Appendix C

Emission Calculations

AirNova, Inc.

EPA Methods 1, 2, 3, 4, 5 and 202
(Flows, O2/CO2, H2O, Filterable PM and Condensible PM)

Client	Fogo De Chao
Project No.	4835
Test Location	Hood Exhaust
Test Scenario	Without Control
Test Run	One - Uncontrolled
Test Date	09/30/22
Time Period	0753-0853

Emission Data

					Data from:
INPUT	Vlc =	21.1	cc	Vol. of H2O collected	EPA 4
INPUT	Vm =	50.834	dcf	Dry gas meter reading	EPA 4
INPUT	Pstatic =	-0.900	in. H2O	Static pressure	EPA 2
INPUT	Pb =	30.33	in. Hg	Barometric pressure	
	Ps =	30.26	in. Hg	Stack pressure	EPA 2
INPUT	Pstd =	29.92	in. Hg	EPA Standard pressure	
	dP =	1.059	in. H2O ^.5	Average sq.rt delta P	EPA 2
	dH =	2.40	in. H2O	Average draft gauge reading	EPA 4
	Tm =	518.7	R	Average meter temperature	EPA 4
	Ts =	551.2	R	Average stack temperature	EPA 2
INPUT	Tstd=	527.0	R	Standard temperature	
INPUT	Y =	1.015		Meter calibration factor	
INPUT	t =	60	min.	Duration of sampling time	
INPUT	Dn =	0.219	in.	Nozzle diameter	
	An =	0.000262	sq. ft.	Nozzle area	
INPUT	Ds =	19"x13"		Diameter of stack	
	As =	1.7150	sq. ft.	Cross sectional area of stack	
INPUT	Cp =	0.84		Pitot tube coefficient	EPA2
	Kp =	85.49	ft[(lb/lbmol)*(inHg)]^.5}/[s*R*inH2O]	Pitot tube constant	
	K1 =	17.614	R/in.Hg	constant	
	K2 =	0.047007	cu.ft/ml	constant	
	K3 =	0.0026688	in.Hg-cf/ml-R	constant	
	Molar vol air=	385.0	scf/lb-mol	constant @ 68 deg F	

EPA Method 3 Data

INPUT	[O2]	20.5	%-dry	Oxygen concentration
INPUT	[CO2]	0.1	%-dry	Carbon Dioxide concentration
	[N2]	79.4	%-dry	Nitrogen concentration

Calculations

1) Volume of gas sampled at standard conditions, Vmstd.

Vmstd =K1 * Y * Vm * (Pb + dH/13.6) / Tm

Vmstd = 53.449 dscf

1.514 dscm

2) Volume of water vapor collected at standard conditions, Vw(std).

Vw(std) = K2 * Vlc

Vw(std) = 0.992 scf

3) Decimal fraction of moisture by volume in stack gas, Bws.

Bws = Vwstd / (Vmstd+Vwstd)

Bws = 0.0182

4) Molecular weight of the stack gas on a wet basis, Ms.

Ms = [((44*%CO2) + (32*%O2) + (28*%N2)) * (1-Bws)] + (18*Bws)

Ms = 28.639 lb/ lbmole

5) Average stack gas velocity, Vs.

Vs = Kp * Cp * (dP) * (Ts/Ps*Ms)^.5

Vs = 60.652 fps

6) Average actual stack gas volumetric flowrate, Qa.

Qa = 60 sec/min * Vs * As

Qa = 6241.09 cfm

176.75 cmm

7) Average stack gas dry volumetric flowrate, Qstd.

Qstd = Qa * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)

Qstd = 5925.69 dscfm

Qstd = 167.82 dscmm

Calculations (cont.)

8) Particulate Matter Analytical Data

INPUT	A	0.0036 g	Filter sample net wt
INPUT	B	300 ml	Front acetone wash vol.
INPUT	C	0.0015 g	Front acetone residue wt.
INPUT	D	300 ml	Acetone blank vol.
INPUT	E	0.0000 g	Acetone blank residue wt.

