COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
January 12, 2007

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SUBJECT: Source Test Results
Reliant Energy Seward Station
East Wheatfield Township, Indiana County
Plan Approval No. 32-040B
Boiler Nos. 1 and 2
Source ID Nos. 034 and 035

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TO: **Mark Wayner**
Regional Air Quality Program Manager
Southwest Regional Office

FROM: Gregory D. Parrish
Chief
Division of Source Testing and Monitoring
Bureau of Air Quality

Attached are two (2) copies of the test programs conducted at your request at Reliant Energy Seward Station in East Wheatfield Township, Indiana County, Pennsylvania. One copy of the report is for the facility's file and one copy is for your file.

The following information was extracted from the test report:

Process Tested-Boiler Nos. 1 & 2

Test No.:	**00306A**	**00306B**	**00306C**
Pollutant Sampled:	Mercury	Mercury	Mercury
Test Date:	7/19/06	7/19/06	7/20/06
Actual Emissions (gr/dscf):	1.09E-08	5.40E-09	4.81E-09
Actual Emissions (lbs/hr):	1.09E-04	5.40E-05	4.93E-05
Actual Emissions (lbs/10^{12}BTU):	0.02	0.01	0.01

avg. of 0.73 lb/yr
scaling up to Dominion heat capacity
of 6264 MM Btu/hr

Process Tested-Boiler Nos. 1 & 2

Test No.:	**00406A**	**00406B**	**00406C**
Pollutant Sampled:	Total PM_{10}	Total PM_{10}	Total PM_{10}
Test Date:	7/19/06	7/19/06	7/20/06
Actual Emissions (gr/dscf):	0.04	0.05	0.02
Actual Emissions (lbs/hr):	436.5	490.2	179.4
Actual Emissions (lbs/MMBTU):	0.09	0.10	0.04
Allowable Emission Rate (lb/hr):		50.6	
Allowable Emission Rate (MMBTU/hr):		0.01	

Test No.:	**00506A**	**00506B**	**00506C**
Pollutant Sampled:	Total PM_{10}	Total PM_{10}	Total PM_{10}
Test Date:	10/19/06	10/19/06	10/20/06
Actual Emissions (gr/dscf):	0.01	0.02	0.02
Actual Emissions (lbs/hr):	125.2	189.1	137.7
Actual Emissions (lbs/MMBTU):	0.025	0.037	0.030
Allowable Emission Rate (lb/hr):		50.6	
Allowable Emission Rate (MMBTU/hr):		0.01	

If you have any questions concerning the test, please do not hesitate to contact me.

Attachments

bcc: AP File through: Dean Van Orden
Reading File, Source Testing
Red Data File-Reliant Energy Seward Station; E.Wheatfield Twp, Indiana Co.

GDP:DRB:drb

Source Test Report

for

Reliant Energy Seward Station

in

East Wheatfield Township, Indiana County

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Department of Environmental Protection
Bureau of Air Quality

Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Executive Summary -- Boilers 1 & 2 -- Mercury

Test Number:	00306A			
Test Date:	07/19/2006			
Volumetric Flow Rate (dscfm):	1,173,361			
Heat Input (MMBTU/hr):	5,076			
Coal (lbs Hg/10^{12} BTU):	71.6			
Hg Removal (%):	100.0			
Mercury:	**Particle Bound**	**Oxidized**	**Elemental**	**Total**
Concentration (gr./dscf):	4.93E-09	2.21E-09	3.74E-09	1.09E-08
Emission Rate (lbs/hour):	4.96E-05	2.22E-05	3.76E-05	1.09E-04
Emission Rate (lbs/10^{12}BTU):	0.01	0.00	0.01	0.02

Test Number:	00306B			
Test Date:	7/19/2006			
Volumetric Flow Rate (dscfm):	1,166,675			
Heat Input (MMBTU/hr):	5,064			
Coal (lbs Hg/10^{12} BTU):	55.2			
Hg Removal (%):	100.0			
Mercury:	**Particle Bound**	**Oxidized**	**Elemental**	**Total**
Concentration (gr./dscf):	4.05E-09	0.00E+00	1.35E-09	5.40E-09
Emission Rate (lbs/hour):	4.05E-05	0.00E+00	1.35E-05	5.40E-05
Emission Rate (lbs/10^{12}BTU):	0.01	0.00	0.00	0.01

Test Number:	00306C			
Test Date:	7/20/2006			
Volumetric Flow Rate (dscfm):	1,194,824			
Heat Input (MMBTU/hr):	5,126			
Coal (lbs Hg/10^{12} BTU):	44.7			
Hg Removal (%):	100.0			
Mercury:	**Particle Bound**	**Oxidized**	**Elemental**	**Total**
Concentration (gr./dscf):	9.95E-10	0.00E+00	3.82E-09	4.81E-09
Emission Rate (lbs/hour):	1.02E-05	0.00E+00	3.91E-05	4.93E-05
Emission Rate (lbs/10^{12}BTU):	0.00	0.00	0.01	0.01

Test Conducted By:

Report Prepared By:

Report Approved By:

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Executive Summary—Boilers 1 & 2—Total PM_{10}

