DAQC-383-13
Site ID 10142 (B4)

MEMORANDUM

To: **STACK TEST FILE – STERICYCLE, INC.**

Through: Harold Burge, Major Source Compliance Section Manager

From: Rob Leishman, Environmental Scientist

Date: 4/8/2013

Subject:

Company:	Stericycle, Inc.
Location:	90 North 1100 West, North Salt Lake, Davis County, Utah
Contact:	Larry Reeves, 801-936-1260
	Steve McOmber, 801-936-1260
Tester:	Air Pollution Testing, Inc.
Source:	Hospital/Medical/Infectious Waste Incinerator (HMIWI) Stack
Airs #:	011-00055
Permit#	Title V operating permit 1100055002 dated 2/19/2009
Action Code:	3A
Subject:	Review of Stack Test Reports received 3/25/2013

On 3/25/2013, DAQ received a test report submitted by Air Pollution Testing, Inc. for the Stericycle HMIWI stack in North Salt Lake. Testing was performed on 11/8/2012, to demonstrate compliance with the particulate matter, HCl and CO emission limits found in Title V operating permit 1100055002 dated 2/19/2009, Condition II.B.3.c (a). The DAQ-calculated test results are:

Source	Test Date	Pollutant	Result	Limit
HMIWI Stack	11/8/2012	PM	0.011 gr/dscf @ 7% O_2 25 mg/dscm @ 7% O_2	0.015 gr/dscf @ 7% O_2 34 mg/dscm @ 7% O_2
		HCl	0.03 ppmdv @ 7% O_2	100 ppmdv @ 7% O_2
		CO	2 ppmdv @ 7% O_2	40 ppmdv @ 7% O_2

Note: Stericycle performed these tests at an incinerator charge rate well below normal. During the test, the charge rate was 1540. Secondary chamber temperatures averaged 1983 degrees F. Reactor inlet temperatures were 339 degrees F. Scrubber liquor flow rates averaged 105 gpm and scrubber liquor pH was 8.4. This data was included in the report that was submitted by APT on behalf of Stericycle. No production or throughput data was submitted other than this summary.

CONCLUSION: The emissions of particulate matter, HCl and CO were in compliance with applicable limits for the pollutants tested at the time of the test. Plant charge rates were significantly below normal rates for this test.

RECOMMENDATION: Stericycle appeared to be in compliance with permit limits of the tested pollutants at the lower charge rates and parameters specified in this report as of the date of this test.

HPV: No compliance action is recommended.

Document Date 4/8/2013
DAQ-2013-003624

Division of Air Quality
Compliance Demonstration
Method 26A - HCl

Source Information

Company Name	**Stericycle - HMIWI Stack**
Company Contact:	**Steve McOmber**
Contact Phone No.	**801-936-1260**
Source Designation:	**HMIWI Stack**

Test & Review Dates

Test Date:	11/8/2012
Review Date:	4/4/2013
Observer:	**Rob Leishman**
Reviewer:	**Rob Leishman**

Tabs Are Shown

Particulate Emission Limits

ppm@7%O2	lbs/hr	gr/dscf		
100.000	50.000	50.000		

Emission Rates - "Front Half"

ppm@7%O2	lbs/hr	gr/dscf		
0.0282	**0.0004**	**0.0000**		

Test Information

Stack_I.D._inches	As ft^2	Y	Dl H @	Cp	Pbar	Pq (static)	Dn
24.50	3.27	1.0080	1.66	0.82	25.45	0.25	0.256

Round

Contractor Information

Contracting Company:	Air Pollution Testing (APT)
Contact:	Andrew Burning - Alex Mongold
Phone No.:	801-974-0481
Project No.:	

F factors for Coal, Oil, and Gas

	Fd scf/MMBtu	Fw scf/MMBtu	Fc scf/MMBtu
COAL			
Anthrocite 2	10100	10540	1970
Bituminous 2	9780	10640	1800
Lignite	9860	11950	1910
OIL	9190	320	1420
GAS			
Natural	8710	10610	1040
Propane	8710	10200	1190
Butane	8710	10390	1250

☐ F factor used

lbs/MMBtu
- O2
- CO2

Summary

Division of Air Quality

Compliance Demonstration of
Reference Methods 26A - Particulate
Stericycle - HMIWI Stack

Testing Results				
Test Date	11/8/2012	11/8/2012	11/8/2012	11/8/2012
Round	Run 1	Run 2	Run 3	Run 4
As ft^2	3.27	3.27	3.27	
Pbar	25.45	25.45	25.45	
Pq (static)	0.25	0.25	0.25	
Ps	25.47	25.47	25.47	
Avg. Ts F	128.29	130.46	130.54	
CO2 - F_{CO2}	6.30	6.60	6.20	
O2	12.60	12.20	12.80	
N2+C	81.10	81.20	81.00	
Md	29.51	29.54	29.50	
Ms	27.55	27.46	27.43	
Y	1.01	1.01	1.01	
Cp	0.82	0.82	0.82	
Vm cf	37.02	39.12	38.48	
Vlc	149.30	162.50	165.00	
$A_{VG.}$ Tm F	93.75	101.27	102.94	
Vm std	30.34	31.64	31.02	
Vw std	7.03	7.65	7.77	
Bws	0.19	0.19	0.20	
S Bws	0.17	0.18	0.18	
Avg. Sqrt Dlp	0.58	0.61	0.59	
Vs	37.16	39.26	38.21	
scfm wet	5576.50	5869.82	5712.23	
acfm	7299.28	7711.51	7505.53	
Qsd dscfh	277677.22	288710.17	280821.88	
# Sample Points	24.00	24.00	24.00	
Dn	0.256	0.256	0.256	
An	3.57E-04	3.57E-04	3.57E-04	
Start Time				
End Time				
Total Test time	60.00	60.00	60.00	
Time @ point	2.50	2.50	2.50	

	Lab Data - grams collected		
Lab Data	Probe	Filter	Back
Run 1	0.0036	0.00665	0
Run 2	0.0065	0.0094	0
Run 3	0.00575	0.0079	0
Run 4			

Front Half Emissions Summary					
	Run 1	Run 2	Run 3	Run 4	Avg.
gr./dscf	0.0052	0.0078	0.0068		0.0066
lbs/hr	0.2069	0.3200	0.2725		0.2664
mg/dscm@7%	19.981734	28.357573	26.667024		25.0021
gr./dscf@7%O2	0.008731932	0.012392138	0.011653375		0.010925815

