APPENDIX A

Particulate Matter / Trace Metals Emissions Calculations / Field Data

1. Auto Feedstock – Scrubber/Cyclone 1
2. Auto Feedstock– Cyclone 2
3. Auto Feedstock– Cyclone 3
4. Municipal Feedstock – Scrubber/Cyclone 1
5. Municipal Feedstock– Cyclone 2
6. Municipal Feedstock– Cyclone 3
7. Blended Feedstock– Scrubber/Cyclone 1
8. Blended Feedstock – Cyclone 2
9. Blended Feedstock – Cyclone 3

A1. Auto Feedstock – Scrubber/Cyclone 1

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Auto-C1-R1
LOCATION:	Scrubber/Cyclone 1 - Auto	DATE :	18-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	713.8
IMP - 2 (INT) :	698.0
IMP - 3 (INT) :	582.0
IMP - 4 (INT) :	716.9
IMP - 5 (INT) :	716.9
IMP - 6 (INT) :	808.4
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	725.7
IMP - 2 (FIN) :	700.1
IMP - 3 (FIN) :	585.0
IMP - 4 (FIN) :	716.8
IMP - 5 (FIN) :	717.4
IMP - 6 (FIN) :	814.9
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.33
Pstack	-1.8
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	987.634
Mid Leak Check	
INTIAL METER	938.110
BEGIN TIME	9:59
END TIME	10:59

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.80	1.67	2.40	47	46	81
2	3.20	1.79	2.40	47	46	82
3	3.10	1.76	2.30	47	46	82
4	2.20	1.48	2.30	47	46	82
B1	2.90	1.70	2.25	47	46	83
2	2.90	1.70	2.20	47	46	83
3	3.00	1.73	2.20	47	47	83
4	2.05	1.43	2.20	47	46	82
C1	2.30	1.52	2.20	47	46	82
2	2.50	1.58	2.20	47	46	83
3	2.70	1.64	2.20	47	46	83
4	2.10	1.45	2.20	47	46	82
D1	2.10	1.45				82
2	2.35	1.53				83
3	2.40	1.55				83
4	2.10	1.45				83
AVERAGE:	2.54	1.59	2.25	47.0	46.1	82.4

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Auto-C1-R2
LOCATION :	Scrubber/Cyclone 1 - Auto	DATE :	18-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	715.2
IMP - 2 (INT) :	678.0
IMP - 3 (INT) :	596.0
IMP - 4 (INT) :	718.7
IMP - 5 (INT) :	715.6
IMP - 6 (INT) :	797.4
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	730.2
IMP - 2 (FIN) :	678.9
IMP - 3 (FIN) :	596.0
IMP - 4 (FIN) :	718.9
IMP - 5 (FIN) :	715.7
IMP - 6 (FIN) :	804.9
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.33
Pstack	-1.8
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	1037.298
INTIAL METER	988.052
BEGIN TIME	12:28
END TIME	13:28

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.60	1.61	2.30	50	49	83
2	2.75	1.66	2.20	50	49	83
3	2.70	1.64	2.20	51	49	84
4	1.90	1.38	2.20	51	50	83
B1	2.80	1.67	2.20	51	50	83
2	2.80	1.67	2.20	52	51	84
3	2.60	1.61	2.20	52	51	84
4	1.80	1.34	2.20	52	51	83
C1	2.30	1.52	2.20	53	51	83
2	2.50	1.58	2.20	53	52	84
3	2.55	1.60	2.20	53	52	84
4	2.10	1.45	2.20	54	53	84
D1	2.10	1.45				84
2	2.25	1.50				84
3	2.40	1.55				84
4	2.00	1.41				84
AVERAGE:	2.38	1.54	2.21	51.8	50.7	83.6

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Auto-C1-R4
LOCATION :	Scrubber/Cyclone 1 - Auto	DATE :	19-Nov-16

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	699.9
IMP - 2 (INT) :	714.8
IMP - 3 (INT) :	584.3
IMP - 4 (INT) :	720.6
IMP - 5 (INT) :	717.2
IMP - 6 (INT) :	814.9
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	716.9
IMP - 2 (FIN) :	717.2
IMP - 3 (FIN) :	585.3
IMP - 4 (FIN) :	720.4
IMP - 5 (FIN) :	720.3
IMP - 6 (FIN) :	823.4
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.09
Pstack	-0.95
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	137.886
INTIAL METER	87.998
BEGIN TIME	7:39
END TIME	8:39

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.55	1.60	2.30	57	58	85
2	2.75	1.66	2.30	57	58	86
3	2.50	1.58	2.30	58	57	86
4	1.80	1.34	2.25	57	57	85
B1	2.80	1.67	2.25	57	57	86
2	2.70	1.64	2.25	58	57	87
3	2.65	1.63	2.20	58	57	87
4	1.50	1.22	2.20	58	57	86
C1	2.30	1.52	2.20	58	57	87
2	2.35	1.53	2.20	58	58	87
3	2.50	1.58	2.20	58	57	87
4	1.90	1.38	2.20	58	57	87
D1	1.95	1.40				87
2	2.10	1.45				87
3	2.20	1.48				88
4	1.80	1.34				87
AVERAGE:	2.27	1.50	2.24	57.7	57.3	86.6

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Auto-C1-R1**
LOCATION :	**Scrubber/Cyclone 1 - Auto**	DATE :	**18-Nov-15**

Ts (°F) =	82.4	% CO2 =	0.00	Vm (CF) =	49.524
Ts (°R) =	542.4	% O2 =	20.90	DELTA H (ABS) =	30.50
Tm (°F) =	46.5	% CO =	0	Ps (ABS) =	30.20
Tm (°R) =	506.5	% N2 =	79.10	SQRT DELTA P =	1.5904
Vl (TOT) =	23.9	Cp =	0.84	Y =	1.0037
Vl (adj) =	NA	TIME =	60	An =	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	52.789	DSCF
Vw std =	.04707 (Vl TOT)	=	1.125	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.021	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.979	
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.610	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.792	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	90.496	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2349398	DSCFH
	DSCFH / 60	=	39157	DSCFM
	3600 (Vs)(As)	=	2443389	ACFH
	ACFH / 60	=	40723	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	92.0	

ISOKINETIC CALCULATION SHEET

PLANT	: **wTe Recycling**	RUN # :	**Auto-C1-R2**
LOCATION	: **Scrubber/Cyclone 1 - Auto**	DATE :	**18-Nov-15**

Ts (°F) =	83.6	% CO2 =	0.00	Vm (CF) =	49.246
Ts (°R) =	543.6	% O2 =	20.90	DELTA H (ABS) =	30.49
Tm (°F) =	51.3	% CO =	0	Ps (ABS) =	30.20
Tm (°R) =	511.3	% N2 =	79.10	SQRT DELTA P =	1.5406
Vl (TOT) =	23.7	Cp =	0.84	Y =	1.0037
Vl (adj) =	NA	TIME =	60	An =	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	52.003	DSCF
Vw std =	.04707 (Vl TOT)	=	1.116	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.021	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.979	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.608	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.793	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	87.760	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2273077	DSCFH
	DSCFH / 60	=	37885	DSCFM
	3600 (Vs)(As)	=	2369517	ACFH
	ACFH / 60	=	39492	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	93.6	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Auto-C1-R4**
LOCATION :	**Scrubber/Cyclone 1 - Auto**	DATE :	**19-Nov-16**

Ts (°F) =	86.6	% CO2 =	0.00	Vm (CF)	=	49.888
Ts (°R) =	546.6	% O2 =	20.90	DELTA H (ABS)	=	30.25
Tm (°F) =	57.5	% CO =	0	Ps (ABS)	=	30.02
Tm (°R) =	517.5	% N2 =	79.10	SQRT DELTA P	=	1.5017
Vl (TOT) =	31.8	Cp =	0.84	Y	=	1.0037
Vl (adj) =	NA	TIME =	60	An	=	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	51.643	DSCF
Vw std =	.04707 (Vl TOT)	=	1.497	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.028	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.972	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.531	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.799	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	86.144	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2190033	DSCFH
	DSCFH / 60	=	36501	DSCFM
	3600 (Vs)(As)	=	2325882	ACFH
	ACFH / 60	=	38765	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (Vs)\ (Time)\ (An)\ (Ps)\ (1\text{-}Bwo)}$	=	95.8	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Auto-C1-R1
LOCATION:	Scrubber/Cyclone 1 - Aut	DATE:	18-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1755	0	1763	0
FINAL		0.0046	0.0334	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0046	0.0334	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		75

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	38.000	Vs	=	90.50 ft/sec
Ar	=	0.000	As	=	7.50 ft2
			Vm std	=	52.79 DSCF
Mn	=	38.000	Ffactor	=	n/a

Qs	=	3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2349398	DSCFH
		3600 (Vs) (As)	=	2443389	ACFH
		ACFH / 60	=	40723	ACFM
Cs	=	(2.205 E-6) (Mn) / (Vm Std)	=	1.58727E-06	LB/SCF
Cs'	=	0.0154 (Mn) /(VmStd)	=	0.0111	GRAINS/SCF
Cs'M	=	(Mn) / (VmSTD x 0.02832)	=	25.4	mg/M3
PMR	=	Qs x Cs	=	3.729	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Auto-C1-R2
LOCATION	Scrubber/Cyclone 1 - Aut	DATE :	18-Nov-15

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER	1756	0	1763	0
FINAL	0.0086	0.0092	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0086	0.0092	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		120

Mn - Ar = Mn		O2 =	20.90	
		CO2 =	0.00	
Mn =	17.800	Vs =	87.76	ft/sec
Ar =	0.000	As =	7.50	ft2
		Vm std=	52.00	DSCF
Mn =	17.800	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts) =	2273077	DSCFH
	3600 (Vs) (As) =	2369516.638	ACFH
	ACFH / 60 =	39492	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std) =	7.5474E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD) =	0.0053	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832) =	12.1	mg/M3
PMR	= Qs x Cs =	1.716	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Auto-C1-R4
LOCATION	Scrubber/Cyclone 1 - Aut	DATE :	19-Nov-16

			BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NUMBER	1764	0	1763	0
FINAL	0.0058	0.0067	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0058	0.0067	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		96

Mn - Ar = Mn			O2 =	20.90	
			CO2 =	0.00	
Mn =	12.500		Vs =	86.14	ft/sec
Ar =	0.000		AS =	7.50	ft2
			Vm std=	51.64	DSCF
Mn =	12.500		Ffactor =	9570.0	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2190033	DSCFH
	3600 (Vs) (As)	=	2325881.619	ACFH
	ACFH / 60	=	38765	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	5.3371E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0037	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	8.5	mg/M3
PMR	= Qs x Cs	=	1.1688	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C1-R1
Source:	Scrubber/Cyclone 1 - Auto	Date:	18-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.35E-12	1.34E-01				1.963E-05	
Cadmium	2.30	ND	2.30	9.61E-11	1.54E+00				2.257E-04	
Lead	14.70	0.92	14.70	6.14E-10	9.83E+00				1.443E-03	
Mercury	7.42	ND	7.42	3.1E-10	4.96E+00				7.282E-04	

Run Data		
V_m (dscf)	=	52.79
Q_s (dscfh)	=	2,349,398
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions	
to obtain dscm:	multiply dscf by 0.02832
to obtain ug:	multiply lb by 0.4536E09
to obtain lb:	multiply ug by 2.205E-09

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C1-R2
Source:	Scrubber/Cyclone 1 - Auto	Date:	18-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.48E-12	1.36E-01				1.928E-05	
Cadmium	2.83	ND	2.83	1.20E-10	1.92E+00				2.728E-04	
Lead	11.10	0.92	11.10	4.71E-10	7.54E+00				1.070E-03	
Mercury	22.94	ND	22.94	9.729E-10	1.56E+01				2.211E-03	

Run Data		
V_m (dscf)	=	52.00
Q_s (dscfh)	=	2,273,077
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C1-R4
Source:	Scrubber/Cyclone 1 - Auto	Date:	19-Nov-16

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.54E-12	1.37E-01				1.870E-05	
Cadmium	1.73	ND	1.73	7.39E-11	1.18E+00				1.618E-04	
Lead	3.40	0.92	3.40	1.45E-10	2.32E+00				3.179E-04	
Mercury	15.02	ND	15.02	6.413E-10	1.03E+01				1.405E-03	

Run Data		
V_m (dscf)	=	51.64
Q_s (dscfh)	=	2,190,033
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling Scrubber/Cyclone 1 - Auto 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Auto-C1-R1	11/18/2015	0.733	< 0.13	< 0.0048	< 0.023	6.53	**7.421**
Auto-C1-R2	11/18/2015	0.089	< 0.16	< 0.0048	0.091	22.6	**22.945**
Auto-C1-R4	11/19/2016	0.042	< 0.17	< 0.005	0.804	14	**15.021**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Scrubber/Cyclone 1 - Auto			
		Run ID	Run ID	Run ID	Reagent Blank
		Auto-C1-R1	Auto-C1-R2	Auto-C1-R4	M29-RB
Trace Metal	Units	11/18/2015	11/18/2015	11/19/2016	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	2.30	2.83	1.73	< 0.10
Lead	ug	14.70	11.10	3.40	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Auto - C1 - R1
Source:	Scrubber/Cyclone 1	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -1.80

Bar. Pres.("H_g): 30.33

Run Time (min.): 60

Final Meter (CF): 987.634

Initial Meter (CF): JC ~~937.818~~ 938.110

Start Time: 0959

End Time: 1059

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	~~Filter~~ DP @ C2 Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Iso Probe Temp
A1	5.0	2.80	2.40	47	46	81	942.2	66	2.40	67	39	7	80
2	10.0	3.20	2.40	47	46	82	946.3	65	2.40	66	40	7	88
3	15.0	3.10	2.30	47	46	82	950.5	73	2.30	63	41	7	90
4	20.0	2.20	2.30	47	46	82	954.6	76	2.30	65	43	7	90
B1	25.0	2.90	2.25	47	46	83	958.7	75	2.25	66	45	7	91
2	30.0	2.90	2.20	47	46	83	962.9	74	2.20	67	45	7	93
3	35.0	3.00	2.20	47	47	83	967.0	74	2.20	68	46	7	93
4	40.0	2.05	2.20	47	46	82	971.1	74	2.20	69	47	7	94
C1	45.0	2.30	2.20	47	46	82	975.2	74	2.20	72	47	7	94
2	50.0	2.50	2.20	47	46	83	979.4	74	2.20	79	48	7	95
3	55.0	2.70	2.20	47	46	83	983.5	OFF	2.20	80	48	7	96
4	60.0	2.10	2.20	47	46	82	—	OFF	2.20	77	49	7	97
D1		2.10				82							
2		2.35				83							
3		2.40				83							
4		2.10				83							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.005	@	10	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.003	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	13030246

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance: n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Auto - C1 - R2
Source:	Scrubber/Cyclone 1	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -1.80

Bar. Pres.("H_g): 30.33

Run Time (min.): 60

Final Meter (CF): 1037.298

Initial Meter (CF): 988.052

Start Time: 1228

End Time: 1328

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F) DP@ C2	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Ts @ C1
A1	5.0	2.60	2.30	50	49	83	992.1	68	2.30	65	44	7	82
2	10.0	2.75	2.20	50	49	83	996.3	76	2.20	70	44	7	94
3	15.0	2.70	2.20	51	49	84	1000.3	73	2.20	73	48	9	96
4	20.0	1.90	2.20	51	50	83	1004.4	71	2.20	74	51	9	98
B1	25.0	2.80	2.20	51	50	83	1008.5	70	2.20	74	52	9	98
2	30.0	2.80	2.20	52	51	84	1012.6	70	2.20	73	53	9	99
3	35.0	2.60	2.20	52	51	84	1016.7	70	2.20	74	54	9	100
4	40.0	1.80	2.20	52	51	83	1020.8	70	2.20	74	54	9	102
C1	45.0	2.30	2.20	53	51	83	1024.9	70	2.20	73	54	9	103
2	50.0	2.50	2.20	53	52	84	1029.0	70	2.20	73	54	9	103
3	55.0	2.55	2.20	53	52	84	1033.2	70	2.20	74	54	9	104
4	60.0	2.10	2.20	54	53	84	—	71	2.20	74	55	9	104
D1		2.10				84							
2		2.25				84							
3		2.40				84							
4		2.00				84							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.003	@	10	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.004	@	10	"Hg
Pitot-pre:	✓	@	3	"H_2O
Pitot-post:	✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	130302246

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g 99.9

1,000.0 g 999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Auto - C1 - R3
Source:	Scrubber/Cyclone 1	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -1.80

Bar. Pres.("H_g): 30.33

Run Time (min.): 60

Final Meter (CF): 87.418

Initial Meter (CF): 37.649

Start Time: 1432

End Time: 1532

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	~~Filter Temp (F)~~ DP @C2	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	DP @C2
A1	5.0	2.70	2.30	56	55	88	41.7	63	2.30	65	47	7	99
2	10.0	2.65	2.30	56	55	90	45.9	72	2.30	68	47	7	103
3	15.0	2.75	2.30	56	55	90	50.1	74	2.30	76	50	7	10[illegible]
4	20.0	1.90	2.30	56	55	89	54.2	72	2.30	76	52	7	103
B1	25.0	2.65	2.30	56	55	89	58.3	71	2.30	76	54	7	103
2	30.0	2.90	2.30	56	55	90	62.4	70	2.30	75	55	7	104
3	35.0	2.70	2.30	56	55	90	66.6	71	2.30	75	55	7	10[illegible]
4	40.0	1.85	2.30	56	55	90	70.7	71	2.30	76	56	7	105
C1	45.0	2.10	2.30	56	55	89	74.9	71	2.30	75	57	7	104
2	50.0	2.30	2.30	57	56	90	79.1	72	2.30	76	58	7	103
3	55.0	2.40	2.30	57	56	90	83.2	72	2.30	76	59	7	104
4	60.0	2.00	2.30	57	56	90	—	73	2.30	75	59	7	104
D1		1.80				89							
2		2.10				90							
3		2.30				91							
4		2.00				90							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.001	@	10	"Hg
Train-mid:	—	@	—	"Hg
Train-post:		@		"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:		@		"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID	130302246

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g 99.9

1,000.0 g 999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Auto - C1 - R4
Source:	Scrubber/Cyclone 1	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -0.95

Bar. Pres.("H_g): 30.09

Run Time (min.): 60

Final Meter (CF): 137.886 (137.886)

Initial Meter (CF): 87.998 (JC 88.)

Start Time: 0739

End Time: 0839

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	~~Filter Temp (F)~~ DP @ 2.5	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Fe C2
A1	5.0	2.55	2.30	57	58	85	92.0	73	2.30	65	48	9	91
2	10.0	2.75	2.30	57	58	86	96.2	73	2.30	71	49	9	97
3	15.0	2.50	2.30	58	57	86	100.4	72	2.30	73	49	9	96
4	20.0	1.80	2.25	57	57	85	104.6	70	2.25	74	50	9	99
B1	25.0	2.80	2.25	57	57	86	108.8	70	2.25	74	51	9	101
2	30.0	2.70	2.25	58	57	87	113.0	69	2.25	74	50	9	10[illegible]
3	35.0	2.65	2.20	58	57	87	117.1	70	2.20	74	50	9	103
4	40.0	1.50	2.20	58	57	86	121.3	70	2.20	74	51	9	10[illegible]
C1	45.0	2.30	2.20	58	57	87	125.4	70	2.20	73	52	9	104
2	50.0	2.35	2.20	58	58	87	129.6	71	2.20	75	52	9	10[illegible]
3	55.0	2.50	2.20	58	57	87	133.8	71	2.20	75	53	9	10[illegible]
4	60.0	1.90	2.20	58	57	87	—	70	2.20	74	53	9	103
D1		1.95				87							
2		2.10				87							
3		2.20				88							
4		1.80				87							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.001	@	15	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.005	@	15	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g 99.9

1,000.0 g 999.1

Impinger Water Appearance:

n/a

Date: WTE - Recycling

Plant: 11/17/15

Auto

11/18/15

#1 - Run 1

	Initial	Final
Impinger 1	713.8	725.7
Impinger 2	698.0	700.1
Impinger 3	582.0	585.0
Impinger 4	716.9	716.8
Impinger 5	716.9	717.4
Impinger 6	~~777.6~~	
Impinger 7	808.4	814.9

Method #1 - Run 2

	Initial	Final
Impinger 1	715.2	730.2
Impinger 2	678.0	678.9
Impinger 3	596.0	596.0
Impinger 4	718.7	718.9
Impinger 5	715.6	715.7
Impinger 6	797.4	804.9
Impinger 7		

~~#3~~ #1 (Run 3)

	Initial	Final
Impinger 1	699.9	716.9
Impinger 2	714.8	717.2
Impinger 3	584.3	585.3
Impinger 4	720.6	720.4
Impinger 5	717.2	720.3
Impinger 6	814.9	823.4
Impinger 7		

#2 - Run 1

	Initial	Final
Impinger 1	717.1	719.1
Impinger 2	696.0	696.7
Impinger 3	577.2	577.2
Impinger 4	699.6	699.7
Impinger 5	710.0	710.5
Impinger 6	~~766.3~~	
Impinger 7	797.0	804.3

Method #2 - Run 2

	Initial	Final
Impinger 1	715.5	719.0
Impinger 2	701.5	703.2
Impinger 3	583.0	583.3
Impinger 4	696.5	696.8
Impinger 5	711.0	711.7
Impinger 6	808.6	815.3
Impinger 7		

~~#2~~ - Run 3

	Initial	Final
Impinger 1	721.0	724.9
Impinger 2	702.2	703.3
Impinger 3	580.6	581.1
Impinger 4	714.2	715.0
Impinger 5	705.7	706.0
Impinger 6		
Impinger 7	804.3	808.7

#3 - Run 1

	Initial	Final
Impinger 1	713.2	684.2
Impinger 2	683.1	714.8
Impinger 3	587.6	588.4
Impinger 4	717.6	717.8
Impinger 5	722.0	722.2
Impinger 6	799.2	806.2
Impinger 7		

Method #3 - Run 2

	Initial	Final
Impinger 1	698.9	700.7
Impinger 2	685.8	686.4
Impinger 3	626.9	627.6
Impinger 4	699.1	699.2
Impinger 5	707.0	707.3
Impinger 6	766.8	774.4
Impinger 7		

~~#3~~ - Run 3

	Initial	Final
Impinger 1	686.7	689.8
Impinger 2	717.2	717.8
Impinger 3	589.4	589.4
Impinger 4	722.6	722.8
Impinger 5	719.3	720.8
Impinger 6	806.2	814.3
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2611799

100.0g wt ID: 6040

100.0g wt reading: 6993

1000.0g wt ID: 999

1000.0g wt reading: 999.1

Date: 11/19/'15

Plant: UTe

Auto-4

Location 1

	Initial	Final
Impinger 1	720.6	735.7
Impinger 2	683.6	686.1
Impinger 3	597.2	598.2
Impinger 4	715.6	715.7
Impinger 5	721.0	721.9
Impinger 6	804.9	812.8
Impinger 7		

Method Man-1

	Initial	Final
Impinger 1	718.1	736.5
Impinger 2	699.5	708.1
Impinger 3	584.4	584.8
Impinger 4	720.6	721.4
Impinger 5	720.3	722.0
Impinger 6	822.4	832.2
Impinger 7		

Man-2

	Initial	Final
Impinger 1	718.5	736.6
Impinger 2	678.1	681.3
Impinger 3	597.3	598.6
Impinger 4	717.3	718.8
Impinger 5	720.7	721.7
Impinger 6	804.4	813.9
Impinger 7		

Location 2

	Initial	Final
Impinger 1	718.9	724.3
Impinger 2	703.2	704.8
Impinger 3	586.6	586.7
Impinger 4	701.0	702.4
Impinger 5	714.1	713.4
Impinger 6	815.3	822.5
Impinger 7		

Method #2 - R1

	Initial	Final
Impinger 1	719.8	727.9
Impinger 2	701.9	703.2
Impinger 3	578.8	579.6
Impinger 4	716.5	716.8
Impinger 5	705.4	705.0
Impinger 6	797.5	805.4
Impinger 7		