9) Particulate sample mass calculations

	Front Half:		
H	Acetone blank adj. residue wt	0.0000 g	E * (B / D)
I	Adj. Acetone wash part.wt.	0.0015 g	C - H
J	Front half sample wt.	0.0051 g	A + I

10) Total Suspended Particulate Matter Emission Data

C[TSP] (grains/dscf) = (Front Half Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[TSP] (lb/dscf) = C[TSP] (grains/dscf) * (1 lb/7000 grains)
E[TSP] (lb/hr) = C[TSP] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TSP] =	0.0015 grains/dscf
C[TSP] =	2.10E-07 lb/dscf
E[TSP] =	0.07 lb/hr
E[TSP] =	0.33 ton/yr

11) Back Half Organic Particulate Analysis

C[BHOPM] (grains/dscf) = (Organic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHOPM] (lb/dscf) = C[BHOPM] (grains/dscf) * (1 lb/7000 grains)
E[BHOPM] (lb/hr) = C[BHOPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHOPM Mass =	0.0020 g
C[BHOPM]=	5.77E-04 grains/dscf
C[BHOPM]=	8.25E-08 lb/dscf
E[BHOPM]=	0.029 lb/hr
E[BHOPM]=	0.13 ton/yr
% BHOPM	24.1

12) Back Half Inorganic Particulate Analysis

Calculations (cont.)

C[BHIPM] (grains/dscf) = (Inorganic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHIPM] (lb/dscf) = C[BHIPM] (grains/dscf) * (1 lb/7000 grains)
E[BHIPM] (lb/hr) = C[BHIPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHIPM Mass =	0.0012	g
C[BHIPM]=	0.0003	grains/dscf
C[BHIPM]=	4.95E-08	lb/dscf
E[BHIPM]=	0.018	lb/hr
E[BHIPM]=	0.08	ton/yr
% BHIPM	14.5	

13) Total Back Half Particulate Matter

C[TBHPM] (grains/dscf) = (C[BHOPM] (grains/dscf)) + (C[BHIPM] (grains/dscf))
C[TBHPM] (lb/dscf) = (C[BHOPM] (lb/dscf)) + (C[BHIPM] (lb/dscf))
E[TBHPM] (lb/hr) = C[TBHPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

Blank Mass =	0.0000	g
TBHPM Mass =	0.0032	g
C[TBHPM]=	9.24E-04	grains/dscf
C[TBHPM]=	1.32E-07	lb/dscf
E[TBHPM]=	0.047	lb/hr
E[TBHPM]=	0.21	ton/yr
% TBHPM	38.6	

14) Total Particulate Matter < 10 Microns Emission Data

C[TPM10] (grains/dscf) = (C[TSP] (grains/dscf)) + (C[TBHPM] (grains/dscf))
C[TPM10] (lb/dscf) = (C[TSP] (lb/dscf)) + (C[TBHPM] (lb/dscf))
E[TPM10] (lb/hr) = C[TPM10] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TPM10] =	0.0024	grains/dscf
C[TPM10] =	3.42E-07	lb/dscf
E[TPM10] =	0.122	lb/hr
E[TPM10] =	0.53	ton/yr

15) Isokinecity, I.

% I = [100*Ts*(K3*Vlc+(((Vm*Y)/Tm)*(Pb+(dH/13.6))))] / (60*t*Ps*Vs*An)

% I = 98.56

AirNova, Inc.

EPA Methods 1, 2, 3, 4, 5 and 202

(Flows, O2/CO2, H2O, Filterable PM and Condensible PM)

Client	Fogo De Chao
Project No.	4835
Test Location	Hood Exhaust
Test Scenario	With Control
Test Run	One - Controlled
Test Date	09/30/22
Time Period	0932-1032