Total Emissions Summary w/back half condensable					
	Run 1	Run 2	Run 3	Run 4	Avg.
gr./Mdscf	8.7319	12.3921	11.6534		10.9258
lbs/hr	0.20687	0.31995	0.27248		0.2664
ppmdv	1.318E+04	1.871E+04	1.759E+04		1.650E+04
at 7% O2	22077.99855	29891.9614	30192.15677		27387.37224

lbs/MMBtu

O2

CO2

F factor used

Summary

Division of Air Quality

Compliance Demonstration of
Reference Methods 26A - HCl
Stericycle - HMIWI Stack

Testing Results				
Test Date	11/8/2012	11/8/2012	11/8/2012	11/8/2012
Round	Run 1	Run 2	Run 3	Run 4
As ft^2	3.27	3.27	3.27	
Pbar	25.45	25.45	25.45	
Pq (static)	0.25	0.25	0.25	
Ps	25.47	25.47	25.47	
Avg. Ts F	128.29	130.46	130.54	
CO2 - F_{CO2}	6.30	6.60	6.20	
O2	12.60	12.20	12.80	
N2+C	81.10	81.20	81.00	
Md	29.51	29.54	29.50	
Ms	27.55	27.46	27.43	
Y	1.01	1.01	1.01	
Cp	0.82	0.82	0.82	
Vm cf	37.02	39.12	38.48	
Vlc	149.30	162.50	165.00	
$A_{VG.}$ Tm F	93.75	101.27	102.94	
Vm std	30.34	31.64	31.02	
Vw std	7.03	7.65	7.77	
Bws	0.19	0.19	0.20	
S Bws	0.17	0.18	0.18	
Avg. Sqrt Dlp	0.58	0.61	0.59	
Vs	37.16	39.26	38.21	
scfm wet	5576.50	5869.82	5712.23	
acfm	7299.28	7711.51	7505.53	
Qsd dscfh	277677.22	288710.17	280821.88	
# Sample Points	24.00	24.00	24.00	
Dn	0.256	0.256	0.256	
An	3.57E-04	3.57E-04	3.57E-04	
Start Time				
End Time				
Total Test time	60.00	60.00	60.00	
Time @ point	2.50	2.50	2.50	

	Lab Data - grams collected		
Lab Data	Probe	Filter	Back
Run 1	0	0	0.00001639
Run 2	0	0	0.0000101
Run 3	0	0	0.00004017
Run 4			

Front Half Emissions Summary					
	Run 1	Run 2	Run 3	Run 4	Avg.
gr./dscf	0.0000	0.0000	0.0000		0.0000
lbs/hr					#DIV/0!
lbs/MMBtu					

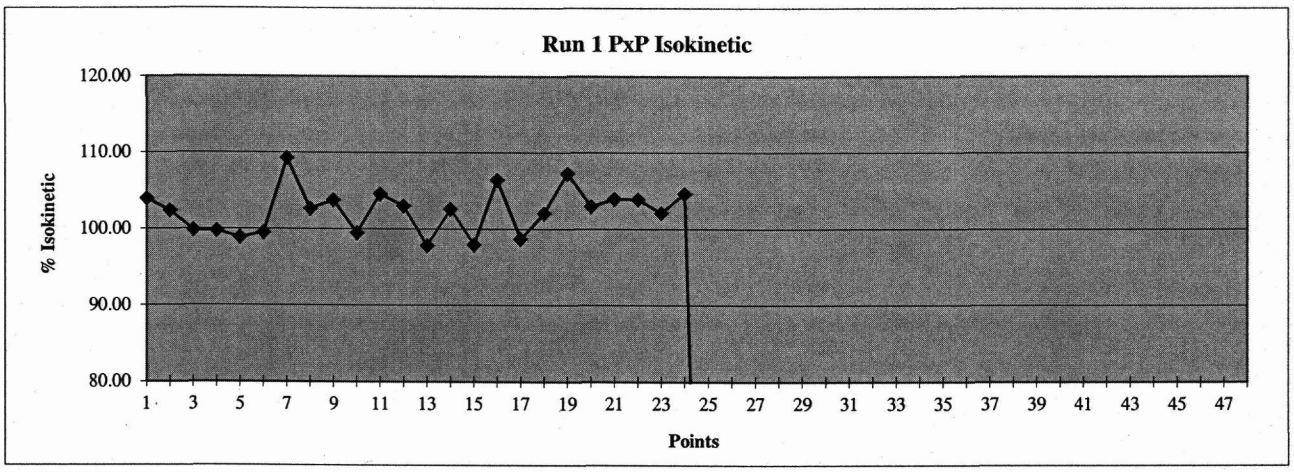
Total Emissions Summary w/back half condensable					
	Run 1	Run 2	Run 3	Run 4	Avg.
gr./dscf	0.000008	0.000005	0.000020		0.0000
lbs/hr	0.00033	0.00020	0.00080		0.0004
ppmdv	1.259E-02	7.439E-03	3.017E-02		1.673E-02
at 7% O2	0.021080363	0.01188456	0.051776601		0.028247175