Test Number	**00406A**	**00406B**	**00406C**	**N/A**
Test Date	**7/19/06**	**7/19/06**	**7/20/06**	**Average**
Volumetric Flow Rate (dscfm	1,184,184	1,143,863	1,162,743	**1,163,597**
Heat Input (MMBTU/hr)	5076.3	5064.0	5125.7	**5088.7**
Concentration (gr/dscf)	0.04	0.05	0.02	**0.04**
Mass Emission Rate (lb/hr)	436.5	490.2	179.4	**368.7**
Mass Emission Rate (lb/MMBTU)	0.09	0.10	0.04	**0.08**

Test Number	**00506A**	**00506B**	**00506C**	**N/A**
Test Date	**10/19/06**	**10/19/06**	**10/20/06**	**Average**
Volumetric Flow Rate (dscfm)	1,123,976	1,103,033	1,147,603	**1,124,871**
Heat Input (MMBTU/hr)	5108.2	5052.7	5042.8	**5067.9**
Concentration (gr/dscf)	0.01	0.02	0.02	**0.02**
Mass Emission Rate (lb/hr)	125.2	189.1	137.7	**150.7**
Mass Emission Rate (lb/MMBTU)	0.025	0.037	0.030	**0.031**

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Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test Data Summary -- Boilers 1 & 2

Pollutant		Mercury	Mercury	Mercury
Test Number		00306A	00306B	00306C
Test Date		07/19/2006	07/19/2006	07/20/2006
Total Sample Time (min)	θ	96	96	96
No. of Sampling Points		1	1	1
Stack or Duct Area at Sampling Plane (ft^2)	A	233.7	233.7	233.7
Barometric Pressure (in. Hg)	Pb	28.76	28.76	28.67
Stack Static Pressure (in. WG)	Pg	-2.10	-2.35	-2.35
Stack Pressure (in. Hg)	Ps	28.61	28.59	28.50
Avg. Pressure Drop at Orifice (in. WG)	ΔH	3.39	3.46	3.66
Avg. Pressure Drop at Pitot Tube (in. WG)	Δp	3.70	3.66	3.86
Average Stack Temperature (°F)	Ts	169	168	169
Avg. Meter Temperature (°F)	Tm	98	102	97
Dry Molecular Wt. (lb/lb-mole)	Md	30.17	30.17	30.21
Stack Molecular Wt. (lb/lb-mole)	Ms	28.44	28.44	28.48
Condensate Volume (ml)	Vlc	319.5	319.9	328.5
Volume of Gas Sampled (dscf)	Vm	90.7	91.4	93.0
Volume of Water Vapor Condensed (scf)	Vw	15	15.1	15.5
Moisture in Gas Stream (%)		14.2	14.2	14.2
Dry Gas Meter Calibration Factor	Y	0.99	0.99	0.99
Pitot Tube Coefficient	Cp	0.84	0.84	0.84
Average Corrected Velocity (fps)	Vs	121.5	120.7	124.2
Volumetric Flow Rate (dscfm)	Qs	1,173,361	1,166,675	1,194,824
Sample Nozzle Diameter (inches)	Dn	0.185	0.185	0.185
Percent Isokinetic Sampling (%)	I	100.5	101.7	101.5

Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test No.		0406A
Test Date		07/19/06
Pollutant		Total PM10
No. of Sampling Points		16
Stack or Duct Area at Sampling Plane (ft2)	A	233.71
Barometric Pressure (in. Hg)	Pbs	28.76
Condensate Volume (ml)	Vlc	414.8
Avg. Pressure Drop at Orifice (in. WG)	DH	3.61
Avg. Meter Temperature (°F)	Tm	99
Volume of Water Vapor Condensed (scf)	Vwc	19.5
Meter Y-factor	Yf	1.00
Volume of Gas Sampled (dscf)	Vms	127.7
Total Sample Time (min)	q	128.0
Moisture in Gas Stream (%)	Bws	13.2
Dry Molecular Wt. (lb/lb-mole)	Mds	30.30
Molecular Wt. (lb/lb-mole)	Mss	28.68
Pitot Tube Coefficient	Cps	0.84
Average Corrected Velocity (fps)	Vss	121.1
Stack Static Pressure (in. WG)	Pg	-2.350
Average Stack Temperature (°F)	Tss	168
Volumetric Flow Rate (dscfm)	Qss	1,184,184
Sample Nozzle Diameter (inches)	Dn	0.190
Percent Isokinetic Sampling (%)	I	100.1
Total PM10 Collected (gm)	Mn	0.35
Total PM10 Concentration (gr/dscf)	Cs	0.043
Total PM10 Mass Emission Rate (lb/hr)	E	436.5
Allowable Total PM10 Mass Emission Rate (lb/hr)		50.6
Heat Input To Combustion Unit (mmbtu/hr)	HI	5076.3
Total PM10 Mass Emission Rate (lb/mmbtu)	E'	0.086
Allowable Total PM10 Mass Emission Rate (lb/mmbtu)		0.01
Filterable Particulate Matter (gm)	MnF	0.17
Filterable Mass Emission Rate (lb/hr)	EF	211.7
Filterable Mass Emission Rate (lb/mmbtu)	EF'	0.04
Condensable Particulate Matter (gm)	MnC	0.18
Condensable Mass Emission Rate (lb/hr)	EC	224.2
Condensable Mass Emission Rate (lb/mmbtu)	EC'	0.05

