Appendix C

Field Sampling Documentation

Field Data Sheets

Method 0023A Sampling Parameters
Confirmatory Performance Test

Run No.		C1-R1	C1-R2	C1-R3	
Date		18-Jul-12	19-Jul-12	19-Jul-12	
Start Time	Units	11:20	09:10	13:03	
Stop Time		17:50	12:20	16:08	AVGS
Nozzle Diameter	inches	0.258	0.258	0.258	0.258
Barometric Pressure	in. Hg	29.15	29.20	29.20	29.18
Net Sampling Time	min.	180.0	180.0	180.0	180.0
Volume Metered	dcf	123.370	119.970	120.784	121.375
Avg. DGM Temp.	°F	83.6	78.1	78.8	80.2
Avg Delta H	in H_2O	1.69	1.57	1.58	1.61
Avg Delta H	in. Hg	0.1242	0.1155	0.1161	0.1186
DGM Calibration Factor	--	1.041	1.041	1.041	1.041
Gas Sample Volume	**dscf**	**122.049**	**120.059**	**120.721**	**120.943**
Total Water Collected	mL	1184.6	1116.0	1116.5	1139.0
Volume of Water Vapor	scf	55.854	52.619	52.643	53.705
Moisture (measured)	% v/v	31.4	30.5	30.4	30.7
Moisture (@ saturation)	% v/v	91.0	87.2	87.2	88.4
Dry Mole Fraction, 100-%M	--	0.6860	0.6953	0.6963	0.6926
CO_2 at Stack	% dry	5.40	5.43	6.00	5.61
O_2 at Stack	% dry	13.80	13.77	13.80	13.79
$CO + N_2$	% dry	80.80	80.80	80.20	80.60
Dry Molecular Weight	lb/lb-mole	29.42	29.42	29.51	29.45
Wet Molecular Weight	lb/lb-mole	25.83	25.94	26.02	25.93
Excess Air at Stack	%	183.2	182.1	187.2	184.2
Stack Diameter	inches	72.0	72.0	72.0	72.0
Stack Area	sq. in.	4071.5	4071.5	4071.5	4071.5
Static Pressure	in H_2O	0.40	0.31	0.35	0.35
Stack Pressure	in. Hg	29.15	29.22	29.23	29.20
Avg. Stack Temp.	°F	206.0	205.0	204.7	205.2
Avg. Sqroot of Delta P	--	0.8340	0.8358	0.8381	0.8360
SDE Average	--	21.523	21.553	21.607	21.561
Pitot Coefficient	--	0.84	0.84	0.84	0.84
Stack Gas Velocity	afpm	3,380	3,373	3,377	3,377
Stack Flowrate	wet acfm	95,566	95,380	95,473	95,473
Stack Flowrate	wet scfm	73,814	73,970	74,077	73,954
Stack Flowrate	**dscfm**	**50,640**	**51,430**	**51,583**	**51,218**
Isokinetics	**%**	**104**	**101**	**101**	**102**
Meter Box No.	--	80645	80645	80645	--
Delta H @	in. Hg	1.795	1.795	1.795	--
Field QA Yqc	--	1.081	1.066	1.061	1.070
[Deviation] Pre-Y	%	3.9%	2.4%	1.9%	2.7%

J:\Air_Tox\Project Files\Von Roll America\Heritage-WTI 2012\2012 MACT CPT\Field Data\[M0023A Separate FH BH.xlsx]DATA

Confirmatory Performance Test

PT	RUN 1 AVGS -- PCDDs/PCDFs						RUN 2 AVGS -- PCDDs/PCDFs						RUN 3 AVGS -- PCDDs/PCDFs					
	DP	SQRT DP	DGM IN	DGM OUT	DH	STACK TEMP	DP	SQRT DP	DGM IN	DGM OUT	DH	STACK TEMP	DP	SQRT DP	DGM IN	DGM OUT	DH	STACK TEMP
a1	0.67	0.8185	87	85	1.62	205	0.67	0.8185	70	69	1.50	202	0.67	0.8185	80	79	1.50	205
a2	0.67	0.8185	88	86	1.62	206	0.67	0.8185	72	70	1.50	202	0.67	0.8185	80	79	1.50	205
a3	0.67	0.8185	90	86	1.62	206	0.70	0.8367	76	71	1.60	203	0.67	0.8185	80	79	1.50	204
a4	0.67	0.8185	92	88	1.62	206	0.70	0.8367	77	72	1.60	204	0.67	0.8185	80	79	1.50	204
a5	0.72	0.8485	92	88	1.75	207	0.73	0.8544	78	73	1.60	204	0.72	0.8485	80	78	1.60	205
a6	0.72	0.8485	93	89	1.75	207	0.73	0.8544	79	74	1.60	205	0.72	0.8485	81	78	1.60	206
a7	0.70	0.8367	94	90	1.70	207	0.70	0.8367	80	75	1.60	205	0.72	0.8485	84	79	1.60	206
a8	0.70	0.8367	96	91	1.70	207	0.70	0.8367	81	76	1.60	205	0.72	0.8485	84	79	1.60	205
a9	0.70	0.8367	96	91	1.70	207	0.73	0.8544	82	77	1.60	205	0.70	0.8367	84	79	1.60	206
a10	0.70	0.8367	98	93	1.70	207	0.73	0.8544	81	77	1.60	206	0.70	0.8367	84	79	1.60	206
a11	0.62	0.7874	99	94	1.50	207	0.67	0.8185	81	77	1.50	205	0.70	0.8367	84	79	1.60	206
a12	0.64	0.8000	73	73	1.55	203	0.67	0.8185	80	77	1.50	205	0.70	0.8367	84	79	1.60	206
b1	0.70	0.8367	73	73	1.70	204	0.67	0.8185	78	77	1.50	205	0.70	0.8367	80	78	1.60	205
b2	0.70	0.8367	76	74	1.70	205	0.70	0.8367	82	78	1.60	206	0.70	0.8367	80	78	1.60	206
b3	0.72	0.8485	79	75	1.75	206	0.70	0.8367	81	78	1.60	206	0.74	0.8602	79	77	1.70	205
b4	0.72	0.8485	80	76	1.75	206	0.70	0.8367	81	79	1.60	205	0.72	0.8485	79	76	1.60	205
b5	0.72	0.8485	80	76	1.75	206	0.72	0.8485	82	78	1.60	206	0.72	0.8485	78	76	1.60	205
b6	0.72	0.8485	81	78	1.75	206	0.72	0.8485	82	78	1.60	206	0.72	0.8485	78	76	1.60	204
b7	0.70	0.8367	81	77	1.70	206	0.70	0.8367	82	79	1.60	206	0.72	0.8485	78	76	1.60	203
b8	0.70	0.8367	80	77	1.70	206	0.70	0.8367	82	79	1.60	206	0.72	0.8485	78	76	1.60	203
b9	0.72	0.8485	79	77	1.75	206	0.68	0.8246	82	79	1.50	206	0.70	0.8367	77	75	1.60	203
b10	0.72	0.8485	79	78	1.75	206	0.70	0.8367	83	80	1.60	206	0.70	0.8367	78	75	1.60	204
b11	0.70	0.8367	79	77	1.70	206	0.70	0.8367	84	80	1.60	206	0.68	0.8246	77	75	1.50	203
b12	0.70	0.8367	79	77	1.70	206	0.68	0.8246	83	79	1.50	204	0.68	0.8246	78	75	1.50	203
AVG	0.70	0.8340	83.6		1.69	206	0.70	0.8358	78.1		1.57	205	0.70	0.8381	78.8		1.58	205