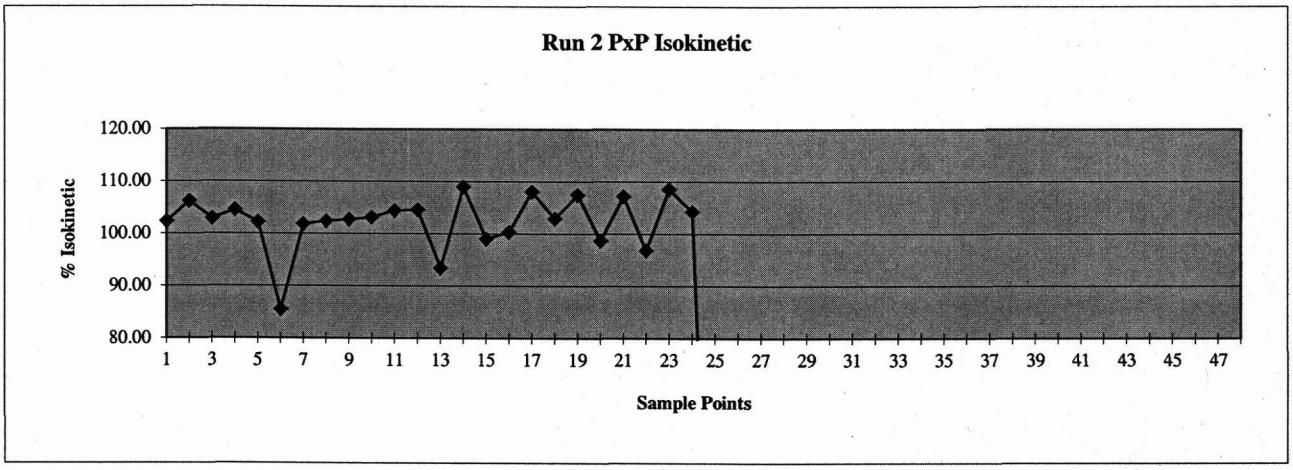
lbs/MMBtu

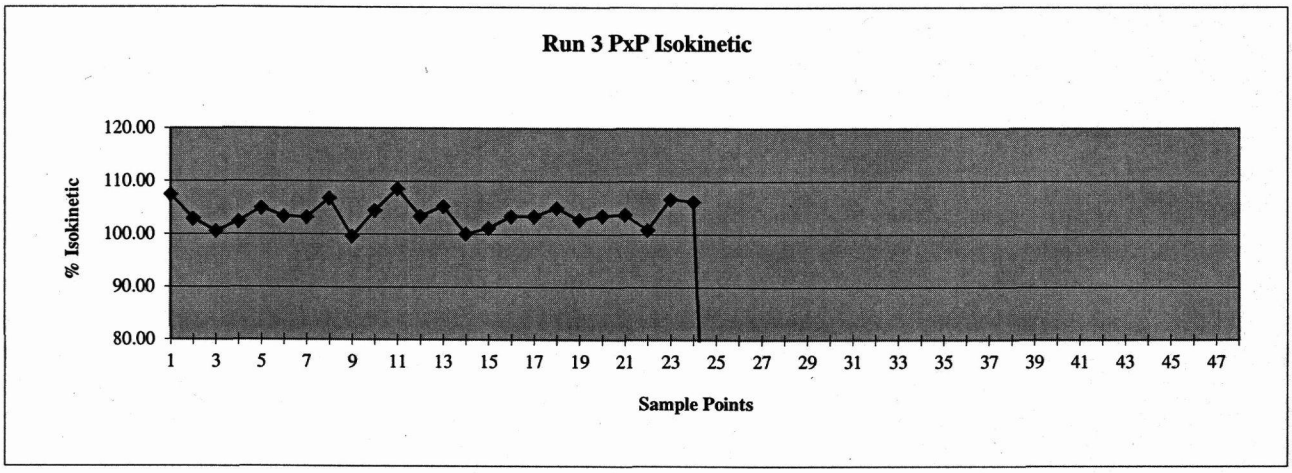
O2

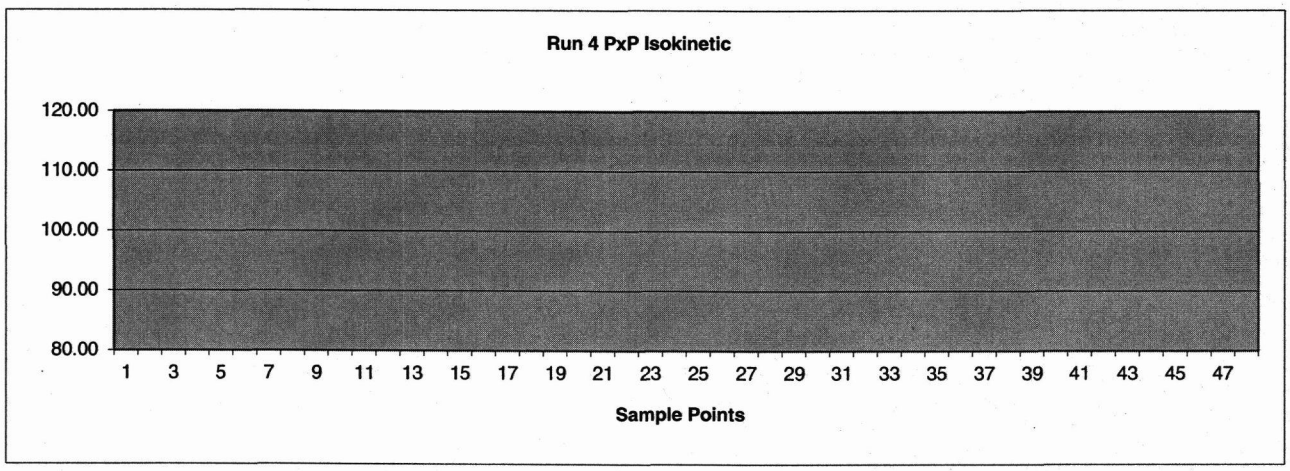
CO2

F factor used


Run 1 PxP Isokinetic
% Isokinetic
120.00
110.00
100.00
90.00
80.00
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Points


Run 2 PxP Isokinetic
% Isokinetic
120.00
110.00
100.00
90.00
80.00
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Sample Points


Run 3 PxP Isokinetic
% Isokinetic
120.00
110.00
100.00
90.00
80.00
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Sample Points


Run 4 PxP Isokinetic
120.00
110.00
100.00
90.00
80.00
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
Sample Points

Stericycle - HMIWI Stack				Flow & Moisture			Test Date	11/8/2012	
As ft^2	Pbar	Pq (static)	Ps	Avg. Ts F	CO2 - F_{CO2}	O2	N2+C	Md	Ms
3.27	25.45	0.25	25.47	128	6.30	12.60	81.10	29.51	27.55
Y	Cp	Vm cf	Vlc	Avg. Tm F	Vm std	Vw std	Bws	S Bws	0.1701
1.0080	0.82	37.021	149.30	93.75	30.338	7.028	0.1881	0.1701	0.999
Avg. Sqrt Dlp	Vs	scfm wet	acfm	Qsd dscfh	# Sample Points	Dn	Total Test time (minutes)	Time @ point (minutes)	Avg. Dlh
0.579	37.16	5,577	7,299	2.78E+05	24	0.256	60	2.50	0.959583
					TRUE				

Point No.	Meter (cf)	dl "p"	dl "h"	ts F	tm F (in)	tm F (out)
1	543.186	0.17	0.47	129.0	93.0	92.0
2	544.300	0.17	0.47	127.0	94.0	92.0
3	545.400	0.25	0.70	128.0	95.0	92.0
4	546.700	0.29	0.81	128.0	96.0	92.0
5	548.100	0.34	0.86	131.0	97.0	92.0
6	549.600	0.38	1.10	129.0	98.0	93.0
7	551.200	0.47	1.30	128.0	100.0	3.0
8	553.000	0.45	1.30	128.0	100.0	93.0
9	554.800	0.49	1.40	129.0	101.0	94.0
10	556.700	0.48	1.30	131.0	101.0	94.0
11	558.500	0.34	0.95	128.0	102.0	94.0
12	560.100	0.31	0.86	133.0	102.0	95.0
13	561.600	0.22	0.61	132.0	100.0	95.0
14	562.800	0.27	0.75	127.0	100.0	95.0
15	564.200	0.34	0.95	128.0	101.0	96.0
16	565.700	0.37	1.00	128.0	101.0	96.0
17	567.400	0.38	1.10	127.0	102.0	96.0
18	569.000	0.40	1.10	126.0	103.0	96.0
19	570.700	0.38	1.10	125.0	10.0	97.0
20	572.300	0.49	1.40	126.0	104.0	97.0
21	574.200	0.34	0.98	126.0	104.0	97.0
22	575.800	0.30	0.87	128.0	104.0	97.0
23	577.300	0.31	0.90	128.0	105.0	97.0
24	578.800	0.26	0.75	129.0	105.0	97.0
25	580.207					
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Imp. Liquid Collected		
Wt. (Final)	Wt. (Initial)	lc
805.8	688.3	117.5
758.0	739.6	18.4
698.9	696.6	2.3
767.9	766.8	1.1
1619.0	1609.0	10.0