#2 - R2

	Initial	Final
Impinger 1	715.2	724.9
Impinger 2	701.6	704.1
Impinger 3	586.6	587.1
Impinger 4	694.1	694.4
Impinger 5	712.3	713.7
Impinger 6	814.3	822.3
Impinger 7		

Location 3

	Initial	Final
Impinger 1	699.4	702.7
Impinger 2	683.9	684.5
Impinger 3	631.3	631.4
Impinger 4	711.3	710.9
Impinger 5	699.1	698.6
Impinger 6	774.4	781.2
Impinger 7		

Method #3 - R1

	Initial	Final
Impinger 1	717.6	721.1
Impinger 2	684.2	685.2
Impinger 3	590.6	592.1
Impinger 4	719.7	718.5
Impinger 5	722.2	723.0
Impinger 6	~~814.0~~	
Impinger 7	798.8	808.1

#3 - R2

	Initial	Final
Impinger 1	700.1	706.9
Impinger 2	689.9	691.9
Impinger 3	629.6	630.7
Impinger 4	706.4	706.7
Impinger 5	712.0	712.8
Impinger 6	795.4	803.0
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A281799

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

100.0g wt ID: 6040

100.0g wt reading: 100.0

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

1000.0g wt ID: 6993

1000.0g wt reading: 1000.1

A2. Auto Feedstock – Cyclone 2

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Auto-C2-R1
LOCATION:	Cyclone 2 - Auto	DATE :	18-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	717.1
IMP - 2 (INT) :	696.0
IMP - 3 (INT) :	577.2
IMP - 4 (INT) :	699.6
IMP - 5 (INT) :	710.0
IMP - 6 (INT) :	797.0
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	719.1
IMP - 2 (FIN) :	696.7
IMP - 3 (FIN) :	577.2
IMP - 4 (FIN) :	699.7
IMP - 5 (FIN) :	710.5
IMP - 6 (FIN) :	804.3
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.33
Pstack	2
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	806.475
Mid Leak Check	
INTIAL METER	762.376
BEGIN TIME	10:01
END TIME	11:01

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.90	1.38	1.90	70	70	43
2	1.60	1.26	1.60	69	70	46
3	1.20	1.10	1.20	69	70	48
B1	1.70	1.30	1.70	69	70	47
2	1.30	1.14	1.30	68	69	50
3	0.95	0.97	0.95	69	69	49
C1	2.10	1.45	2.10	69	69	49
2	1.90	1.38	1.90	70	70	49
3	1.40	1.18	1.40	70	70	49
D1	2.20	1.48	2.20	70	70	49
2	2.10	1.45	2.10	70	70	49
3	1.80	1.34	1.80	70	71	49
AVERAGE:	1.68	1.29	1.68	69.4	69.8	48.1

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Auto-C2-R2
LOCATION :	Cyclone 2 - Auto	DATE :	18-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	715.5
IMP - 2 (INT) :	701.5
IMP - 3 (INT) :	583.0
IMP - 4 (INT) :	696.5
IMP - 5 (INT) :	711.0
IMP - 6 (INT) :	808.6
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	719.0
IMP - 2 (FIN) :	703.2
IMP - 3 (FIN) :	583.3
IMP - 4 (FIN) :	696.8
IMP - 5 (FIN) :	711.7
IMP - 6 (FIN) :	815.3
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.33
Pstack	2
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	854.883
INTIAL METER	807.206
BEGIN TIME	12:28
END TIME	13:28

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.90	1.38	2.47	73	73	48
2	1.60	1.26	2.08	73	73	52
3	1.00	1.00	1.30	74	73	52
B1	1.70	1.30	2.21	74	73	53
2	1.30	1.14	1.69	74	73	53
3	0.95	0.97	1.24	73	73	54
C1	1.70	1.30	2.21	73	73	54
2	2.00	1.41	2.60	74	74	54
3	1.40	1.18	1.82	72	73	55
D1	2.00	1.41	2.60	72	73	55
2	1.80	1.34	2.34	72	73	56
3	1.40	1.18	1.82	72	73	56
AVERAGE:	1.56	1.24	2.03	73.0	73.1	53.5

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Auto-C2-R4
LOCATION :	Cyclone 2 - Auto	DATE :	19-Nov-16

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	718.9
IMP - 2 (INT) :	703.2
IMP - 3 (INT) :	586.6
IMP - 4 (INT) :	701
IMP - 5 (INT) :	714.1
IMP - 6 (INT) :	815.3
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	724.3
IMP - 2 (FIN) :	704.8
IMP - 3 (FIN) :	586.7
IMP - 4 (FIN) :	702.4
IMP - 5 (FIN) :	713.4
IMP - 6 (FIN) :	822.5
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.09
Pstack	2
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	955.735
INTIAL METER	907.771
BEGIN TIME	7:39
END TIME	8:39

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.50	1.22	1.95	74	74	55
2	1.30	1.14	1.69	74	74	56
3	0.95	0.97	1.24	75	74	57
B1	2.00	1.41	2.60	75	74	58
2	1.60	1.26	2.08	75	75	59
3	1.40	1.18	1.82	74	75	60
C1	2.10	1.45	2.73	75	75	60
2	1.60	1.26	2.08	75	75	60
3	1.60	1.26	2.08	75	75	60
D1	2.20	1.48	2.86	75	76	60
2	2.00	1.41	2.60	75	76	60
3	0.90	0.95	1.17	75	75	60
AVERAGE:	1.60	1.25	2.07	74.8	74.8	58.8

ISOKINETIC CALCULATION SHEET

PLANT	: wTe Recycling	RUN # :	Auto-C2-R1
LOCATION	: Cyclone 2 - Auto	DATE :	18-Nov-15

Ts (°F) =	48.1	% CO2 =	0.00	Vm (CF) =	44.099
Ts (°R) =	508.1	% O2 =	20.90	DELTA H (ABS) =	30.45
Tm (°F) =	69.6	% CO =	0	Ps (ABS) =	30.48
Tm (°R) =	529.6	% N2 =	79.10	SQRT DELTA P =	1.2869
Vl (TOT) =	10.6	Cp =	0.84	Y =	0.9845
Vl (adj) =	10.44	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	44.036	DSCF
Vw std =	.04707 (Vl TOT)	=	0.499	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.011	
Bwo =	by steam tables	=	0.0110397	
1 - Bwo =	1 - Bwo	=	0.989	adj
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.716	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.762	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	70.411	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1105216	DSCFH
	DSCFH / 60	=	18420	DSCFM
	3600 (Vs)(As)	=	1056162	ACFH
	ACFH / 60	=	17603	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	87.6	adj

ISOKINETIC CALCULATION SHEET

PLANT :	wTe Recycling	RUN # :	Auto-C2-R2
LOCATION :	Cyclone 2 - Auto	DATE :	18-Nov-15

Ts (°F) =	53.5	% CO2 =	0.00	Vm (CF) =	47.677
Ts (°R) =	513.5	% O2 =	20.90	DELTA H (ABS) =	30.48
Tm (°F) =	73.0	% CO =	0	Ps (ABS) =	30.48
Tm (°R) =	533.0	% N2 =	79.10	SQRT DELTA P =	1.2419
Vl (TOT) =	13.2	Cp =	0.84	Y =	0.9845
Vl (adj) =	NA	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	47.344	DSCF
Vw std =	.04707 (Vl TOT)	=	0.621	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.013	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.987	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.696	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.766	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	68.335	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1059263	DSCFH
	DSCFH / 60	=	17654	DSCFM
	3600 (Vs)(As)	=	1025027	ACFH
	ACFH / 60	=	17084	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	98.4	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Auto-C2-R4**
LOCATION :	**Cyclone 2 - Auto**	DATE :	**19-Nov-16**

Ts (°F) =	58.8	% CO2 =	0.00	Vm (CF) =	47.964
Ts (°R) =	518.8	% O2 =	20.90	DELTA H (ABS) =	30.24
Tm (°F) =	74.8	% CO =	0	Ps (ABS) =	30.24
Tm (°R) =	534.8	% N2 =	79.10	SQRT DELTA P =	1.2523
Vl (TOT) =	15.0	Cp =	0.84	Y =	0.9845
Vl (adj) =	NA	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	47.105	DSCF
Vw std =	.04707 (Vl TOT)	=	0.706	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.015	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.985	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.676	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.773	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	69.556	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1056931	DSCFH
	DSCFH / 60	=	17616	DSCFM
	3600 (Vs)(As)	=	1043345	ACFH
	ACFH / 60	=	17389	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	97.3	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Auto-C2-R1
LOCATION:	Cyclone 2 - Auto	DATE:	18-Nov-15

			BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NUMBER	1759	0	1763	0
FINAL	0.0038	0.0197	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0038	0.0197	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		73

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	23.500	Vs	=	70.41 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std	=	44.04 DSCF
Mn	=	23.500	Ffactor	=	n/a

Qs	=	3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts) =	1105216	DSCFH
		3600 (Vs) (As) =	1056162	ACFH
		ACFH / 60 =	17603	ACFM
Cs	=	(2.205 E-6) (Mn) / (Vm Std) =	1.1767E-06	LB/SCF
Cs'	=	0.0154 (Mn) /(VmStd) =	0.0082	GRAINS/SCF
Cs'M	=	(Mn) / (VmSTD x 0.02832) =	18.8	mg/M3
PMR	=	Qs x Cs =	1.301	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Auto-C2-R2
LOCATION	Cyclone 2 - Auto	DATE :	18-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1758	0	1763	0
FINAL		0.0000	0.0185	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0000	0.0185	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		110

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	18.500	Vs	=	68.34 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std=		47.34 DSCF
Mn	=	18.500	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1059263	DSCFH
	3600 (Vs) (As)	=	1025026.738	ACFH
	ACFH / 60	=	17084	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	8.61613E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0060	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	13.8	mg/M3
PMR	= Qs x Cs	=	0.913	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Auto-C2-R4
LOCATION	Cyclone 2 - Auto	DATE :	19-Nov-16

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1765	0	1763	0
FINAL		0.0106	0.0421	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0106	0.0421	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		160

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	52.700	Vs	=	69.56 ft/sec
Ar	=	0.000	AS	=	4.17 ft2
			Vm std	=	47.10 DSCF
Mn	=	52.700	Ffactor	=	9570.0

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1056931	DSCFH
	3600 (Vs) (As)	=	1043345.449	ACFH
	ACFH / 60	=	17389	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	2.46692E-06	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0172	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	39.5	mg/M3
PMR	= Qs x Cs	=	2.6074	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C2-R1
Source:	Cyclone 2 - Auto	Date:	18-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	1.00E-11	1.60E-01				1.107E-05	
Cadmium	3.00	ND	3.00	1.50E-10	2.41E+00				1.660E-04	
Lead	21.80	0.92	21.80	1.09E-09	1.75E+01				1.206E-03	
Mercury	0.40	ND	0.40	2.017E-11	3.23E-01				2.229E-05	

Run Data		
V_m (dscf)	=	44.04
Q_s (dscfh)	=	1,105,216
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions	
to obtain dscm:	multiply dscf by 0.02832
to obtain ug:	multiply lb by 0.4536E09
to obtain lb:	multiply ug by 2.205E-09

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C2-R2
Source:	Cyclone 2 - Auto	Date:	18-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.31E-12	1.49E-01				9.867E-06	
Cadmium	0.95	ND	0.95	4.42E-11	7.09E-01				4.687E-05	
Lead	19.90	0.92	19.90	9.27E-10	1.48E+01				9.817E-04	
Mercury	0.50	ND	0.50	2.347E-11	3.76E-01				2.486E-05	

Run Data		
V_m (dscf)	=	47.34
Q_s (dscfh)	=	1,059,263
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C2-R4
Source:	Cyclone 2 - Auto	Date:	19-Nov-16

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.36E-12	1.50E-01				9.895E-06	
Cadmium	2.60	ND	2.60	1.22E-10	1.95E+00				1.286E-04	
Lead	60.30	0.92	60.30	2.82E-09	4.52E+01				2.983E-03	
Mercury	0.58	ND	0.58	2.715E-11	4.35E-01				2.870E-05	

Run Data		
V_m (dscf)	=	47.10
Q_s (dscfh)	=	1,056,931
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	Cyclone 2 - Auto 3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Auto-C2-R1	11/18/2015	0.023	< 0.18	< 0.0048	< 0.023	0.172	**0.403**
Auto-C2-R2	11/18/2015	0.021	< 0.16	< 0.0049	< 0.023	0.295	**0.504**
Auto-C2-R4	11/19/2016	0.048	< 0.15	< 0.0051	< 0.02	0.354	**0.580**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Cyclone 2 - Auto			
		Run ID	Run ID	Run ID	Reagent Blank
		Auto-C2-R1	Auto-C2-R2	Auto-C2-R4	M29-RB
Trace Metal	Units	11/18/2015	11/18/2015	11/19/2016	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	3.00	0.95	2.60	< 0.10
Lead	ug	21.80	19.90	60.30	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Auto - C2 - R1
Source:	Cyclone 2	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.9	1.9	70	70	43	765.9	-	N/A	40	36	4
2	10.0	1.6	1.6	68	70	46	769.5	90		41	37	4
3	15.0	1.2	1.2	69	70	48	773.0	100		49	39	3
B1	20.0	1.7	1.7	69	70	47	776.6	100		55	40	3
2	25.0	1.3	1.3	68	69	50	779.9	100		60	40	3
3	30.0	0.95	0.95	69	69	49	782.8	100		64	41	3
C1	35.0	2.10	2.10	69	69	49	786.9	100		65	41	4
2	40.0	1.90	1.90	70	70	49	790.8	94		66	41	4
3	45.0	1.40	1.40	70	70	49	794.2	90		63	42	4
D1	50.0	2.20	2.20	70	70	49	798.5	95		64	42	5
2	55.0	2.10	2.10	70	70	49	802.4	100		66	42	5
3	60.0	1.90	1.80	70	71	49	—	90		64	42	5

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	30.33
Run Time (min.):	60
Final Meter (CF):	806.475
Initial Meter (CF):	762.376
Start Time:	1001
End Time:	1101

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.006	@	12	"Hg
Train-mid:		@		"Hg
Train-post:	0.002	@	7	"Hg
Pitot-pre:	✓	@	3	"H_2O
Pitot-post:	✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.0
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	13030246

Comments:

~~26.5~~

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Ato - C2 - R2
Source:	Cyclone 2	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	30.33
Run Time (min.):	60
Final Meter (CF):	854.983
Initial Meter (CF):	807.206
Start Time:	1229
End Time:	1328

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.9	2.47	73	73	48	811.4	85	n/a	44	50	5
2	10.0	1.6	2.08	73	73	52	815.5	85		51	48	5
3	15.0	1.00	1.3	74	73	52	819.7	82		53	49	5
B1	20.0	1.7	2.21	74	73	53	822.8	95		56	48	5
2	25.0	1.3	1.69	74	73	53	826.6	105		57	47	5
3	30.0	0.95	1.24	73	73	54	829.8	90		57	46	5
C1	35.0	1.7	2.21	73	73	54	833.8	95		59	48	4
2	40.0	2.0	2.60	74	74	54	839.2	90		60	47	5
3	45.0	1.4	1.82	72	73	55	842.1	88		61	48	4
D1	50.0	2.0	2.60	72	73	55	846.6	95		66	49	5
2	55.0	1.8	2.34	72	73	56	851.0	94		65	49	4
3	60.0	1.4	1.82	72	73	56	—	90		64	49	4

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.006	@	15	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.001	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	130302246

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Auto - C2 - R3
Source:	Cyclone 2	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	~~7.0~~
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.9	2.47	77	77	55	859.8	92	N/A	63	46	5
2	10.0	1.3	1.69	76	76	57	863.6	95		65	46	4
3	15.0	1.2	1.56	76	76	57	867.0	95		65	46	4
B1	20.0	1.8	2.34	76	76	57	871.2	90		66	47	5
2	25.0	1.3	1.69	75	75	58	874.9	93		68	48	5
3	30.0	1.0	1.30	76	75	58	878.2	90		67	48	4
C1	35.0	2.1	2.73	76	75	56	882.4	90		68	48	5
2	40.0	2.0	2.60	76	75	56	887.0	90		69	47	5
3	45.0	1.7	2.21	75	75	57	891.2	90		68	47	5
D1	50.0	2.1	2.73	74	75	58	895.7	88		67	48	6
2	55.0	2.0	2.60	75	75	59	900.3	89		66	47	5
3	60.0	1.6	2.08	75	76	59		90		66	48	5

Pstack ("H_2O):	2.0
Bar. Pres.("H_g):	
Run Time (min.):	60
Final Meter (CF):	903.652
Initial Meter (CF):	855.906
Start Time:	1432
End Time:	1532

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.004	@	10	"Hg
Train-mid:		@		"Hg
Train-post:		@		"Hg
Pitot-pre:	✓✓	@	5	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	130302246

TRAVERSE DATA SHEET

C2

Facility:/Site:	wTe Recycling	Run No.:	Auto - ~~C1~~ - R4
Source:	Cyclone 2	Date:	(AS) 19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): ~~30.09~~ +2.0 (MB)

Bar. Pres.("H_g): 30.09

Run Time (min.): 60

Final Meter (CF): 955.735

Initial Meter (CF): 907.771

Start Time: 739

End Time (MB): ~~739~~ 839

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.5	1.95	74	74	55	911.2	90	N/A	58	48	4
2	10.0	1.3	1.69	74	74	56	915.3	90		59	49	4
3	15.0	0.95	1.24	75	74	57	919.5	90		58	50	4
B1	20.0	2.0	2.60	75	74	58	922.6	86		60	50	5
2	25.0	1.6	2.08	75	75	59	926.7	90		63	50	5
3	30.0	1.4	1.82	74	75	60	930.3	90		65	50	4
C1	35.0	2.1	2.73	75	75	60	933.8	90		67	50	5
2	40.0	1.6	2.08	75	75	60	939.9	92		68	50	5
3	45.0	1.6	2.08	75	75	60	943.0	92		68	51	5
D1	50.0	2.2	2.86	75	76	60	947.3	93		68	50	5
2	55.0	2.0	2.60	75	76	60	951.5	93		68	50	5
3	60.0	0.90	1.17	75	75	60	—	93		67	51	4

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.002	@	12	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.003	@	8	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:		@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: JS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	130302246

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

11/18/15

Date: WTE - Recycling

Plant: 11/17/15

Auto

Method #1 - Run 1

	Initial	Final
Impinger 1	713.8	725.7
Impinger 2	698.0	700.1
Impinger 3	582.0	585.0
Impinger 4	716.5	716.8
Impinger 5	716.9	717.4
Impinger 6	~~777.6~~	
Impinger 7	808.4	814.9

Method #1 - Run 2

	Initial	Final
Impinger 1	715.2	730.2
Impinger 2	675.0	676.9
Impinger 3	596.0	596.0
Impinger 4	718.7	718.9
Impinger 5	715.6	715.7
Impinger 6	797.4	804.9
Impinger 7		

#1 (Run 3)

	Initial	Final
Impinger 1	699.9	716.9
Impinger 2	714.8	717.2
Impinger 3	584.3	585.3
Impinger 4	720.6	720.4
Impinger 5	717.2	720.3
Impinger 6	814.9	823.4
Impinger 7		

#2 - Run 1

	Initial	Final
Impinger 1	717.1	719.1
Impinger 2	696.0	696.7
Impinger 3	577.2	577.2
Impinger 4	699.6	699.7
Impinger 5	710.0	710.5
Impinger 6	~~766.3~~	
Impinger 7	797.0	804.3

Method #2 - Run 2

	Initial	Final
Impinger 1	715.5	719.0
Impinger 2	701.5	703.2
Impinger 3	583.0	583.3
Impinger 4	696.5	696.8
Impinger 5	711.0	711.7
Impinger 6	808.6	815.3
Impinger 7		

#2 - Run 3

	Initial	Final
Impinger 1	721.0	724.9
Impinger 2	702.2	703.3
Impinger 3	580.6	581.1
Impinger 4	714.2	715.0
Impinger 5	705.7	706.0
Impinger 6		
Impinger 7	804.3	808.7

#3 - Run 1

	Initial	Final
Impinger 1	713.2	684.2
Impinger 2	683.1	714.8
Impinger 3	587.6	588.4
Impinger 4	717.6	717.8
Impinger 5	722.0	722.2
Impinger 6	799.2	806.2
Impinger 7		

Method #3 - Run 2

	Initial	Final
Impinger 1	698.9	700.7
Impinger 2	685.8	686.4
Impinger 3	626.9	627.6
Impinger 4	699.1	699.2
Impinger 5	707.0	707.3
Impinger 6	766.8	774.4
Impinger 7		

#3 - Run 3

	Initial	Final
Impinger 1	681.7	689.8
Impinger 2	712.2	717.8
Impinger 3	589.4	589.4
Impinger 4	722.6	722.8
Impinger 5	719.3	720.8
Impinger 6	806.2	814.3
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2611799

100.0g wt ID: 6040

100.0g wt reading: 6993

1000.0g wt ID: 999

1000.0g wt reading: 999.1

Date: 11/19/'18

Plant: WTE

Auto-4

Location 1

	Initial	Final
Impinger 1	720.6	735.7
Impinger 2	683.6	686.1
Impinger 3	597.3	598.2
Impinger 4	715.6	715.7
Impinger 5	721.0	721.9
Impinger 6	804.9	812.8
Impinger 7		

Multi

Method Mun-1

	Initial	Final
Impinger 1	718.1	736.5
Impinger 2	699.5	708.1
Impinger 3	584.4	584.8
Impinger 4	720.6	721.4
Impinger 5	720.3	722.0
Impinger 6	822.4	832.3
Impinger 7		

Muni-2

	Initial	Final
Impinger 1	718.5	736.6
Impinger 2	678.1	681.3
Impinger 3	597.3	598.6
Impinger 4	717.3	718.8
Impinger 5	720.7	721.7
Impinger 6	804.4	813.9
Impinger 7		

Location 2

	Initial	Final
Impinger 1	718.5	724.3
Impinger 2	703.2	704.8
Impinger 3	586.6	586.7
Impinger 4	701.0	702.4
Impinger 5	714.1	713.4
Impinger 6	815.3	822.5
Impinger 7		

Method #2 - R1

	Initial	Final
Impinger 1	719.8	727.9
Impinger 2	701.9	703.2
Impinger 3	578.8	579.6
Impinger 4	716.5	716.8
Impinger 5	705.4	705.0
Impinger 6	797.5	805.4
Impinger 7		

#2 - R2

	Initial	Final
Impinger 1	715.2	724.9
Impinger 2	701.6	704.1
Impinger 3	586.6	587.1
Impinger 4	694.1	694.4
Impinger 5	712.3	713.7
Impinger 6	814.3	822.3
Impinger 7		

Location 3

	Initial	Final
Impinger 1	699.4	702.7
Impinger 2	683.9	684.5
Impinger 3	631.3	631.4
Impinger 4	711.3	710.9
Impinger 5	699.1	698.6
Impinger 6	774.4	781.2
Impinger 7		

Method #3 - R1

	Initial	Final
Impinger 1	717.6	721.1
Impinger 2	684.2	685.2
Impinger 3	590.6	592.1
Impinger 4	719.7	718.5
Impinger 5	722.3	723.0
Impinger 6	~~614.3~~	
Impinger 7	798.8	808.1

#3 - R2

	Initial	Final
Impinger 1	700.1	706.9
Impinger 2	689.9	691.9
Impinger 3	629.6	630.7
Impinger 4	706.4	706.7
Impinger 5	712.0	712.8
Impinger 6	795.4	803.0
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2811799