Emission Data

					Data from:
INPUT	Vlc =	21.1	cc	Vol. of H2O collected	EPA 4
INPUT	Vm =	50.007	dcf	Dry gas meter reading	EPA 4
INPUT	Pstatic =	-0.940	in. H2O	Static pressure	EPA 2
INPUT	Pb =	30.33	in. Hg	Barometric pressure	
	Ps =	30.26	in. Hg	Stack pressure	EPA 2
INPUT	Pstd =	29.92	in. Hg	EPA Standard pressure	
	dP =	1.011	in. H2O ^.5	Average sq.rt delta P	EPA 2
	dH =	2.23	in. H2O	Average draft gauge reading	EPA 4
	Tm =	523.0	R	Average meter temperature	EPA 4
	Ts =	557.0	R	Average stack temperature	EPA 2
INPUT	Tstd=	527.0	R	Standard temperature	
INPUT	Y =	1.015		Meter calibration factor	
INPUT	t =	60	min.	Duration of sampling time	
INPUT	Dn =	0.219	in.	Nozzle diameter	
	An =	0.000262	sq. ft.	Nozzle area	
INPUT	Ds =	19"x13"		Diameter of stack	
	As =	1.7150	sq. ft.	Cross sectional area of stack	
INPUT	Cp =	0.84		Pitot tube coefficient	EPA2
	Kp =	85.49	ft[(lb/lbmol)*(inHg)]^.5)/[s*R*inH2O]	Pitot tube constant	
	K1 =	17.614	R/in.Hg	constant	
	K2 =	0.047007	cu.ft/ml	constant	
	K3 =	0.0026688	in.Hg-cf/ml-R	constant	
	Molar vol air=	385.0	scf/lb-mol	constant @ 68 deg F	

EPA Method 3 Data

INPUT	[O2]	20.5	%-dry	Oxygen concentration
INPUT	[CO2]	0.1	%-dry	Carbon Dioxide concentration
	[N2]	79.4	%-dry	Nitrogen concentration

Calculations

1) Volume of gas sampled at standard conditions, Vmstd.

Vmstd =K1* Y * Vm * (Pb + dH/13.6) / Tm
Vmstd = 52.123 dscf
1.476 dscm

2) Volume of water vapor collected at standard conditions, Vw(std).

Vw(std) = K2 * Vlc
Vw(std) = 0.992 scf

3) Decimal fraction of moisture by volume in stack gas, Bws.

Bws = Vwstd / (Vmstd+Vwstd)
Bws = 0.0187

4) Molecular weight of the stack gas on a wet basis, Ms.

Ms = [((44*%CO2) + (32*%O2) + (28*%N2)) * (1-Bws)] + (18*Bws)
Ms = 28.634 lb/ lbmole

5) Average stack gas velocity, Vs.

Vs = Kp * Cp * (dP) * (Ts/Ps*Ms)^.5
Vs = 58.233 fps

6) Average actual stack gas volumetric flowrate, Qa.

Qa = 60 sec/min * Vs * As
Qa = 5992.15 cfm
169.70 cmm

7) Average stack gas dry volumetric flowrate, Qstd.

Qstd = Qa * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)
Qstd = 5626.59 dscfm
Qstd = 159.35 dscmm

Calculations (cont.)

8) Particulate Matter Analytical Data

INPUT	A	0.0006 g	Filter sample net wt
INPUT	B	300 ml	Front acetone wash vol.
INPUT	C	0.0009 g	Front acetone residue wt.
INPUT	D	300 ml	Acetone blank vol.
INPUT	E	0.0000 g	Acetone blank residue wt.

9) Particulate sample mass calculations

	Front Half:		
H	Acetone blank adj. residue wt	0.0000 g	E * (B / D)
I	Adj. Acetone wash part.wt.	0.0009 g	C - H
J	Front half sample wt.	0.0015 g	A + I

10) Total Suspended Particulate Matter Emission Data

C[TSP] (grains/dscf) = (Front Half Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[TSP] (lb/dscf) = C[TSP] (grains/dscf) * (1 lb/7000 grains)
E[TSP] (lb/hr) = C[TSP] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TSP] =	0.0004 grains/dscf
C[TSP] =	6.34E-08 lb/dscf
E[TSP] =	0.02 lb/hr
E[TSP] =	0.09 ton/yr

11) Back Half Organic Particulate Analysis

C[BHOPM] (grains/dscf) = (Organic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHOPM] (lb/dscf) = C[BHOPM] (grains/dscf) * (1 lb/7000 grains)
E[BHOPM] (lb/hr) = C[BHOPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHOPM Mass =	0.0007 g
C[BHOPM]=	2.07E-04 grains/dscf
C[BHOPM]=	2.96E-08 lb/dscf
E[BHOPM]=	0.010 lb/hr
E[BHOPM]=	0.04 ton/yr
% BHOPM	22.6

12) Back Half Inorganic Particulate Analysis

Calculations (cont.)

