice - Hazardous Metals Measurement Methods (exam date: 3/15/18)

Dear Mr. Millegan:

It is my pleasure to inform you that you have satisfied the requirements of the Source Evaluation Society Qualified Source Test Individual program renewal for group exam(s) listed above. As a member of the successful candidates in this SES program, you should be proud of this distinction within the source emissions testing community. I am confident that you will continue to uphold the standards of technical excellence and ethical conduct embodied in the SES mission statement.

The enclosed Qualification Notice(s) and SES identification card are your permanent record of this achievement. This status is valid for the period shown on the Qualification Notices.

Congratulations on your achievement and I wish you continued success in your future endeavors.

Sincerely yours,

Peter R. Westlin
SES QSTI/QSTO Review Committee Chairman

cc: Glenn England, SES QSTI/QSTO Review Board Member
Karen D. Kajiya-Mills, SES QSTI/QSTO Review Board Member
Peter S. Pakalnis, SES QSTI/QSTO Review Board Member
Theresa M. Lowe, SES QSTI/QSTO Review Committee Administrator
Bruce C. Randall, SES QSTI/QSTO Review Board Member
J. Wade Bice, SES QSTI/QSTO Review Board Member
Gail Westlin, SES QSTI/QSTO Review Board Member

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

DAVID R. MILLEGAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GAS VOLUME MEASUREMENTS AND ISOKINETIC PARTICULATE SAMPLING METHODS

ISSUED THIS 10TH DAY OF APRIL 2018 AND EFFECTIVE UNTIL APRIL 9TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2012-750

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

DAVID R. MILLEGAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

MANUAL GASEOUS POLLUTANTS SOURCE SAMPLING METHODS

ISSUED THIS 21ST DAY OF APRIL 2017 AND EFFECTIVE UNTIL APRIL 20TH, 2022

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2012-750

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

DAVID R. MILLEGAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

GASEOUS POLLUTANTS INSTRUMENTAL SAMPLING METHODS

ISSUED THIS 10TH DAY OF MAY 2018 AND EFFECTIVE UNTIL MAY 9TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2012-750

SOURCE EVALUATION SOCIETY INCORPORATED 1985 NORTH CAROLINA

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

DAVID R. MILLEGAN

HAS SUCCESSFULLY PASSED A COMPREHENSIVE EXAMINATION AND SATISFIED EXPERIENCE REQUIREMENTS IN ACCORDANCE WITH THE GUIDELINES ISSUED BY THE SES QUALIFIED SOURCE TEST INDIVIDUAL REVIEW BOARD FOR

HAZARDOUS METALS MEASURMENT METHODS

ISSUED THIS 15TH DAY OF MARCH 2018 AND EFFECTIVE UNTIL MARCH 14TH, 2023

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, QSTI/QSTO Review Board

Theresa Lowe, QSTI/QSTO Review Board

J. Wade Bice, QSTI/QSTO Review Board

Karen D. Kajiya-Mills , QSTI/QSTO Review Board

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2012-750

APPENDIX E

Notifications of Intent to Test and Correspondence

Millegan, David R

From: Millegan, David R
Sent: Thursday, April 19, 2018 9:04 AM
To: 'jraty@mt.gov'; 'gallagher.bob@epa.gov'; 'loiacono.sara@epa.gov'
Cc: Christian, Stephen J; Criswell, Gordon D
Subject: CSES 2018 2nd Quarter MATS Compliance Testing Schedule Ltr
Attachments: CSES 2018 2nd Quarter MATS Compliance Testing Schedule Ltr.pdf

To All,

Please find attached a copy of the CSES 2018 2nd Quarter MATS Compliance Testing Schedule for CSES Units 3 & 4. Hardcopies of this letter are being placed in the U.S. Mail today. If you have any questions, please give me a call or send me an e-mail. Thank you for your assistance.

TALEN ENERGY

David Millegan • Senior Compliance Professional
Environmental Compliance Department • (406) 748-5346 •
David.Millegan@talenenergy.com
Talen Energy Colstrip SES • P.O. Box 38 • Colstrip, MT 59323

TALEN ENERGY

Stephen J. Christian • Manager, Environmental Compliance • Talen Montana, LLC
PO Box 38 • Colstrip, MT 59323
(406) 748-5019 • Stephen.Christian@TalenEnergy.com

April 19, 2018

Mr. Dan Walsh
Air Compliance Section
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

RE: 2018 Plant 2nd Qtr MATS Particulate Compliance Testing
Colstrip Units 3 & 4
Talen Montana

Dear Mr. Walsh:

Listed in the table below is the proposed schedule for the 2018 Second Quarter Particulate Compliance testing on Colstrip Steam Electric Station (CSES) Units 3 & 4. It is anticipated that CSES Units 1 & 2 will be offline for the entirety of the Second Quarter.

Date	Unit	Test
6/5/18	3	Particulate Compliance
6/7/18	4	Particulate Compliance

Talen Montana Environmental Compliance Department personnel will be performing all Particulate Compliance testing activities utilizing the methods specified in our CEMS/QA Plan, the Talen Montana Source Test Protocol, and the Talen Montana AETB Manual as appropriate.