Isokinetics	102.3	
Test Date	11/8/2012	
Start Time	enter	enter
End Time	enter	

Stericycle - HMIWI Stack				Flow & Moisture			Test Date	5/13/2009	
As ft^2	Pbar	Pq (static)	Ps	Avg. Ts F	CO2 - F_{CO2}	O2	N2+C	Md	Ms
3.27	25.45	0.25	25.47	130	6.60	12.20	81.20	29.54	27.46
Y	Cp	Vm cf	Vlc	Avg. Tm F	Vm std	Vw std	Bws	S Bws	0.1802
1.0080	0.82	39.120	162.50	101	31.636	7.649	0.1947	0.1802	0.999
Avg. Sqrt Dlp	Vs	scfm wet	acfm	Qsd dscfh	# Sample Points	Dn	Total Test time (minutes)	Time @ point (minutes)	Avg. Dlh
0.610	39.26	5,870	7,712	2.89E+05	24	0.256	60	2.50	1.04
					TRUE				

Point No.	Meter (cf)	dl "p"	dl "h"	ts F	tm F (in)	tm F (out)
1	581.209	0.20	0.56	132.0	99.0	98.0
2	582.400	0.22	0.62	130.0	100.0	98.0
3	583.700	0.20	0.56	131.0	100.0	98.0
4	584.900	0.39	1.10	131.0	100.0	98.0
5	586.600	0.36	1.00	131.0	102.0	98.0
6	588.200	0.58	1.10	130.0	102.0	98.0
7	589.900	0.46	1.30	131.0	102.0	98.0
8	591.700	0.45	1.30	127.0	104.0	98.0
9	593.500	0.40	1.10	129.0	104.0	98.0
10	595.200	0.35	0.99	128.0	104.0	99.0
11	596.800	0.34	0.96	127.0	105.0	99.0
12	598.400	0.34	0.96	129.0	105.0	99.0
13	600.000	0.24	0.68	128.0	103.0	99.0
14	601.200	0.24	0.68	129.0	104.0	99.0
15	602.600	0.29	0.82	128.0	104.0	100.0
16	604.000	0.47	1.30	129.0	104.0	99.0
17	605.800	0.36	1.00	129.0	105.0	99.0
18	607.500	0.40	1.10	131.0	103.0	99.0
19	609.200	0.46	1.30	133.0	103.0	99.0
20	611.100	0.60	1.70	132.0	107.0	100.0
21	613.100	0.46	1.30	135.0	107.0	100.0
22	615.000	0.40	1.10	136.0	107.0	100.0
23	616.600	0.40	1.10	132.0	107.0	100.0
24	618.400	0.50	1.40	133.0	107.0	100.0
25	620.329					
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Imp. Liquid Collected		
Wt. (Final)	Wt. (Initial)	lc
782.20	661.50	120.7
789.30	764.70	24.6
762.40	760.20	2.2
738.10	735.50	2.6
1551.8	1539.4	12.4

Isokinetics	102.2
Test Date	11/8/2012
Start Time	enter
End Time	enter

Stericycle - HMIWI Stack				Flow & Moisture			Test Date	5/13/2009	
As ft^2	Pbar	Pq (static)	Ps	Avg. Ts F	CO2 - F_{CO2}	O2	N2+C	Md	Ms
3.27	25.45	0.25	25.47	131	6.20	12.80	81.00	29.50	27.43
Y	Cp	Vm cf	Vlc	Avg. Tm F	Vm std	Vw std	Bws	S Bws	0.1806
1.0080	0.82	38.476	165.00	103	31.020	7.767	0.2002	0.1806	0.999
Avg. Sqrt Dlp	Vs	scfm wet	acfm	Qsd dscfh	# Sample Points	Dn	Total Test time (minutes)	Time @ point (minutes)	Avg. Dlh
0.593	38.21	5,712	7,506	2.81E+05	24	0.256	60	2.50	1.01
					TRUE				
Point No.	Meter (cf)	dl "p"	dl "h"	ts F	tm F (in)	tm F (out)	Imp. Liquid Collected		
1	620.510	0.18	0.51	126.0	101.0	100.0	Wt. (Final)	Wt. (Initial)	lc
2	621.700	0.20	0.57	127.0	101.0	100.0	824.9	704.6	120.3
3	622.900	0.33	0.93	131.0	101.0	100.0	772.8	746.2	26.6
4	624.400	0.36	1.00	129.0	103.0	100.0	698.1	694.4	3.7
5	626.000	0.54	1.50	134.0	104.0	100.0	771.6	769.7	1.9
6	628.000	0.40	1.10	133.0	105.0	100.0	1634.7	1622.2	12.5
7	629.700	0.50	1.40	130.0	105.0	100.0			
8	631.600	0.52	1.50	134.0	106.0	100.0	Isokinetics	103.7	
9	633.600	0.43	1.20	132.0	106.0	100.0	Test Date	11/8/2012	
10	635.300	0.54	1.50	130.0	106.0	100.0	Start Time	enter	
11	637.300	0.36	1.00	129.0	105.0	100.0	End Time	enter	
12	639.000	0.31	0.88	131.0	104.0	101.0			
13	640.500	0.19	0.54	128.0	104.0	101.0			
14	641.700	0.21	0.59	128.0	105.0	101.0			
15	642.900	0.28	0.79	128.0	105.0	101.0			
16	644.300	0.35	0.99	128.0	106.0	101.0			
17	645.900	0.35	0.99	129.0	107.0	101.0			
18	647.500	0.34	0.96	130.0	107.0	101.0			
19	649.100	0.40	1.10	128.0	107.0	101.0			
20	650.800	0.55	1.60	132.0	107.0	101.0			
21	652.800	0.35	0.99	133.0	107.0	101.0			
22	654.400	0.37	1.00	134.0	108.0	101.0			
23	656.000	0.33	0.93	134.0	108.0	102.0			
24	657.600	0.25	0.71	135.0	108.0	102.0			
25	658.986								
26									
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Division of Air Quality

Instrumental Reference Methods - Gaseous Measurements

Reference Methods 2, 3A, 6C, 7E, 10, & 19

Source Information

Company Name	**Stericycle**
Company Contact:	**Steve McOmber**
Contact Phone No.	**801-936-1260**
Stack Designation:	**HMIWI Stack**

CO2 Interferece w/CO: ☐ Yes

Wet CEM: ☐ Yes

Correct For O2:

Test & Review Dates

Test Date:	**11/8/2012**	High Flow Test Date:	1/0/1900
Review Date:	4/4/2013	Mid Flow Test Date:	1/0/1900
Observer:	Rob Leishman	Low Flow Test Date:	1/0/1900
Reviewer:	**ROB LEISHMAN**		

	Emission Limits			Emission Rates		
	SO_2	NO_X	CO	SO2	NOX	CO
lbs/MMBtu						
lbs/hr						
ppm	55.0	250.0	40.0			1.788
Percent						
%O2 Correction as a whole #	**7.00**	**7.00**	**7.00**			

Test Information

Stack I.D. inches	As ft^2	Y	Dl H @	Cp	Pbar	Pq (static)
24.50	3.27	1.0080	1.66	0.82	25.45	0.25

Round

Heat Input

fuel flow rate (Btu/hr)	Heat Input (Btu/hr.)