C[BHIPM] (grains/dscf) = (Inorganic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHIPM] (lb/dscf) = C[BHIPM] (grains/dscf) * (1 lb/7000 grains)
E[BHIPM] (lb/hr) = C[BHIPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHIPM Mass =	0.0009	g
C[BHIPM]=	0.0003	grains/dscf
C[BHIPM]=	3.81E-08	lb/dscf
E[BHIPM]=	0.013	lb/hr
E[BHIPM]=	0.06	ton/yr
% BHIPM	29.0	

13) Total Back Half Particulate Matter

C[TBHPM] (grains/dscf) = (C[BHOPM] (grains/dscf)) + (C[BHIPM] (grains/dscf))
C[TBHPM] (lb/dscf) = (C[BHOPM] (lb/dscf)) + (C[BHIPM] (lb/dscf))
E[TBHPM] (lb/hr) = C[TBHPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

Blank Mass =	0.0000	g
TBHPM Mass =	0.0016	g
C[TBHPM]=	4.74E-04	grains/dscf
C[TBHPM]=	6.77E-08	lb/dscf
E[TBHPM]=	0.023	lb/hr
E[TBHPM]=	0.10	ton/yr
% TBHPM	51.6	

14) Total Particulate Matter < 10 Microns Emission Data

C[TPM10] (grains/dscf) = (C[TSP] (grains/dscf)) + (C[TBHPM] (grains/dscf))
C[TPM10] (lb/dscf) = (C[TSP] (lb/dscf)) + (C[TBHPM] (lb/dscf))
E[TPM10] (lb/hr) = C[TPM10] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TPM10] =	0.0009	grains/dscf
C[TPM10] =	1.31E-07	lb/dscf
E[TPM10] =	0.044	lb/hr
E[TPM10] =	0.19	ton/yr

15) Isokinecity, I.

% I = [100*Ts*(K3*Vlc+(((Vm*Y)/Tm)*(Pb+(dH/13.6))))] / (60*t*Ps*Vs*An)
% I = 101.23

AirNova, Inc.

EPA Methods 1, 2, 3, 4, 5 and 202
(Flows, O2/CO2, H2O, Filterable PM and Condensible PM)

Client	Fogo De Chao
Project No.	4835
Test Location	Hood Exhaust
Test Scenario	Without Control
Test Run	One - Uncontrolled
Test Date	10/18/22
Time Period	0810-0910

Emission Data

					Data from:
INPUT	Vlc =	13.0	cc	Vol. of H2O collected	EPA 4
INPUT	Vm =	42.582	dcf	Dry gas meter reading	EPA 4
INPUT	Pstatic =	-0.600	in. H2O	Static pressure	EPA 2
INPUT	Pb =	29.62	in. Hg	Barometric pressure	
	Ps =	29.58	in. Hg	Stack pressure	EPA 2
INPUT	Pstd =	29.92	in. Hg	EPA Standard pressure	
	dP =	0.890	in. H2O ^.5	Average sq.rt delta P	EPA 2
	dH =	1.40	in. H2O	Average draft gauge reading	EPA 4
	Tm =	516.7	R	Average meter temperature	EPA 4
	Ts =	570.7	R	Average stack temperature	EPA 2
INPUT	Tstd=	527.0	R	Standard temperature	
INPUT	Y =	1.010		Meter calibration factor	
INPUT	t =	60	min.	Duration of sampling time	
INPUT	Dn =	0.216	in.	Nozzle diameter	
	An =	0.000254	sq. ft.	Nozzle area	
INPUT	Ds =	19"x13"		Diameter of stack	
	As =	1.7150	sq. ft.	Cross sectional area of stack	
INPUT	Cp =	0.84		Pitot tube coefficient	EPA2
	Kp =	85.49	ft[(lb/lbmol)*(inHg)]^.5)/[s*R*inH2O]	Pitot tube constant	
	K1 =	17.614	R/in.Hg	constant	
	K2 =	0.047007	cu.ft/ml	constant	
	K3 =	0.0026688	in.Hg-cf/ml-R	constant	
	Molar vol air=	385.0	scf/lb-mol	constant @ 68 deg F	

EPA Method 3 Data

INPUT	[O2]	20.6	%-dry	Oxygen concentration
INPUT	[CO2]	0.1	%-dry	Carbon Dioxide concentration
	[N2]	79.3	%-dry	Nitrogen concentration

Calculations

1) Volume of gas sampled at standard conditions, Vmstd.