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

100.0g wt ID: 6040

100.0g wt reading: 100.0

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

1000.0g wt ID: 6993

1000.0g wt reading: 1000.1

A3. Auto Feedstock – Cyclone 3

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Auto-C3-R1
LOCATION:	Cyclone 3 - Auto	DATE :	18-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	713.2
IMP - 2 (INT) :	683.1
IMP - 3 (INT) :	587.6
IMP - 4 (INT) :	717.6
IMP - 5 (INT) :	722.0
IMP - 6 (INT) :	799.2
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	714.8
IMP - 2 (FIN) :	684.2
IMP - 3 (FIN) :	588.4
IMP - 4 (FIN) :	717.8
IMP - 5 (FIN) :	822.2
IMP - 6 (FIN) :	806.2
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.33
Pstack	2
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	412.389
Mid Leak Check INTIAL METER	367.631
BEGIN TIME	9:59
END TIME	10:59

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.20	1.10	1.44	52	52	45
2	1.90	1.38	2.28	52	52	45
3	1.40	1.18	1.68	52	52	46
B1	2.00	1.41	2.40	52	53	47
2	1.70	1.30	2.04	52	53	47
3	1.30	1.14	1.56	53	53	47
C1	2.00	1.41	2.40	54	54	47
2	2.10	1.45	2.52	54	54	48
3	1.50	1.22	1.80	54	54	48
D1	1.60	1.26	1.92	55	55	49
2	2.20	1.48	2.64	56	56	49
3	1.60	1.26	1.92	56	57	49
AVERAGE:	1.71	1.30	2.05	53.5	53.8	47.3

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Auto-C3-R2
LOCATION :	Cyclone 3 - Auto	DATE :	18-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	698.9
IMP - 2 (INT) :	685.8
IMP - 3 (INT) :	626.9
IMP - 4 (INT) :	699.1
IMP - 5 (INT) :	707.0
IMP - 6 (INT) :	766.8
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	700.7
IMP - 2 (FIN) :	686.4
IMP - 3 (FIN) :	627.6
IMP - 4 (FIN) :	694.2
IMP - 5 (FIN) :	707.3
IMP - 6 (FIN) :	774.4
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.33
Pstack	2
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	458.482
INTIAL METER	412.683
BEGIN TIME	12:28
END TIME	13:28

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.10	1.45	2.52	63	63	49
2	2.00	1.41	2.40	64	64	50
3	1.50	1.22	1.80	63	63	51
B1	2.30	1.52	2.76	64	64	51
2	2.10	1.45	2.52	65	64	52
3	1.20	1.10	1.44	64	64	52
C1	2.00	1.41	2.40	64	65	52
2	1.80	1.34	2.16	64	65	53
3	1.20	1.10	1.44	64	64	53
D1	2.00	1.41	2.40	64	64	52
2	1.60	1.26	1.92	65	64	53
3	1.30	1.14	1.56	65	64	54
AVERAGE:	1.76	1.32	2.11	64.1	64.0	51.8

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Auto-C3-R4
LOCATION :	Cyclone 3 - Auto	DATE :	19-Nov-16

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	699.9
IMP - 2 (INT) :	683.9
IMP - 3 (INT) :	631.3
IMP - 4 (INT) :	711.3
IMP - 5 (INT) :	694.1
IMP - 6 (INT) :	774.4
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	702.7
IMP - 2 (FIN) :	684.5
IMP - 3 (FIN) :	631.4
IMP - 4 (FIN) :	710.9
IMP - 5 (FIN) :	698.6
IMP - 6 (FIN) :	781.2
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.09
Pstack	2
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	552.124
INTIAL METER	506.551
BEGIN TIME	7:39
END TIME	8:39

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.20	1.48	2.64	67	67	55
2	1.90	1.38	2.28	67	68	55
3	1.40	1.18	1.68	67	68	56
B1	2.30	1.52	2.76	67	68	58
2	1.80	1.34	2.16	68	68	58
3	1.20	1.10	1.44	67	68	57
C1	2.20	1.48	2.64	67	68	57
2	1.90	1.38	2.28	67	68	58
3	1.00	1.00	1.20	67	68	58
D1	1.90	1.38	2.28	67	68	58
2	1.80	1.34	2.16	67	68	57
3	1.00	1.00	1.20	67	68	57
AVERAGE:	1.72	1.30	2.06	67.1	67.9	57.0

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Auto-C3-R1**
LOCATION :	**Cyclone 3 - Auto**	DATE :	**18-Nov-15**

Ts (°F) =	47.3	% CO2 =	0.00	Vm (CF)	=	44.758
Ts (°R) =	507.3	% O2 =	20.90	DELTA H (ABS)	=	30.48
Tm (°F) =	53.6	% CO =	0	Ps (ABS)	=	30.48
Tm (°R) =	513.6	% N2 =	79.10	SQRT DELTA P	=	1.3014
Vl (TOT) =	110.9	Cp =	0.84	Y	=	1.0419
Vl (adj) =	11.33	TIME =	60	An	=	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	48.817	DSCF
Vw std =	.04707 (Vl TOT)	=	5.220	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.097	
Bwo =	by steam tables	=	0.0108097	
1 - Bwo =	1 - Bwo	=	0.990	adj
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.729	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.761	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	71.131	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1119675	DSCFH
	DSCFH / 60	=	18661	DSCFM
	3600 (Vs)(As)	=	1066967	ACFH
	ACFH / 60	=	17783	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	104.7	adj

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Auto-C3-R2**
LOCATION :	**Cyclone 3 - Auto**	DATE :	**18-Nov-15**

Ts (°F) =	51.8	% CO2 =	0.00	Vm (CF) =	45.799
Ts (°R) =	511.8	% O2 =	20.90	DELTA H (ABS) =	30.49
Tm (°F) =	64.0	% CO =	0	Ps (ABS) =	30.48
Tm (°R) =	524.0	% N2 =	79.10	SQRT DELTA P =	1.3183
Vl (TOT) =	6.1	Cp =	0.84	Y =	1.0419
Vl (adj) =	NA	TIME =	60	An =	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	48.967	DSCF
Vw std =	.04707 (Vl TOT)	=	0.287	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.006	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.994	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.773	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.764	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	72.327	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1132915	DSCFH
	DSCFH / 60	=	18882	DSCFM
	3600 (Vs)(As)	=	1084910	ACFH
	ACFH / 60	=	18082	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	103.8	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Auto-C3-R4**
LOCATION :	**Cyclone 3 - Auto**	DATE :	**19-Nov-16**

Ts (°F) =	57.0	% CO2 =	0.00	Vm (CF) =	45.573
Ts (°R) =	517.0	% O2 =	20.90	DELTA H (ABS) =	30.24
Tm (°F) =	67.5	% CO =	0	Ps (ABS) =	30.24
Tm (°R) =	527.5	% N2 =	79.10	SQRT DELTA P =	1.2984
Vl (TOT) =	14.4	Cp =	0.84	Y =	1.0419
Vl (adj) =	NA	TIME =	60	An =	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	48.019	DSCF
Vw std =	.04707 (Vl TOT)	=	0.678	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.014	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.986	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.685	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.772	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	71.984	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1098462	DSCFH
	DSCFH / 60	=	18308	DSCFM
	3600 (Vs)(As)	=	1079754	ACFH
	ACFH / 60	=	17996	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	104.1	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Auto-C3-R1
LOCATION:	Cyclone 3 - Auto	DATE:	18-Nov-15

			BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NUMBER	1760	0	1763	0
FINAL	0.0060	0.0365	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0060	0.0365	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		110

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	42.500	Vs	=	71.13 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std	=	48.82 DSCF
Mn	=	42.500	Ffactor	=	n/a

Qs	=	3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1119675 DSCFH
		3600 (Vs) (As)	=	1066967 ACFH
		ACFH / 60	=	17783 ACFM
Cs	=	(2.205 E-6) (Mn) / (Vm Std)	=	1.91965E-06 LB/SCF
Cs'	=	0.0154 (Mn) /(VmStd)	=	0.0134 GRAINS/SCF
Cs'M	=	(Mn) / (VmSTD x 0.02832)	=	30.7 mg/M3
PMR	=	Qs x Cs	=	2.149 LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Auto-C3-R2
LOCATION	Cyclone 3 - Auto	DATE :	18-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1757	0	1763	0
FINAL		0.0012	0.0158	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0012	0.0158	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		72

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	17.000	Vs	=	72.33 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std=		48.97 DSCF
Mn	=	17.000	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1132915	DSCFH
	3600 (Vs) (As)	=	1084909.542	ACFH
	ACFH / 60	=	18082	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	7.65516E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0053	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	12.3	mg/M3
PMR	= Qs x Cs	=	0.867	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Auto-C3-R4
LOCATION	Cyclone 3 - Auto	DATE :	19-Nov-16

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1769	0	1763	0
FINAL		0.0000	0.0540	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0000	0.0540	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		75

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	54.000	Vs	=	71.98 ft/sec
Ar	=	0.000	AS	=	4.17 ft2
			Vm std=		48.02 DSCF
Mn	=	54.000	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1098462	DSCFH
	3600 (Vs) (As)	=	1079753.761	ACFH
	ACFH / 60	=	17996	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	2.47965E-06	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0173	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	39.7	mg/M3
PMR	= Qs x Cs	=	2.7238	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C3-R1
Source:	Cyclone 3 - Auto	Date:	18-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.03E-12	1.45E-01				1.011E-05	
Cadmium	1.96	ND	1.96	8.85E-11	1.42E+00				9.912E-05	
Lead	20.50	0.92	20.50	9.26E-10	1.48E+01				1.037E-03	
Mercury	0.33	ND	0.33	1.472E-11	2.36E-01				1.648E-05	

Run Data		
V_m (dscf)	=	48.82
Q_s (dscfh)	=	1,119,675
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C3-R2
Source:	Cyclone 3 - Auto	Date:	18-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.01E-12	1.44E-01				1.020E-05	
Cadmium	0.74	ND	0.74	3.33E-11	5.34E-01				3.775E-05	
Lead	12.20	0.92	12.20	5.49E-10	8.80E+00				6.224E-04	
Mercury	0.39	ND	0.39	1.778E-11	2.85E-01				2.015E-05	

Run Data		
V_m (dscf)	=	48.97
Q_s (dscfh)	=	1,132,915
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Auto-C3-R4
Source:	Cyclone 3 - Auto	Date:	19-Nov-16

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.18E-12	1.47E-01				1.009E-05	
Cadmium	1.80	ND	1.80	8.27E-11	1.32E+00				9.079E-05	
Lead	52.90	0.92	52.90	2.43E-09	3.89E+01				2.668E-03	
Mercury	0.40	ND	0.40	1.828E-11	2.93E-01				2.008E-05	

Run Data		
V_m (dscf)	=	48.02
Q_s (dscfh)	=	1,098,462
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	Cyclone 3 - Auto 3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Auto-C3-R1	11/18/2015	0.038	< 0.15	< 0.0049	< 0.023	0.110	**0.326**
Auto-C3-R2	11/18/2015	< 0.015	< 0.15	< 0.0049	< 0.023	0.202	**0.395**
Auto-C3-R4	11/19/2016	0.023	< 0.15	< 0.005	< 0.02	0.197	**0.398**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Cyclone 3 - Auto			
		Run ID	Run ID	Run ID	Reagent Blank
		Auto-C3-R1	Auto-C3-R2	Auto-C3-R4	M29-RB
Trace Metal	Units	11/18/2015	11/18/2015	11/19/2016	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	1.96	0.74	1.80	< 0.10
Lead	ug	20.50	12.20	52.90	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Auto-C3-R1
Source:	Cyclone 3	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O):	+20
Bar. Pres.("H_g):	30.33
Run Time (min.):	60
Final Meter (CF):	412.389
Initial Meter (CF):	367.631
Start Time:	959
End Time:	1059

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.2	1.44	52	52	45	370.7	—	NA	41	36	3
2	10.0	1.9	2.28	52	52	45	374.5	—	|	42	37	5
3	15.0	1.4	1.68	52	52	46	377.9	90	|	44	37	5
B1	20.0	2.0	2.40	52	53	47	381.4	100	|	52	37	5
2	25.0	1.7	2.04	52	53	47	385.7	90	|	60	38	5
3	30.0	1.3	1.56	53	53	47	389.9	90	|	65	39	4
C1	35.0	2.0	2.40	54	54	47	393.0	90	|	63	40	5
2	40.0	2.1	2.52	54	54	48	397.1	91	|	64	40	5
3	45.0	1.5	1.80	54	54	48	400.7	90	|	63	40	5
D1	50.0	1.6	1.92	55	55	49	404.3	90	|	65	41	5
2	55.0	2.2	2.64	56	56	49	408.6	90	|	65	41	5
3	60.0	1.6	1.92	56	57	49	—	91	|	66	41	5

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.010	@	12	"Hg
Train-mid:		@		"Hg
Train-post:	0.002	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: JS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.2
Nozzle ID: /Nozzle Diameter:	0.160
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	13030246

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Auto-C3-R2
Source:	Cyclone 3	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	2.1	2.52	63	63	49	416.8	88	N/A	44	48	6
2	10.0	2.0	2.40	64	64	50	420.9	89		53	47	6
3	15.0	1.5	1.80	63	63	51	424.5	90		58	48	5
B1	20.0	2.3	2.76	64	64	51	429.8	92		59	47	6
2	25.0	2.1	2.52	65	64	52	432.8	94		59	47	6
3	30.0	1.2	1.44	64	64	52	436.1	92		61	48	5
C1	35.0	2.0	2.40	64	65	52	440.1	90		63	49	6
2	40.0	1.8	2.16	64	65	53	444.1	87		62	50	6
3	45.0	1.2	1.44	64	64	53	447.0	88		62	51	4
D1	50.0	2.0	2.40	64	64	52	451.4	89		64	50	5
2	55.0	1.6	1.92	65	64	53	455.1	90		65	50	5
3	60.0	1.3	1.56	65	64	54	—	90		65	50	4

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	30.33
Run Time (min.):	60
Final Meter (CF):	459.482
Initial Meter (CF):	412.683
Start Time:	1225
End Time:	1328

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.005	@	12	"Hg
Train-mid:		@		"Hg
Train-post:	0.003	@	7	"Hg
Pitot-pre:	✓	@	3	"H_2O
Pitot-post:	✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TJ

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.2
Nozzle ID: /Nozzle Diameter:	0.150
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	13030246

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Ato-C5-R3
Source:	Cyclone 3	Date:	18 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	2.2	2.64	69	69	54	463.8	95	n/a	59	56	5
2	10.0	1.9	2.28	69	69	55	466.9	95		61	53	5
3	15.0	1.7	2.04	69	70	55	471.0	89		62	55	5
B1	20.0	2.6	3.12	69	70	56	475.2	90		65	56	6
2	25.0	2.0	2.40	69	69	57	479.5	88		67	53	6
3	30.0	1.6	1.92	70	69	57	483.2	90		69	50	5
C1	35.0	1.8	2.16	70	70	56	487.1	90		69	50	5
2	40.0	2.0	2.40	71	70	57	491.1	90		68	50	5
3	45.0	1.5	1.80	71	70	57	494.7	87		68	49	5
D1	50.0	2.0	2.40	71	70	56	499.7	89		67	49	5
2	55.0	1.8	2.16	71	70	56	502.6	89		66	49	5
3	60.0	1.4	1.68	71	71	57	—	90		67	49	5

Pstack ("H_2O):	2.0
Bar. Pres.("H_g):	
Run Time (min.):	60
Final Meter (CF):	505.978
Initial Meter (CF):	459.867
Start Time:	1432
End Time:	1532

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.002	@	12	"Hg
Train-mid:		@		"Hg
Train-post:	0.003	@	6	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	12
Nozzle ID: /Nozzle Diameter:	0
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID	130362246

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Auto - C3 - R4
Source:	Cyclone 3	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): +2.0

Bar. Pres.("H_g): 30.09

Run Time (min.): 60

Final Meter (CF): 552.124

Initial Meter (CF): 506.551

Start Time: 0739

End Time: 0839

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	2.2	2.64	67	67	55	510.8	87		52	56	6
2	10.0	1.90	2.28	67	68	55	514.9	87		53	57	5
3	15.0	1.40	1.68	67	68	56	518.9	87		54	57	5
B1	20.0	2.3	2.76	67	68	58	522.8	87		54	57	6
2	25.0	1.80	2.16	68	68	58	526.8	87		54	57	5
3	30.0	1.20	1.44	67	68	57	530.2	87		54	58	4
C1	35.0	2.2	2.64	67	68	57	533.9	87		53	59	4
2	40.0	1.90	2.28	67	68	58	538.0	85		54	59	5
3	45.0	1.00	1.20	67	68	58	541.0	87		55	59	5
D1	50.0	1.90	2.28	67	68	58	545.1	87		55	59	5
2	55.0	1.80	2.16	67	68	57	549.0	87		55	60	5
3	60.0	1.00	1.20	67	68	57	—	87		57	60	5

Filter Information:

ID:	
Tare (g):	

Trap Information:

ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.002	@	15	"Hg
Train-mid:		@		"Hg
Train-post:	0.002	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: S. Thomas

Probe Operator: Tim S.

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.2
Nozzle ID: /Nozzle Diameter:	0.180
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993
Barometer ID:	30302246

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance: n/a

Date: WTE - Recycling

Plant: 11/17/15

Auto

11/18/15

Method #1 - Run 1

	Initial	Final
Impinger 1	713.8	725.7
Impinger 2	698.0	700.1
Impinger 3	582.0	585.0
Impinger 4	716.5	716.8
Impinger 5	716.9	717.4
Impinger 6	~~777.6~~	
Impinger 7	808.4	814.9

Method #1 - Run 2

	Initial	Final
Impinger 1	715.2	730.2
Impinger 2	675.0	678.9
Impinger 3	596.0	596.0
Impinger 4	718.7	718.9
Impinger 5	715.6	715.7
Impinger 6	797.4	804.9
Impinger 7		

#1 (Run 3)

	Initial	Final
Impinger 1	699.9	716.9
Impinger 2	714.8	717.2
Impinger 3	584.3	585.3
Impinger 4	720.6	720.4
Impinger 5	717.2	720.3
Impinger 6	814.9	823.4
Impinger 7		

#2 - Run 1

	Initial	Final
Impinger 1	717.1	719.1
Impinger 2	696.0	696.7
Impinger 3	577.2	577.2
Impinger 4	699.6	699.7
Impinger 5	710.0	710.5
Impinger 6	~~766.3~~	
Impinger 7	797.0	804.3

Method #2 - Run 2

	Initial	Final
Impinger 1	715.5	719.0
Impinger 2	701.5	703.2
Impinger 3	583.0	583.3
Impinger 4	696.5	696.8
Impinger 5	711.0	711.7
Impinger 6	808.6	815.3
Impinger 7		

#2 - Run 3

	Initial	Final
Impinger 1	721.0	724.9
Impinger 2	702.2	703.3
Impinger 3	580.6	581.1
Impinger 4	714.2	715.0
Impinger 5	705.7	706.0
Impinger 6		
Impinger 7	804.3	808.7

#3 - Run 1

	Initial	Final
Impinger 1	713.2	684.2
Impinger 2	683.1	714.8
Impinger 3	587.6	588.4
Impinger 4	717.6	717.8
Impinger 5	722.0	722.2
Impinger 6	799.2	806.2
Impinger 7		

Method #3 - Run 2

	Initial	Final
Impinger 1	698.9	700.7
Impinger 2	685.8	686.4
Impinger 3	626.9	627.6
Impinger 4	699.1	699.2
Impinger 5	707.0	707.3
Impinger 6	766.8	774.4
Impinger 7		

#3 - Run 3

	Initial	Final
Impinger 1	686.7	689.8
Impinger 2	717.2	717.8
Impinger 3	589.4	589.4
Impinger 4	722.6	722.8
Impinger 5	719.3	720.8
Impinger 6	806.2	814.3
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2611799

100.0g wt ID: 6040

100.0g wt reading: 6993

1000.0g wt ID: 999

1000.0g wt reading: 999.1

Date: 11/19/'15

Plant: UTe

Muni

Auh-4

Location 1

	Initial	Final
Impinger 1	720.6	735.7
Impinger 2	687.6	686.1
Impinger 3	597.2	598.2
Impinger 4	715.6	715.7
Impinger 5	721.0	721.9
Impinger 6	804.9	812.8
Impinger 7		

Method Muni-1

	Initial	Final
Impinger 1	718.1	736.5
Impinger 2	699.5	708.1
Impinger 3	584.4	584.8
Impinger 4	720.6	721.4
Impinger 5	720.3	722.0
Impinger 6	822.4	832.2
Impinger 7		

Muni-2

	Initial	Final
Impinger 1	718.5	736.6
Impinger 2	678.1	681.3
Impinger 3	597.3	598.6
Impinger 4	717.3	718.8
Impinger 5	720.7	721.7
Impinger 6	804.4	813.4
Impinger 7		

Location 2

	Initial	Final
Impinger 1	718.9	724.3
Impinger 2	703.2	704.8
Impinger 3	586.6	586.7
Impinger 4	701.0	702.4
Impinger 5	714.1	713.4
Impinger 6	815.3	822.5
Impinger 7		

Method #2 - R1

	Initial	Final
Impinger 1	719.8	727.9
Impinger 2	701.4	703.2
Impinger 3	576.8	579.6
Impinger 4	716.5	716.8
Impinger 5	705.4	705.0
Impinger 6	797.5	805.4
Impinger 7		

#2 - R2

	Initial	Final
Impinger 1	715.2	724.9
Impinger 2	701.6	704.1
Impinger 3	586.6	587.1
Impinger 4	694.1	694.4
Impinger 5	712.3	713.7
Impinger 6	814.3	822.3
Impinger 7		

Location 3

	Initial	Final
Impinger 1	699.4	702.7
Impinger 2	683.9	684.5
Impinger 3	631.3	631.4
Impinger 4	711.3	710.9
Impinger 5	699.1	698.6
Impinger 6	774.4	781.2
Impinger 7		

Method #3 - R1

	Initial	Final
Impinger 1	717.6	721.1
Impinger 2	684.2	685.2
Impinger 3	590.6	592.1
Impinger 4	719.7	718.5
Impinger 5	722.2	723.0
Impinger 6	~~814.0~~	
Impinger 7	798.8	808.1

#3 - R2

	Initial	Final
Impinger 1	700.1	706.9
Impinger 2	689.9	691.9
Impinger 3	629.6	630.7
Impinger 4	706.4	706.7
Impinger 5	712.0	712.8
Impinger 6	795.4	803.0
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2811799

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

100.0g wt ID: 6040

100.0g wt reading: 100.0

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

1000.0g wt ID: 6993

1000.0g wt reading: 1000.1

A4. Municipal Feedstock – Scrubber/Cyclone 1

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Muni-C1-R1
LOCATION:	Scrubber/Cyclone 1 - Muni	DATE :	19-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	718.1
IMP - 2 (INT) :	699.5
IMP - 3 (INT) :	584.4
IMP - 4 (INT) :	720.6
IMP - 5 (INT) :	720.3
IMP - 6 (INT) :	822.4
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	736.5
IMP - 2 (FIN) :	708.1
IMP - 3 (FIN) :	584.8
IMP - 4 (FIN) :	721.4
IMP - 5 (FIN) :	722.0
IMP - 6 (FIN) :	832.2
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.09
Pstack	-0.95
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	189.675
Mid Leak Check	
INTIAL METER	138.289
BEGIN TIME	9:51
END TIME	10:51

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.70	1.64	2.40	59	58	88
2	2.75	1.66	2.40	59	58	90
3	2.75	1.66	2.30	59	58	91
4	2.00	1.41	2.30	59	58	91
B1	2.85	1.69	2.30	59	58	91
2	2.70	1.64	2.30	59	58	92
3	2.45	1.57	2.30	59	58	91
4	1.60	1.26	2.30	59	58	91
C1	2.20	1.48	2.30	59	59	91
2	2.30	1.52	2.30	59	59	91
3	2.35	1.53	2.30	60	59	92
4	1.85	1.36	2.30	60	59	91
D1	1.70	1.30				91
2	1.95	1.40				92
3	2.15	1.47				92
4	1.90	1.38				92
AVERAGE:	2.26	1.50	2.32	59.2	58.3	91.1