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Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test No.		00406B
Test Date		07/19/06
Pollutant		Total PM10
No. of Sampling Points		16
Stack or Duct Area at Sampling Plane (ft2)	A	233.71
Barometric Pressure (in. Hg)	Pbs	28.70
Condensate Volume (ml)	Vlc	420.0
Avg. Pressure Drop at Orifice (in. WG)	DH	3.23
Avg. Meter Temperature (°F)	Tm	104
Volume of Water Vapor Condensed (scf)	Vwc	19.8
Meter Y-factor	Yf	1.000
Volume of Gas Sampled (dscf)	Vms	120.1
Total Sample Time (min)	q	128.0
Moisture in Gas Stream (%)	Bws	14.2
Dry Molecular Wt. (lb/lb-mole)	Mds	30.30
Molecular Wt. (lb/lb-mole)	Mss	28.55
Pitot Tube Coefficient	Cps	0.840
Average Corrected Velocity (fps)	Vss	118.4
Stack Static Pressure (in. WG)	Pg	-2.350
Average Stack Temperature (°F)	Tss	167
Volumetric Flow Rate (dscfm)	Qss	1,143,863
Sample Nozzle Diameter (inches)	Dn	0.188
Percent Isokinetic Sampling (%)	I	99.6
Total PM10 Collected (gm)	Mn	0.39
Total PM10 Concentration (gr/dscf)	Cs	0.050
Total PM10 Mass Emission Rate (lb/hr)	E	490.2
Allowable Total PM10 Mass Emission Rate (lb/hr)	E'	50.6
Heat Input To Combustion Unit (mmbtu/hr)	HI	5064.0
Total PM10 Mass Emission Rate (lb/mmbtu)	E'	0.10
Allowable Total PM10 Mass Emission Rate (lb/mmbtu)		0.01
Filterable Particulate Matter (gm)	MnF	0.20
Filterable Mass Emission Rate (lb/hr)	EF	251.7
Filterable Mass Emission Rate (lb/mmbtu)	EF'	0.05
Condensable Particulate Matter (gm)	MnC	0.19
Condensable Mass Emission Rate (lb/hr)	EC	239.1
Condensable Mass Emission Rate (lb/mmbtu)	EC'	0.05

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Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test No.		00406C
Test Date		07/20/06
Pollutant		Total PM10
No. of Sampling Points		16
Stack or Duct Area at Sampling Plane (ft2)	A	233.71
Barometric Pressure (in. Hg)	Pbs	28.73
Condensate Volume (ml)	Vlc	415.5
Avg. Pressure Drop at Orifice (in. WG)	DH	3.40
Avg. Meter Temperature (°F)	Tm	99
Volume of Water Vapor Condensed (scf)	Vwc	19.6
Meter Y-factor	Yf	1.000
Volume of Gas Sampled (dscf)	Vms	121.8
Total Sample Time (min)	q	128.0
Moisture in Gas Stream (%)	Bws	13.9
Dry Molecular Wt. (lb/lb-mole)	Mds	30.21
Molecular Wt. (lb/lb-mole)	Mss	28.51
Pitot Tube Coefficient	Cps	0.840
Average Corrected Velocity (fps)	Vss	120.0
Stack Static Pressure (in. WG)	Pg	-2.350
Average Stack Temperature (°F)	Tss	168
Volumetric Flow Rate (dscfm)	Qss	1,162,743
Sample Nozzle Diameter (inches)	Dn	0.188
Percent Isokinetic Sampling (%)	I	99.4
Total PM10 Collected (gm)	Mn	0.14
Total PM10 Concentration (gr/dscf)	Cs	0.018
Total PM10 Mass Emission Rate (lb/hr)		179.4
Allowable Total PM10 Mass Emission Rate (lb/hr)	E	50.6
Heat Input To Combustion Unit (mm btu/hr)	HI	5,125.7
Total PM10 Mass Emission Rate (lb/mm btu)	E'	0.04
Allowable Total PM10 Mass Emission Rate (lb/mm btu)		0.01
Filterable Particulate Matter (gm)	MnF	0.01
Filterable Mass Emission Rate (lb/hr)	EF	12.8
Filterable Mass Emission Rate (lb/mmbtu)	EF'	0.002
Condensable Particulate Matter (gm)	MnC	0.13
Condensable Mass Emission Rate (lb/hr)	EC	166.6
Condensable Mass Emission Rate (lb/mmbtu)	EC'	0.033