STOP @ 1238
LIGHTNING
RESTART @

PAGE 1 OF 2

AECOM

EPA ISOKINETIC SAMPLING - FIELD DATA SHEET

Sampling Train: M23A Dioxin/Furans
Condition: #1
Run No.: #1
Facility: WTI
Location: EAST LIVERPOOL, OHIO
Source: STACK OUTLET
Date: 7/18/12
Operator: P HARRY D MOLL
Stack Dia. - in.: 72
Start Time: 1120
Stop Time:

Barometric Pressure: 29.15
Static Pressure (+/-): +0.40
Probe/Pitot Number: M5-7-H
Pitot Coefficient: 0.84
Filter Box No.: HB-17
Meter Box No.: 80645
Orifice Coefficient (Y): 1.041
Delta H @: 1.795
Nozzle Size/No.: 0.258
XAD TC ID: II
Imp Outlet TC ID: L-26

LEAK CHECKS in "Hg
INITIAL VAC. 20 in. CFM .006
MID VAC. in. CFM
FINAL VAC. in. CFM
INITIAL PITOT ✓ ✓ FINAL PITOT ✓ ✓

FILTER DATA

NUMBER	TARE	NUMBER	TARE

IMPINGER VOLS.		
INIT.	FINAL	RINSE
0	691	
100	980	
100	952	
0	114	
SiGel		
XAD		
809.1	325.2	
SILICA GEL		
721.4	252.4	

CEM	
CO2	O2
5.4	13.8

Final Purge Rate
Final PH

SAMPLE POINT	CLOCK TIME	VELOCITY HEAD Delta P, in.wc	ORIFICE METER VOL. Delta H, in.wc	GAS METER VOLUME ft³	TEMPERATURE READINGS, °F STACK	PROBE	OVEN	XAD INLET	IMPINGER	GAS METER IN	GAS METER OUT	PUMP VACUUM in. Hg	COMMENTS
A1	0 7.5	0.67	1.62	349.243	205	247	251	50	63	87	85	12	
1	7.5 15	0.67	1.62	354.52	206	251	246	53	55	88	86	13	
2	15 22.5	0.67	1.62	358.70	206	250	258	56	54	90	86	13	
2	22.5 30	0.67	1.62	364.42	206	242	260	58	61	92	88	14	
3	30 37.5	0.72	1.75	369.53	207	244	265	59	63	92	88	15	
3	37.5 45	0.72	1.75	374.83	207	252	257	58	62	93	89	15	
4	45 52.5	0.70	1.70	380.22	207	255	261	59	60	94	90	14	
4	52.5 60	0.70	1.70	—	207	256	256	59	62	96	91	14	
5	60 67.5	0.70	1.70	390.81	207	241	254	60	63	96	91	14	
6	67.5 75	0.70	1.70	395.59	207	249	247	61	65	98	93	14	
6	75 82.5	0.62	1.50	401.41	207	250	251	57	67	99	94	12	
6	82.5 90												
B1	90 97.5												
1	97.5 105												
2	105 112.5												
2	112.5 120												
3	120 127.5												
3	127.5 135												
4													
4													QC
5													PICO
5													7/18/12
6													
6													

AECOM

EPA ISOKINETIC SAMPLING - FIELD DATA SHEET

Sampling Train	M23A Dioxin/Furans
Condition	1
Run No.	1
Facility	
Location	
Source	
Date	7.18.12
Operator	W. Hardy D. Mock
Stack Dia. - In.	
Start Time	RESTART @ 1510
Stop Time	STOP @ 1522 port change