Contractor Information

Contact:	Alex Mongold - Chris Keefe
Contracting Company:	Air Pollution Testing (APT)
Address:	1959 South 4130 West, Unit B, SLC,Ut. 84104
Phone No.:	801-974-0481 or 303-420-5949 ext. 24
Project No.:	

☑ F factor used

8710

Diluent

- ○ O2
- ○ CO2

Method 19 - F factors for Coal, Oil, and Gas

		Fd scf/MMBtu	Fw scf/MMBtu	Fc scf/MMBtu
COAL	Anthracite 2	○ 10100	○ 10540	○ 1970
	Bituminous	○ 9780	○ 10640	○ 1800
	Lignite	○ 9860	○ 11950	○ 1910
OIL		○ 9190	○ 320	○ 1420
GAS	Natural	◉ 8710	○ 10610	○ 1040
	Propan	○ 8710	○ 10200	○ 1190
	Butane	○ 8710	○ 10390	○ 1250

Tabs Are Sh

Stericycle CO Low 3-25-13

Division of Air Quality

NSPS Relative Accuracy Performance Specification Test - CEMS C

Stericycle

HMIWI Stack

lbs/MMBTU
O2
CO2
Clear

Average Emission

Dry	SO_2	NO_X	CO
lbs/Mbtu			0.002
lbs/hr			
ppm			1.79
ppm corrected for %O2			

Average % concentration

CO_2	O_2
6.27	12.70

Run 1

Dry	SO_2	NO_X	CO	CO_2	O_2	Enter O2 or CO2 O2
Atomic Weight	64	46	28			
lbs/MMBtu (O2)			1.12E-03			E=Cd x Fd x (20.9/(20.9-%O2d))
lbs/MMBtu (CO2)						E=Cd x Fc x (100 / % CO2d)
lbs/cu.ft			5.090E-08			
lbs/hr			0.014	6.30	12.60	C For Cal Drift
ppm corrected for %O			1.17	6.30	12.50	Raw Value

Run 2

Dry	SO_2	NO_X	CO	CO_2	O_2	
Atomic Weight	64	46	28			
lbs/MMBtu (O2)			1.67E-03			E=Cd x Fd x (20.9/(20.9-%O2d))
lbs/MMBtu (CO2)						E=Cd x Fc x (100 / % CO2d)
lbs/cu.ft			7.998E-08			
lbs/hr			0.02298	6.67	12.20	C For Cal Drift
ppm corrected for %O			1.76	6.60	12.10	Raw Value

Run 3

Dry	SO_2	NO_X	CO	CO_2	O_2	
Atomic Weight	64	46	28			
lbs/MMBtu (O2)			2.12E-03			E=Cd x Fd x (20.9/(20.9-%O2d))
lbs/MMBtu (CO2)						E=Cd x Fc x (100 / % CO2d)
lbs/cu.ft			9.452E-08			
lbs/hr			0.026366	6.27	12.77	C For Cal Drift
ppm corrected for %O			2.222	6.20	12.60	Raw Value

Run 4

Dry	SO_2	NO_X	CO	CO_2	O_2	
Atomic Weight	64	46	28			
lbs/MMBtu (O2)	#VALUE!	#VALUE!	1.90E-03			E=Cd x Fd x (20.9/(20.9-%O2d))
lbs/MMBtu (CO2)	#VALUE!	#VALUE!				E=Cd x Fc x (100 / % CO2d)
lbs/cu.ft	#VALUE!	#VALUE!	7.998E-08			
lbs/hr	#VALUE!	#VALUE!	0.02	5.85	13.24	C For Cal Drift
ppm corrected for %O	#VALUE!	#VALUE!	2.00	5.90	13.20	Raw Value

Calibration Error Test

Test Date November 8, 2012			O_2				
		CS - Cal. Span	21.20				
		Units	%				
Cylinder No.	**Expiration Date**	**Cal. Gas**	**C_V- Certified Concentration**	**C_{Dir} or C_S - Measured Concentration**	Difference	**ACE** Eq. 7E-1 Analyzer Cal. Error	**Status**
		Low-level	0.00	0.00	0.00	0.00%	Passed Cal.
		Mid-level	9.98	10.00	0.02	0.09%	Passed Cal.
		High-level	21.20	21.20	0.00	0.00%	Passed Cal.
			% of Span	**Sec. 8.2.1 Cal Gas Verification**			
0 to 20% of CS - Cal. Span		Low-Level	0.00%				
40 to 60% of Cal. Span		Mid-level	47.08%				
100% of Cal. Span		High-level	100.00%				

Test Date November 8, 2012			CO_2				
		CS - Cal. Span	9.98				
		Units	%				
Cylinder No.	**Expiration Date**	**Cal. Gas**	**C_V- Certified Concentration**	**C_{Dir} or C_S - Measured Concentration**	Difference	**ACE** Eq. 7E-1 Analyzer Cal. Error	**Status**
		Low-level	0.00	0.00	0.00	0.000%	Passed Cal.
		Mid-level	5.10	5.20	0.10	1.002%	Passed Cal.
		High-level	9.98	10.00	0.02	0.200%	Passed Cal.
			% of Span	**Sec. 8.2.1 Cal Gas Verification**			
0 to 20% of Cal. Span		Low-Level	0.00%				
40 to 60% of Cal. Span		Mid-level	51.10%				
100% of Cal. Span		High-level	100.00%				

Test Date			SO2				
		CS - Cal. Span					
		Units	ppm				
Cylinder No.	**Expiration Date**	**Cal. Gas**	**C_V- Certified Concentration**	**C_{Dir} or C_S - Measured Concentration**	Difference	**ACE** Eq. 7E-1 Analyzer Cal. Error	**Status**
		Low-level					
		Mid-level					
		High-level					
			% of Span	**Sec. 8.2.1 Cal Gas Verification**			
0 to 20% of Cal. Span		Low-Level					
40 to 60% of Cal. Span		Mid-level					
100% of Cal. Span		High-level					