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Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test No.		0506A
Test Date		10/19/06
Pollutant		Total PM10
No. of Sampling Points		16
Stack or Duct Area at Sampling Plane (ft^2)	A	233.71
Barometric Pressure (in. Hg)	Pbs	29.18
Condensate Volume (ml)	Vlc	223.5
Avg. Pressure Drop at Orifice (in. WG)	DH	2.96
Avg. Meter Temperature (°F)	Tm	81
Volume of Water Vapor Condensed (scf)	Vwc	10.5
Meter Y-factor	Yf	0.99
Volume of Gas Sampled (dscf)	Vms	71.4
Total Sample Time (min)	q	80.0
Moisture in Gas Stream (%)	Bws	12.8
Dry Molecular Wt. (lb/lb-mole)	Mds	30.16
Molecular Wt. (lb/lb-mole)	Mss	28.60
Pitot Tube Coefficient	Cps	0.84
Average Corrected Velocity (fps)	Vss	112.4
Stack Static Pressure (in. WG)	Pg	-2.350
Average Stack Temperature (°F)	Tss	166
Volumetric Flow Rate (dscfm)	Qss	1,123,976
Sample Nozzle Diameter (inches)	Dn	0.183
Percent Isokinetic Sampling (%)	I	101.7
Total PM10 Collected (gm)	Mn	0.06
Total PM10 Concentration (gr/dscf)	Cs	0.013
Total PM10 Mass Emission Rate (lb/hr)	E	125.2
Allowable Total PM10 Mass Emission Rate (lb/hr)		50.6
Heat Input To Combustion Unit (mmbtu/hr)	HI	5108.2
Total PM10 Mass Emission Rate (lb/mmbtu)	E'	0.025
Allowable Total PM10 Mass Emission Rate (lb/mmbtu)		0.010
Filterable Particulate Matter (gm)	MnF	0.01
Filterable Mass Emission Rate (lb/hr)	EF	20.9
Filterable Mass Emission Rate (lb/mmbtu)	EF'	0.004
Condensable Particulate Matter (gm)	MnC	0.05
Condensable Mass Emission Rate (lb/hr)	EC	104.3
Condensable Mass Emission Rate (lb/mmbtu)	EC'	0.021

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Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test No.		00506B
Test Date		10/19/06
Pollutant		Total PM10
No. of Sampling Points		16
Stack or Duct Area at Sampling Plane (ft2)	A	233.71
Barometric Pressure (in. Hg)	Pbs	29.26
Condensate Volume (ml)	Vlc	207.8
Avg. Pressure Drop at Orifice (in. WG)	DH	2.87
Avg. Meter Temperature (oF)	Tm	86
Volume of Water Vapor Condensed (scf)	Vwc	9.8
Meter Y-factor	Yf	0.99
Volume of Gas Sampled (dscf)	Vms	69.4
Total Sample Time (min)	q	80.0
Moisture in Gas Stream (%)	Bws	12.4
Dry Molecular Wt. (lb/lb-mole)	Mds	30.32
Molecular Wt. (lb/lb-mole)	Mss	28.79
Pitot Tube Coefficient	Cps	0.84
Average Corrected Velocity (fps)	Vss	109.5
Stack Static Pressure (in. WG)	Pg	-2.350
Average Stack Temperature (oF)	Tss	166
Volumetric Flow Rate (dscfm)	Qss	1,103,033
Sample Nozzle Diameter (inches)	Dn	0.183
Percent Isokinetic Sampling (%)	I	100.6
Total PM10 Collected (gm)	Mn	0.09
Total PM10 Concentration (gr/dscf)	Cs	0.020
Total PM10 Mass Emission Rate (lb/hr)	E	189.1
Allowable Total PM10 Mass Emission Rate (lb/hr)		50.6
Heat Input To Combustion Unit (mmbtu/hr)	HI	5052.7
Total PM10 Mass Emission Rate (lb/mmbtu)	E'	0.037
Allowable Total PM10 Mass Emission Rate (lb/mmbtu)		0.010
Filterable Particulate Matter (gm)	MnF	0.01
Filterable Mass Emission Rate (lb/hr)	EF	21.0
Filterable Mass Emission Rate (lb/mmbtu)	EF'	0.004
Condensable Particulate Matter (gm)	MnC	0.08
Condensable Mass Emission Rate (lb/hr)	EC	168.0
Condensable Mass Emission Rate (lb/mmbtu)	EC'	0.033

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Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test No.		00506B
Test Date		10/19/06
Pollutant		Total PM10
No. of Sampling Points		16
Stack or Duct Area at Sampling Plane (ft2)	A	233.71
Barometric Pressure (in. Hg)	Pbs	29.26
Condensate Volume (ml)	Vlc	207.8
Avg. Pressure Drop at Orifice (in. WG)	DH	2.87
Avg. Meter Temperature (oF)	Tm	86
Volume of Water Vapor Condensed (scf)	Vwc	9.8
Meter Y-factor	Yf	0.99
Volume of Gas Sampled (dscf)	Vms	69.4
Total Sample Time (min)	q	80.0
Moisture in Gas Stream (%)	Bws	12.4
Dry Molecular Wt. (lb/lb-mole)	Mds	30.32
Molecular Wt. (lb/lb-mole)	Mss	28.79
Pitot Tube Coefficient	Cps	0.84
Average Corrected Velocity (fps)	Vss	109.5
Stack Static Pressure (in. WG)	Pg	-2.350
Average Stack Temperature (oF)	Tss	166