Barometric Pressure	
Static Pressure (+/-)	
Probe/Pitot Number	
Pitot Coefficient	
Filter Box No.	
Meter Box No.	
Orifice Coefficient (Y)	
Delta H @	
Nozzle Size/No.	
XAD TC ID:	
Imp Outlet TC ID:	

LEAK CHECKS in "Hg

INITIAL VAC.	20 in.	CFM	0.006	
MID VAC.	in.	CFM		
FINAL VAC.	17 in.	CFM	0.004	
INITIAL PITOT	+ ✓ - ✓	FINAL PITOT	+ ✓ - ✓	

FILTER DATA

NUMBER	TARE	NUMBER	TARE

IMPINGER VOLS. INIT.	FINAL	RINSE
0		
100		
100		
0		
SIGel		
SILICA GEL		

CEM CO2	O2

Final Purge Rate
Final PH

SAMPLE POINT	CLOCK TIME	VELOCITY HEAD Delta P, in wc	ORIFICE METER VOL. Delta H, in wc	GAS METER VOLUME ft³	TEMPERATURE READINGS, °F STACK	PROBE	OVEN	XAD INLET	IMPINGER	GAS METER IN	GAS METER OUT	PUMP VACUUM in Hg	COMMENTS
6	825-90	0.64	1.55	406.31	203	244	242	53	49	73	73	14	
				410.199	LEAK CHECK								
				411.321									1522 port change
1	0 7.5	0.70	1.70	411.321	204	252	259	58	58	73	73	15	RESTART 1530
1	7.5 15	0.70	1.70	416.47	205	257	255	54	55	76	74	15	
2	15 22.5	0.72	1.75	421.63	206	256	259	59	56	79	75	16	
2	22.5 30	0.72	1.75	426.86	206	252	252	58	58	80	76	16	
3	30 37.5	0.72	1.75	432.09	206	257	241	58	58	80	76	16	
3	37.5 45	0.72	1.75	437.32	206	233	247	58	59	81	78	16	stopped @ 55 min
4	45 52.5	0.70	1.70	442.48	206	249	243	58	60	81	77	16	Light rain
4	52.5 60	0.70	1.70	447.67	206	255	242	59	62	80	77	16	RESTART
5	60 67.5	0.72	1.75	452.82	206	253	261	61	59	79	77	16	1715
5	67.5 75	0.72	1.75	458.21	206	241	250	61	57	79	78	16	
6	75 82.5	0.70	1.70	463.34	206	250	246	61	59	79	77	16	
6	82.5 90	0.70	1.70	468.58	206	244	262	61	63	79	77	16	
			Vf -	473.735									Stope 1750

AECOM

EPA ISOKINETIC SAMPLING - FIELD DATA SHEET

Sampling Train	M23A Dioxin/Furans
Condition	Cond 1
Run No.	2
Facility	WTI
Location	GAS LIVERPOOL, OH
Source	STACK EXHAUST
Date	7/19/12
Operator	W. Harry D Moll
Stack Dia. - in.	72
Start Time	9:10 10:50
Stop Time	10:40 1220

Barometric Pressure	29.2
Static Pressure (+/-)	+0.31
Probe/Pitot Number	MS-7-A
Pitot Coefficient	0.84
Filter Box No.	MB-17
Meter Box No.	80645
Orifice Coefficient (Y)	1.041
Delta H @	1.795
Nozzle Size/No.	0.258
XAD TC ID:	XAD9
Imp Outlet TC ID:	70-26

LEAK CHECKS in "Hg

INITIAL VAC.	22 in.	CFM	0.015	
MID VAC.	13 in.	CFM	0.001	
FINAL VAC.	14 in.	CFM	0.002	
	+ -		+ -	
INITIAL PITOT	✓ ✓	FINAL PITOT	✓ ✓	

FILTER DATA

NUMBER	TARE	NUMBER	TARE

IMPINGER VOLS.		
INIT.	FINAL	RINSE
0	658	
100	315	
100	280	
0	16	
SiGel		
XAD		
3139	3288	

SILICA GEL	
2219	2370

CEM	
CO2	O2
5.4	13.8

Final Purge Rate

Final PH

SAMPLE POINT	CLOCK TIME	VELOCITY HEAD Delta P, in wc	ORIFICE METER VOL. Delta H, in wc	GAS METER VOLUME ft³	TEMPERATURE READINGS, °F STACK	PROBE	OVEN	XAD INLET	IMPINGER	GAS METER IN	GAS METER OUT	PUMP VACUUM in. Hg	COMMENTS
1	0 7.5	0.64	1.50	477.333	202	247	233	53	68	70	69	10	0.64/1.50
1	7.5 15	0.67	1.50	482.20	202	249	259	47	44	72	70	11	
2	15 22.5	0.70	1.60	486.85	203	258	256	52	49	76	71	12	
2	22.5 30	0.70	1.60	491.90	204	242	255	54	51	77	72	12	
3	30 37.5	0.73	1.60	496.93	204	252	255	55	53	78	73	12	
3	37.5 45	0.73	1.60	501.94	205	241	258	56	54	79	74	12	
4	45 52.5	0.70	1.60	506.99	205	248	253	57	55	80	25	12	
4	52.5 60	0.70	1.60	512.1	205	241	261	59	57	81	76	12	
5	60 67.5	0.73	1.60	517.01	205	257	266	59	63	82	77	12	
5	67.5 75	0.73	1.60	522.2	206	251	247	59	60	81	77	12	
6	75 82.5	0.67	1.50	527.12	205	255	248	60	61	81	77	12	
6	82.5 90	0.67	1.50	532.16	205	256	245	61	62	80	77	12	10:40
				537.169									LEAK CHECK
1	0 7.5	0.67	1.50	537.380	205	250	236	63	68	78	77	12	Port change
1	7.5 15	0.70	1.60	542.21	206	246	261	57	58	82	78	12	RESTART 10:50
2	15 22.5	0.70	1.60	547.37	206	254	255	56	54	81	78	12	
2	22.5 30	0.70	1.60	552.61	205	243	264	52	55	81	79	13	
3	30 37.5	0.72	1.60	557.40	206	253	254	56	54	82	78	13	
3	37.5 45	0.72	1.60	562.37	206	247	253	56	54	82	78	13	
4	45 52.5	0.70	1.60	567.41	206	246	254	55	55	82	79	13	
4	52.5 60	0.70	1.60	572.57	206	248	250	57	56	82	79	13	
5	60 67.5	0.68	1.50	577.5	206	251	262	59	57	82	79	13	
5	67.5 75	0.70	1.60	583.—	206	242	261	62	60	83	80	13.5	
6	75 82.5	0.70	1.60	587.4—	206	240	249	65	63	84	80	14	0.70/1.60
6	82.5 90	0.68	1.50	592.47	204	245	252	57	58	83	79	14	
			VF—	597.514									
													BC
													PLU 7/19/12