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C1-R2
LOCATION :	Scrubber/Cyclone 1 - Muni	DATE :	19-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	718.5
IMP - 2 (INT) :	678.1
IMP - 3 (INT) :	597.3
IMP - 4 (INT) :	717.3
IMP - 5 (INT) :	720.7
IMP - 6 (INT) :	804.4
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	736.6
IMP - 2 (FIN) :	681.3
IMP - 3 (FIN) :	598.6
IMP - 4 (FIN) :	718.8
IMP - 5 (FIN) :	721.7
IMP - 6 (FIN) :	813.9
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.06
Pstack	-0.95
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	240.395
INTIAL METER	190.034
BEGIN TIME	12:32
END TIME	13:32

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.50	1.58	2.30	60	59	90
2	2.60	1.61	2.30	60	60	93
3	2.70	1.64	2.30	59	59	93
4	1.95	1.40	2.25	60	59	93
B1	2.60	1.61	2.25	60	59	94
2	2.60	1.61	2.25	60	59	94
3	2.50	1.58	2.25	60	59	94
4	1.85	1.36	2.25	60	60	93
C1	2.15	1.47	2.25	60	60	94
2	2.15	1.47	2.25	60	60	94
3	2.25	1.50	2.25	60	60	93
4	1.80	1.34	2.25	60	60	93
D1	1.70	1.30				93
2	1.85	1.36				93
3	2.05	1.43				94
4	1.95	1.40				93
AVERAGE:	2.20	1.48	2.26	59.9	59.5	93.2

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C1-R3
LOCATION :	Scrubber/Cyclone 1 - Muni	DATE :	19-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	719.5
IMP - 2 (INT) :	702.6
IMP - 3 (INT) :	584.8
IMP - 4 (INT) :	720.3
IMP - 5 (INT) :	721.2
IMP - 6 (INT) :	809.6
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	739.8
IMP - 2 (FIN) :	707.8
IMP - 3 (FIN) :	586.3
IMP - 4 (FIN) :	721.1
IMP - 5 (FIN) :	720.9
IMP - 6 (FIN) :	818.5
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.06
Pstack	-0.95
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	290.287
INTIAL METER	240.667
BEGIN TIME	14:38
END TIME	15:38

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.70	1.64	2.25	60	60	90
2	2.75	1.66	2.25	60	60	93
3	2.75	1.66	2.25	60	60	93
4	1.80	1.34	2.25	60	60	93
B1	2.80	1.67	2.20	60	60	93
2	2.65	1.63	2.20	60	60	94
3	2.45	1.57	2.20	60	60	94
4	1.75	1.32	2.20	60	60	93
C1	2.30	1.52	2.20	60	60	93
2	2.30	1.52	2.20	60	60	94
3	2.25	1.50	2.20	60	60	94
4	1.90	1.38	2.20	60	60	94
D1	1.85	1.36	2.20			93
2	2.15	1.47	2.20			94
3	2.25	1.50	2.20			94
4	1.90	1.38	2.20			94
AVERAGE:	2.28	1.51	2.21	60.0	60.0	93.3

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Muni-C1-R1**
LOCATION :	**Scrubber/Cyclone 1 - Muni**	DATE :	**19-Nov-15**

Ts (°F) =	91.1	% CO2 =	0.00	Vm (CF)	=	51.386
Ts (°R) =	551.1	% O2 =	20.90	DELTA H (ABS)	=	30.26
Tm (°F) =	58.8	% CO =	0	Ps (ABS)	=	30.02
Tm (°R) =	518.8	% N2 =	79.10	SQRT DELTA P	=	1.4983
Vl (TOT) =	39.7	Cp =	0.84	Y	=	1.0037
Vl (adj) =	NA	TIME =	60	An	=	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	53.072	DSCF
Vw std =	.04707 (Vl TOT)	=	1.869	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.034	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.966	
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.467	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.803	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	86.402	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2165559	DSCFH
	DSCFH / 60	=	36093	DSCFM
	3600 (Vs)(As)	=	2332857	ACFH
	ACFH / 60	=	38881	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	99.5	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Muni-C1-R2**
LOCATION :	**Scrubber/Cyclone 1 - Muni**	DATE :	**19-Nov-15**

Ts (°F) =	93.2	% CO2 =	0.00	Vm (CF) =	50.361
Ts (°R) =	553.2	% O2 =	20.90	DELTA H (ABS) =	30.23
Tm (°F) =	59.7	% CO =	0	Ps (ABS) =	29.99
Tm (°R) =	519.7	% N2 =	79.10	SQRT DELTA P =	1.4791
Vl (TOT) =	34.6	Cp =	0.84	Y =	1.0037
Vl (adj) =	NA	TIME =	60	An =	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	51.859	DSCF
Vw std =	.04707 (Vl TOT)	=	1.629	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.030	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.970	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.506	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.804	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	85.442	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2139012	DSCFH
	DSCFH / 60	=	35650	DSCFM
	3600 (Vs)(As)	=	2306947	ACFH
	ACFH / 60	=	38449	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	98.4	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Muni-C1-R3**
LOCATION :	**Scrubber/Cyclone 1 - Muni**	DATE :	**19-Nov-15**

Ts (°F) =	93.3	% CO2 =	0.00	Vm (CF) =	49.620
Ts (°R) =	553.3	% O2 =	20.90	DELTA H (ABS) =	30.22
Tm (°F) =	60.0	% CO =	0	Ps (ABS) =	29.99
Tm (°R) =	520.0	% N2 =	79.10	SQRT DELTA P =	1.5067
Vl (TOT) =	36.4	Cp =	0.84	Y =	1.0037
Vl (adj) =	NA	TIME =	60	An =	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	51.061	DSCF
Vw std =	.04707 (Vl TOT)	=	1.713	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.032	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.968	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.484	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.805	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	87.079	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2174960	DSCFH
	DSCFH / 60	=	36249	DSCFM
	3600 (Vs)(As)	=	2351139	ACFH
	ACFH / 60	=	39186	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	95.2	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Muni-C1-R1
LOCATION:	Scrubber/Cyclone 1 - Mun	DATE:	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1767	0	1763	0
FINAL		0.0074	0.0083	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0074	0.0083	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		96

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	15.700	Vs	=	86.40 ft/sec
Ar	=	0.000	As	=	7.50 ft2
			Vm std	=	53.07 DSCF
Mn	=	15.700	Ffactor	=	n/a

Qs	=	3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts) =	2165559	DSCFH
		3600 (Vs) (As) =	2332857	ACFH
		ACFH / 60 =	38881	ACFM
Cs	=	(2.205 E-6) (Mn) / (Vm Std) =	6.52297E-07	LB/SCF
Cs'	=	0.0154 (Mn) /(VmStd) =	0.0046	GRAINS/SCF
Cs'M	=	(Mn) / (VmSTD x 0.02832) =	10.4	mg/M3
PMR	=	Qs x Cs =	1.413	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Muni-C1-R2
LOCATION	Scrubber/Cyclone 1 - Mun	DATE :	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1766	0	1763	0
FINAL		0.0050	0.0096	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0050	0.0096	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		110

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	14.600	Vs	=	85.44 ft/sec
Ar	=	0.000	As	=	7.50 ft2
			Vm std=		51.86 DSCF
Mn	=	14.600	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2139012	DSCFH
	3600 (Vs) (As)	=	2306946.507	ACFH
	ACFH / 60	=	38449	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	6.20781E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0043	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	9.9	mg/M3
PMR	= Qs x Cs	=	1.328	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Muni-C1-R3
LOCATION	Scrubber/Cyclone 1 - Mun	DATE :	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1778	0	1763	0
FINAL		0.0063	0.0113	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0063	0.0113	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		110

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	17.600	Vs	=	87.08 ft/sec
Ar	=	0.000	AS	=	7.50 ft2
			Vm std=		51.06 DSCF
Mn	=	17.600	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2174960	DSCFH
	3600 (Vs) (As)	=	2351138.552	ACFH
	ACFH / 60	=	39186	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	7.60033E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0053	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	12.2	mg/M3
PMR	= Qs x Cs	=	1.6530	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C1-R1
Source:	Scrubber/Cyclone 1 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.31E-12	1.33E-01				1.799E-05	
Cadmium	2.29	ND	2.29	9.51E-11	1.52E+00				2.060E-04	
Lead	2.57	0.92	2.57	1.07E-10	1.71E+00				2.312E-04	
Mercury	9.90	ND	9.90	4.113E-10	6.59E+00				8.907E-04	

Run Data		
V_m (dscf)	=	53.07
Q_s (dscfh)	=	2,165,559
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C1-R2
Source:	Scrubber/Cyclone 1 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.50E-12	1.36E-01				1.819E-05	
Cadmium	2.38	ND	2.38	1.01E-10	1.62E+00				2.165E-04	
Lead	2.83	0.92	2.83	1.20E-10	1.93E+00				2.574E-04	
Mercury	21.04	ND	21.04	8.946E-10	1.43E+01				1.914E-03	

Run Data		
V_m (dscf)	=	51.86
Q_s (dscfh)	=	2,139,012
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C1-R3
Source:	Scrubber/Cyclone 1 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.64E-12	1.38E-01				1.878E-05	
Cadmium	3.20	ND	3.20	1.38E-10	2.21E+00				3.006E-04	
Lead	3.37	0.92	3.37	1.46E-10	2.33E+00				3.165E-04	
Mercury	14.64	ND	14.64	6.322E-10	1.01E+01				1.375E-03	

Run Data		
V_m (dscf)	=	51.06
Q_s (dscfh)	=	2,174,960
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling Scrubber/Cyclone 1 - Muni 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Muni-C1-R1	11/19/2015	< 0.015	< 0.16	< 0.005	3.42	6.30	**9.900**
Muni-C1-R2	11/19/2015	< 0.015	< 0.16	< 0.0049	2.56	18.3	**21.040**
Muni-C1-R3	11/19/2015	0.045	< 0.17	< 0.0052	1.32	13.1	**14.640**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Scrubber/Cyclone 1 - Muni			
		Run ID	Run ID	Run ID	Reagent Blank
		Muni-C1-R1	Muni-C1-R2	Muni-C1-R3	M29-RB
Trace Metal	Units	11/19/2015	11/19/2015	11/19/2015	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	2.29	2.38	3.20	< 0.10
Lead	ug	2.57	2.83	3.37	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Muni - C1 - R1
Source:	Scrubber/Cyclone 1	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -0.95

Bar. Pres.("H_g): 30.09

Run Time (min.): 60

Final Meter (CF): 189.675

Initial Meter (CF): 138.289

Start Time: 0951

End Time: 1051

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	~~Filter Temp (F)~~ DP@ C2	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Iso C2
A1	5.0	2.70	2.40	59	58	88	142.6	64	2.40	65	44	6	95
2	10.0	2.75	2.40	59	58	90	146.9	73	2.40	66	44	6	99
3	15.0	2.75	2.30	59	58	91	151.2	73	2.30	75	46	6	103
4	20.0	2.00	2.30	59	58	91	155.5	OFF	2.30	77	47	6	10[illegible]
B1	25.0	2.85	2.30	59	58	91	159.8	OFF	2.30	77	49	6	103
2	30.0	2.70	2.30	59	58	92	164.1	OFF	2.30	76	50	6	104
3	35.0	2.45	2.30	59	58	91	168.4	OFF	2.30	77	50	6	105
4	40.0	1.60	2.30	59	58	91	172.6	OFF	2.30	78	51	6	10[illegible]
C1	45.0	2.20	2.30	59	59	91	176.8	OFF	2.30	78	51	6	106
2	50.0	2.30	2.30	59	59	91	181.1	OFF	2.30	79	52	6	10[illegible]
3	55.0	2.35	2.30	60	59	92	185.4	OFF	2.30	79	52	6	109
4	60.0	1.85	2.30	60	59	91	—	OFF	2.30	80	53	6	10[illegible]
D1		1.70				91							
2		1.95				92							
3		2.15				92							
4		1.90				92							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.002	@	15	"Hg
Train-mid:	–	@	–	"Hg
Train-post:	0.002	@	10	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g 99.9

1,000.0 g 999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Muni - C1 - R2
Source:	Scrubber/Cyclone 1	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -0.95

Bar. Pres.("H_g): 30.06

Run Time (min.): 60

Final Meter (CF): 240.395

Initial Meter (CF): 190.034

Start Time: 1232

End Time: 1332

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	~~Filter Temp (F)~~ DP @ C2	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Ts @ C1
A1	5.0	2.50	2.30	60	59	90	194.3	OFF	2.30	66	46	6	94
2	10.0	2.60	2.30	60	60	93	198.5	OFF	2.30	66	43	6	101
3	15.0	2.70	2.30	59	59	93	202.7	OFF	2.30	72	46	6	103
4	20.0	1.95	2.25	60	59	93	206.9	OFF	2.25	74	49	6	10[illegible]
B1	25.0	2.60	2.25	60	59	94	211.1	OFF	2.25	75	50	6	104
2	30.0	2.60	2.25	60	59	94	215.3	OFF	2.25	75	51	6	10[illegible]
3	35.0	2.50	2.25	60	59	94	219.5	OFF	2.25	75	51	6	105
4	40.0	1.95	2.25	60	60	93	223.7	OFF	2.25	75	52	6	10[illegible]
C1	45.0	2.15	2.25	60	60	94	227.9	OFF	2.25	76	52	6	106
2	50.0	2.15	2.25	60	60	94	232.0	OFF	2.25	76	53	6	106
3	55.0	2.25	2.25	60	60	94	236.2	OFF	2.25	76	54	6	10[illegible]
4	60.0	1.80	2.25	60	60	93	—	OFF	2.25	77	55	6	105
D1		1.70				93							
2		1.85				93							
3		2.05				94							
4		1.95				93							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.004	@	15	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.001	@	10	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Muni-C1-R3
Source:	Scrubber/Cyclone 1	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -0.95

Bar. Pres.("H_g): 30.06

Run Time (min.): 60

Final Meter (CF): 290.287

Initial Meter (CF): 240.667

Start Time: JC 1437 1438

End Time: 1538

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F) (OFF C2)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Ts
A1	5.0	2.70	2.25	60	60	90	244.8	OFF	2.25	65	51	8	96
2	10.0	2.75	2.25	60	60	93	249.0	OFF	2.25	66	48	8	103
3	15.0	2.75	2.25	60	60	93	253.1	OFF	2.25	72	52	8	105
4	20.0	1.80	2.25	60	60	93	257.3	OFF	2.25	76	53	9	105
B1	25.0	2.80	2.20	60	60	93	261.4	OFF	2.20	75	53	9	105
2	30.0	2.65	2.20	61	60	94	265.5	OFF	2.20	75	54	9	105
3	35.0	2.45	2.20	60	60	94	269.7	OFF	2.20	76	55	9	10
4	40.0	1.75	2.20	60	60	93	273.8	OFF	2.20	76	55	9	106
C1	45.0	2.30	2.20	60	60	93	277.9	OFF	2.20	77	54	9	10
2	50.0	2.30	2.20	60	60	94	282.0	OFF	2.20	78	55	9	10
3	55.0	2.25	2.20	60	60	94	286.2	OFF	2.20	78	56	9	105
4	60.0	1.90	2.20	60	60	94	—	OFF	2.20	77	56	9	109
D1		1.85				93							
2		2.15				94							
3		2.25				94							
4		1.90				94							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.001	@	10	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.002	@	15	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g 99.9

1,000.0 g 999.1

Impinger Water Appearance:

n/a

Date: 11/19/18

Plant: UTe

Muni

Amb-4

Location 1

	Initial	Final
Impinger 1	720.6	735.7
Impinger 2	687.6	686.1
Impinger 3	597.2	598.2
Impinger 4	715.8	715.7
Impinger 5	721.0	721.9
Impinger 6	804.9	812.8
Impinger 7		

Method Muni-1

	Initial	Final
Impinger 1	718.1	736.5
Impinger 2	699.5	708.1
Impinger 3	584.4	584.8
Impinger 4	720.6	721.4
Impinger 5	720.3	722.0
Impinger 6	822.4	832.3
Impinger 7		

Muni-2

	Initial	Final
Impinger 1	718.5	736.6
Impinger 2	678.1	681.3
Impinger 3	597.3	598.6
Impinger 4	717.3	718.8
Impinger 5	720.7	721.7
Impinger 6	804.4	813.9
Impinger 7		

Location 2

	Initial	Final
Impinger 1	718.9	724.3
Impinger 2	703.2	704.8
Impinger 3	586.6	586.7
Impinger 4	701.0	702.4
Impinger 5	714.1	713.4
Impinger 6	815.3	822.5
Impinger 7		

Method #2 - R1

	Initial	Final
Impinger 1	719.8	727.9
Impinger 2	701.9	703.2
Impinger 3	578.9	579.6
Impinger 4	716.5	716.8
Impinger 5	705.4	705.0
Impinger 6	797.5	805.4
Impinger 7		

#2 - R2

	Initial	Final
Impinger 1	715.2	724.9
Impinger 2	701.6	704.1
Impinger 3	586.6	587.1
Impinger 4	694.1	694.4
Impinger 5	712.3	713.7
Impinger 6	814.3	822.3
Impinger 7		

Location 3

	Initial	Final
Impinger 1	699.4	702.7
Impinger 2	683.9	684.5
Impinger 3	631.3	631.4
Impinger 4	711.3	710.9
Impinger 5	699.1	698.8
Impinger 6	774.4	781.2
Impinger 7		

Method #3 - R1

	Initial	Final
Impinger 1	717.6	721.1
Impinger 2	684.2	685.2
Impinger 3	590.6	592.1
Impinger 4	719.7	718.5
Impinger 5	722.2	722.0
Impinger 6	~~814.2~~	
Impinger 7	798.8	808.1

#3 - R2

	Initial	Final
Impinger 1	700.1	706.9
Impinger 2	689.9	691.9
Impinger 3	629.6	630.7
Impinger 4	706.4	706.7
Impinger 5	712.0	712.8
Impinger 6	795.4	803.0
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2811799

100.0g wt ID: 6040

100.0g wt reading: 100.0

1000.0g wt ID: 6993

1000.0g wt reading: 1000.1

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni — Muni R3 C1 — R3

	Initial	Final
Impinger 1	719.5	~~707.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method Blend R1 C1 (Blend)

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.6
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

Blend R2 C1 (Blend)

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.6
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.7
Impinger 6	818.5	827.8
Impinger 7		

Cyclone 1

C2 — R3

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	703.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 — R1

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 — R2

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	713.3	712.8
Impinger 5	703.3	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

C3 — R3

	Initial	Final
Impinger 1	717.4	721.6
Impinger 2	681.9	682.9
Impinger 3	591.3	592.1
Impinger 4	722.4	722.8
Impinger 5	725.0	725.6
Impinger 6	808.6	817.6
Impinger 7		

Method C3 — R1

	Initial	Final
Impinger 1	705.8	~~705.0~~ 712.3
Impinger 2	691.6	~~686.9~~ 691.9
Impinger 3	630.1	629.7
Impinger 4	704.4	703.1
Impinger 5	703.4	713.0
Impinger 6	803.0	810.5
Impinger 7		

C3 — R2

	Initial	Final
Impinger 1	710.4	713.4
Impinger 2	684.1	685.3
Impinger 3	589.3	589.7
Impinger 4	720.4	720.6
Impinger 5	727.7	726.3
Impinger 6	817.6	824.3
Impinger 7		

Cyclone 3

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: _____

100.0g wt ID: _____
100.0g wt reading: _____

1000.0g wt ID: _____
1000.0g wt reading: _____

A5. Municipal Feedstock – Cyclone 2

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Muni-C2-R1
LOCATION:	Cyclone 2 - Muni	DATE :	19-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	719.8
IMP - 2 (INT) :	701.9
IMP - 3 (INT) :	578.8
IMP - 4 (INT) :	716.5
IMP - 5 (INT) :	705.4
IMP - 6 (INT) :	797.6
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	727.9
IMP - 2 (FIN) :	703.2
IMP - 3 (FIN) :	579.6
IMP - 4 (FIN) :	716.8
IMP - 5 (FIN) :	705.0
IMP - 6 (FIN) :	805.4
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.09
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	999.820
Mid Leak Check	
INTIAL METER	956.598
BEGIN TIME	9:51
END TIME	10:51

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.70	1.30	2.21	72	72	59
2	1.50	1.22	1.95	72	72	61
3	1.20	1.10	1.56	73	72	62
B1	1.50	1.22	1.95	72	72	64
2	1.50	1.22	1.95	72	72	67
3	1.00	1.00	1.30	71	72	68
C1	2.10	1.45	2.73	71	71	67
2	2.00	1.41	2.60	71	70	68
3	1.60	1.26	2.08	71	70	68
D1	1.80	1.34	2.34	71	70	68
2	1.30	1.14	1.69	70	70	69
3	1.10	1.05	1.43	70	70	68
AVERAGE:	1.53	1.23	1.98	71.3	71.1	65.8

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C2-R2
LOCATION :	Cyclone 2 - Muni	DATE :	19-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	715.2
IMP - 2 (INT) :	701.6
IMP - 3 (INT) :	586.6
IMP - 4 (INT) :	694.1
IMP - 5 (INT) :	712.3
IMP - 6 (INT) :	814.3
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	724.9
IMP - 2 (FIN) :	704.1
IMP - 3 (FIN) :	587.1
IMP - 4 (FIN) :	694.4
IMP - 5 (FIN) :	716.7
IMP - 6 (FIN) :	822.3
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.06
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	44.028
INTIAL METER	0.438
BEGIN TIME	12:32
END TIME	13:32

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.60	1.26	2.08	76	76	58
2	1.20	1.10	1.56	73	73	64
3	0.95	0.97	1.24	73	73	66
B1	1.70	1.30	2.21	74	73	67
2	1.00	1.00	1.30	74	74	69
3	0.90	0.95	1.17	74	74	69
C1	1.20	1.10	1.56	74	74	70
2	1.30	1.14	1.69	74	74	70
3	0.85	0.92	1.11	74	74	70
D1	1.20	1.10	1.56	74	74	69
2	1.50	1.22	1.95	74	74	68
3	1.10	1.05	1.43	74	74	69
AVERAGE:	1.21	1.09	1.57	74.0	73.9	67.4

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C2-R3
LOCATION :	Cyclone 2 - Muni	DATE :	19-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	724.8
IMP - 2 (INT) :	703.5
IMP - 3 (INT) :	580.8
IMP - 4 (INT) :	713.7
IMP - 5 (INT) :	702.1
IMP - 6 (INT) :	805.4
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	734.7
IMP - 2 (FIN) :	706.9
IMP - 3 (FIN) :	581
IMP - 4 (FIN) :	713.6
IMP - 5 (FIN) :	703.2
IMP - 6 (FIN) :	812.5
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.06
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	91.540
INTIAL METER	44.940
BEGIN TIME	14:39
END TIME	15:38

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.50	1.22	1.95	72	72	64
2	1.10	1.05	1.43	71	71	68
3	1.00	1.00	1.30	71	71	68
B1	1.80	1.34	2.34	72	71	68
2	1.50	1.22	1.95	72	71	69
3	1.50	1.22	1.95	72	71	70
C1	2.10	1.45	2.73	72	71	70
2	2.00	1.41	2.60	72	71	70
3	1.50	1.22	1.95	72	71	70
D1	1.80	1.34	2.34	72	72	70
2	1.30	1.14	1.69	72	72	71
3	1.00	1.00	1.30	73	72	71
AVERAGE:	1.51	1.22	1.96	71.9	71.3	69.1

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Muni-C2-R1**
LOCATION :	**Cyclone 2 - Muni**	DATE :	**19-Nov-15**

Ts (°F) =	65.8	% CO2 =	0.00	Vm (CF)	=	43.222
Ts (°R) =	525.8	% O2 =	20.90	DELTA H (ABS)	=	30.24
Tm (°F) =	71.2	% CO =	0	Ps (ABS)	=	30.24
Tm (°R) =	531.2	% N2 =	79.10	SQRT DELTA P	=	1.2277
Vl (TOT) =	17.9	Cp =	0.84	Y	=	0.9845
Vl (adj) =	NA	TIME =	60	An	=	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(\text{DELTA H ABS})}{(Tm)}$	=	42.724	DSCF
Vw std =	.04707 (Vl TOT)	=	0.845	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.019	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.981	
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.626	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.779	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	68.711	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1025352	DSCFH
	DSCFH / 60	=	17089	DSCFM
	3600 (Vs)(As)	=	1030668	ACFH
	ACFH / 60	=	17178	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (\text{Delta H abs})}{60\ (Tstd)\ (Vs)\ (Time)\ (An)\ (Ps)\ (1\text{-}Bwo)}$	=	91.0	