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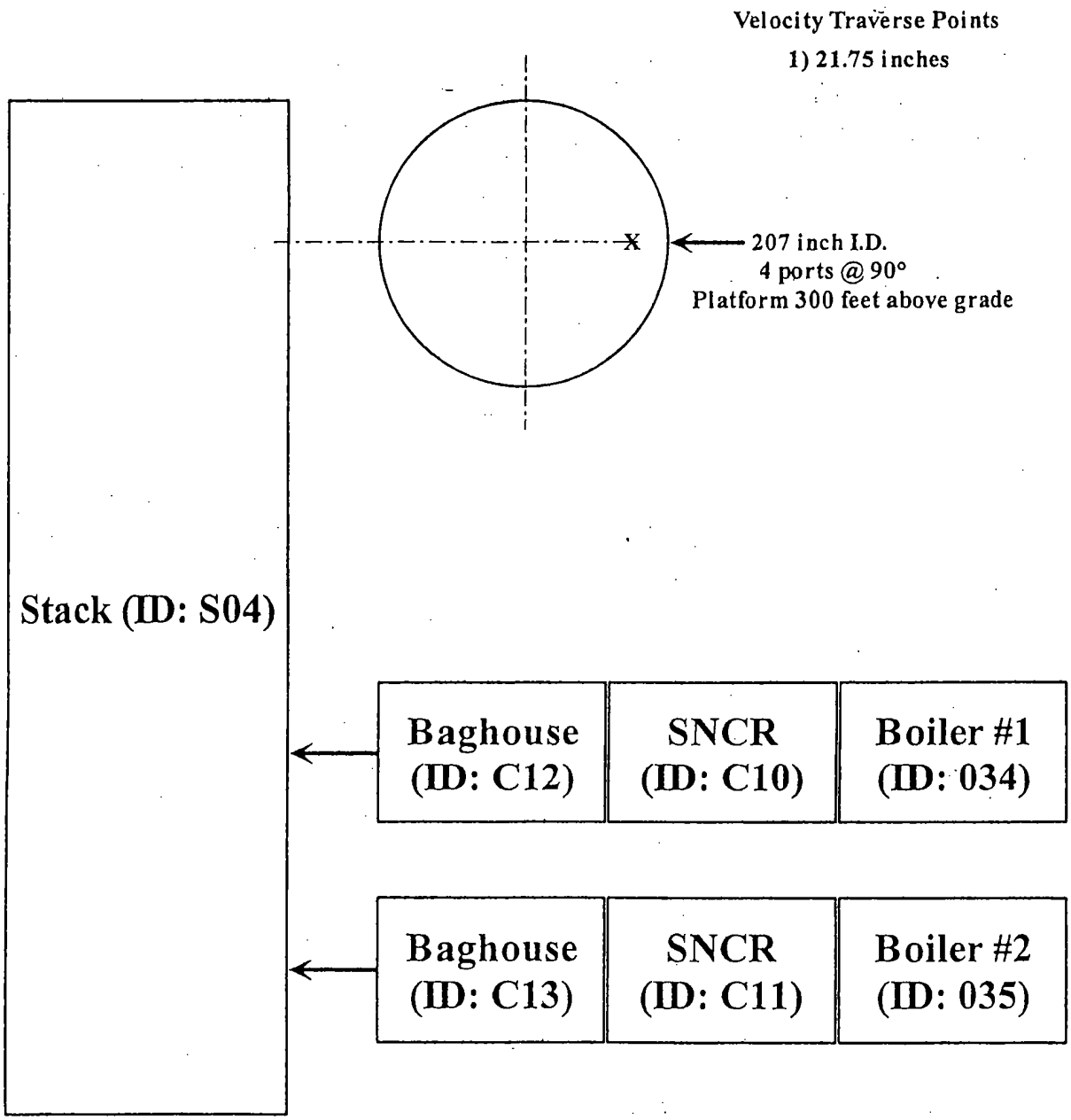
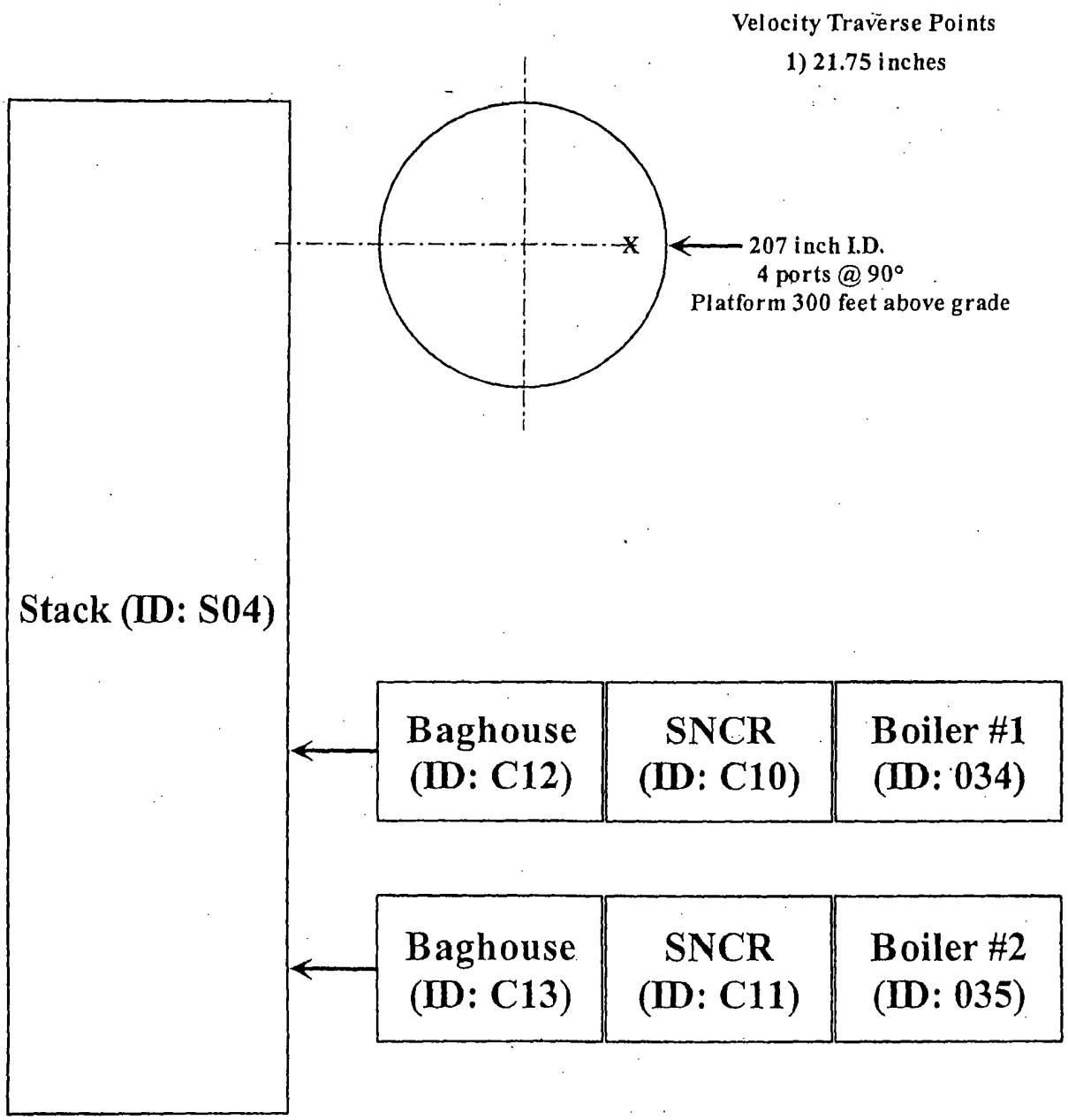
Reliant Energy – Seward Power Plant, East Wheatfield Twp., Indiana County