AECOM

EPA ISOKINETIC SAMPLING - FIELD DATA SHEET

Sampling Train	M23A Dioxin/Furans
Condition	COND 1
Run No.	3
Facility	WTI
Location	EAST LIVERPOOL, OHIO
Source	STACK EXHAUST
Date	7/19/12
Operator	W. HARRY D. MILL
Stack Dia. - In.	72
Start Time	1303 1438
Stop Time	1433 1608

Barometric Pressure	29.20
Static Pressure (+/-)	.35
Probe/Pitot Number	M5-7-14
Pitot Coefficient	0.84
Filter Box No.	HB-17
Meter Box No.	80645
Orifice Coefficient (Y)	1.041
Delta H @	1.295
Nozzle Size/No.	0.258
XAD TC ID:	XAD-11
Imp Outlet TC ID:	IT-26

LEAK CHECKS in "Hg

INITIAL VAC.	23 in.	CFM	0.002
MID VAC.	13 in.	CFM	0.001
FINAL VAC.	14 in.	CFM	0.001

INITIAL PITOT ✓ ✓ (+ -) FINAL PITOT ✓ ✓ (+ -)

FILTER DATA

NUMBER	TARE	NUMBER	TARE

IMPINGER VOLS. INIT.	FINAL	RINSE
0	660	
100	300	
100	270	
0	40	
SiGel		
XAD		
308.3	324.1	

SILICA GEL	
220.6	251.3

CEM CO2	O2
6.0	13.8

Final Purge Rate

Final PH

SAMPLE POINT	CLOCK TIME	VELOCITY HEAD Delta P, in wc	ORIFICE METER VOL Delta H, in wc	GAS METER VOLUME ft³	TEMPERATURE READINGS, °F STACK	PROBE	OVEN	XAD INLET	IMPINGER	GAS METER IN	GAS METER OUT	PUMP VACUUM in Hg	COMMENTS
1	0 7.5	0.67	1.50	598.335	205	242	237	41	68	80	79	10	
1	7.5 15	0.67	1.50	603.16	205	247	249	50	52	80	79	11	
2	15 22.5	0.67	1.50	608.08	204	249	252	49	53	80	79	11	
2	22.5 30	0.67	1.50	612.97	204	256	259	49	54	80	79	11	
3	30 37.5	0.72	1.60	617.79	205	238	260	60	56	80	78	12	
3	37.5 45	0.72	1.60	623.0	206	253	256	52	50	81	78	12	
4	45 52.5	0.72	1.60	628.06	206	243	259	53	54	84	79	12	
4	52.5 60	0.72	1.60	633.21	205	240	255	56	54	84	79	13	
5	60 67.5	0.70	1.60	638.30	206	253	255	54	59	84	79	13	
5	67.5 75	0.70	1.60	643.49	206	253	255	55	60	84	79	13	
6	75 82.5	0.70	1.60	648.54	206	252	251	56	61	84	79	13	
6	82.5 90	0.70	1.60	653.—	206	254	256	57	62	84	79	13	
				658.833									LEAK CHK
				658.933									
1	0 7.5	0.70	1.60	658.935	205	237	243	58	65	80	78	13	
1	7.5 15	0.70	1.60	664.2	206	258	259	51	57	80	78	13	
2	15 22.5	0.74	1.70	668.31	205	246	262	50	52	79	77	13	
2	22.5 30	0.72	1.60	674.18	205	250	260	52	54	79	76	13	
3	30 37.5	0.72	1.60	679.5—	205	241	247	51	51	78	76	13	
3	37.5 45	0.72	1.60	684.41	204	256	259	51	51	78	76	13	
4	45 52.5	0.72	1.60	689.6—	203	245	266	51	51	78	76	13	
4	52.5 60	0.72	1.60	—	203	250	262	51	52	76	76	13	
5	60 67.5	0.70	1.60	699.39	203	250	243	52	54	77	75	13	
5	67.5 75	0.70	1.60	704.41	204	241	260	52	55	78	75	13	
6	75 82.5	0.68	1.60	709.38	203	248	260	53	55	77	75	13	QC
6	82.5 90	0.68	1.50	714.45	203	249	261	54	56	78	75	13	PILOT 1.2
			VF —	719.219									