ISOKINETIC CALCULATION SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C2-R2
LOCATION :	Cyclone 2 - Muni	DATE :	19-Nov-15

Ts (°F) =	67.4	% CO2 =	0.00	Vm (CF) =	43.590
Ts (°R) =	527.4	% O2 =	20.90	DELTA H (ABS) =	30.18
Tm (°F) =	74.0	% CO =	0	Ps (ABS) =	30.21
Tm (°R) =	534.0	% N2 =	79.10	SQRT DELTA P =	1.0928
Vl (TOT) =	25.4	Cp =	0.84	Y =	0.9845
Vl (adj) =	NA	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	42.781	DSCF
Vw std =	.04707 (Vl TOT)	=	1.196	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.027	
Bwo =	by steam tables	=	0.0225213	
1 - Bwo =	1 - Bwo	=	0.978	adj
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.593	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.781	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	61.326	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	908541	DSCFH
	DSCFH / 60	=	15142	DSCFM
	3600 (Vs)(As)	=	919890	ACFH
	ACFH / 60	=	15332	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	102.6	adj

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Muni-C2-R3**
LOCATION :	**Cyclone 2 - Muni**	DATE :	**19-Nov-15**

Ts (°F) =	69.1	% CO2 =	0.00	Vm (CF) =	46.600
Ts (°R) =	529.1	% O2 =	20.90	DELTA H (ABS) =	30.20
Tm (°F) =	71.6	% CO =	0	Ps (ABS) =	30.21
Tm (°R) =	531.6	% N2 =	79.10	SQRT DELTA P =	1.2195
Vl (TOT) =	21.6	Cp =	0.84	Y =	0.9845
Vl (adj) =	NA	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	45.979	DSCF
Vw std =	.04707 (Vl TOT)	=	1.017	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.022	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.978	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.602	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.783	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	68.534	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1012937	DSCFH
	DSCFH / 60	=	16882	DSCFM
	3600 (Vs)(As)	=	1028012	ACFH
	ACFH / 60	=	17134	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	99.0	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Muni-C2-R1
LOCATION:	Cyclone 2 - Muni	DATE:	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1768	0	1763	0
FINAL		0.1230	0.0303	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.1230	0.0303	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		100

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	153.300	Vs	=	68.71 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std	=	42.72 DSCF
Mn	=	153.300	Ffactor	= n/a	

Qs	=	3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts) =	1025352	DSCFH
		3600 (Vs) (As) =	1030668	ACFH
		ACFH / 60 =	17178	ACFM
Cs	=	(2.205 E-6) (Mn) / (Vm Std) =	7.9118E-06	LB/SCF
Cs'	=	0.0154 (Mn) /(VmStd) =	0.0553	GRAINS/SCF
Cs'M	=	(Mn) / (VmSTD x 0.02832) =	126.7	mg/M3
PMR	=	Qs x Cs =	8.112	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Muni-C2-R2
LOCATION	Cyclone 2 - Muni	DATE :	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1776	0	1763	0
FINAL		0.0004	0.0214	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0004	0.0214	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		97

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	21.800	Vs	=	61.33 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std=		42.78 DSCF
Mn	=	21.800	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	908541 DSCFH
	3600 (Vs) (As)	=	919890.4351 ACFH
	ACFH / 60	=	15332 ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	1.12361E-06 LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0078 GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	18.0 mg/M3
PMR	= Qs x Cs	=	1.021 LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Muni-C2-R3
LOCATION	Cyclone 2 - Muni	DATE :	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1777	0	1763	0
FINAL		0.0242	0.0260	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0242	0.0260	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		85

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	50.200	Vs	=	68.53 ft/sec
Ar	=	0.000	AS	=	4.17 ft2
			Vm std=		45.98 DSCF
Mn	=	50.200	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1012937	DSCFH
	3600 (Vs) (As)	=	1028012.1	ACFH
	ACFH / 60	=	17134	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	2.40741E-06	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0168	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	38.6	mg/M3
PMR	= Qs x Cs	=	2.4386	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C2-R1
Source:	Cyclone 2 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm				Emission Rate (E) lb/hr	
Beryllium	< 0.20	ND	< 0.20	1.03E-11	1.65E-01				1.058E-05	
Cadmium	13.40	ND	13.40	6.92E-10	1.11E+01				7.091E-04	
Lead	43.00	0.92	43.00	2.22E-09	3.55E+01				2.275E-03	
Mercury	0.71	ND	0.71	3.647E-11	5.84E-01				3.739E-05	

Run Data		
V_m (dscf)	=	42.72
Q_s (dscfh)	=	1,025,352
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions	
to obtain dscm:	multiply dscf by 0.02832
to obtain ug:	multiply lb by 0.4536E09
to obtain lb:	multiply ug by 2.205E-09

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C2-R2
Source:	Cyclone 2 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	1.03E-11	1.65E-01				9.366E-06	
Cadmium	3.70	ND	3.70	1.91E-10	3.05E+00				1.733E-04	
Lead	12.10	0.92	12.10	6.24E-10	9.99E+00				5.666E-04	
Mercury	1.13	ND	1.13	5.809E-11	9.30E-01				5.278E-05	

Run Data		
V_m (dscf)	=	42.78
Q_s (dscfh)	=	908,541
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C2-R3
Source:	Cyclone 2 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.59E-12	1.54E-01				9.715E-06	
Cadmium	4.23	ND	4.23	2.03E-10	3.25E+00				2.055E-04	
Lead	17.40	0.92	17.40	8.34E-10	1.34E+01				8.452E-04	
Mercury	0.80	ND	0.80	3.837E-11	6.14E-01				3.886E-05	

Run Data		
V_m (dscf)	=	45.98
Q_s (dscfh)	=	1,012,937
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	Cyclone 2 - Muni 3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Muni-C2-R1	11/19/2015	0.146	< 0.16	< 0.0046	< 0.02	0.376	**0.707**
Muni-C2-R2	11/19/2015	0.035	< 0.16	< 0.005	< 0.023	0.904	**1.127**
Muni-C2-R3	11/19/2015	0.051	< 0.16	< 0.005	< 0.023	0.561	**0.800**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Cyclone 2 - Muni			
		Run ID	Run ID	Run ID	Reagent Blank
		Muni-C2-R1	Muni-C2-R2	Muni-C2-R3	M29-RB
Trace Metal	Units	11/19/2015	11/19/2015	11/19/2015	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	13.40	3.70	4.23	< 0.10
Lead	ug	43.00	12.10	17.40	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	MUni - C2 - R1
Source:	Cyclone 2	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.70	2.21	72	72	59	961.9	90		65	48	5
2	10.0	1.50	1.95	72	72	61	964.7	90		68	49	5
3	15.0	1.20	1.56	73	72	62	969.1	91		69	49	4
B1	20.0	1.60	2.54	72	72	64	971.9	90		71	52	5
2	25.0	1.50	1.95	72	72	67	976.0	90		72	53	5
3	30.0	1.00	1.30	71	72	68	979.2	90		71	53	4
C1	35.0	2.10	2.73	71	71	67	985.6	90		72	54	5
2	40.0	2.00	2.60	71	70	68	990.0	90		72	54	5
3	45.0	1.60	2.08	71	70	68	989.3	90		71	55	5
D1	50.0	1.80	2.34	71	70	68	994.0	89		72	55	5
2	55.0	1.30	1.69	70	70	69	997.6	89		70	55	4
3	60.0	1.10	1.43	70	70	68	—	90		71	55	4

Pstack ("H_2O):	-2.0
Bar. Pres.("H_g):	30.09
Run Time (min.):	60
Final Meter (CF):	999.820
Initial Meter (CF):	956.598
Start Time:	951
End Time:	1051

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.006	@	10	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.012	@	8	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TJ

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Muni-Cl-R2
Source:	Cyclone 2	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): +2.0

Bar. Pres.("H_g): 30.06

Run Time (min.): 60

Final Meter (CF): 44.028

Initial Meter (CF): 000.438

Start Time: 1232

End Time: 1332

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.6	2.08	76	76	58	4.1	90		55	50	5
2	10.0	1.2	1.56	73	73	64	7.7	90		63	46	5
3	15.0	0.95	1.24	73	73	66	11.2	90		67	47	5
B1	20.0	1.7	2.21	74	73	67	14.9	90		68	48	5
2	25.0	1.00	1.30	74	74	69	18.4	88		68	47	6
3	30.0	0.90	1.17	74	74	69	22.0	90		69	47	4
C1	35.0	1.2	1.56	74	74	70	25.5	90		71	49	5
2	40.0	1.3	1.69	74	74	70	29.2	91		72	50	5
3	45.0	0.85	1.11	74	74	70	32.6	90		71	51	4
D1	50.0	1.2	1.56	74	74	69	36.0	90		71	51	4
2	55.0	1.5	1.95	74	74	68	39.7	88		74	52	4
3	60.0	1.1	1.43	74	74	69	—	91		73	53	4

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.005	@	15	"Hg
Train-mid:		@		"Hg
Train-post:	0.002	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: M. Bruni

Probe Operator: T. Smith

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.30
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance: n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Muni - C2 - R3
Source:	Cyclone 2	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O):	2.0
Bar. Pres.("H_g):	30.06
Run Time (min.):	60
Final Meter (CF):	91.540
Initial Meter (CF):	44.940
Start Time:	1439
End Time:	1539

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.5	1.95	72	72	64	48.9	88		63	50	3
2	10.0	1.1	1.43	71	71	68	52.0	91		68	50	3
3	15.0	1.00	1.30	71	71	68	55.2	91		70	51	3
B1	20.0	1.8	2.34	72	71	68	58.9	90		72	51	4
2	25.0	1.5	1.95	72	71	69	63.0	90		72	52	4
3	30.0	1.5	1.95	72	71	70	66.7	90		72	53	4
C1	35.0	2.1	2.73	72	71	70	71.8	89		73	52	5
2	40.0	2.0	2.60	72	71	70	74.7	91		74	52	5
3	45.0	1.5	1.95	72	71	70	78.6	88		74	53	5
D1	50.0	1.8	2.34	72	72	70	84.0	89		75	53	5
2	55.0	1.3	1.69	72	72	71	87.9	90		75	53	5
3	60.0	1.00	1.30	73	72	71	—	90		75	52	4

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.002	@	10	"Hg
Train-mid:		@		"Hg
Train-post:	0.002	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:		@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

Date: 11/19/'15

Plant: UTe

Auto-4

Location 1

	Initial	Final
Impinger 1	720.6	735.7
Impinger 2	682.6	686.1
Impinger 3	597.2	598.2
Impinger 4	715.6	715.7
Impinger 5	721.0	721.9
Impinger 6	804.9	812.8
Impinger 7		

Manu

Method Man-1

	Initial	Final
Impinger 1	718.1	736.5
Impinger 2	699.5	708.1
Impinger 3	584.4	584.8
Impinger 4	720.6	721.4
Impinger 5	720.3	722.0
Impinger 6	822.4	832.2
Impinger 7		

Manu-2

	Initial	Final
Impinger 1	718.5	736.6
Impinger 2	678.1	681.3
Impinger 3	597.3	598.6
Impinger 4	717.3	718.8
Impinger 5	720.7	721.7
Impinger 6	804.4	813.9
Impinger 7		

Location 2

	Initial	Final
Impinger 1	718.9	724.3
Impinger 2	703.2	704.8
Impinger 3	586.6	586.7
Impinger 4	701.0	702.4
Impinger 5	714.1	713.4
Impinger 6	815.3	822.5
Impinger 7		

Method #2 - R1

	Initial	Final
Impinger 1	719.8	727.9
Impinger 2	701.9	703.2
Impinger 3	578.8	579.6
Impinger 4	716.5	718.8
Impinger 5	705.4	705.0
Impinger 6	797.5	805.4
Impinger 7		

#2 - R2

	Initial	Final
Impinger 1	715.2	724.9
Impinger 2	701.6	704.1
Impinger 3	586.6	587.1
Impinger 4	694.1	694.4
Impinger 5	712.3	713.7
Impinger 6	814.3	822.3
Impinger 7		

Location 3

	Initial	Final
Impinger 1	699.4	702.7
Impinger 2	683.9	684.5
Impinger 3	631.3	631.4
Impinger 4	711.3	710.9
Impinger 5	699.1	698.6
Impinger 6	774.4	781.2
Impinger 7		

Method #3 - R1

	Initial	Final
Impinger 1	717.6	721.1
Impinger 2	684.2	685.2
Impinger 3	590.6	592.1
Impinger 4	719.7	718.5
Impinger 5	722.2	723.0
Impinger 6	~~814.2~~	
Impinger 7	798.8	808.1

#3 - R2

	Initial	Final
Impinger 1	700.1	706.9
Impinger 2	689.9	691.9
Impinger 3	629.6	630.7
Impinger 4	706.4	706.7
Impinger 5	712.0	712.8
Impinger 6	795.4	803.0
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2811799

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

100.0g wt ID: 6040

100.0g wt reading: 100.0

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

1000.0g wt ID: 6993

1000.0g wt reading: 1000.1

Date: 11/19/19 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni — Muni R3 C1 — R3

	Initial	Final
Impinger 1	719.5	~~707.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

Blend Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.6
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.7
Impinger 6	818.5	827.8
Impinger 7		

Cyclone 1

C2 — R3

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	703.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 — R1

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 — R2

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	712.3	712.8
Impinger 5	703.3	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

C3 — R3

	Initial	Final
Impinger 1	717.4	721.6
Impinger 2	681.9	682.9
Impinger 3	591.3	592.1
Impinger 4	722.4	722.8
Impinger 5	725.0	725.6
Impinger 6	808.6	817.6
Impinger 7		

Method C3 — R1

	Initial	Final
Impinger 1	705.8	~~709.0~~ 712.3
Impinger 2	691.6	~~685.9~~ 691.9
Impinger 3	630.1	627.7
Impinger 4	704.4	703.1
Impinger 5	703.4	713.0
Impinger 6	803.6	810.5
Impinger 7		

C3 — R2

	Initial	Final
Impinger 1	710.4	713.4
Impinger 2	684.1	685.3
Impinger 3	589.7	589.7
Impinger 4	720.4	720.6
Impinger 5	727.7	726.3
Impinger 6	817.6	824.7
Impinger 7		

Cyclone 3

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: _____

100.0g wt ID: _____
100.0g wt reading: _____

1000.0g wt ID: _____
1000.0g wt reading: _____

A6. Municipal Feedstock – Cyclone 3

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Muni-C3-R1
LOCATION:	Cyclone 3 - Muni	DATE :	19-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	717.6
IMP - 2 (INT) :	684.2
IMP - 3 (INT) :	590.6
IMP - 4 (INT) :	719.7
IMP - 5 (INT) :	722.7
IMP - 6 (INT) :	798.8
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	721.1
IMP - 2 (FIN) :	685.2
IMP - 3 (FIN) :	592.1
IMP - 4 (FIN) :	718.5
IMP - 5 (FIN) :	723.0
IMP - 6 (FIN) :	808.6
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.09
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	597.910
Mid Leak Check	
INTIAL METER	552.516
BEGIN TIME	9:51
END TIME	10:51

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.90	1.38	2.28	66	67	57
2	1.80	1.34	2.16	66	67	57
3	1.10	1.05	1.32	66	67	62
B1	2.20	1.48	2.64	65	67	61
2	1.80	1.34	2.16	65	67	61
3	1.10	1.05	1.32	65	67	62
C1	2.20	1.48	2.64	65	66	61
2	2.00	1.41	2.40	65	66	62
3	1.60	1.26	1.92	65	67	63
D1	2.30	1.52	2.76	65	67	63
2	1.90	1.38	2.28	65	66	64
3	1.60	1.26	1.92	65	66	64
AVERAGE:	1.79	1.33	2.15	65.3	66.7	61.4

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C3-R2
LOCATION :	Cyclone 3 - Muni	DATE :	19-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	700.1
IMP - 2 (INT) :	689.9
IMP - 3 (INT) :	629.6
IMP - 4 (INT) :	706.4
IMP - 5 (INT) :	712.0
IMP - 6 (INT) :	795.4
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	706.9
IMP - 2 (FIN) :	691.9
IMP - 3 (FIN) :	630.7
IMP - 4 (FIN) :	706.7
IMP - 5 (FIN) :	712.8
IMP - 6 (FIN) :	803.0
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.06
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	636.272
INTIAL METER	599.001
BEGIN TIME	12:32
END TIME	13:32

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.50	1.22	1.80	68	68	59
2	1.20	1.10	1.44	68	68	59
3	1.20	1.10	1.44	68	68	64
B1	1.00	1.00	1.20	68	69	64
2	1.30	1.14	1.56	68	69	66
3	1.00	1.00	1.20	68	69	67
C1	1.50	1.22	1.80	68	69	67
2	1.70	1.30	2.04	68	69	68
3	0.90	0.95	1.08	69	69	68
D1	1.60	1.26	1.92	69	69	67
2	1.80	1.34	2.16	69	70	68
3	1.00	1.00	1.20	69	70	68
AVERAGE:	1.31	1.14	1.57	68.3	68.9	65.4

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C3-R3
LOCATION :	Cyclone 3 - Muni	DATE :	19-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	717.4
IMP - 2 (INT) :	681.9
IMP - 3 (INT) :	591.3
IMP - 4 (INT) :	722.4
IMP - 5 (INT) :	725
IMP - 6 (INT) :	808.6
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	721.6
IMP - 2 (FIN) :	682.9
IMP - 3 (FIN) :	592.1
IMP - 4 (FIN) :	722.8
IMP - 5 (FIN) :	725.6
IMP - 6 (FIN) :	817.6
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	30.06
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	682.138
INTIAL METER	637.060
BEGIN TIME	14:38
END TIME	15:38

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.70	1.30	2.04	68	69	61
2	1.30	1.14	1.56	67	68	64
3	1.10	1.05	1.32	67	68	65
B1	2.20	1.48	2.64	67	68	67
2	1.30	1.14	1.56	67	68	67
3	1.70	1.30	2.04	67	68	67
C1	2.50	1.58	3.00	67	68	67
2	1.40	1.18	1.68	67	68	67
3	1.10	1.05	1.32	67	68	66
D1	2.30	1.52	2.76	67	68	66
2	1.50	1.22	1.80	67	68	66
3	1.10	1.05	1.32	67	68	66
AVERAGE:	1.60	1.25	1.92	67.1	68.1	65.8

ISOKINETIC CALCULATION SHEET

PLANT : **wTe Recycling**	RUN # : **Muni-C3-R1**
LOCATION : **Cyclone 3 - Muni**	DATE : **19-Nov-15**

Ts (°F) =	61.4	% CO2 =	0.00	Vm (CF) =	45.394
Ts (°R) =	521.4	% O2 =	20.90	DELTA H (ABS) =	30.25
Tm (°F) =	66.0	% CO =	0	Ps (ABS) =	30.24
Tm (°R) =	526.0	% N2 =	79.10	SQRT DELTA P =	1.3304
Vl (TOT) =	14.9	Cp =	0.84	Y =	1.0419
Vl (adj) =	NA	TIME =	60	An =	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	47.981	DSCF
Vw std =	.04707 (Vl TOT)	=	0.701	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.014	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.986	
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.680	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.775	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	74.082	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1120348	DSCFH
	DSCFH / 60	=	18672	DSCFM
	3600 (Vs)(As)	=	1111225	ACFH
	ACFH / 60	=	18520	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	102.0	

ISOKINETIC CALCULATION SHEET

PLANT :	wTe Recycling	RUN # :	Muni-C3-R2
LOCATION :	Cyclone 3 - Muni	DATE :	19-Nov-15

Ts (°F) =	65.4	% CO2 =	0.00	Vm (CF) =	37.271
Ts (°R) =	525.4	% O2 =	20.90	DELTA H (ABS) =	30.18
Tm (°F) =	68.6	% CO =	0	Ps (ABS) =	30.21
Tm (°R) =	528.6	% N2 =	79.10	SQRT DELTA P =	1.1366
Vl (TOT) =	18.6	Cp =	0.84	Y =	1.0419
Vl (adj) =	NA	TIME =	60	An =	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	39.102	DSCF
Vw std =	.04707 (Vl TOT)	=	0.876	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.022	
Bwo =	by steam tables	=	0.0210078	
1 - Bwo =	1 - Bwo	=	0.979	adj
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.609	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.780	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	63.645	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	947868	DSCFH
	DSCFH / 60	=	15798	DSCFM
	3600 (Vs)(As)	=	954678	ACFH
	ACFH / 60	=	15911	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	98.1	adj

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Muni-C3-R3**
LOCATION :	**Cyclone 3 - Muni**	DATE :	**19-Nov-15**

Ts (°F) =	65.8	% CO2 =	0.00	Vm (CF)	=	45.078
Ts (°R) =	525.8	% O2 =	20.90	DELTA H (ABS)	=	30.20
Tm (°F) =	67.6	% CO =	0	Ps (ABS)	=	30.21
Tm (°R) =	527.6	% N2 =	79.10	SQRT DELTA P	=	1.2519
Vl (TOT) =	16.0	Cp =	0.84	Y	=	1.0419
Vl (adj) =	NA	TIME =	60	An	=	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	47.427	DSCF
Vw std =	.04707 (Vl TOT)	=	0.753	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.016	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.984	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.667	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.779	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	70.053	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1048346	DSCFH
	DSCFH / 60	=	17472	DSCFM
	3600 (Vs)(As)	=	1050798	ACFH
	ACFH / 60	=	17513	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	107.6	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Muni-C3-R1
LOCATION:	Cyclone 3 - Muni	DATE:	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1771	0	1763	0
FINAL		0.0635	0.0219	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0635	0.0219	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		110

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	85.400	Vs	=	74.08 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std	=	47.98 DSCF
Mn	=	85.400	Ffactor	=	n/a

Qs	=	3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts) =	1120348	DSCFH
		3600 (Vs) (As) =	1111225	ACFH
		ACFH / 60 =	18520	ACFM
Cs	=	(2.205 E-6) (Mn) / (Vm Std) =	3.92461E-06	LB/SCF
Cs'	=	0.0154 (Mn) /(VmStd) =	0.0274	GRAINS/SCF
Cs'M	=	(Mn) / (VmSTD x 0.02832) =	62.8	mg/M3
PMR	=	Qs x Cs =	4.397	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Muni-C3-R2
LOCATION	Cyclone 3 - Muni	DATE :	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1774	0	1763	0
FINAL		0.0005	0.0295	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0005	0.0295	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		150

Mn - Ar = Mn			O2	=	20.90
			CO2	=	0.00
Mn	=	30.000	Vs	=	63.65 ft/sec
Ar	=	0.000	As	=	4.17 ft2
			Vm std=		39.10 DSCF
Mn	=	30.000	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	947868	DSCFH
	3600 (Vs) (As)	=	954677.9518	ACFH
	ACFH / 60	=	15911	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	1.69172E-06	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0118	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	27.1	mg/M3
PMR	= Qs x Cs	=	1.604	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Muni-C3-R3
LOCATION	Cyclone 3 - Muni	DATE :	19-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1779	0	1763	0
FINAL		0.0043	0.0166	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0043	0.0166	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		100

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	20.900	Vs	=	70.05 ft/sec
Ar	=	0.000	AS	=	4.17 ft2
			Vm std=		47.43 DSCF
Mn	=	20.900	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1048346	DSCFH
	3600 (Vs) (As)	=	1050798.044	ACFH
	ACFH / 60	=	17513	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	9.71701E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0068	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	15.6	mg/M3
PMR	= Qs x Cs	=	1.0187	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C3-R1
Source:	Cyclone 3 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm				Emission Rate (E) lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.19E-12	1.47E-01				1.030E-05	
Cadmium	9.65	ND	9.65	4.43E-10	7.10E+00				4.968E-04	
Lead	22.00	0.92	22.00	1.01E-09	1.62E+01				1.133E-03	
Mercury	0.41	ND	0.41	1.87E-11	2.99E-01				2.095E-05	