Test No.		0506C
Test Date		10/20/06
Pollutant		Total PM10
No. of Sampling Points		16
Stack or Duct Area at Sampling Plane (ft2)	A	233.71
Barometric Pressure (in. Hg)	Pbs	28.32
Condensate Volume (ml)	Vlc	193.7
Avg. Pressure Drop at Orifice (in. WG)	DH	3.02
Avg. Meter Temperature (oF)	Tm	76
Volume of Water Vapor Condensed (scf)	Vwc	9.1
Meter Y-factor	Yf	0.99
Volume of Gas Sampled (dscf)	Vms	70.7
Total Sample Time (min)	q	80.0
Moisture in Gas Stream (%)	Bws	11.4
Dry Molecular Wt. (lb/lb-mole)	Mds	30.16
Molecular Wt. (lb/lb-mole)	Mss	28.77
Pitot Tube Coefficient	Cps	0.84
Average Corrected Velocity (fps)	Vss	116.4
Stack Static Pressure (in. WG)	Pg	-2.350
Average Stack Temperature (oF)	Tss	166
Volumetric Flow Rate (dscfm)	Qss	1,147,603
Sample Nozzle Diameter (inches)	Dn	0.183
Percent Isokinetic Sampling (%)	I	98.5
Total PM10 Collected (gm)	Mn	0.066
Total PM10 Concentration (gr/dscf)	Cs	0.014
Total PM10 Mass Emission Rate (lb/hr)	E	137.7
Allowable Total PM10 Mass Emission Rate (lb/hr)		50.6
Heat Input To Combustion Unit (mmbtu/hr)	HI	5042.8
Total PM10 Mass Emission Rate (lb/mmbtu)	E'	0.030
Allowable Total PM10 Mass Emission Rate (lb/mmbtu)		0.010
Filterable Particulate Matter (gm)	MnF	0.014
Filterable Mass Emission Rate (lb/hr)	EF	29.2
Filterable Mass Emission Rate (lb/mmbtu)	EF'	0.006
Condensable Particulate Matter (gm)	MnC	0.052
Condensable Mass Emission Rate (lb/hr)	EC	108.5
Condensable Mass Emission Rate (lb/mmbtu)	EC'	0.024

Reliant Energy -- Seward Power Station
East Wheatfield Twp., Indiana County
Figure 1: Process Flow Diagram



Reliant Energy -- Seward Power Station
East Wheatfield Twp., Indiana County
Figure 1: Process Flow Diagram



Process Description

Reliant Energy produces a net nominal 521 megawatts (MW) of power at Seward Station in East Wheatfield Township, Indiana County. There are two identical circulating fluidized bed (CFB) coal fired steam-generating units rated a 2,532 nominal BTU/hr each installed at Seward. Each unit is equipped with selective non-catalytic reduction (SNCR), baghouse, in-furnace limestone injection, and flash dryer absorber to control stack emissions. The boilers are fired with bituminous waste coal (GOB). Their emissions are vented to the atmosphere via a common stack approximately 426 feet above grade.