AECOM

SAMPLE TRAIN MOISTURE RECOVERY DATA SHEET

Reference Method / Sampling Train :	M0023A - PCDDs/PCDFs	CPT

Recovered by : F. Sanguedolce				Recovered by : F. Sanguedolce				Recovered by : F. Sanguedolce			
Run No. 1		Date : 7/18/2012		Run No. 2		Date : 7/19/2012		Run No. 3		Date : 7/19/2012	
XAD Module No. : ST32571				XAD Module No. : ST32571				XAD Module No. : ST32571			
Filter # : N/A		Tare: N/A		Filter # : N/A		Tare: N/A		Filter # : N/A		Tare: N/A	
Impinger No. and Volume				Impinger No. and Volume				Impinger No. and Volume			
No.	Initial (mL)	Final (mL)	Rinse (mL)	No.	Initial (mL)	Final (mL)	Rinse (mL)	No.	Initial (mL)	Final (mL)	Rinse (mL)
1	0	691	N/A	1	0	658	N/A	1	0	660	N/A
2	100	280		2	100	315		2	100	300	
3	100	252		3	100	280		3	100	270	
4	0	114		4	0	16		4	0	40	
5	SG			5	SG			5	SG		
6				6				6			
7				7				7			
			DIFF :				DIFF :				DIFF :
Totals	200	1337	1137	Totals	200	1269	1069	Totals	200	1270	1070
	Initial (g)	Final (g)	DIFF :		Initial (g)	Final (g)	DIFF :		Initial (g)	Final (g)	DIFF :
Silica Gel	221.4	252.9	31.5	Silica Gel	224.9	257.0	32.1	Silica Gel	220.6	251.3	30.7
XAD Trap	309.1	325.2	16.1	XAD Trap	313.9	328.8	14.9	XAD Trap	308.3	324.1	15.8
Final Net Moisture Gain:			1184.6	Final Net Moisture Gain:			1116.0	Final Net Moisture Gain:			1116.5

Reagent:	Acetone	Methylene Chloride	Toluene
Vendor:	Fisher Scientific	Fisher Scientific	Fisher Scientific
Lot No.:	121162	094449	117513

AC
PKH
7/23/12

AECOM

ORSAT ANALYSIS (EPA METHOD 3)

FACILITY: HERITAGE - WTI	PRE-LEAK CHECK : ✓
LOCATION : EAST LIVERPOOL, OH	POST-LEAK CHECK : ✓
SOURCE: INCINERATOR	NOTE:
DATE: 7-18-12	Valid Leak Check : Liquid level must not fall below bottom of capillary tubing in 4 minutes and meniscus must not change by more than 0.2 mL in 4 minutes.
SAMPLE TYPE: TEDLAR BAG	
OPERATOR: MOLL	

NOTES / DATA CRITERIA --

CO_2 : When greater than 4%, difference between readings shall be 0.3% or less.
When less than 4%, difference between readings shall be 0.2% or less.

O_2 : When greater than or equal to 15%, difference between readings shall be 0.2% or less.
When less than 15%, difference between readings shall be 0.3% or less.

Test Condition:

Run: 1	Reading A		Reading B		Reading C		Avg. Net Volume
GAS	Actual	Net	Actual	Net	Actual	Net	
CO_2	5.4	5.4	5.3	5.3	5.4	5.4	5.4
O_2 *	19.2	13.8	19.2	13.9	19.2	13.8	13.8

Run: 2	Reading A		Reading B		Reading C		Avg. Net Volume
GAS	Actual	Net	Actual	Net	Actual	Net	
CO_2	5.4	5.4	5.5	5.5	5.4	5.4	5.43
O_2 *	19.2	13.8	19.2	13.7	19.2	13.8	13.77

Run: 3	Reading A		Reading B		Reading C		Avg. Net Volume
GAS	Actual	Net	Actual	Net	Actual	Net	
CO_2	6.1	6.1	6.0	6.0	5.9	5.9	6.0
O_2 *	20.0	13.9	19.8	13.8	19.7	13.8	13.8

7/19/2012

* Net O_2 is actual O_2 minus actual CO_2 reading.

QC PLCU 7/25/12

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Equipment Calibration Data

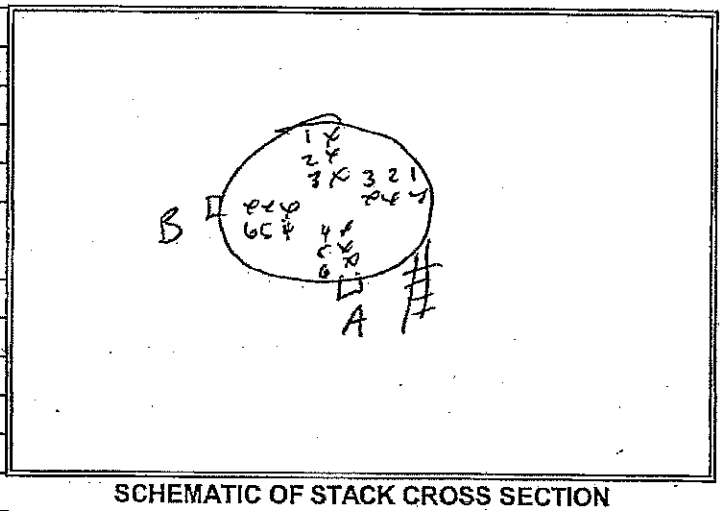
AECOM

Box 80645
γ 1.041 ΔH. 1.795

METHOD 2 GAS VELOCITY AND VOLUME DATA SHEET

Facility : Heritage-WTI
Location: Incinerator Stack - Level 2
Source: Rotary Kiln Incinerator
Date : 7-18-12
Operator(s) : W. Hanay D Moll
Stack Diameter (in.) : 72"
Bar. Press. (in. Hg) : 29.05
Static Press. (in. H_2O) -1.40
Cp : 0.84 or 0.99 (Circle one)
O_2 (%) 13.20
CO_2 (%) 4.80
Wet Bulb Temp. (°F) : N/A
Dry Bulb Temp. (°F) : N/A
Probe/Pitot Number: M5-7-4
Pitot Leak Check/Zero: initial + - ✓ final + - ✓
Angle Finder 0°/90°: initial + - ✓ final + - ✓
Time: 0:855 – 9:05