Run Data		
V_m (dscf)	=	47.98
Q_s (dscfh)	=	1,120,348
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C3-R2
Source:	Cyclone 3 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	1.13E-11	1.81E-01				1.069E-05	
Cadmium	4.76	ND	4.76	2.68E-10	4.30E+00				2.544E-04	
Lead	19.30	0.92	19.30	1.09E-09	1.74E+01				1.032E-03	
Mercury	0.65	ND	0.65	3.655E-11	5.85E-01				3.464E-05	

Run Data		
V_m (dscf)	=	39.10
Q_s (dscfh)	=	947,868
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Muni-C3-R3
Source:	Cyclone 3 - Muni	Date:	19-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.30E-12	1.49E-01				9.748E-06	
Cadmium	2.17	ND	2.17	1.01E-10	1.62E+00				1.058E-04	
Lead	11.90	0.92	11.90	5.53E-10	8.86E+00				5.800E-04	
Mercury	0.46	ND	0.46	2.134E-11	3.42E-01				2.238E-05	

Run Data		
V_m (dscf)	=	47.43
Q_s (dscfh)	=	1,048,346
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	Cyclone 3 - Muni 3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Muni-C3-R1	11/19/2015	0.048	< 0.16	< 0.0049	< 0.023	0.171	**0.407**
Muni-C3-R2	11/19/2015	< 0.015	< 0.17	< 0.0051	< 0.023	0.435	**0.648**
Muni-C3-R3	11/19/2015	0.026	< 0.16	< 0.0051	< 0.023	0.245	**0.459**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Cyclone 3 - Muni			
		Run ID	Run ID	Run ID	Reagent Blank
		Muni-C3-R1	Muni-C3-R2	Muni-C3-R3	M29-RB
Trace Metal	Units	11/19/2015	11/19/2015	11/19/2015	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	9.65	4.76	2.17	< 0.10
Lead	ug	22.00	19.30	11.90	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Mun - C3 - R1
Source:	Cyclone 3	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.40	2.28	66	67	57	556.3	92		58	55	5
2	10.0	1.80	2.16	66	67	57	560.3	85		66	54	5
3	15.0	1.10	1.32	66	67	62	563.5	86		68	54	5
B1	20.0	2.20	2.64	65	67	61	567.5	96		68	56	4
2	25.0	1.80	2.16	65	67	61	571.6	100		69	57	5
3	30.0	1.10	1.32	65	67	62	574.8	83		72	59	4
C1	35.0	2.20	2.64	65	66	61	578.4	84		70	50	4
2	40.0	2.00	2.40	65	66	62	581.6	86		71	59	5
3	45.0	1.60	1.92	65	67	63	586.4	87		71	60	5
D1	50.0	2.30	2.76	65	67	63	590.1	87		71	60	5
2	55.0	1.90	2.28	65	66	64	594.1	87		72	61	5
3	60.0	1.60	1.92	65	66	64	—	87		72	61	5

Pstack ("H_2O):	-2.0
Bar. Pres.("H_g):	30.09
Run Time (min.):	60
Final Meter (CF):	597.910
Initial Meter (CF):	552.516
Start Time:	0951
End Time:	1051

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:				
Train-pre:	0.001	@	15	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.006	@	10	"Hg
Pitot-pre:	✓	@	?	"H_2O
Pitot-post:	✓	@	?	"H_2O

Field Team Members:

Box Operator: S. Thompson

Probe Operator: T. Smith

Sampling Train Information:	
Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.10
Nozzle ID: /Nozzle Diameter:	.180
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Mu-C3-R2
Source:	Cyclone 3	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.50	1.80	68	68	59	602.5	87		57	51	5
2	10.0	1.20	1.44	68	68	59	605.8	87		57	51	5
3	15.0	1.20	1.44	68	68	64	609.1	87		65	51	5
B1	20.0	1.00	1.20	68	69	64	612.1	85		68	54	5
2	25.0	1.30	1.56	68	69	66	615.4	86		69	53	5
3	30.0	1.00	1.20	68	69	67	618.6	87		70	54	4
C1	35.0	1.50	1.80	68	69	67	621.8	88		70	54	5
2	40.0	1.70	2.04	68	69	68	623.4	87		71	55	5
3	45.0	0.90	1.08	69	69	68	625.8	87		71	56	4
D1	50.0	1.60	1.92	69	69	67	629.2	87		72	57	5
2	55.0	1.80	2.16	69	70	68	631.9	86		72	57	5
3	60.0	1.00	1.20	69	70	68	—	86		73	58	5

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	~~+1.8~~ 30.06
Run Time (min.):	60
Final Meter (CF):	636.272
Initial Meter (CF):	599.001
Start Time:	1232
End Time:	1332

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.004	@	15	"Hg
Train-mid:		@		"Hg
Train-post:	0.004	@	8	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: S. Thompson

Probe Operator: T. Smith

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.10
Nozzle ID: /Nozzle Diameter:	.180
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	MUN. - C3 - R3
Source:	Cyclone 3	Date:	19 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.70	2.04	68	69	61	641.0	89		62	55	5
2	10.0	1.30	1.56	67	68	64	644.5	88		64	55	5
3	15.0	1.10	1.32	67	68	65	647.6	86		68	57	5
B1	20.0	2.20	2.64	67	68	67	651.9	85		68	59	5
2	25.0	1.50	1.80	67	68	67	655.6	85		70	59	5
3	30.0	1.70	2.04	67	68	67	659.3	85		70	60	4
C1	35.0	~~2.50~~	~~2.07~~	67	68	67	663.6	84		70	60	5
2	40.0	1.40	3:00 1.68	67	68	67	667.8	84		70	60	5
3	45.0	1.10	1.32	67	68	66	671.0	85		71	61	5
D1	50.0	2.30	2.76	67	68	66	675.3	85		71	61	5
2	55.0	1.50	1.80	67	68	66	679.0	85		72	62	5
3	60.0	1.10	1.32	67	68	66	—	85		71	62	5

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	30.06
Run Time (min.):	60
Final Meter (CF):	682.138
Initial Meter (CF):	657.060
Start Time:	1438
End Time:	1538

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:				
Train-pre:	0.005	@	15	"Hg
Train-mid:		@		"Hg
Train-post:	0.001	@	6	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:		@	3	"H_2O

Field Team Members:

Box Operator: S. Thompson

Probe Operator: T. Smith

Sampling Train Information:	
Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.20
Nozzle ID: /Nozzle Diameter:	.180
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6918 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance: n/a

Date: 11/19/18

Plant: UTe

Multi

Auh-4

Location 1

	Initial	Final
Impinger 1	720.6	735.7
Impinger 2	682.6	686.1
Impinger 3	597.2	598.2
Impinger 4	715.6	715.7
Impinger 5	721.0	721.9
Impinger 6	804.9	812.8
Impinger 7		

Method Mun-1

	Initial	Final
Impinger 1	718.1	726.5
Impinger 2	699.5	708.1
Impinger 3	584.4	584.8
Impinger 4	720.6	721.4
Impinger 5	720.3	722.0
Impinger 6	822.4	832.2
Impinger 7		

Muni-2

	Initial	Final
Impinger 1	718.5	736.6
Impinger 2	678.1	681.3
Impinger 3	597.3	598.6
Impinger 4	717.3	718.8
Impinger 5	720.7	721.7
Impinger 6	804.4	813.4
Impinger 7		

Location 2

	Initial	Final
Impinger 1	718.5	724.3
Impinger 2	703.2	704.8
Impinger 3	586.6	586.7
Impinger 4	701.0	702.4
Impinger 5	714.1	713.4
Impinger 6	815.3	822.5
Impinger 7		

Method #2 – R1

	Initial	Final
Impinger 1	719.8	727.9
Impinger 2	701.9	703.2
Impinger 3	578.9	579.6
Impinger 4	716.5	716.8
Impinger 5	705.4	705.0
Impinger 6	797.5	805.4
Impinger 7		

#2 – R2

	Initial	Final
Impinger 1	715.2	724.9
Impinger 2	701.6	704.1
Impinger 3	586.6	587.1
Impinger 4	694.1	694.4
Impinger 5	712.3	713.7
Impinger 6	814.3	822.3
Impinger 7		

Location 3

	Initial	Final
Impinger 1	699.4	702.7
Impinger 2	683.9	684.5
Impinger 3	631.3	631.4
Impinger 4	711.3	710.9
Impinger 5	699.1	698.6
Impinger 6	774.4	781.2
Impinger 7		

Method #3 – R1

	Initial	Final
Impinger 1	717.6	721.1
Impinger 2	684.2	685.2
Impinger 3	590.6	592.1
Impinger 4	719.7	718.5
Impinger 5	722.2	723.0
Impinger 6	~~814.0~~	
Impinger 7	798.8	808.1

#3 – R2

	Initial	Final
Impinger 1	700.1	706.9
Impinger 2	689.9	691.9
Impinger 3	629.6	630.7
Impinger 4	706.4	706.7
Impinger 5	712.0	712.8
Impinger 6	795.4	803.0
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: 5A2811799

100.0g wt ID: 6040

100.0g wt reading: 100.0

1000.0g wt ID: 6993

1000.0g wt reading: 1000.1

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VJe

Muni — Muni R3 C1 — R3

	Initial	Final
Impinger 1	719.5	~~702.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

Blend Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.8
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.7
Impinger 6	818.5	827.8
Impinger 7		

C, clone 1

C2 — R3

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	703.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 — R1

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 — R2

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	712.3	712.8
Impinger 5	703.3	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

C3 — R3

	Initial	Final
Impinger 1	717.4	721.6
Impinger 2	681.9	682.9
Impinger 3	591.3	592.1
Impinger 4	722.4	722.8
Impinger 5	725.0	725.6
Impinger 6	808.6	817.6
Impinger 7		

Method C3 — R1

	Initial	Final
Impinger 1	705.8	~~705.0~~ 712.2
Impinger 2	691.6	~~686.9~~ 691.9
Impinger 3	630.1	629.7
Impinger 4	704.4	703.1
Impinger 5	703.4	713.0
Impinger 6	803.6	810.5
Impinger 7		

C3 — R2

	Initial	Final
Impinger 1	710.4	713.4
Impinger 2	684.1	685.3
Impinger 3	589.7	589.7
Impinger 4	720.4	720.6
Impinger 5	727.7	726.3
Impinger 6	817.6	824.7
Impinger 7		

Cyclone 3

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: _____

100.0g wt ID: _____
100.0g wt reading: _____

1000.0g wt ID: _____
1000.0g wt reading: _____

A7. Blended Feedstock – Scrubber/Cyclone 1

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Blend-C1-R1
LOCATION:	Scrubber/Cyclone 1 - Blend	DATE :	20-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	718.3
IMP - 2 (INT) :	678.9
IMP - 3 (INT) :	596.8
IMP - 4 (INT) :	718.6
IMP - 5 (INT) :	717.7
IMP - 6 (INT) :	813.9
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	736.9
IMP - 2 (FIN) :	681.7
IMP - 3 (FIN) :	596.8
IMP - 4 (FIN) :	719.9
IMP - 5 (FIN) :	719.0
IMP - 6 (FIN) :	822.1
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	-1.3
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	340.643
Mid Leak Check INTIAL METER	290.890
BEGIN TIME	8:09
END TIME	9:09

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.50	1.58	2.30	62	61	87
2	2.60	1.61	2.30	61	61	89
3	2.65	1.63	2.25	61	61	90
4	1.75	1.32	2.25	61	61	90
B1	2.80	1.67	2.25	61	61	91
2	2.75	1.66	2.25	61	61	91
3	2.50	1.58	2.25	61	61	91
4	1.50	1.22	2.20	61	61	89
C1	2.40	1.55	2.20	61	61	90
2	2.30	1.52	2.20	61	61	91
3	2.50	1.58	2.20	61	61	91
4	1.90	1.38	2.20	61	61	91
D1	1.90	1.38				90
2	2.06	1.43				91
3	2.20	1.48				91
4	1.95	1.40				91
AVERAGE:	2.27	1.50	2.24	61.1	61.0	90.3

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Blend-C1-R2
LOCATION :	Scrubber/Cyclone 1 - Blend	DATE :	20-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	718.8
IMP - 2 (INT) :	701.6
IMP - 3 (INT) :	584.0
IMP - 4 (INT) :	721.1
IMP - 5 (INT) :	721.8
IMP - 6 (INT) :	818.5
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	737.1
IMP - 2 (FIN) :	703.6
IMP - 3 (FIN) :	585.1
IMP - 4 (FIN) :	720.8
IMP - 5 (FIN) :	722.7
IMP - 6 (FIN) :	827.8
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	-1.3
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	390.805
INTIAL METER	340.896
BEGIN TIME	10:16
END TIME	11:21

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.60	1.61	2.30	61	61	94
2	2.65	1.63	2.30	61	61	95
3	2.60	1.61	2.30	61	61	95
4	2.00	1.41	2.25	61	61	95
B1	2.80	1.67	2.25	61	61	95
2	2.70	1.64	2.25	61	61	96
3	2.50	1.58	2.25	61	61	96
4	1.70	1.30	2.25	61	61	95
C1	2.25	1.50	2.20	61	61	94
2	2.35	1.53	2.20	61	61	95
3	2.40	1.55	2.20	61	61	96
4	1.70	1.30	2.20	61	61	95
D1	1.80	1.34				94
2	2.05	1.43				95
3	2.20	1.48				95
4	1.90	1.38				96
AVERAGE:	2.26	1.50	2.25	61.0	61.0	95.1

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Blend-C1-R3
LOCATION :	Scrubber/Cyclone 1 - Blend	DATE :	20-Nov-15

As (SQFT) :	7.500
Dn (INCHES)	0.185
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	721.3
IMP - 2 (INT) :	681.9
IMP - 3 (INT) :	596.8
IMP - 4 (INT) :	719.7
IMP - 5 (INT) :	722
IMP - 6 (INT) :	822.1
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	743
IMP - 2 (FIN) :	685
IMP - 3 (FIN) :	597.5
IMP - 4 (FIN) :	721.5
IMP - 5 (FIN) :	724.4
IMP - 6 (FIN) :	829.6
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	-1.3
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	441.536
INTIAL METER	391.589
BEGIN TIME	12:16
END TIME	13:16

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	2.50	1.58	2.30	61	61	90
2	2.60	1.61	2.30	61	61	96
3	2.65	1.63	2.20	61	61	96
4	1.80	1.34	2.20	61	61	96
B1	2.65	1.63	2.20	62	62	96
2	2.70	1.64	2.20	62	62	97
3	2.55	1.60	2.20	62	62	96
4	1.70	1.30	2.00	62	62	96
C1	2.30	1.52	2.20	62	62	94
2	2.30	1.52	2.20	62	62	96
3	2.40	1.55	2.20	62	62	96
4	1.85	1.36	2.20	62	62	96
D1	1.80	1.34				95
2	2.00	1.41				96
3	2.10	1.45				96
4	1.80	1.34				96
AVERAGE:	2.23	1.49	2.20	61.7	61.7	95.5

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Blend-C1-R1**
LOCATION :	**Scrubber/Cyclone 1 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	90.3	% CO2 =	0.00	Vm (CF) =	49.753
Ts (°R) =	550.3	% O2 =	20.90	DELTA H (ABS) =	29.97
Tm (°F) =	61.0	% CO =	0	Ps (ABS) =	29.71
Tm (°R) =	521.0	% N2 =	79.10	SQRT DELTA P =	1.4999
Vl (TOT) =	32.2	Cp =	0.84	Y =	1.0037
Vl (adj) =	NA	TIME =	60	An =	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	50.676	DSCF
Vw std =	.04707 (Vl TOT)	=	1.516	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.029	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.971	
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.521	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.806	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	86.792	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2167466	DSCFH
	DSCFH / 60	=	36124	DSCFM
	3600 (Vs)(As)	=	2343394	ACFH
	ACFH / 60	=	39057	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	94.1	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Blend-C1-R2**
LOCATION :	**Scrubber/Cyclone 1 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	95.1	% CO2 =	0.00	Vm (CF) =	49.909
Ts (°R) =	555.1	% O2 =	20.90	DELTA H (ABS) =	29.98
Tm (°F) =	61.0	% CO =	0	Ps (ABS) =	29.71
Tm (°R) =	521.0	% N2 =	79.10	SQRT DELTA P =	1.4993
Vl (TOT) =	31.3	Cp =	0.84	Y =	1.0037
Vl (adj) =	NA	TIME =	60	An =	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	50.840	DSCF
Vw std =	.04707 (Vl TOT)	=	1.473	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.028	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.972	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.531	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.809	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	87.122	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2158777	DSCFH
	DSCFH / 60	=	35980	DSCFM
	3600 (Vs)(As)	=	2352288	ACFH
	ACFH / 60	=	39205	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	94.8	

ISOKINETIC CALCULATION SHEET

PLANT	: **wTe Recycling**	RUN # :	**Blend-C1-R3**
LOCATION	: **Scrubber/Cyclone 1 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	95.5	% CO2 =	0.00	Vm (CF) =	49.947
Ts (°R) =	555.5	% O2 =	20.90	DELTA H (ABS) =	29.97
Tm (°F) =	61.7	% CO =	0	Ps (ABS) =	29.71
Tm (°R) =	521.7	% N2 =	79.10	SQRT DELTA P =	1.4890
Vl (TOT) =	37.2	Cp =	0.84	Y =	1.0037
Vl (adj) =	NA	TIME =	60	An =	0.000187

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	50.808	DSCF
Vw std =	.04707 (Vl TOT)	=	1.751	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.033	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.967	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.475	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.810	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	86.639	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2133763	DSCFH
	DSCFH / 60	=	35563	DSCFM
	3600 (Vs)(As)	=	2339266	ACFH
	ACFH / 60	=	38988	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	95.8	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Blend-C1-R1
LOCATION:	Scrubber/Cyclone 1 - Blen	DATE:	20-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1784	0	1763	0
FINAL		0.0059	0.0063	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0059	0.0063	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		130

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	12.200	Vs	=	86.79 ft/sec
Ar	=	0.000	As	=	7.50 ft2
			Vm std	=	50.68 DSCF
Mn	=	12.200	Ffactor	= n/a	

Qs	= 3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2167466	DSCFH
	3600 (Vs) (As)	=	2343394	ACFH
	ACFH / 60	=	39057	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	5.30844E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmStd)	=	0.0037	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	8.5	mg/M3
PMR	= Qs x Cs	=	1.151	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Blend-C1-R2
LOCATION	Scrubber/Cyclone 1 - Blen	DATE :	20-Nov-15

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER	1772	0	1763	0
FINAL	0.0064	0.0060	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0064	0.0060	0.0000	0.0000

VOLUME BLANK RINSE	100
VOLUME OF RINSE	110

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	12.400	Vs	=	87.12 ft/sec
Ar	=	0.000	As	=	7.50 ft2
			Vm std=		50.84 DSCF
Mn	=	12.400	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2158777	DSCFH
	3600 (Vs) (As)	=	2352287.846	ACFH
	ACFH / 60	=	39205	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	5.37806E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0038	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	8.6	mg/M3
PMR	= Qs x Cs	=	1.161	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Blend-C1-R3
LOCATION	crubber/Cyclone 1 - Blen	DATE :	20-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1782	0	1763	0
FINAL		0.0096	0.0049	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0096	0.0049	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		110

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	14.500	Vs	=	86.64 ft/sec
Ar	=	0.000	AS	=	7.50 ft2
			Vm std=		50.81 DSCF
Mn	=	14.500	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	2133763	DSCFH
	3600 (Vs) (As)	=	2339266.257	ACFH
	ACFH / 60	=	38988	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	6.29282E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0044	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	10.1	mg/M3
PMR	= Qs x Cs	=	1.3427	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C1-R1
Source:	Scrubber/Cyclone 1 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.70E-12	1.39E-01				1.886E-05	
Cadmium	2.81	ND	2.81	1.22E-10	1.96E+00				2.650E-04	
Lead	3.26	0.92	3.26	1.42E-10	2.27E+00				3.075E-04	
Mercury	5.45	ND	5.45	2.371E-10	3.80E+00				5.139E-04	

Run Data		
V_m (dscf)	=	50.68
Q_s (dscfh)	=	2,167,466
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C1-R2
Source:	Scrubber/Cyclone 1 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.67E-12	1.39E-01				1.873E-05	
Cadmium	2.26	ND	2.26	9.80E-11	1.57E+00				2.116E-04	
Lead	2.56	0.92	2.56	1.11E-10	1.78E+00				2.397E-04	
Mercury	8.36	ND	8.36	3.625E-10	5.80E+00				7.825E-04	

Run Data		
V_m (dscf)	=	50.84
Q_s (dscfh)	=	2,158,777
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions	
to obtain dscm:	multiply dscf by 0.02832
to obtain ug:	multiply lb by 0.4536E09
to obtain lb:	multiply ug by 2.205E-09

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C1-R3
Source:	Scrubber/Cyclone 1 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.68E-12	1.39E-01				1.852E-05	
Cadmium	2.08	ND	2.08	9.03E-11	1.45E+00				1.926E-04	
Lead	3.19	0.92	3.19	1.38E-10	2.22E+00				2.954E-04	
Mercury	2.80	ND	2.80	1.213E-10	1.94E+00				2.589E-04	

Run Data		
V_m (dscf)	=	50.81
Q_s (dscfh)	=	2,133,763
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	Scrubber/Cyclone 1 - Blend 3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Blend-C1-R1	11/20/2015	0.017	< 0.16	< 0.005	0.467	4.8	**5.449**
Blend-C1-R2	11/20/2015	< 0.015	< 0.17	< 0.0047	0.088	8.08	**8.358**
Blend-C1-R3	11/20/2015	< 0.015	< 0.16	< 0.0047	0.06	2.56	**2.796**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Scrubber/Cyclone 1 - Blend			
		Run ID	Run ID	Run ID	Reagent Blank
		Blend-C1-R1	Blend-C1-R2	Blend-C1-R3	M29-RB
Trace Metal	Units	11/20/2015	11/20/2015	11/20/2015	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	2.81	2.26	2.08	< 0.10
Lead	ug	3.26	2.56	3.19	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Blend - C1 - R1
Source:	Scrubber/Cyclone 1	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Dry Gas Meter Temp (F)
A1	5.0	2.50	2.30	62	61	87	295.1	OFF	2.30	66	44	5	93
2	10.0	2.60	2.30	61	61	89	299.2	OFF	2.30	67	42	5	99
3	15.0	2.65	2.25	61	61	90	303.4	OFF	2.25	71	47	5	10[illegible]
4	20.0	1.75	2.25	61	61	90	307.5	OFF	2.25	74	48	5	103
B1	25.0	2.80	2.25	61	61	91	311.7	OFF	2.25	74	48	5	104
2	30.0	2.75	2.25	61	61	91	315.8	OFF	2.25	75	50	5	10[illegible]
3	35.0	2.50	2.25	61	61	91	319.9	OFF	2.25	75	51	5	105
4	40.0	1.50	2.20	61	61	89	324.1	OFF	2.20	75	51	5	105
C1	45.0	2.40	2.20	61	61	90	328.2	OFF	2.20	76	52	5	10[illegible]
2	50.0	2.30	2.20	61	61	91	332.3	OFF	2.20	77	51	5	10[illegible]
3	55.0	2.50	2.20	61	61	91	336.4	OFF	2.20	77	52	5	10[illegible]
4	60.0	1.90	2.20	61	61	91	—	OFF	2.20	78	52	5	10[illegible]
D1		1.90				90							
2		2.05				91							
3		2.20				91							
4		1.95				91							

Pstack ("H_2O):	-1.30
Bar. Pres.("H_g):	29.81
Run Time (min.):	60
Final Meter (CF):	340.643
Initial Meter (CF):	290.890
Start Time:	0809
End Time:	0909

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:				
Train-pre:	0.001	@	10	"Hg
Train-mid:	–	@	–	"Hg
Train-post:	0.003	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:	
Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Blend - C1 - R2
Source:	Scrubber/Cyclone 1	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -1.30