Vmstd =K1* Y * Vm * (Pb + dH/13.6) / Tm
Vmstd = 43.576 dscf
1.234 dscm

2) Volume of water vapor collected at standard conditions, Vw(std).

Vw(std) = K2 * Vlc
Vw(std) = 0.611 scf

3) Decimal fraction of moisture by volume in stack gas, Bws.

Bws = Vwstd / (Vmstd+Vwstd)
Bws = 0.0138

4) Molecular weight of the stack gas on a wet basis, Ms.

Ms = [((44*%CO2) + (32*%O2) + (28*%N2)) * (1-Bws)] + (18*Bws)
Ms = 28.690 lb/ lbmole

5) Average stack gas velocity, Vs.

Vs = Kp * Cp * (dP) * (Ts/Ps*Ms)^.5
Vs = 52.422 fps

6) Average actual stack gas volumetric flowrate, Qa.

Qa = 60 sec/min * Vs * As
Qa = 5394.27 cfm
152.77 cmm

7) Average stack gas dry volumetric flowrate, Qstd.

Qstd = Qa * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)
Qstd = 4855.83 dscfm
Qstd = 137.52 dscmm

Calculations (cont.)

8) Particulate Matter Analytical Data

INPUT	A	0.0372 g	Filter sample net wt
INPUT	B	300 ml	Front acetone wash vol.
INPUT	C	0.0073 g	Front acetone residue wt.
INPUT	D	300 ml	Acetone blank vol.
INPUT	E	0.0000 g	Acetone blank residue wt.

9) Particulate sample mass calculations

Front Half:

H	Acetone blank adj. residue wt	0.0000 g	E * (B / D)
I	Adj. Acetone wash part.wt.	0.0073 g	C - H
J	Front half sample wt.	0.0445 g	A + I

10) Total Suspended Particulate Matter Emission Data

C[TSP] (grains/dscf) = (Front Half Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[TSP] (lb/dscf) = C[TSP] (grains/dscf) * (1 lb/7000 grains)
E[TSP] (lb/hr) = C[TSP] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TSP] =	0.0158 grains/dscf
C[TSP] =	2.25E-06 lb/dscf
E[TSP] =	0.66 lb/hr
E[TSP] =	2.87 ton/yr

11) Back Half Organic Particulate Analysis

C[BHOPM] (grains/dscf) = (Organic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHOPM] (lb/dscf) = C[BHOPM] (grains/dscf) * (1 lb/7000 grains)
E[BHOPM] (lb/hr) = C[BHOPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHOPM Mass =	0.0014 g
C[BHOPM]=	4.96E-04 grains/dscf
C[BHOPM]=	7.08E-08 lb/dscf
E[BHOPM]=	0.021 lb/hr
E[BHOPM]=	0.09 ton/yr
% BHOPM	2.9

12) Back Half Inorganic Particulate Analysis

Calculations (cont.)

C[BHIPM] (grains/dscf) = (Inorganic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHIPM] (lb/dscf) = C[BHIPM] (grains/dscf) * (1 lb/7000 grains)
E[BHIPM] (lb/hr) = C[BHIPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHIPM Mass =	0.0028	g
C[BHIPM]=	0.0010	grains/dscf
C[BHIPM]=	1.42E-07	lb/dscf
E[BHIPM]=	0.041	lb/hr
E[BHIPM]=	0.18	ton/yr
% BHIPM	5.7	

13) Total Back Half Particulate Matter

C[TBHPM] (grains/dscf) = (C[BHOPM] (grains/dscf)) + (C[BHIPM] (grains/dscf))
C[TBHPM] (lb/dscf) = (C[BHOPM] (lb/dscf)) + (C[BHIPM] (lb/dscf))
E[TBHPM] (lb/hr) = C[TBHPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

Blank Mass =	0.0000	g
TBHPM Mass =	0.0042	g
C[TBHPM]=	1.49E-03	grains/dscf
C[TBHPM]=	2.12E-07	lb/dscf
E[TBHPM]=	0.062	lb/hr
E[TBHPM]=	0.27	ton/yr
% TBHPM	8.6	