Port Length: 12"
Port Diam.: 3"
Monorail ? (Y) or N
Platform Width:
Railing Ht. : 44"



SCHEMATIC OF STACK CROSS SECTION

Pt. #	Pos. (in.)	Pos. w/ Port (in.)	Vel. DP (in. H_2O)	Stack Temp. (°F)	Flow Angle that Yields a Null DP	Pt. #	Pos. (in.)	Pos. w/ Port (in.)	Vel. DP (in. H_2O)	Stack Temp. (°F)	Flow Angle that Yields a Null DP
A1		9.7	0.50	200							
A2		17.0	0.64	205							
A3		27.8	0.63	205							
A4		57.2	0.63	205							
A5		68.0	0.63	205							
A6		75.3	0.57	206							
0.63 B1		9.7	0.69	203							
B2		17.0	0.83	202							
B3		27.8	0.85	203							
B4		57.2	0.85	203							
B5		68.0	0.81	203							
B6		75.3	0.73	203							
	AVG		0.639	203.6							

R:\Air_Tox\COMMON\Source Test Templates\DataSheets\[Method 2 Data Sheet.xlsx]A

AECOM

NOZZLE CALIBRATION FORM

Client: Heritage-WTI Project #: 60271731-1

Date: 7/18/2012 Calibrated by: F. Sanguedolce

Nozzle ID #	D_1, in.	D_2, in.	D_3, in.	Delta D, in.	D_{avg}, in.
m23-G-0.258	0.258	0.258	0.258	0.000	0.258

Where:

$D_{1,2,3}$ = Nozzle diameter measured on a different diameter to the nearest 0.001 in.
Delta D = Maximum difference between any two measurements, in.
Tolerance = 0.004 in.
D_{avg} = Average of $D_{1,2,3}$

C:\Projects\PCS\2012\sampling form\[Nozzle Cal Form.xlsx]A

AECOM

DRY GAS METER CALIBRATION

Meter Box No.: 80645

Check one:

Annual Calibration X Recalibration _____

Date:	1/4/2012	
Operator:	Ryan Burns	
Barometric Pressure:	29.80	(in Hg)
Theoretical Critical Vacuum:	14.06	(in Hg)

Pretest Leak Checks		
	Allowable	Actual
Positive	0	0.00
(at 5 - 7 in. H_2O)	in. H_2O per min.	
Negative	0	0.000
(at 3 in. Hg)	cfm	cfm

Manufacturer: Anderson NUTECH

Date Received/Placed in service: Pre 1990

Serial No.: 80645

DRY GAS METER DATA							CRITICAL ORIFICE DATA					
		Volume			Temp					Ambient Temperature		
ΔH (in H_2O)	Time (min)	Initial (ft^3)	Final (ft^3)	Total (ft^3)	Initial °F	Final °F	Critical Orifice Serial #	K' Orifice Calibration Coefficient	Actual Vacuum (in Hg)	Initial °F	Final °F	Average °F
0.26	20	568.800	574.443	5.643	61	63	40	0.225	15	65	65	65
0.96	15	621.600	629.554	7.954	67	67	52	0.427	15	65	65	65
1.80	15	585.800	596.298	10.498	66	67	63	0.562	15	65	65	65
3.80	10	606.000	616.290	10.290	68	69	76	0.831	15	65	65	65

CORRECTED VOLUME	
Dry Gas Meter Vm (std ft^3)	Critical Orifice Vcr (std ft^3)
5.686	5.858
7.953	8.330
10.528	10.966
10.331	10.807

DRY GAS METER CALIBRATION FACTOR Y	
1.030	-0.011
1.047	0.01
1.042	0.00
1.046	0.00

DRY GAS METER CALIBRATION FACTOR ΔH@	
1.705	-0.090
1.751	-0.044
1.895	0.099
1.830	0.04

Avg. Y 1.041

Avg. ΔH@ 1.795

Notes:

1) For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
2) The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
3) The minimum number of sample volume required per orifice is 5 cubic feet.
4) For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.(
5) For Orifice Calibration Factor ΔH@, the orifice differential pressure in inches of H_2O that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is ± 0.2.

Dry Gas Meter Thermocouple Calibration					
Ref. TC ID#	HH81	Inlet ID# :	80645-IN	Outlet ID# :	80645-OUT
Ref. Source	Ref, °F	°F	Δ	°F	Δ
Amb. Air	65	65	0	65	0
Hot Water	110	110	0	110	0

Potentiometer Calibration		
Low	50 °F	51
Mid	450 °F	450
High	950 °F	951

Notes:

1) Hot Water to be in the range of 104 - 122 °F.
2) Tolerance allowed for all thermocouple individual readings : ± 5.4 °F
3) Tolerance allowed for all potentiometer individual readings : ± 2 °F

$$V_{m(std)} = 17.64\,(V_m)\frac{P_b + \frac{\Delta H}{13.6}}{t_m + 460}$$

$$V_{cr(std)} = K'\frac{P_b\theta}{\sqrt{t_{amb} + 460}}$$

$$Y = \frac{V_{cr(std)}}{V_{m(std)}}$$

$$\Delta H_@ = \Delta H\left(\frac{.75\theta}{V_{cr(std)}}\right)^2$$

AECOM

Calibrator: Ryan Burns

Reference Thermometer: HH-81 Omega

Filter Box Calibration

Hot Box #1

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	25-Jan-11	
	Ambient	Hot
Reference Temperatures	65	272
Actual Temperatures	66	272
Temp Difference (tol. = +-2)	-1	0