Bar. Pres.("H_g): 29.81

Run Time (min.): 60

Final Meter (CF): 390.805

Initial Meter (CF): 340.896

Start Time: 1016

End Time: 1121

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	~~Filter Temp (F)~~ Dry Gas Cf	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Ts
A1	5.0	2.60	2.30	61	61	94	345.1	OFF	2.30	65	50	8	97
2	10.0	2.65	2.30	61	61	95	349.3		2.30	65	47	8	98
3	15.0	2.60	2.30	61	61	95	353.5		2.30	67	48	9	105
4	20.0	2.00	2.25	61	61	95	357.6		2.25	72	51	9	103
B1	25.0	2.80	2.25	61	61	95	361.8		2.25	73	52	9	108
2	30.0	2.70	2.25	61	61	96	366.0		2.25	74	53	9	109
3	35.0	2.50	2.25	61	61	96	370.1		2.25	74	53	9	107
4	40.0	1.70	2.25	61	61	95	374.2		2.25	75	55	9	109
C1	45.0	2.25	2.20	61	61	94	378.4		2.20	75	56	9	108
2	50.0	2.35	2.20	61	61	95	382.5		2.20	76	58	9	107
3	55.0	2.40	2.20	61	61	96	386.6		2.20	76	59	9	107
4	60.0	1.70	2.20	61	61	95	—		2.20	76	61	9	106
D1		1.80				94							
2		2.05				95							
3		2.20				95							
4		1.90				96							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:				
Train-pre:	0.001	@	10	"Hg
Train-mid:	—	@	—	"Hg
Train-post:	0.001	@	10	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:	
Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Iso Probe ID: P-3-6

Pause: 1019
Restart: 1023

Scale Calibration:

100.0 g 99.9

1,000.0 g 999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Blend - C1 - R3
Source:	Scrubber/Cyclone 1	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Pstack ("H_2O): -1.30

Bar. Pres.("H_g): 29.81

Run Time (min.): 60

Final Meter (CF): 441.536

Initial Meter (CF): 391.589

Start Time: 1216

End Time: 1316

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	~~Filter Temp (F)~~ DP @C2	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)	Ts @C2
A1	5.0	2.50	2.30	61	61	90	395.8	OFF	2.30	66	54	6	98
2	10.0	2.60	2.30	61	61	96	400.0		2.30	71	52	6	10[illegible]
3	15.0	2.65	2.20	61	61	96	404.2		2.20	72	50	6	10[illegible]
4	20.0	1.80	2.20	61	61	96	408.4		2.20	74	52	6	10[illegible]
B1	25.0	2.65	2.20	62	62	96	412.5		2.20	74	53	6	10[illegible]
2	30.0	2.70	2.20	62	62	97	416.7		2.20	74	55	6	10[illegible]
3	35.0	2.55	2.20	62	62	96	420.8		2.20	76	55	6	10[illegible]
4	40.0	1.70	2.20	62	62	96	425.0		2.20	76	56	6	106
C1	45.0	2.30	2.20	62	62	94	429.1		2.20	75	57	6	10[illegible]
2	50.0	2.30	2.20	62	62	96	433.3		2.20	75	59	6	10[illegible]
3	55.0	2.40	2.20	62	62	96	437.4		2.20	75	60	6	110
4	60.0	1.85	2.20	62	62	96	—	↓	2.20	76	61	6	106
D1		1.80				95							
2		2.00				96							
3		2.10				96							
4		1.40				96							

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:				
Train-pre:	0.002	@	10	"Hg
Train-mid:	–	@	–	"Hg
Train-post:	0.001	@	10	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: JC

Probe Operator: AS

Sampling Train Information:	
Test Method:	EPA 5/29
Meter Box No.:	EE2
Delta H:	1.783
Y:	1.0037
K-factor:	1
Nozzle ID: /Nozzle Diameter:	0.185
Probe ID:	S-4-1
Probe TC ID:	TC-S-4-1
Filter Exit TC ID:	6910 or 6918
4th Impinger TC ID:	3060
Hot Box ID:	HB-6
Umbilical ID:	SFES-200
Scale ID:	*5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Iso Probe ID: P-3-6

Scale Calibration:

100.0 g 99.9

1,000.0 g 999.1

Impinger Water Appearance:

n/a

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni munis3 C1 - R3

	Initial	Final
Impinger 1	719.5	~~702.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

Blend Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.8
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.7
Impinger 6	818.5	827.8
Impinger 7		

C, clone 1

C2 - R3

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	723.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 - R1

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 - R2

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	712.3	712.8
Impinger 5	703.3	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni munis3 C1 - R3

	Initial	Final
Impinger 1	719.5	~~702.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

Blend Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.8
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.7
Impinger 6	818.5	827.8
Impinger 7		

C, clone 1

C2 - R3

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	723.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 - R1

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 - R2

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	712.3	712.8
Impinger 5	703.3	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

Date: 11/20/15

Plant: wJe

Blend 3 C1-R3

Method _____

	Initial	Final
Impinger 1	721.3	743.0
Impinger 2	681.9	685.0
Impinger 3	596.8	597.5
Impinger 4	719.7	721.5
Impinger 5	722.0	724.4
Impinger 6	822.3	829.6
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

C2-R3

Method _____

	Initial	Final
Impinger 1	718.4	719.2
Impinger 2	704.3	706.3
Impinger 3	584.8	585.4
Impinger 4	698.4	701.0
Impinger 5	710.8	715.0
Impinger 6	828.9	836.4
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

C3-R3

Method _____

	Initial	Final
Impinger 1	706.0	708.6
Impinger 2	689.8	690.9
Impinger 3	630.0	630.0
Impinger 4	701.0	700.1
Impinger 5	710.4	711.9
Impinger 6	810.3	817.6
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: _____

100.0g wt ID: _____

100.0g wt reading: _____

1000.0g wt ID: _____

1000.0g wt reading: _____

A8. Blended Feedstock – Cyclone 2

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Blend-C2-R1
LOCATION:	Cyclone 2 - Blend	DATE :	20-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	720.7
IMP - 2 (INT) :	703.9
IMP - 3 (INT) :	585.9
IMP - 4 (INT) :	695.1
IMP - 5 (INT) :	712.0
IMP - 6 (INT) :	822.3
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	728.0
IMP - 2 (FIN) :	708.5
IMP - 3 (FIN) :	586.0
IMP - 4 (FIN) :	695.9
IMP - 5 (FIN) :	713.4
IMP - 6 (FIN) :	828.9
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	141.628
Mid Leak Check	
INTIAL METER	92.161
BEGIN TIME	8:09
END TIME	9:09

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.70	1.30	2.21	59	59	60
2	1.20	1.10	1.56	59	59	62
3	0.90	0.95	1.17	59	59	62
B1	2.00	1.41	2.60	60	60	64
2	1.60	1.26	2.08	61	60	64
3	1.40	1.18	1.82	61	60	63
C1	2.20	1.48	2.86	61	61	64
2	1.90	1.38	2.47	62	61	64
3	1.50	1.22	1.95	63	62	65
D1	2.20	1.48	2.86	64	63	64
2	1.90	1.38	2.47	64	64	65
3	1.10	1.05	1.43	64	64	65
AVERAGE:	1.63	1.27	2.12	61.4	61.0	63.5

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Blend-C2-R2
LOCATION :	Cyclone 2 - Blend	DATE :	20-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	724.6
IMP - 2 (INT) :	703.4
IMP - 3 (INT) :	578.9
IMP - 4 (INT) :	713.3
IMP - 5 (INT) :	703.3
IMP - 6 (INT) :	812.5
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	728.2
IMP - 2 (FIN) :	704.4
IMP - 3 (FIN) :	579.6
IMP - 4 (FIN) :	712.8
IMP - 5 (FIN) :	703.6
IMP - 6 (FIN) :	818.9
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	189.451
INTIAL METER	141.882
BEGIN TIME	10:16
END TIME	11:21

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.80	1.34	2.34	73	73	62
2	1.60	1.26	2.08	72	73	61
3	1.10	1.05	1.43	72	72	62
B1	1.90	1.38	2.47	71	72	63
2	1.60	1.26	2.08	71	71	64
3	1.00	1.00	1.30	71	71	63
C1	2.00	1.41	2.60	71	71	64
2	1.60	1.26	2.08	71	70	63
3	1.20	1.10	1.56	71	71	63
D1	1.90	1.38	2.47	72	71	64
2	1.50	1.22	1.95	71	71	64
3	0.90	0.95	1.17	71	71	64
AVERAGE:	1.51	1.22	1.96	71.4	71.4	63.1

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Blend-C2-R3
LOCATION :	Cyclone 2 - Blend	DATE :	20-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.188
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	718.4
IMP - 2 (INT) :	704.3
IMP - 3 (INT) :	584.8
IMP - 4 (INT) :	698.4
IMP - 5 (INT) :	710.8
IMP - 6 (INT) :	828.9
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	719.2
IMP - 2 (FIN) :	706.3
IMP - 3 (FIN) :	585.4
IMP - 4 (FIN) :	701
IMP - 5 (FIN) :	715
IMP - 6 (FIN) :	836.4
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	237.455
INTIAL METER	189.715
BEGIN TIME	12:16
END TIME	13:16

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.80	1.34	2.34	74	74	62
2	1.30	1.14	1.69	74	74	63
3	0.95	0.97	1.24	74	73	63
B1	2.00	1.41	2.60	75	74	63
2	1.80	1.34	2.34	75	74	63
3	1.20	1.10	1.56	75	75	64
C1	1.90	1.38	2.47	75	75	64
2	1.50	1.22	1.95	74	75	65
3	1.10	1.05	1.43	74	75	65
D1	2.10	1.45	2.73	75	75	64
2	1.70	1.30	2.21	75	75	64
3	1.00	1.00	1.30	75	75	64
AVERAGE:	1.53	1.23	1.99	74.6	74.5	63.7

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Blend-C2-R1**
LOCATION :	**Cyclone 2 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	63.5	% CO2 =	0.00	Vm (CF) =	49.467
Ts (°R) =	523.5	% O2 =	20.90	DELTA H (ABS) =	29.97
Tm (°F) =	61.2	% CO =	0	Ps (ABS) =	29.96
Tm (°R) =	521.2	% N2 =	79.10	SQRT DELTA P =	1.2673
Vl (TOT) =	20.8	Cp =	0.84	Y =	0.9845
Vl (adj) =	NA	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	49.391	DSCF
Vw std =	.04707 (Vl TOT)	=	0.979	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.019	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.981	
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.625	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.781	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	71.104	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1055704	DSCFH
	DSCFH / 60	=	17595	DSCFM
	3600 (Vs)(As)	=	1066561	ACFH
	ACFH / 60	=	17776	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	101.2	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Blend-C2-R2**
LOCATION :	**Cyclone 2 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	63.1	% CO2 =	0.00	Vm (CF) =	47.569
Ts (°R) =	523.1	% O2 =	20.90	DELTA H (ABS) =	29.95
Tm (°F) =	71.4	% CO =	0	Ps (ABS) =	29.96
Tm (°R) =	531.4	% N2 =	79.10	SQRT DELTA P =	1.2188
Vl (TOT) =	11.5	Cp =	0.84	Y =	0.9845
Vl (adj) =	NA	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	46.565	DSCF
Vw std =	.04707 (Vl TOT)	=	0.541	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.011	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.989	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.711	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.780	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	68.253	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1022394	DSCFH
	DSCFH / 60	=	17040	DSCFM
	3600 (Vs)(As)	=	1023790	ACFH
	ACFH / 60	=	17063	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	98.5	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Blend-C2-R3**
LOCATION :	**Cyclone 2 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	63.7	% CO2 =	0.00	Vm (CF) =	47.740
Ts (°R) =	523.7	% O2 =	20.90	DELTA H (ABS) =	29.96
Tm (°F) =	74.5	% CO =	0	Ps (ABS) =	29.96
Tm (°R) =	534.5	% N2 =	79.10	SQRT DELTA P =	1.2261
Vl (TOT) =	17.7	Cp =	0.84	Y =	0.9845
Vl (adj) =	NA	TIME =	60	An =	0.000193

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	46.462	DSCF
Vw std =	.04707 (Vl TOT)	=	0.833	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.018	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.982	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.645	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.781	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	68.780	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1022762	DSCFH
	DSCFH / 60	=	17046	DSCFM
	3600 (Vs)(As)	=	1031693	ACFH
	ACFH / 60	=	17195	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	98.3	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Blend-C2-R1
LOCATION:	Cyclone 2 - Blend	DATE:	20-Nov-15

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER	1780	0	1763	0
FINAL	0.0000	0.0426	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0000	0.0426	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		84

Mn - Ar = Mn		O2	=	20.90
		CO2	=	0.00
Mn	= 42.600	Vs	=	71.10 ft/sec
Ar	= 0.000	As	=	4.17 ft2
		Vm std	=	49.39 DSCF
Mn	= 42.600	Ffactor	=	n/a

Qs	= 3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1055704	DSCFH
	3600 (Vs) (As)	=	1066561	ACFH
	ACFH / 60	=	17776	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	1.90182E-06	LB/SCF
Cs'	= 0.0154 (Mn) /(VmStd)	=	0.0133	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	30.5	mg/M3
PMR	= Qs x Cs	=	2.008	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Blend-C2-R2
LOCATION	Cyclone 2 - Blend	DATE :	20-Nov-15

			BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NUMBER	1781	0	1763	0
FINAL	0.0000	0.0161	0.0000	0.0000
TARE :	0.0000	0.00000	0.0000	0.0000
NET :	0.0000	0.0161	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		97

Mn - Ar = Mn		O2	=	20.90
		CO2	=	0.00
Mn	= 16.100	Vs	=	68.25 ft/sec
Ar	= 0.000	As	=	4.17 ft2
		Vm std=		46.57 DSCF
Mn	= 16.100	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1022394	DSCFH
	3600 (Vs) (As)	=	1023790.033	ACFH
	ACFH / 60	=	17063	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	7.62384E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0053	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	12.2	mg/M3
PMR	= Qs x Cs	=	0.779	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Blend-C2-R3
LOCATION	Cyclone 2 - Blend	DATE :	20-Nov-15

			BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NUMBER	1783	0	1763	0
FINAL	0.0017	0.0250	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0017	0.0250	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		66

Mn - Ar = Mn		O2	=	20.90
		CO2	=	0.00
Mn	= 26.700	Vs	=	68.78 ft/sec
Ar	= 0.000	AS	=	4.17 ft2
		Vm std	=	46.46 DSCF
Mn	= 26.700	Ffactor	=	n/a

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1022762	DSCFH
	3600 (Vs) (As)	=	1031693.068	ACFH
	ACFH / 60	=	17195	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	1.26712E-06	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0088	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	20.3	mg/M3
PMR	= Qs x Cs	=	1.2960	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C2-R1
Source:	Cyclone 2 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	8.93E-12	1.43E-01				9.426E-06	
Cadmium	3.09	ND	3.09	1.38E-10	2.21E+00				1.456E-04	
Lead	29.40	0.92	29.40	1.31E-09	2.10E+01				1.386E-03	
Mercury	0.40	ND	0.40	1.791E-11	2.87E-01				1.890E-05	

Run Data		
V_m (dscf)	=	49.39
Q_s (dscfh)	=	1,055,704
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C2-R2
Source:	Cyclone 2 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.47E-12	1.52E-01				9.683E-06	
Cadmium	1.21	ND	1.21	5.73E-11	9.18E-01				5.858E-05	
Lead	9.25	0.92	9.25	4.38E-10	7.01E+00				4.478E-04	
Mercury	0.44	ND	0.44	2.086E-11	3.34E-01				2.133E-05	

Run Data		
V_m (dscf)	=	46.57
Q_s (dscfh)	=	1,022,394
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C2-R3
Source:	Cyclone 2 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.49E-12	1.52E-01				9.708E-06	
Cadmium	1.45	ND	1.45	6.88E-11	1.10E+00				7.038E-05	
Lead	21.00	0.92	21.00	9.97E-10	1.60E+01				1.019E-03	
Mercury	0.29	ND	0.29	1.386E-11	2.22E-01				1.417E-05	

Run Data		
V_m (dscf)	=	46.46
Q_s (dscfh)	=	1,022,762
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	Cyclone 2 - Blend 3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Blend-C2-R1	11/20/2015	0.040	< 0.16	< 0.0051	< 0.023	0.173	**0.401**
Blend-C2-R2	11/20/2015	< 0.015	< 0.16	< 0.0046	< 0.023	0.238	**0.441**
Blend-C2-R3	11/20/2015	< 0.015	< 0.15	< 0.005	< 0.023	0.099	**0.292**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Cyclone 2 - Blend			
		Run ID	Run ID	Run ID	Reagent Blank
		Blend-C2-R1	Blend-C2-R2	Blend-C2-R3	M29-RB
Trace Metal	Units	11/20/2015	11/20/2015	11/20/2015	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	3.09	1.21	1.45	< 0.10
Lead	ug	29.40	9.25	21.00	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Blend - C2 - R1
Source:	Cyclone 2	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.7	2.21	59	59	60	96.2	85		60	49	5
2	10.0	1.2	1.56	59	59	62	99.8	86		61	47	5
3	15.0	0.90	1.17	59	59	62	102.9	86		63	46	5
B1	20.0	2.0	2.60	60	60	64	107.2	90		65	48	6
2	25.0	1.6	2.08	61	60	64	111.3	90		65	50	5
3	30.0	1.4	1.82	61	60	63	115.1	89		66	51	5
C1	35.0	2.2	2.86	61	61	64	119.8	91		68	50	6
2	40.0	1.9	2.47	62	61	64	124.4	100		70	52	6
3	45.0	1.5	1.95	63	62	65	129.0	100		71	52	5
D1	50.0	2.2	2.86	64	63	64	133.5	100		70	53	5
2	55.0	1.9	2.47	64	64	65	138.0	98		71	53	5
3	60.0	1.1	1.43	64	64	65	—	100		71	53	4

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	29.81
Run Time (min.):	60
Final Meter (CF):	141.628
Initial Meter (CF):	92.161
Start Time:	909
End Time:	909

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:				
Train-pre:	0.001	@	10	"Hg
Train-mid:		@		"Hg
Train-post:	0.001	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: ST

Sampling Train Information:	
Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.198
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance: n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Blend – C2 – R2
Source:	Cyclone 2	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.8	2.34	73	73	62	146.0	90		62	64	5
2	10.0	1.6	2.08	72	73	61	150.1	90		65	58	5
3	15.0	1.1	1.43	72	72	62	153.8	91		69	54	3
B1	20.0	1.9	2.47	71	72	63	158.1	90		72	54	5
2	25.0	1.6	2.08	71	71	64	162.5	90		73	54	5
3	30.0	1.0	1.3	71	71	63	166.0	90		75	53	3
C1	35.0	2.0	2.6	71	71	64	170.1	90		75	54	5
2	40.0	1.6	2.08	71	70	63	174.4	90		75	55	5
3	45.0	1.2	1.56	71	71	63	177.9	90		76	53	4
D1	50.0	1.9	2.47	72	71	64	182.4	86		75	53	5
2	55.0	1.5	1.95	71	71	64	186.5	89		74	53	4
3	60.0	0.90	1.17	[illegible]	71	64	—	90		75	53	4

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	29.81
Run Time (min.):	60
Final Meter (CF):	189.451
Initial Meter (CF):	141.882
Start Time:	1016
End Time:	1121

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:				
Train-pre:	0.001	@	10	"Hg
Train-mid:		@		"Hg
Train-post:	0.001	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Sampling Train Information:	
Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Paused 1019 - 1023

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Blend - C2-R5
Source:	Cyclone 2	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.8	2.34	74	74	62	~~173.8~~ 183.2	90		64	55	4
2	10.0	1.3	1.69	74	74	63	197.5	90		66	53	4
3	15.0	0.95	1.24	74	73	63	200.6	91		69	52	4
B1	20.0	2.0	2.6	75	74	63	205.2	90		69	52	5
2	25.0	1.8	2.34	75	74	63	209.3	90		70	53	5
3	30.0	1.2	1.56	75	75	64	213.3	91		70	53	4
C1	35.0	1.9	2.47	75	75	64	217.8	92		70	53	5
2	40.0	1.5	1.95	74	75	65	222.0	88		71	54	5
3	45.0	1.1	1.43	74	75	65	225.4	89		70	55	5
D1	50.0	2.1	2.73	75	75	64	230.0	91		70	55	5
2	55.0	1.7	2.21	75	75	64	234.2	93		71	56	5
3	60.0	1.0	1.3	75	75	64	—	91		72	56	4

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	29.81
Run Time (min.):	60
Final Meter (CF):	237.455
Initial Meter (CF):	189.715
Start Time:	1216
End Time:	1316

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.001	@	10	"Hg
Train-mid:		@		"Hg
Train-post:	0.001	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE3
Delta H:	1.855
Y:	0.9845
K-factor:	1.3
Nozzle ID: /Nozzle Diameter:	0.188
Probe ID:	ESP27B
Probe TC ID:	ESP27B
Filter Exit TC ID:	3133 or 3134
4th Impinger TC ID:	3061
Hot Box ID:	HB-5
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni ~~Muni R3~~ ~~C1~~ ~~R3~~

	Initial	Final
Impinger 1	719.5	~~702.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method ~~Blend~~ Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

~~Blend~~ Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.6
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.7
Impinger 6	818.5	827.8
Impinger 7		

Cyclone 1

~~C2~~ ~~R3~~

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	703.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 ~~R1~~

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 ~~R2~~

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	713.3	712.8
Impinger 5	703.5	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni ~~Muni R3~~ ~~C1~~ ~~R3~~

	Initial	Final
Impinger 1	719.5	~~702.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method ~~Blend~~ Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

~~Blend~~ Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.6
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.7
Impinger 6	818.5	827.8
Impinger 7		

Cyclone 1

~~C2~~ ~~R3~~

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	703.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 ~~R1~~

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 ~~R2~~

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	713.3	712.8
Impinger 5	703.5	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

Date: 11/20/15

Plant: uJe

Blend 3 C1-R3

Method _____

	Initial	Final
Impinger 1	721.3	743.0
Impinger 2	681.9	685.0
Impinger 3	596.8	597.5
Impinger 4	719.7	721.5
Impinger 5	722.0	724.4
Impinger 6	822.1	829.6
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

C2-R3

Method _____

	Initial	Final
Impinger 1	718.4	719.2
Impinger 2	704.3	706.5
Impinger 3	584.8	585.4
Impinger 4	698.4	701.0
Impinger 5	710.8	715.0
Impinger 6	828.9	836.4
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

C3-R3

Method _____

	Initial	Final
Impinger 1	706.0	708.6
Impinger 2	689.8	690.9
Impinger 3	630.0	630.0
Impinger 4	701.0	700.1
Impinger 5	710.4	710.9
Impinger 6	810.5	817.6
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: _____

100.0g wt ID: _____

100.0g wt reading: _____

1000.0g wt ID: _____

1000.0g wt reading: _____

A9. Blended Feedstock – Cyclone 3

INPUT DATA SHEET

PLANT:	wTe Recycling	RUN # :	Blend-C3-R1
LOCATION:	Cyclone 3 - Blend	DATE :	20-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	705.8
IMP - 2 (INT) :	691.6
IMP - 3 (INT) :	630.1
IMP - 4 (INT) :	704.4
IMP - 5 (INT) :	703.4
IMP - 6 (INT) :	803.0
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	712.3
IMP - 2 (FIN) :	691.9
IMP - 3 (FIN) :	629.7
IMP - 4 (FIN) :	703.1
IMP - 5 (FIN) :	713.0
IMP - 6 (FIN) :	810.5
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	727.749
Mid Leak Check	
INTIAL METER	683.436
BEGIN TIME	8:09
END TIME	9:09

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.80	1.34	2.16	58	58	60
2	1.30	1.14	1.56	58	58	61
3	1.00	1.00	1.20	59	58	63
B1	1.70	1.30	2.04	59	58	63
2	1.80	1.34	2.16	59	59	62
3	1.40	1.18	1.68	59	59	62
C1	2.10	1.45	2.52	59	59	63
2	1.90	1.38	2.28	60	60	64
3	1.40	1.18	1.68	60	60	64
D1	2.20	1.48	2.64	60	60	64
2	1.80	1.34	2.16	60	60	64
3	1.00	1.00	1.20	60	60	65
AVERAGE:	1.62	1.26	1.94	59.3	59.1	62.9