This letter is intended to satisfy the notification requirements of 40 CFR 63 10030(d), 40 CFR 60.8(d) and the MDEQ Compliance Source Testing Protocol. I will keep you apprised of any changes in plans. Please contact me at your convenience with any questions or comments.

Sincerely,

David R. Millegan,
Senior Environmental Compliance
Professional

cc: Bob Gallagher – Region 8 US EPA, Helena
Sara Loiacono – Region 8 US EPA, Denver
ecc: John Raty – MDEQ, Billings
David Millegan/FileNet

TALEN ENERGY

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May 23, 2018

Mr. Hoby Rash
Air Compliance Section
Montana Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

RE: 2018 Plant 2nd Qtr MATS Particulate Compliance Testing, Rev.1
Colstrip Units 1-4
Talen Montana

Dear Mr. Rash:

Please find below our revised tentative schedule for the 2018 Second Quarter Particulate Compliance testing on Colstrip Steam Electric Station (CSES) Units1-4. In early April, it was anticipated that CSES Units 1 & 2 would be offline for the entire Second Quarter. However, a change in economic conditions may necessitate bringing Units 1&2 on-line towards the end June. If either Unit 1 or Unit 2's operations are greater than 168 hours we will conduct MATS particulate compliance test(s).

Date	Unit	Test
6/5/18	3	Particulate Compliance
6/7/18	4	Particulate Compliance
6/26/18	1	Particulate Compliance
6/28/18	2	Particulate Compliance

Talen Montana Environmental Compliance Department personnel will be performing all Particulate Compliance testing activities utilizing the methods specified in our CEMS/QA Plan, the Talen Montana Source Test Protocol, and the Talen Montana AETB Manual as appropriate.

This letter is intended to satisfy the notification requirements of 40 CFR 63.10030(d), 40 CFR 60.8(d) and the MDEQ Compliance Source Testing Protocol. I will keep you apprised of any changes in plans. Please contact me at your convenience with any questions or comments.

Sincerely,

David R. Millegan,
Sr. Environmental Compliance Professional

cc: Bob Gallagher – Region 8 US EPA, Helena
Sara Loiacono – Region 8 US EPA, Denver
ecc: John Raty – MDEQ, Billings
Steve Christian/David Millegan/OnBase

Millegan, David R

From: Millegan, David R
Sent: Friday, June 01, 2018 9:51 AM
To: 'jraty@mt.gov'
Cc: Christian, Stephen J; Criswell, Gordon D; Hensleigh, Shane; Dennehy, Neil J
Subject: CSES Units 3 & 4 Quarterly MATS Particulate Compliance Testing

John

As a result of projected power market conditions through next week, we will not be able to attain the required 90% of full load conditions necessary for performing the Quarterly MATS Particulate Compliance Testing on CSES Units 3 & 4 originally scheduled for June 5th and 7th respectively. We will be shifting these test dates to later in the month when it is anticipated that the market conditions will be more favorable and allow the units to operate at full load conditions. Additionally, CSES Unit 1 is scheduled to return to service on June 25th. As a result, CSES Unit 1 will not operate for more than 168 hours in the Quarter and therefore is not subject to the Quarterly MATS Particulate Testing requirements. CSES Unit 1 will be removed from the proposed testing schedule. Please see the table below for the revisions in RED. If you have any questions, please give me a call or send me an e-mail. Thank you for your assistance.

Date	Unit	Test
~~6/5/18~~	~~3~~	~~Particulate Compliance~~
~~6/7/18~~	~~4~~	~~Particulate Compliance~~
~~6/26/18~~	~~1~~	~~Particulate Compliance~~
6/21/18	3	Particulate Compliance
6/26/18	4	Particulate Compliance
6/28/18	2	Particulate Compliance

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Millegan, David R

From: Millegan, David R
Sent: Wednesday, June 27, 2018 3:24 PM
To: 'jraty@mt.gov'
Cc: Christian, Stephen J; Criswell, Gordon D
Subject: CSES Unit 2 Second Quarter Particulate Compliance Test Cancellation

John,

We will be cancelling the CSES Unit 2 Second Quarter Particulate Compliance test being that the unit did not operate for more than 168 hours in the Second Quarter (Please see attached table). The unit was recently taken offline to repair a steam leak on a main turbine control valve. It is not anticipated that CSES Unit 2 will return to service before the end of the Second Quarter due to economic reasons. If you have any questions, please give me a call or send me an e-mail. Thank you for your assistance.

Date	Unit	Test
6/21/18	3	Particulate Compliance
6/26/18	4	Particulate Compliance
~~6/28/18~~	~~2~~	~~Particulate Compliance~~

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APPENDIX F

Coal Analyses

Weighted Average BTU for Units 3 & 4 (As Delivered Coal Report)									
		Btu Per Pound ---------				Ash % ----------		Sulphur % ---------	
Date	Shift	Received	Dry	A&MF	% Moist	Received	Dry	Received	Dry
6/21/2018	2	8701	11579	13105	24.85	8.75	11.65	0.62	0.83
6/21/2018	3	8645	11592	13101	25.42	8.59	11.52	0.60	0.81
6/25/2018	2	8452	11455	13117	26.22	9.35	12.67	0.70	0.95
6/25/2018	3	8444	11553	13162	26.91	8.94	12.23	0.71	0.98
6/27/2018	3	8385	11352	13050	26.13	9.61	13.01	0.90	1.22