Hot Box #2

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	27-Jan-11	
	Ambient	2
Reference Temperatures	64	245
Actual Temperatures	64	245
Temp Difference (tol. = +-2)	0	0

Hot Box #3

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	25-Jan-11	
	Ambient	Hot
Reference Temperatures	68	270
Actual Temperatures	69	270
Temp Difference (tol. = +-2)	-1	0

Hot Box #4

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	28-Jan-11	
	Ambient	Hot
Reference Temperatures	64	239
Actual Temperatures	65	238
Temp Difference (tol. = +-2)	-1	1

Hot Box #5

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	27-Jan-11	
	Ambient	Hot
Reference Temperatures	66	235
Actual Temperatures	68	235
Temp Difference (tol. = +-2)	-2	0

Hot Box #6

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	27-Jan-11	
	Ambient	Hot
Reference Temperatures	65	247
Actual Temperatures	65	247
Temp Difference (tol. = +-2)	0	0

Hot Box #7

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	27-Jan-11	
	Ambient	Hot
Reference Temperatures	67	243
Actual Temperatures	67	244
Temp Difference (tol. = +-2)	0	-1

Hot Box #8

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	6-Feb-12	
	Ambient	Hot
Reference Temperatures	65	254
Actual Temperatures	65	256
Temp Difference (tol. = +-2)	0	-2

Hot Box #9

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	26-Jan-11	
	Ambient	Hot
Reference Temperatures	65	236
Actual Temperatures	66	235
Temp Difference (tol. = +-2)	0	1

Hot Box #10

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	6-Feb-12	
	Ambient	Hot
Reference Temperatures	66	251
Actual Temperatures	66	253
Temp Difference (tol. = +-2)	0	-2

Hot Box #11

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	25-Jul-12	
	Ambient	Hot
Reference Temperatures	77	254
Actual Temperatures	77	254
Temp Difference (tol. = +-2)	0	0

Hot Box #12

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	15-Feb-11	
	Ambient	Hot
Reference Temperatures	62	261
Actual Temperatures	64	260
Temp Difference (tol. = +-2)	-2	1

Hot Box #13

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	16-Feb-11	
	Ambient	Hot
Reference Temperatures	61	260
Actual Temperatures	61	261
Temp Difference (tol. = +-2)	0	-1

Hot Box #14

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	6-Feb-12	
	Ambient	Hot
Reference Temperatures	66	245
Actual Temperatures	65	246
Temp Difference (tol. = +-2)	1	-1

Hot Box #15

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:		
	Ambient	Hot
Reference Temperatures		
Actual Temperatures		
Temp Difference (tol. = +-2)	0	0

Hot Box #16

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	26-Jan-11	
	Ambient	Hot
Reference Temperatures	64	241
Actual Temperatures	64	242
Temp Difference (tol. = +-2)	0	-2

Hot Box #17

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	25-Jul-12	
	Ambient	Hot
Reference Temperatures	77	255
Actual Temperatures	77	253
Temp Difference (tol. = +-2)	0	2

Hot Box #18

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	6-Feb-12	
	Ambient	Hot
Reference Temperatures	65	238
Actual Temperatures	66	238
Temp Difference (tol. = +-2)	-1	0

Hot Box #19

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	27-Jan-11	
	Ambient	Hot
Reference Temperatures	64	249
Actual Temperatures	64	247
Temp Difference (tol. = +-2)	0	2

Hot Box #20

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:		
	Ambient	Hot
Reference Temperatures		
Actual Temperatures		
Temp Difference (tol. = +-2)	0	0

Hot Box #21

Manufacturer: Anderson NUTECH
Serial No.: N/A
Date received/placed in service: Pre 1995

Calibration Date:	6-Feb-12	
	Ambient	Hot
Reference Temperatures	65	251
Actual Temperatures	66	249
Temp Difference (tol. = +-2)	-1	2

AECOM

Calibrator: J. Hendley/R.Burns Reference Thremometer ID: fluke 2131035

Date: 1/23/12-7/25/12

Last Impinger Thermocouple Calibration 2012

		Thermocouple	Reference	Difference (+/- 2°)			Thermocouple	Reference	Difference (+/- 2°)
LI-2	Hot			0	LI-21	Hot			0
	Cold			0		Cold			0
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-4	Hot			0	LI-22	Hot	214	215	-1
	Cold			0		Cold	34	35	-1
Manufacturer:			Anderson NUTECH		Manufacturer:				
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-5	Hot			0	LI-23	Hot			0
	Cold			0		Cold			0
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-7	Hot			0	LI-24	Hot	214	214	0
	Cold			0		Cold	34	34	0
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-8	Hot			0	LI-25	Hot	211	212	-1
	Cold			0		Cold	33	33	0
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-9	Hot			0	LI-26	Hot	213	212	1
	Cold			0		Cold	33	32	1
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-10	Hot			0	LI-27	Hot	212	212	0
	Cold			0		Cold	33	33	0
Manufacturer:					Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-11	Hot	213	212	1	LI-28	Hot			0
	Cold	34	35	-1		Cold			0
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-12	Hot	213	213	0	LI-29	Hot			0
	Cold	34	33	1		Cold			0
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-13	Hot	212	212	0	LI-5	Hot			0
	Cold	33	34	-1		Cold			0
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	
LI-20	Hot	213	211	2	LI-14	Hot	213	212	1
	Cold	34	33	1		Cold	34	33	1
Manufacturer:			Anderson NUTECH		Manufacturer:			Anderson NUTECH	
Serial No.:					Serial No.:				
Date received/placed in service:			Pre 1990		Date received/placed in service:			Pre 1990	