Test Program Discussion

The Department performed three Mercury (Hg) in accordance with ASTM D6784 – 02, Standard Test Method for Elemental, Oxidized, Particle Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method) and six total PM_{10} test runs in accordance with EPA Methods 5/202 (filterable particulate matter/condensable particulate matter) on Units 1 & 2 at Seward Station. The Mercury and the first three PM_{10} test runs were conducted in July 2006 and three PM_{10} test runs were conducted in October 2006. Reliant personnel tested simultaneously using EPA Test Method 324 for total Mercury and a method developed by Frontier Geosciences, Flue gas Adsorbent Mercury Speciation (FAMS) for sample speciation during the July test program. The purpose of the July testing was to establish emission factors for the source type. As the July total PM_{10} results indicated non-compliance with the facility limit and as the testing was conducted for emission factor determination, not compliance purposes, the Department agreed to repeat the PM_{10} test program. Air Hygiene International, Inc. of Tulsa, OK was contracted by Reliant to conduct PM_{10} testing simultaneously with the Department test crew.

The Department Mercury test results are comparable to the data obtained by Reliant using the sorbent traps. Department results, which ranged from 5.40E-05 to 1.09E-04 lb/hr and 0.01 to 0.02 lb/10^{12} BTU, were slightly lower than the Reliant results, which ranged from 1.40E-04 to 1.62E-04 lb/hr and 0.03 lb/10^{12} BTU, due to the sorbent traps having lower detection limits.

The Department's July 2006 total PM_{10} test results yielded average mass emission rates (368.7 lb/hr and 0.08 lb/MMBTU) well in excess of both the permitted allowables (50.6 lb/hr and 0.01 lb/MMBTU) and the facility's initial December 2004 compliance test results (21.0 lb/hr and 0.004 lb/MMBTU).

The Department's October 2006 total PM_{10} test results yielded average mass emission rates (150.7 lb/hr and 0.031 lb/MMBTU) in excess of both the permitted allowable and Air Hygiene's concurrent test results. The Air Hygiene report has been received and is currently under review.

Department personnel for the July test program included, AnnMary Bihl, Rajdeep Bhangu, Rick Szekeres, Tony Pitts, Rick Begley, Dave Baker, and intern Amy Peck. Brian Kearney was present for Reliant Energy and performed the simultaneous sorbent tube testing. For the October test program, AnnMary Bihl, Richard Szekeres, and Dave Baker from the Department, Brian Kearney for Reliant, and the Air Hygiene test team were on-site.

The common stack houses a 17.25-foot I.D. inner stack. Four test ports, 90 degrees apart, were available for stack sampling. The Department and Reliant personnel used additional ports for the mercury single point simultaneous sampling using the Ontario Hydro Method and the 324/FAMS probe.

The mercury testing was conducted isokinetically using a single point of average velocity to compare the results with those of the FAMS. For the PM_{10} testing, 4 points from each of the sampling ports were sampled. The facility's CEMs were used to determine stack O_2/CO_2 concentrations and coal samples were taken from the coal feeders by Reliant personnel for each test run. Leak checks were performed prior to and after each port change. After each test run, the impinger trains were recovered in the Department test truck located at the base of the stack. All samples were stabilized in accordance with method directions and packed with ice for transport to the Department laboratory.

Stack and coal sample results are posted in the following tables. Mercury stack sample results are reported as elemental, oxidized, particle bound, and total mercury. Coal samples are reported only as total mercury. PM_{10} results are reported as total particulate matter, filterable particulate matter (FPM) and condensable particulate matter (CPM).

During the July test program, coal samples were taken by Reliant personnel during each test run and divided between the Department and Reliant for separate analyses. Since the data corresponded well with the July Department results, the Department did not perform separate coal analyses during the October testing. The Reliant data from the coal analyses are used for this test report.

The emission rate (lbs/MMBtu) for each test run was determined using the heat input (MMBtu/hr) provided by the facility CEMs.

Process Data (07/19-20/2006)

Run	1	2	3	Average
Test Date	7/19/06	7/19/06	7/20/06	N/A
Gross MegaWatt (MW)	579.4	575.9	579.1	578.1
Coal Input (TPH)	400.7	399.9	411.9	404.2
Heat Input *(MMBTU/hr)	5076.3	5064.0	5125.7	5088.7
NO_x Emission Rate* (lbs/MMBTU)	0.089	0.084	0.101	0.091
SO_2 Emission Rate* (lbs/MMBTU)	0.398	0.403	0.393	0.398
Limestone Usage (TPH)	75.2	68.0	89.7	77.6
Ammonia Injection Rate (lb/hr)	19.8	20.0	19.7	19.8

*Data obtained from CEMS.