Test Date			NOx				
		CS - Cal. Span					
		Units	ppm				
Cylinder No.	**Expiration Date**	**Cal. Gas**	**C_V- Certified Concentration**	**C_{Dir} or C_S - Measured Concentration**	Difference	**ACE** Eq. 7E-1 Analyzer Cal. Error	**Status**
		Low-level					
		Mid-level					
		High-level					
			% of Span	**Sec. 8.2.1 Cal Gas Verification**			
0 to 20% of Cal. Span		Low-Level					
40 to 60% of Cal. Span		Mid-level					
100% of Cal. Span		High-level					

Test Date November 8, 2012			CO				
		CS - Cal. Span	15.80				
	40	Units	ppm				
Cylinder No.	**Expiration Date**	**Cal. Gas**	**C_V- Certified Concentration**	**C_{Dir} or C_S - Measured Concentration**	Difference	**ACE** Eq. 7E-1 Analyzer Cal. Error	**Status**
		Low-level	0.00	0.10	0.10	0.633%	Passed Cal.
		Mid-level	8.18	8.00	0.18	1.139%	Passed Cal.
		High-level	15.80	16.10	0.30	1.899%	Passed Cal.
			% of Span	**Sec. 8.2.1 Cal Gas Verification**			
0 to 20% of Cal. Span		Low-Level	0.00%				
40 to 60% of Cal. Span		Mid-level	51.77%				
100% of Cal. Span		High-level	100.00%				

Division of Air Quality Stack Test Review of

Stericycle

	SO_2	NO_X	CO	CO_2	O_2	*HMIWI Stack*
CS Calibration Span			15.80	9.98	21.20	☐ CO Calibration Gas
Units	ppm	ppm	ppm	%	%	Unprotectec
CV - Cylinder Value:	SO_2	NO_X	CO	CO_2	O_2	
Low-Level			0.00	0.00	0.00	
Mid-Level			8.18	5.10	9.98	
High-Level			15.80	9.98	21.20	
0 to 20% of Cal. Span			0.00%	0.00%	0.00%	
40 to 60% of Cal. Span			51.8%	51.1%	47.1%	
100% of Cal. Span			100.0%	100.0%	100.0%	

Cdir - Enter Actual Up-scale Cylinder Value Used To Correct Emission Concentration.

C_{Dir} C_{MA}			8.18	5.10	9.98

Calibration Error Test

Cs - Measured Concentration	SO_2	NO_X	CO	CO_2	O_2
Low-Level			0.10	0.00	0.00
Mid-Level			8.00	5.20	10.00
High-Level			16.10	10.00	21.20

Enter Up-scale Analyzer Response to be used during testing.

ACE Eq. 7E-1			8.00	5.20	10.00
Low-Level			0.63%	0.00%	0.00%
ppmdv Difference			0.1	0	0
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
Mid-Level			1.14%	1.00%	0.09%
ppmdv Difference			0.18	0.1	0.02
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
High-Level			1.90%	0.20%	0.00%
ppmdv Difference			0.3	0.02	0
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

☐ Failed Cal Error Dialog

NOTE
These cells sc appropriate (after the Cm entered.

If this scan is the Cma and gas value.

Pre-Test Sampling System Bias

Initial Values	SO_2	NO_X	CO	CO_2	O_2
C_O - Low-Level			0.10	0.00	0.00
SBi - Zero Bias	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	TRUE	TRUE	0	0	0
Pass or Failed Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
C_M - Up-scale Gas			8.00	5.10	9.90
SBi - Up-Scale Bias	TRUE	TRUE	0.00%	1.00%	0.47%
Difference	TRUE	TRUE	0.00	0.10	0.10
Pass or Failed Invalid Run	**TRUE**	**TRUE**	**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

System Bias. ± 5% of Span

☐ Failed Bias Dialog

Raw Test Data

Test Date: 11/8/2012

	SO_2	NO_X	CO	CO_2	O_2
			0.70	6.3	12.5
	0.0%	0.0%	4.4%	63.1%	59.0%

Time	Start	Stop
SO_2		0:21
NO_X	0:00	0:21
CO	0:00	0:21
CO_2/O_2	0:00	0:21

Post-Test System Bias 7E-2 SB=(Cs - Cdir)/CS x 100

Final Values	SO_2	NO_X	CO	CO_2	O_2
C_O - Low-Level			0.10	0.00	0.00
SBi - Zero Bias	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	**TRUE**	**TRUE**	**0.0**	**0.0**	**0.0**
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
C_M - Up-scale Gas			8.00	5.10	9.90
SBi - Up-Scale Bias	TRUE	TRUE	0.00%	1.00%	0.47%
Difference	TRUE	TRUE	0.0	0.1	0.1
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

System Bias. ± 5% of Span

☑ Failed Bias Dialog

Calibration Drift % of Span - D=ABS(SBf - SBi)

Low-Level Drift	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	TRUE	TRUE	0.0	0.0	0.0
Pass or Re-Calibrate			**Pass**	**Pass**	**Pass**
Up-scale Gas Drift	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	**TRUE**	**TRUE**	**0.0**	**0.0**	**0.0**
Pass or Re-Calibrate			**Pass**	**Pass**	**Pass**

Drift **3% of Span**

☐ Failed Drift Dialog

Division of Air Quality Stack Test Review of

Stericycle

HMIWI Stack — **Flow & Moisture**

As ft^2	Pbar	Pq (static)	Ps	Avg Ts F	CO2 - F_{CO2}	O2	N2+C	Md	Ms
3.27	25.45	0.25	25.47	128	6.30	12.60	81.10	29.51	27.89

Y	Cp	Vm cf	Vlc	A_{VG} Tm F	Vm std	Vw std	Bws	S Bws	0.1701
1.0080	0.82	37.021	149.30	96	30.152	7.028	0.1890	0.1701	0.999

AvgSqrtDlp	Vs	scfm wet	acfm	Qsd dscfh	Heat Input Btu/hr
0.5789	36.9	5,542	7,255	2.760E+5	