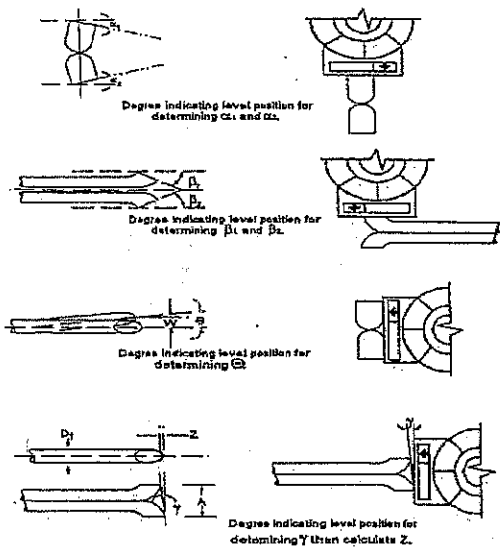
AECOM

SAMPLE PROBE CALIBRATION DATA FORM
TYPE "S" PITOT TUBE ASSEMBLY AND NOZZLE

Thermocouple Calibration

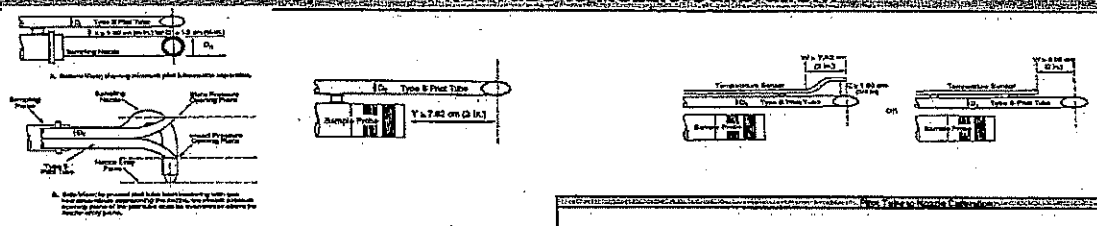
PROBE ID:	Reference Thermometer ID #:	Omega HH-81					Omega CH1000, #060222D0					Omega CH1000, #060222D0				
M5-7-H		Ice Bath					Boiling Water					Tube Furnace (300° - 500° F)				
Date: 8/5/2012																
	M5-7-H	33	274	33	274	0	212	373	213	374	0.1	450	505	450	505	0.0
		33	274	33	274	0	212	373	213	374	0.1	450	505	450	505	0.0
Ambient Temperature °F: 74		33	274	33	274	0	212	373	212	373	0.0	450	505	450	505	0.0
Barometric Pressure in Hg: 29.25	Average	33	274	33	274	0	212	373	213	374	0.1	450	505	450	505	0.0

Type "S" Pitot Tube Calibration



Level and Perpendicular	Yes
Obstruction	No
Damaged	No
α_1 ($-10° \le \alpha_1 \le +10°$)	1
α_2 ($-10° \le \alpha_2 \le +10°$)	2
β_1 ($-5° \le \beta_1 \le +5°$)	1
β_2 ($-5° \le \beta_2 \le +5°$)	1
γ	0
Θ	0
z = A Tan γ ($\pm \le$ 0.125")	0.000
W = A TanΘ ($\pm \le$ 0.03125")	0.000
D_t ($3/16 \le D_t \le 3/8$")	0.375
A	0.91
$A/2D_t$ ($1.05 \le P_A/D_t \le 1.5$)	1.213

Pitot Tube to Nozzle Calibration



Pitot Tube to Nozzle Calibration			
1) Pitot to nozzle separation	X	>3/4" (w/.500 nozzle)	0.885
2) Thermocouple to pitot sepe	Z	>3/4"	1.67
3) Pitot end to probe union dis	Y	>3.0"	3.610

Probe Information

Manufacturer: Apex
Date Received and placed in Service: pre-1995
Condition of Probe when placed in service: NEW USED RECONDITIONED (circle one)

QA/QC Check
Completeness _X_ Legibility _X_ Accuracy _X_ Specifications _X_ Reasonableness _X_

I certify that the Type S pitot tube/probe ID# M5-7-H meets or exceeds all Specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor $C_p$of 0.84

Certified by: Ryan Burns 8/5/12
Personnel (Signature/Date)

Ryan Burns 8/5/12
Team Leader (Signature/Date)

All construction criteria for an isolated "S" type pitot are within given tolerances prescribed in Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods. EPA/600/R-94/038c, September 1994

rev 08/PS

NOTES:

AECOM

XAD Thermocouple Calibrations

Date: 1-25-12
Bp (in.Hg): 29.50
Reference Thermometer ID#:
Manufacturer:
Date Placed in Service:

Calibrator: Jarrod Hendley
Ambient Temp (°F): 65
HH-81
Omega
1980-2010

	Ice Bath			Ambient		
Thermocouple ID#	Reference Temp	XAD Temp	Temp Difference Tol = +- 2 F	Reference Temp	XAD Temp	Temp Difference Tol = +- 2 F
XAD-1			0			0
XAD-2			0			0
XAD-3	33	34	1	65	66	1
XAD-4			0			0
XAD-5	33	33	0	65	66	1
XAD-6	33	33	0	65	66	1
XAD-7			0			0
XAD-8	33	33	0	66	66	0
XAD-9	33	34	1	74	74	0
XAD-10	33	33	0	66	66	0
XAD-11	33	33	0	74	74	0
XAD-12			0			0