14) Total Particulate Matter < 10 Microns Emission Data

C[TPM10] (grains/dscf) = (C[TSP] (grains/dscf)) + (C[TBHPM] (grains/dscf))
C[TPM10] (lb/dscf) = (C[TSP] (lb/dscf)) + (C[TBHPM] (lb/dscf))
E[TPM10] (lb/hr) = C[TPM10] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TPM10] =	0.0172	grains/dscf
C[TPM10] =	2.46E-06	lb/dscf
E[TPM10] =	0.718	lb/hr
E[TPM10] =	3.14	ton/yr

15) Isokinecity, I.

% I = [100*Ts*(K3*Vlc+(((Vm*Y)/Tm)*(Pb+(dH/13.6))))] / (60*t*Ps*Vs*An)
% I = 100.80

AirNova, Inc.

EPA Methods 1, 2, 3, 4, 5 and 202
(Flows, O2/CO2, H2O, Filterable PM and Condensible PM)

Client	Fogo De Chao
Project No.	4835
Test Location	Hood Exhaust
Test Scenario	With Control
Test Run	Two - Controlled
Test Date	10/18/22
Time Period	1001-1101

Emission Data

					Data from:
INPUT	Vlc =	11.3	cc	Vol. of H2O collected	EPA 4
INPUT	Vm =	42.001	dcf	Dry gas meter reading	EPA 4
INPUT	Pstatic =	-0.540	in. H2O	Static pressure	EPA 2
INPUT	Pb =	29.64	in. Hg	Barometric pressure	
	Ps =	29.60	in. Hg	Stack pressure	EPA 2
INPUT	Pstd =	29.92	in. Hg	EPA Standard pressure	
	dP =	0.890	in. H2O ^.5	Average sq.rt delta P	EPA 2
	dH =	1.38	in. H2O	Average draft gauge reading	EPA 4
	Tm =	518.7	R	Average meter temperature	EPA 4
	Ts =	563.9	R	Average stack temperature	EPA 2
INPUT	Tstd=	527.0	R	Standard temperature	
INPUT	Y =	1.010		Meter calibration factor	
INPUT	t =	60	min.	Duration of sampling time	
INPUT	Dn =	0.216	in.	Nozzle diameter	
	An =	0.000254	sq. ft.	Nozzle area	
INPUT	Ds =	19"x13"		Diameter of stack	
	As =	1.7150	sq. ft.	Cross sectional area of stack	
INPUT	Cp =	0.84		Pitot tube coefficient	EPA2
	Kp =	85.49	ft[(lb/lbmol)*(inHg)]^.5}/[s*R*inH2O]	Pitot tube constant	
	K1 =	17.614	R/in.Hg	constant	
	K2 =	0.047007	cu.ft/ml	constant	
	K3 =	0.0026688	in.Hg-cf/ml-R	constant	
	Molar vol air=	385.0	scf/lb-mol	constant @ 68 deg F	

EPA Method 3 Data

INPUT	[O2]	20.6	%-dry	Oxygen concentration
INPUT	[CO2]	0.1	%-dry	Carbon Dioxide concentration
	[N2]	79.3	%-dry	Nitrogen concentration

Calculations

1) Volume of gas sampled at standard conditions, Vmstd.

Vmstd =K1* Y * Vm * (Pb + dH/13.6) / Tm
Vmstd = 42.842 dscf
1.213 dscm

2) Volume of water vapor collected at standard conditions, Vw(std).

Vw(std) = K2 * Vlc
Vw(std) = 0.531 scf

3) Decimal fraction of moisture by volume in stack gas, Bws.

Bws = Vwstd / (Vmstd+Vwstd)
Bws = 0.0122

4) Molecular weight of the stack gas on a wet basis, Ms.

Ms = [((44*%CO2) + (32*%O2) + (28*%N2)) * (1-Bws)] + (18*Bws)
Ms = 28.707 lb/ lbmole

5) Average stack gas velocity, Vs.

Vs = Kp * Cp * (dP) * (Ts/Ps*Ms)^.5
Vs = 52.036 fps

6) Average actual stack gas volumetric flowrate, Qa.