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Blend-C3-R2
LOCATION :	Cyclone 3 - Blend	DATE :	20-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	710.4
IMP - 2 (INT) :	684.1
IMP - 3 (INT) :	589.7
IMP - 4 (INT) :	720.4
IMP - 5 (INT) :	727.7
IMP - 6 (INT) :	817.6
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	713.4
IMP - 2 (FIN) :	685.3
IMP - 3 (FIN) :	589.7
IMP - 4 (FIN) :	720.6
IMP - 5 (FIN) :	726.3
IMP - 6 (FIN) :	824.7
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	771.750
INTIAL METER	727.800
BEGIN TIME	10:16
END TIME	11:21

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.80	1.34	2.16	64	64	63
2	1.60	1.26	1.92	66	66	63
3	1.30	1.14	1.56	66	66	64
B1	2.00	1.41	2.40	67	66	64
2	1.80	1.34	2.16	67	67	64
3	1.20	1.10	1.44	66	67	64
C1	2.10	1.45	2.52	67	67	64
2	1.70	1.30	2.04	67	67	64
3	1.20	1.10	1.44	68	67	64
D1	1.90	1.38	2.28	68	68	64
2	1.40	1.18	1.68	68	68	64
3	0.85	0.92	1.02	68	68	64
AVERAGE:	1.57	1.24	1.89	66.8	66.8	63.8

INPUT DATA SHEET

PLANT :	wTe Recycling	RUN # :	Blend-C3-R3
LOCATION :	Cyclone 3 - Blend	DATE :	20-Nov-15

As (SQFT) :	4.167
Dn (INCHES)	0.180
PITOT COEFFICIENT:	0.84
IMP - 1 (INT) :	706
IMP - 2 (INT) :	689.8
IMP - 3 (INT) :	630
IMP - 4 (INT) :	701
IMP - 5 (INT) :	710.4
IMP - 6 (INT) :	810.3
IMP - 7 (INT) :	-
IMP - 1 (FIN) :	708.6
IMP - 2 (FIN) :	690.9
IMP - 3 (FIN) :	630
IMP - 4 (FIN) :	700.1
IMP - 5 (FIN) :	710.9
IMP - 6 (FIN) :	817.6
IMP - 7 (FIN) :	-
% CO2 (OUT):	0.0
% O2 (OUT) :	20.9
% CO (OUT) :	0
Pbar	29.81
Pstack	2.0
NUMBER OF POINTS	12
TEST LENGTH	60
FINAL METER	815.801
INTIAL METER	772.015
BEGIN TIME	12:16
END TIME	13:16

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	1.70	1.30	2.04	65	65	64
2	1.40	1.18	1.68	66	65	65
3	1.00	1.00	1.20	66	66	65
B1	1.90	1.38	2.28	67	66	64
2	1.60	1.26	1.92	68	66	64
3	1.30	1.14	1.56	67	67	64
C1	2.10	1.45	2.52	68	67	65
2	1.60	1.26	1.92	68	67	65
3	1.40	1.18	1.68	68	67	65
D1	1.90	1.38	2.28	67	67	64
2	1.60	1.26	1.92	68	67	64
3	1.00	1.00	1.20	67	67	64
AVERAGE:	1.54	1.23	1.85	67.1	66.4	64.4

ISOKINETIC CALCULATION SHEET

PLANT	: **wTe Recycling**	RUN # :	**Blend-C3-R1**
LOCATION	: **Cyclone 3 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	62.9	% CO2 =	0.00	Vm (CF)	=	44.313
Ts (°R) =	522.9	% O2 =	20.90	DELTA H (ABS)	=	29.95
Tm (°F) =	59.2	% CO =	0	Ps (ABS)	=	29.96
Tm (°R) =	519.2	% N2 =	79.10	SQRT DELTA P	=	1.2622
Vl (TOT) =	22.2	Cp =	0.84	Y	=	1.0419
Vl (adj) =	20.11	TIME =	60	An	=	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	46.988	DSCF
Vw std =	.04707 (Vl TOT)	=	1.045	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.022	
Bwo =	by steam tables	=	0.0197477	
1 - Bwo =	1 - Bwo	=	0.980	adj
Md (DRY)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.622	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.781	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	70.783	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1051820	DSCFH
	DSCFH / 60	=	17530	DSCFM
	3600 (Vs)(As)	=	1061745	ACFH
	ACFH / 60	=	17696	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	105.4	adj

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Blend-C3-R2**
LOCATION :	**Cyclone 3 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	63.8	% CO2 =	0.00	Vm (CF) =	43.950
Ts (°R) =	523.8	% O2 =	20.90	DELTA H (ABS) =	29.95
Tm (°F) =	66.8	% CO =	0	Ps (ABS) =	29.96
Tm (°R) =	526.8	% N2 =	79.10	SQRT DELTA P =	1.2442
Vl (TOT) =	10.1	Cp =	0.84	Y =	1.0419
Vl (adj) =	NA	TIME =	60	An =	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	45.922	DSCF
Vw std =	.04707 (Vl TOT)	=	0.475	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.010	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.990	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.725	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.780	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	69.709	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1044033	DSCFH
	DSCFH / 60	=	17401	DSCFM
	3600 (Vs)(As)	=	1045640	ACFH
	ACFH / 60	=	17427	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	103.8	

ISOKINETIC CALCULATION SHEET

PLANT :	**wTe Recycling**	RUN # :	**Blend-C3-R3**
LOCATION :	**Cyclone 3 - Blend**	DATE :	**20-Nov-15**

Ts (°F) =	64.4	% CO2 =	0.00	Vm (CF) =	43.786
Ts (°R) =	524.4	% O2 =	20.90	DELTA H (ABS) =	29.95
Tm (°F) =	66.8	% CO =	0	Ps (ABS) =	29.96
Tm (°R) =	526.8	% N2 =	79.10	SQRT DELTA P =	1.2343
Vl (TOT) =	10.6	Cp =	0.84	Y =	1.0419
Vl (adj) =	NA	TIME =	60	An =	0.000177

Vm std =	$\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$	=	45.750	DSCF
Vw std =	.04707 (Vl TOT)	=	0.499	CF
Bwo =	Vw std / (Vw std) + (Vm std)	=	0.011	
Bwo =	by steam tables	=	NA	
1 - Bwo =	1 - Bwo	=	0.989	
Ms (WET)=	0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2)	=	28.836	LB/LB MOLE
Ms (WET)=	MD (1-Bwo) + 18 (Bwo)	=	28.719	LB/LB MOLE
G =	SQRT (Ts/Ps/Ms)	=	0.781	
Vs =	85.49 (Cp) (G) (SQRT DELTA P)	=	69.200	FPS
Qs =	3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1034681	DSCFH
	DSCFH / 60	=	17245	DSCFM
	3600 (Vs)(As)	=	1037997	ACFH
	ACFH / 60	=	17300	ACFM
% ISO =	$\frac{100\ (Ts)\ (Vm\ std)\ (Delta\ H\ abs)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$	=	104.3	

PARTICULATE EMISSION CALCULATION SHEET

PLANT:	wTe Recycling	RUN # :	Blend-C3-R1
LOCATION:	Cyclone 3 - Blend	DATE:	20-Nov-15

			BLANKS	
	FILTER	BEAKER	FILTER	ACETONE
NUMBER	1773	0	1763	0
FINAL	0.0000	0.0207	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0000	0.0207	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		87

Mn - Ar = Mn		O2	=	20.90
		CO2	=	0.00
Mn	= 20.700	Vs	=	70.78 ft/sec
Ar	= 0.000	As	=	4.17 ft2
		Vm std	=	46.99 DSCF
Mn	= 20.700	Ffactor	= n/a	

Qs	= 3600(1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1051820	DSCFH
	3600 (Vs) (As)	=	1061745	ACFH
	ACFH / 60	=	17696	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	9.71393E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmStd)	=	0.0068	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	15.6	mg/M3
PMR	= Qs x Cs	=	1.022	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Blend-C3-R2
LOCATION	Cyclone 3 - Blend	DATE :	20-Nov-15

	FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER	1775	0	1763	0
FINAL	0.0009	0.0131	0.0000	0.0000
TARE :	0.0000	0.0000	0.0000	0.0000
NET :	0.0009	0.0131	0.0000	0.0000
		VOLUME BLANK RINSE		100
		VOLUME OF RINSE		84

Mn - Ar = Mn		O2 =	20.90	
		CO2 =	0.00	
Mn =	14.000	Vs =	69.71	ft/sec
Ar =	0.000	As =	4.17	ft2
		Vm std=	45.92	DSCF
Mn =	14.000	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1044033	DSCFH
	3600 (Vs) (As)	=	1045640.382	ACFH
	ACFH / 60	=	17427	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	6.72226E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0047	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	10.8	mg/M3
PMR	= Qs x Cs	=	0.702	LB/HR

PARTICULATE EMISSION CALCULATION SHEET

PLANT	wTe Recycling	RUN # :	Blend-C3-R3
LOCATION	Cyclone 3 - Blend	DATE :	20-Nov-15

		FILTER	BEAKER	BLANKS FILTER	BLANKS ACETONE
NUMBER		1785	0	1763	0
FINAL		0.0018	0.0128	0.0000	0.0000
TARE	:	0.0000	0.0000	0.0000	0.0000
NET	:	0.0018	0.0128	0.0000	0.0000
			VOLUME BLANK RINSE		100
			VOLUME OF RINSE		92

Mn - Ar	= Mn		O2	=	20.90
			CO2	=	0.00
Mn	=	14.600	Vs	=	69.20 ft/sec
Ar	=	0.000	AS	=	4.17 ft2
			Vm std=		45.75 DSCF
Mn	=	14.600	Ffactor =	n/a	

Qs	= 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts)	=	1034681	DSCFH
	3600 (Vs) (As)	=	1037996.781	ACFH
	ACFH / 60	=	17300	ACFM
Cs	= (2.205 E-6) (Mn) / (Vm Std)	=	7.03666E-07	LB/SCF
Cs'	= 0.0154 (Mn) /(VmSTD)	=	0.0049	GRAINS/SCF
Cs'M	= (Mn) / (VmSTD x 0.02832)	=	11.3	mg/M3
PMR	= Qs x Cs	=	0.7281	LB/HR

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C3-R1
Source:	Cyclone 3 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) lb/dscf	Concentration (Cs) ug/dscm				Emission Rate (E) lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.39E-12	1.50E-01				9.872E-06	
Cadmium	1.73	ND	1.73	8.12E-11	1.30E+00				8.539E-05	
Lead	15.30	0.92	15.30	7.18E-10	1.15E+01				7.552E-04	
Mercury	0.34	ND	0.34	1.614E-11	2.59E-01				1.698E-05	

Run Data		
V_m (dscf)	=	46.99
Q_s (dscfh)	=	1,051,820
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C3-R2
Source:	Cyclone 3 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	Concentration (Cs) ug/dscm				Emission Rate (E) lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.60E-12	1.54E-01				1.003E-05	
Cadmium	1.01	ND	1.01	4.85E-11	7.77E-01				5.063E-05	
Lead	7.39	0.92	7.39	3.55E-10	5.68E+00				3.705E-04	
Mercury	0.35	ND	0.35	1.681E-11	2.69E-01				1.755E-05	

Run Data		
V_m (dscf)	=	45.92
Q_s (dscfh)	=	1,044,033
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Metals Emission Calculations

Facility/Site:	wTe Recycling	Run No.:	Blend-C3-R3
Source:	Cyclone 3 - Blend	Date:	20-Nov-15

Analyte	Total (ug)	Reagent Blank (ug)	Total (ug)	Concentration (Cs) (lb/dscf)	ug/dscm		Emission Rate (E)		lb/hr	
Beryllium	< 0.20	ND	< 0.20	9.64E-12	1.54E-01				9.974E-06	
Cadmium	0.89	ND	0.89	4.29E-11	6.87E-01				4.438E-05	
Lead	11.00	0.92	11.00	5.30E-10	8.49E+00				5.485E-04	
Mercury	0.28	ND	0.28	1.344E-11	2.15E-01				1.390E-05	

Run Data		
V_m (dscf)	=	45.75
Q_s (dscfh)	=	1,034,681
O_2 (%)	=	20.90
CO_2 (%)	=	0.00

Equations		
Q_s (dscfh)	=	$3600\ (1-B_{wo})(V_s)(A_s)(17.64)(P_s)/(T_s)$
C_s (lb/dscf)	=	(ug * 4.536E08) / V_m Std
C_s (ug/dscm @1%CO_2)	=	(ug/dscm)* (1% CO_2)/(Test %CO_2)
E (lb/hr)	=	(lb/dscf) * dscfh

Conversions			
to obtain dscm:	multiply dscf by 0.02832		
to obtain ug:	multiply lb by 0.4536E09		
to obtain lb:	multiply ug by 2.205E-09		

Run ID	Sampling Date	Mercury Laboratory Results by Train Fraction - Sampling Runs wTe Recycling 1B Filter/probe rinse (ug)	2B Impinger 1&2 contents & HNO_3 rinse (ug)	Cyclone 3 - Blend 3A Impinger 3 contents & HNO_3 rinse (ug)	3B Impinger 4&5 contents & $KMNO_4$/DI (ug)	3C Impingers 4&5 HCl rinse & DI H_2O (ug)	Total Hg (ug)
Blend-C3-R1	11/20/2015	< 0.015	< 0.18	< 0.005	< 0.023	0.121	**0.344**
Blend-C3-R2	11/20/2015	< 0.015	< 0.15	< 0.005	< 0.023	0.157	**0.350**
Blend-C3-R3	11/20/2015	< 0.015	< 0.16	< 0.0048	< 0.025	0.074	**0.279**

Blank Type	Sampling Date	Mercury Results by Train Fraction - Blanks 1B Filter (ug)	2B HNO_3/H_2O_2 (ug)	3A HNO_3 (ug)	3B $KMnO_4/H_2SO_4$ (ug)	3C HCl (ug)	Total Hg (ug)
Reagent	11/18/2016	< 0.015	< 0.15	< 0.005	< 0.02	< 0.013	< **0.203**

Trace Metals Laboratory Results (excluding mercury)					
wTe Recycling		Cyclone 3 - Blend			
		Run ID	Run ID	Run ID	Reagent Blank
		Blend-C3-R1	Blend-C3-R2	Blend-C3-R3	M29-RB
Trace Metal	Units	11/20/2015	11/20/2015	11/20/2015	11/17/2009
Beryllium	ug	< 0.20	< 0.20	< 0.20	< 0.10
Cadmium	ug	1.73	1.01	0.89	< 0.10
Lead	ug	15.30	7.39	11.00	0.92

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Blend - C3 - R1
Source:	Cyclone 3	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.8	2.16	58	58	60	687.3	95		60	51	4
2	10.0	1.3	1.56	58	58	61	690.4	96		63	50	4
3	15.0	1.0	1.20	59	58	63	693.5	95		64	50	4
B1	20.0	1.7	2.04	59	59	63	697.1	95		66	51	5
2	25.0	1.8	2.16	59	59	62	700.9	95		69	53	5
3	30.0	1.4	1.68	59	59	62	704.4	95		70	55	5
C1	35.0	2.1	2.52	59	59	63	708.6	95		71	56	5
2	40.0	1.9	2.28	60	60	64	712.9	96		72	56	5
3	45.0	1.4	1.68	60	60	64	716.3	95		72	57	4
D1	50.0	2.2	2.64	60	60	64	720.2	95		72	56	5
2	55.0	1.8	2.16	60	60	64	723.7	95		73	55	5
3	60.0	1.0	1.20	60	60	65	—	95		73	55	5

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	29.83
Run Time (min.):	60
Final Meter (CF):	727.749
Initial Meter (CF):	683.436
Start Time:	809
End Time:	909

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.004	@	10	"Hg
Train-mid:		@		"Hg
Train-post:	0.001	@	6	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.2
Nozzle ID: /Nozzle Diameter:	0.180
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.	Blend - C3 - R2
Source:	Cyclone 3	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.8	2.16	64	64	63	732.0	85		63	53	5
2	10.0	1.6	1.92	66	66	63	735.6	85		70	50	5
3	15.0	1.3	1.56	66	66	64	738.9	85		71	50	5
B1	20.0	2.0	2.40	67	66	64	742.8	86		73	52	6
2	25.0	1.8	2.16	67	67	64	747.0	85		73	54	5
3	30.0	1.2	1.44	66	67	64	750.2	85		74	54	4
C1	35.0	2.1	2.52	67	67	64	754.3	86		73	54	5
2	40.0	1.7	2.04	67	67	64	759.2	85		73	55	5
3	45.0	1.2	1.44	68	67	64	761.5	85		74	55	4
D1	50.0	1.9	2.28	68	68	64	765.4	85		74	56	5
2	55.0	1.4	1.68	68	68	64	769.0	85		73	56	5
3	60.0	0.85	1.02	68	68	64	—	86		73	56	3

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	29.81
Run Time (min.):	60
Final Meter (CF):	771.750
Initial Meter (CF):	727.800
Start Time:	1016
End Time:	1121

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.000	@	10	"Hg
Train-mid:		@		"Hg
Train-post:	0.001	@	7	"Hg
Pitot-pre:	✓	@	3	"H_2O
Pitot-post:	✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: TS

Comments: Paused @ 1019-1023

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance: n/a

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.2
Nozzle ID: /Nozzle Diameter:	0.180
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

TRAVERSE DATA SHEET

Facility:/Site:	wTe Recycling	Run No.:	Blend - C3 - R3
Source:	Cyclone 3	Date:	20 November 2015

Impinger Volumes (ml):	
1 - Initial	
2 - Initial	
3 - Initial	
4 - Initial	
5 - Initial	
6 - Initial	
7 - Initial	-
1 - Final	
2 - Final	
3 - Final	
4 - Final	
5 - Final	
6 - Final	
7 - Final	-

Sampling Parameters

Traverse Point	Run Time	Delta P (H_2O)	Delta H ("H_2O)	Dry Gas Meter In (F)	Dry Gas Meter Out (F)	Stack Temp (F)	Meter Reading (CF)	Probe Temp (F)	Filter Temp (F)	Filter Exit Temp (F)	Impinger Temp (F)	Vacuum ("Hg)
A1	5.0	1.7	2.04	65	65	64	776.6	90		65	54	4
2	10.0	1.4	1.68	66	65	65	779.6	90		68	53	4
3	15.0	1.0	1.2	66	66	65	782.4	90		69	51	4
B1	20.0	1.9	2.28	67	66	64	786.5	90		70	52	5
2	25.0	1.6	1.92	68	66	64	790.1	92		70	52	5
3	30.0	1.3	1.56	67	67	64	793.6	91		70	52	5
C1	35.0	2.1	2.52	68	67	65	797.9	90		71	53	5
2	40.0	1.6	1.92	68	67	65	801.6	90		71	53	5
3	45.0	1.4	1.68	68	67	65	805.2	91		71	53	4
D1	50.0	1.9	~~1.87~~ 2.28	67	67	64	809.2	91		70	52	5
2	55.0	1.6	1.92	68	67	64	812.9	91		70	53	5
3	60.0	1.0	1.2	67	67	64	—	92		70	53	3

Pstack ("H_2O):	+2.0
Bar. Pres.("H_g):	29.81
Run Time (min.):	60
Final Meter (CF):	815.801
Initial Meter (CF):	772.015
Start Time:	1216
End Time:	1316

Filter Information:	
ID:	
Tare (g):	
Trap Information:	
ID:	n/a
Pre Weight:	n/a
Post Weight:	n/a

Leak Checks:

Train-pre:	0.002	@	10	"Hg
Train-mid:		@		"Hg
Train-post:	0.002	@	7	"Hg
Pitot-pre:	✓✓	@	3	"H_2O
Pitot-post:	✓✓	@	3	"H_2O

Field Team Members:

Box Operator: MB

Probe Operator: ST

Sampling Train Information:

Test Method:	EPA 5/29
Meter Box No.:	EE6
Delta H:	1.913
Y:	1.0419
K-factor:	1.2
Nozzle ID: /Nozzle Diameter:	0.180
Probe ID:	SFES-2'
Probe TC ID:	SFES-2'
Filter Exit TC ID:	6916 or 6917
4th Impinger TC ID:	3066
Hot Box ID:	HB-7
Umbilical ID:	100'
Scale ID:	5A2811799
Weight ID (100g):	6040
Weight ID (1,000g):	6993

Comments:

Scale Calibration:

100.0 g	99.9
1,000.0 g	999.1

Impinger Water Appearance:

n/a

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni — Muni R3 C1 — R3

	Initial	Final
Impinger 1	719.5	~~707.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method ~~Blend~~ Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

~~Blend~~ Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.6
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.3
Impinger 6	818.5	827.8
Impinger 7		

Cyclone 1

C2 — R3

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	703.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 — R1

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 — R2

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	713.3	712.8
Impinger 5	703.3	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

Date: 11/19/15 (muni) & 11/20 (Blend 1 & Blend 2)

Plant: VTe

Muni — Muni R3 C1 — R3

	Initial	Final
Impinger 1	719.5	~~707.6~~ 739.8
Impinger 2	702.6	707.8
Impinger 3	584.8	586.3
Impinger 4	720.3	721.1
Impinger 5	721.2	720.9
Impinger 6	809.6	818.5
Impinger 7		

Method ~~Blend~~ Blend R1 C1

	Initial	Final
Impinger 1	718.3	736.9
Impinger 2	678.9	681.7
Impinger 3	596.8	596.8
Impinger 4	718.6	719.9
Impinger 5	717.7	719.0
Impinger 6	813.9	822.1
Impinger 7		

~~Blend~~ Blend R2 C1

	Initial	Final
Impinger 1	718.8	737.1
Impinger 2	701.6	703.6
Impinger 3	584.0	585.1
Impinger 4	721.1	720.8
Impinger 5	721.8	722.3
Impinger 6	818.5	827.8
Impinger 7		

Cyclone 1

C2 — R3

	Initial	Final
Impinger 1	724.8	734.7
Impinger 2	703.5	706.9
Impinger 3	580.8	581.0
Impinger 4	713.7	713.6
Impinger 5	702.1	703.2
Impinger 6	805.4	812.5
Impinger 7		

Method C2 — R1

	Initial	Final
Impinger 1	720.7	~~734.7~~ 728.0
Impinger 2	703.9	708.5
Impinger 3	585.9	586.0
Impinger 4	695.1	695.9
Impinger 5	712.0	713.4
Impinger 6	822.3	828.9
Impinger 7		

C2 — R2

	Initial	Final
Impinger 1	724.6	728.2
Impinger 2	702.4	704.4
Impinger 3	578.9	579.6
Impinger 4	713.3	712.8
Impinger 5	703.3	703.6
Impinger 6	812.5	818.9
Impinger 7		

Cyclone 2

Date: 11/20/15

Plant: vJe

Blend 3 C1-R3

	Initial	Final
Impinger 1	721.3	743.0
Impinger 2	681.9	685.0
Impinger 3	596.8	597.5
Impinger 4	719.7	721.5
Impinger 5	722.0	724.4
Impinger 6	822.1	829.6
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

C2-R3

	Initial	Final
Impinger 1	718.4	719.2
Impinger 2	704.3	706.3
Impinger 3	584.8	585.4
Impinger 4	698.4	701.0
Impinger 5	710.8	715.0
Impinger 6	828.9	836.4
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

C3-R3

	Initial	Final
Impinger 1	706.0	708.6
Impinger 2	689.8	690.9
Impinger 3	630.0	630.0
Impinger 4	701.0	700.1
Impinger 5	710.4	710.9
Impinger 6	810.5	817.6
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Method _____

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4		
Impinger 5		
Impinger 6		
Impinger 7		

Scale ID: _____

100.0g wt ID: _____

100.0g wt reading: _____

1000.0g wt ID: _____

1000.0g wt reading: _____