Load - Megawatts

Low	Mid	High

#1 - Times

Date

Point No.	dl "p"	sqrt dl "p"	ts F	tm F (in)	tm F (out)	Cp *3D Probe*	Final Vf	Initial Vi	
1	0.17	0.41	129.0	93.0	92.0		149.3		149.3
2	0.17	0.41	127.0	94.0	92.0				0
3	0.25	0.50	128.0	95.0	92.0				0
4	0.29	0.54	128.0	96.0	92.0				0
5	0.34	0.58	131.0	97.0	92.0				0
6	0.38	0.62	129.0	98.0	93.0				
7	0.47	0.69	128.0	100.0	93.0				
8	0.45	0.67	128.0	100.0	93.0				
9	0.49	0.70	129.0	101.0	94.0				
10	0.48	0.69	131.0	101.0	94.0				
11	0.34	0.58	128.0	102.0	94.0				
12	0.31	0.56	133.0	102.0	95.0				
13	0.22	0.47	132.0	100.0	95.0				
14	0.27	0.52	127.0	100.0	95.0				
15	0.34	0.58	128.0	101.0	96.0				
16	0.37	0.61	128.0	101.0	96.0				
17	0.38	0.62	127.0	102.0	96.0				
18	0.40	0.63	126.0	103.0	96.0				
19	0.38	0.62	125.0	10.0	97.0				
20	0.49	0.70	126.0	104.0	97.0				
21	0.34	0.58	126.0	104.0	97.0				
22	0.30	0.55	128.0	104.0	97.0				
23	0.31	0.56	128.0	105.0	97.0				
24	0.26	0.51	129.0	105.0	97.0				

Division of Air Quality Stack Test Review of
Stericycle

	SO_2	NO_X	CO	CO_2	O_2	*HMIWI Stack*
CS Calibration Span			15.80	9.98	21.20	
Units	ppm	ppm	ppm	%	%	
CV - Cylinder Value:	SO_2	NO_X	CO	CO_2	O_2	
Low-Level			**0.00**	**0.00**	**0.00**	
Mid-Level			**8.18**	**5.10**	**9.98**	
High-Level			**15.80**	**9.98**	**21.20**	
0 to 20% of Cal. Span			**0.00%**	**0.00%**	**0.00%**	
40 to 60% of Cal. Span			**51.8%**	**51.1%**	**47.1%**	
100% of Cal. Span			**100.0%**	**100.0%**	**100.0%**	

Cdir - Enter Actual Up-scale Cylinder Value Used To Correct Emission Concentration.

C_{MA}			8.18	5.10	9.98

Calibration Error Test

Measured Concentration	SO_2	NO_X	CO	CO_2	O_2
Low-Level			**0.10**	**0.00**	**0.00**
Mid-Level			**8.00**	**5.20**	**10.00**
High-Level			**16.10**	**10.00**	**21.20**

Enter Up-scale Analyzer Response to be used during testing.

ACE Eq. 7E-1			8.00	5.20	10.00
Low-Level			0.63%	0.00%	0.00%
ppmdv Difference			0.1	0	0
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
Mid-Level			1.14%	1.00%	0.09%
ppmdv Difference			0.18	0.1	0.02
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
High-Level			1.90%	0.20%	0.00%
ppmdv Difference			0.3	0.02	0
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

☐ Failed Cal Error Dialog

Pre-Test Sampling System Bias

Initial Values	SO_2	NO_X	CO	CO_2	O_2
C_O - Low-Level			0.10	0.00	0.00
SBi - Zero Bias	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	TRUE	TRUE	0	0	0
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
C_M - Up-scale Gas			8.00	5.10	9.90
SBi - Up-Scale Bias	TRUE	TRUE	0.00%	1.00%	0.47%
Difference	TRUE	TRUE	0	0.1	0.1
Pass or Invalid Run	**TRUE**	**TRUE**	**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

System Bias.
± 5% of Span

☐ Failed Bias Dialog

Raw Test Data

Test Date: 11/8/2012

	SO_2	NO_X	CO	CO_2	O_2
			1.1	**6.6**	**12.1**
	0.0%	**0.0%**	**7.0%**	**66.1%**	**57.1%**

Time	**Start**	**Stop**
SO_2		0:21
NO_X	0:00	0:21
CO	0:00	0:21
CO_2/O_2	0:00	0:21

Post-Test System Bias 7E-2 SB=(Cs - Cdir)/CS x 100

Final Values	SO_2	NO_X	CO	CO_2	O_2
C_O - Low-Level			0.10	0.00	0.00
SBi - Zero Bias	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	**TRUE**	**TRUE**	**0.0**	**0.0**	**0.0**
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
C_M - Up-scale Gas			8.00	5.00	9.90
SBi - Up-Scale Bias	TRUE	TRUE	0.00%	2.00%	0.47%
Difference	TRUE	TRUE	0.0	0.2	0.1
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

System Bias.
± 5% of Span

☐ Failed Bias Dialog

Calibration Drift % of Span - D=ABS(SBf - SBi)

Low-Level Drift	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	TRUE	TRUE	0.0	0.0	0.0
Pass or Re-Calibrate			**Pass**	**Pass**	**Pass**
Up-scale Gas Drift	TRUE	TRUE	0.00%	1.00%	0.00%
Difference	**TRUE**	**TRUE**	**0.0**	**0.1**	**0.0**
Pass or Re-Calibrate			**Pass**	**Pass**	**Pass**

Response Spec.
3% of Span

☐ Failed Drift Dialog

Division of Air Quality Stack Test Review of
Stericycle

HMIWI Stack — **Flow & Moisture**

As ft^2	Pbar	Pq (static)	Ps	Avg Ts F	CO2 - F_{CO2}	O2	N2+C	Md	Ms
3.27	25.45	0.25	25.47	130	6.67	12.20	81.14	29.55	27.74

Y	Cp	Vm cf	Vlc	A_{VG} Tm F	Vm std	Vw std	Bws	S Bws	0.1802
1.0080	0.82	39.120	162.50	101	31.541	7.649	0.1952	0.1802	0.999

AvgSqrtDlp	Vs	scfm wet	acfm	Qsd dscfh	Heat Input Btu/hr
0.6095	39.1	5,840	7,673	2.873E+5	

Load - Megawatts

Low	Mid	High

#1 - Times
Date

Point No.	dl "p"	sqrt dl "p"	ts F	tm F (in)	tm F (out)	Cp *3D Probe*	Final Vf	Initial Vi	
1	0.20	0.45	132.0	99.0	98.0		162.5		162.5
2	0.22	0.47	130.0	100.0	98.0				0
3	0.20	0.45	131.0	100.0	98.0				0
4	0.39	0.62	131.0	100.0	98.0				0
5	0.36	0.60	131.0	102.0	98.0				0
6	0.58	0.76	130.0	102.0	98.0				
7	0.46	0.68	131.0	102.0	98.0				
8	0.45	0.67	127.0	104.0	98.0				
9	0.40	0.63	129.0	104.0	98.0				
10	0.35	0.59	128.0	104.0	99.0				
11	0.34	0.58	127.0	105.0	99.0				
12	0.34	0.58	129.0	105.0	99.0				
13	0.24	0.49	128.0	103.0	99.0				
14	0.24	0.49	129.0	104.0	99.0				
15	0.29	0.54	128.0	104.0	100.0				
16	0.47	0.69	129.0	104.0	99.0				
17	0.36	0.60	129.0	105.0	99.0				
18	0.40	0.63	131.0	103.0	99.0				
19	0.46	0.68	133.0	103.0	99.0				
20	0.60	0.77	132.0	107.0	100.0				
21	0.46	0.68	135.0	107.0	100.0				
22	0.40	0.63	136.0	107.0	100.0				
23	0.40	0.63	132.0	107.0	100.0				
24	0.50	0.71	133.0	107.0	100.0				