Qa = 60 sec/min * Vs * As
Qa = 5354.54 cfm
151.64 cmm

7) Average stack gas dry volumetric flowrate, Qstd.

Qstd = Qa * (Tstd/Ts) * (Ps/Pstd) * (1-Bws)
Qstd = 4890.34 dscfm
Qstd = 138.49 dscmm

Calculations (cont.)

8) Particulate Matter Analytical Data

INPUT	A	0.0124 g	Filter sample net wt
INPUT	B	300 ml	Front acetone wash vol.
INPUT	C	0.0045 g	Front acetone residue wt.
INPUT	D	300 ml	Acetone blank vol.
INPUT	E	0.0000 g	Acetone blank residue wt.

9) Particulate sample mass calculations

	Front Half:		
H	Acetone blank adj. residue wt	0.0000 g	E * (B / D)
I	Adj. Acetone wash part.wt.	0.0045 g	C - H
J	Front half sample wt.	0.0169 g	A + I

10) Total Suspended Particulate Matter Emission Data

C[TSP] (grains/dscf) = (Front Half Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[TSP] (lb/dscf) = C[TSP] (grains/dscf) * (1 lb/7000 grains)
E[TSP] (lb/hr) = C[TSP] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TSP] =	0.0061	grains/dscf
C[TSP] =	8.70E-07	lb/dscf
E[TSP] =	0.26	lb/hr
E[TSP] =	1.12	ton/yr

11) Back Half Organic Particulate Analysis

C[BHOPM] (grains/dscf) = (Organic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHOPM] (lb/dscf) = C[BHOPM] (grains/dscf) * (1 lb/7000 grains)
E[BHOPM] (lb/hr) = C[BHOPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHOPM Mass =	0.0002	g
C[BHOPM]=	7.20E-05	grains/dscf
C[BHOPM]=	1.03E-08	lb/dscf
E[BHOPM]=	0.003	lb/hr
E[BHOPM]=	0.01	ton/yr
% BHOPM	1.1	

12) Back Half Inorganic Particulate Analysis

Calculations (cont.)

C[BHIPM] (grains/dscf) = (Inorganic Mass Wt)(g) * (1/Vmstd) * 15.43(grains/g)
C[BHIPM] (lb/dscf) = C[BHIPM] (grains/dscf) * (1 lb/7000 grains)
E[BHIPM] (lb/hr) = C[BHIPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

BHIPM Mass =	0.0005	g
C[BHIPM]=	0.0002	grains/dscf
C[BHIPM]=	2.57E-08	lb/dscf
E[BHIPM]=	0.008	lb/hr
E[BHIPM]=	0.03	ton/yr
% BHIPM	2.8	

13) Total Back Half Particulate Matter

C[TBHPM] (grains/dscf) = (C[BHOPM] (grains/dscf)) + (C[BHIPM] (grains/dscf))
C[TBHPM] (lb/dscf) = (C[BHOPM] (lb/dscf)) + (C[BHIPM] (lb/dscf))
E[TBHPM] (lb/hr) = C[TBHPM] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

Blank Mass =	0.0000	g
TBHPM Mass =	0.0007	g
C[TBHPM]=	2.52E-04	grains/dscf
C[TBHPM]=	3.60E-08	lb/dscf
E[TBHPM]=	0.011	lb/hr
E[TBHPM]=	0.05	ton/yr
% TBHPM	4.0	

14) Total Particulate Matter < 10 Microns Emission Data

C[TPM10] (grains/dscf) = (C[TSP] (grains/dscf)) + (C[TBHPM] (grains/dscf))
C[TPM10] (lb/dscf) = (C[TSP] (lb/dscf)) + (C[TBHPM] (lb/dscf))
E[TPM10] (lb/hr) = C[TPM10] * Vdscfm * A * (60 min/hr) * (1 lb / 7000 grains)

C[TPM10] =	0.0063	grains/dscf
C[TPM10] =	9.06E-07	lb/dscf
E[TPM10] =	0.266	lb/hr
E[TPM10] =	1.16	ton/yr

15) Isokinecity, I.

% I = [100*Ts*(K3*Vlc+(((Vm*Y)/Tm)*(Pb+(dH/13.6))))] / (60*t*Ps*Vs*An)

% I = 98.41