Division of Air Quality Stack Test Review of
Stericycle

	SO_2	NO_X	CO	CO_2	O_2	*HMIWI Stack*
CS Calibration Span			15.80	9.98	21.20	
Units	ppm	ppm	ppm	%	%	
CV - Cylinder Value:	SO_2	NO_X	CO	CO_2	O_2	
Low-Level			**0.00**	**0.00**	**0.00**	
Mid-Level			**8.18**	**5.10**	**9.98**	
High-Level			**15.80**	**9.98**	**21.20**	
0 to 20% of Cal. Span			**0.00%**	**0.00%**	**0.00%**	
40 to 60% of Cal. Span			**51.8%**	**51.1%**	**47.1%**	
100% of Cal. Span			**100.0%**	**100.0%**	**100.0%**	

Cdir - Enter Actual Up-scale Cylinder Value Used To Correct Emission Concentration.

C_{MA}			8.18	5.10	9.98

Calibration Error Test

Measured Concentration	SO_2	NO_X	CO	CO_2	O_2
Low-Level			**0.10**	**0.00**	**0.00**
Mid-Level			**8.00**	**5.20**	**10.00**
High-Level			**16.10**	**10.00**	**21.20**

Enter Up-scale Analyzer Response to be used during testing.

ACE Eq. 7E-1			8.00	5.20	10.00
Low-Level			0.63%	0.00%	0.00%
ppmv Difference			0.1	0	0
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
Mid-Level			1.14%	1.00%	0.09%
ppmv Difference			0.18	0.1	0.02
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
High-Level			1.90%	0.20%	0.00%
ppmv Difference			0.3	0.02	0
Status			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

☐ Failed Cal Error Dialog

Pre-Test Sampling System Bias

Initial Values	SO_2	NO_X	CO	CO_2	O_2
C_O - Low-Level			0.10	0.00	0.00
SBi - Zero Bias	TRUE	TRUE	0.00%	0.00%	0.00%
Difference	TRUE	TRUE	0	0	0
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
C_M - Up-scale Gas			8.00	5.00	9.90
SBi - Up-Scale Bias	TRUE	TRUE	0.00%	2.00%	0.47%
Difference	TRUE	TRUE	0	0.2	0.1
Pass or Invalid Run	**TRUE**	**TRUE**	**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

System Bias.
± 5% of Span

☐ Failed Bias Dialog

Raw Test Data

Test Date: 11/8/2012

	SO_2	NO_X	CO	CO_2	O_2
			1.3	**6.2**	**12.6**
	0.0%	**0.0%**	**8.2%**	**62.1%**	**59.4%**

Time	**Start**	**Stop**
SO_2		0:21
NO_X	0:00	0:21
CO	0:00	0:21
CO_2/O_2	0:00	0:21

Post-Test System Bias 7E-2 SB=(Cs - Cdir)/CS x 100

Final Values	SO_2	NO_X	CO	CO_2	O_2
C_O - Low-Level			0.10	0.10	0.00
SBi - Zero Bias	TRUE	TRUE	0.00%	1.00%	0.00%
Difference	**TRUE**	**TRUE**	**0.0**	**0.1**	**0.0**
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**
C_M - Up-scale Gas			8.00	5.10	9.80
SBi - Up-Scale Bias	TRUE	TRUE	0.00%	1.00%	0.94%
Difference	TRUE	TRUE	0.0	0.1	0.2
Pass or Invalid Run			**Passed Cal.**	**Passed Cal.**	**Passed Cal.**

System Bias.
± 5% of Span

☐ Failed Bias Dialog

Calibration Drift % of Span - D=ABS(SBf - SBi)

Low-Level Drift	TRUE	TRUE	0.00%	1.00%	0.00%
Difference	TRUE	TRUE	0.0	0.1	0.0
Pass or Re-Calibrate			**Pass**	**Pass**	**Pass**
Up-scale Gas Drift	TRUE	TRUE	0.00%	1.00%	0.47%
Difference	**TRUE**	**TRUE**	**0.0**	**0.1**	**0.1**
Pass or Re-Calibrate			**Pass**	**Pass**	**Pass**

Response Spec.
3% of Span

☐ Failed Drift Dialog

Division of Air Quality Stack Test Review of
Stericycle

HMIWI Stack — **Flow & Moisture**

As ft^2	Pbar	Pq (static)	Ps	Avg Ts F	CO2 - F_{CO2}	O2	N2+C	Md	Ms
3.27	25.45	0.25	25.47	131	6.27	12.77	80.96	29.51	27.80

Y	Cp	Vm cf	Vlc	A_{VG} Tm F	Vm std	Vw std	Bws	S Bws	0.1806
1.0080	0.82	38.476	165.00	103	30.930	7.767	0.2007	0.1806	0.999

AvgSqrtDlp	Vs	scfm wet	acfm	Qsd dscfh	Heat Input Btu/hr
0.5928	38.0	5,674	7,455	2.789E+5	

Load - Megawatts

Low	Mid	High

#1 - Times
Date

Point No.	dl "p"	sqrt dl "p"	ts F	tm F (in)	tm F (out)	Cp *3D Probe*	Final Vf	Initial Vi	
1	0.18	0.42	126.0	101.0	100.0		165		165
2	0.20	0.45	127.0	101.0	100.0				0
3	0.33	0.57	131.0	101.0	100.0				0
4	0.36	0.60	129.0	103.0	100.0				0
5	0.54	0.73	134.0	104.0	100.0				0
6	0.40	0.63	133.0	105.0	100.0				
7	0.50	0.71	130.0	105.0	100.0				
8	0.52	0.72	134.0	106.0	100.0				
9	0.43	0.66	132.0	106.0	100.0				
10	0.54	0.73	130.0	106.0	100.0				
11	0.36	0.60	129.0	105.0	100.0				
12	0.31	0.56	131.0	104.0	101.0				
13	0.19	0.44	128.0	104.0	101.0				
14	0.21	0.46	128.0	105.0	101.0				
15	0.28	0.53	128.0	105.0	101.0				
16	0.35	0.59	128.0	106.0	101.0				
17	0.35	0.59	129.0	107.0	101.0				
18	0.34	0.58	130.0	107.0	101.0				
19	0.40	0.63	128.0	107.0	101.0				
20	0.55	0.74	132.0	107.0	101.0				
21	0.35	0.59	133.0	107.0	101.0				
22	0.37	0.61	134.0	108.0	101.0				
23	0.33	0.57	134.0	108.0	102.0				
24	0.25	0.50	135.0	108.0	102.0				