Process Data (10/19-20/2006)

Run	1	2	3	Average
Test Date	10/19/06	10/19/06	10/20/06	N/A
Gross MegaWatt (MW)	583.3	581.6	581.5	582.1
Coal Input (TPH)	389.5	385.4	401.2	392.0
Heat Input *(MMBTU/hr)	5108.2	5052.7	5042.8	5067.9
NO_x Emission Rate* (lbs/MMBTU)	0.097	0.096	0.110	0.101
SO_2 Emission Rate* (lbs/MMBTU)	0.407	0.414	0.420	0.414
Limestone Usage (TPH)	80.1	78.8	81.8	80.2
Ammonia Injection Rate (lb/hr)	12.5	14.8	5.5	10.9

*Data obtained from CEMS.

Mercury Data

00306A	Weight (g)	Conc. (gr/dscf)	Flow Rate (lbs/hr)	lbs/10^{12} Btu
Front 1/2 Rinse	0.00E+00	0.00E+00	0.00E+00	0.00
Filter	2.90E-08	4.93E-09	4.96E-05	0.01
KCl (1-3)	1.30E-08	2.21E-09	2.22E-05	0.00
HNO3-H2O2 (4)	2.20E-08	3.74E-09	3.76E-05	0.01
KMnO4 (5-7)	0.00E+00	0.00E+00	0.00E+00	0.00
Particle Bound =	2.90E-08	4.93E-09	4.96E-05	0.01
Oxidized =	1.30E-08	2.21E-09	2.22E-05	0.00
Elemental =	2.20E-08	3.74E-09	3.76E-05	0.01
Total Hg =	6.40E-08	1.09E-08	1.09E-04	0.02

00306B	Weight (g)	Conc. (gr/dscf)	Flow Rate (lbs/hr)	lbs/10^{12} Btu
Front 1/2 Rinse	0.00E+00	0.00E+00	0.00E+00	0.00
Filter	2.40E-08	4.05E-09	4.05E-05	0.01
KCl (1-3)	0.00E+00	0.00E+00	0.00E+00	0.00
HNO3-H2O2 (4)	0.00E+00	0.00E+00	0.00E+00	0.00
KMnO4 (5-7)	8.00E-09	1.35E-09	1.35E-05	0.00
Particle Bound =	2.40E-08	4.05E-09	4.05E-05	0.01
Oxidized =	0.00E+00	0.00E+00	0.00E+00	0.00
Elemental =	8.00E-09	1.35E-09	1.35E-05	0.00
Total Hg =	3.20E-08	5.40E-09	5.40E-05	0.01

00306C	Weight (g)	Conc. (gr/dscf)	Flow Rate (lbs/hr)	lbs/10^{12} Btu
Front 1/2 Rinse	0.00E+00	0.00E+00	0.00E+00	0.00
Filter	6.00E-09	9.95E-10	1.02E-05	0.00
KCl (1-3)	0.00E+00	0.00E+00	0.00E+00	0.00
HNO3-H2O2 (4)	0.00E+00	0.00E+00	0.00E+00	0.00
KMnO4 (5-7)	2.30E-08	3.82E-09	3.91E-05	0.01
Particle Bound =	6.00E-09	9.95E-10	1.02E-05	0.00
Oxidized =	0.00E+00	0.00E+00	0.00E+00	0.00
Elemental =	2.30E-08	3.82E-09	3.91E-05	0.01
Total Hg =	2.90E-08	4.81E-09	4.93E-05	0.01

00306A

	Contents	Initial (g)	Final (g)	Diff. (g)
Impinger 1	KCl	767.4	917.3	149.9
Impinger 2	KCl	763.3	858.1	94.8
Impinger 3	KCl	775.3	812.3	37.0
Impinger 4	H_2O_2 / HNO_3	769.2	786.1	16.9
Impinger 5	$KMnO_4$	765.2	769.0	3.8
Impinger 6	$KMnO_4$	772.1	773.7	1.6
Impinger 7	$KMnO_4$	769.1	769.1	0.0
Impinger 8	Silica Gel	732.5	748.0	15.5
Total		6114.1	6433.6	319.5

Gas Analysis

% CO_2	12.2
% O_2	5.4
% CO	0.0
% N_2	82.4

Coal Analysis

% S	3.0
ppm Hg	0.465
% H_2O	0.8
% Ash	50.2
BTU/lb.	6498

00306B

	Contents	Initial (g)	Final (g)	Diff. (g)
Impinger 1	KCl	763.9	932.9	169.0
Impinger 2	KCl	760.2	856.7	96.5
Impinger 3	KCl	782.5	808.5	26.0
Impinger 4	H_2O_2 / HNO_3	765.4	774.0	8.6
Impinger 5	$KMnO_4$	775.9	777.2	1.3
Impinger 6	$KMnO_4$	781.4	781.8	0.4
Impinger 7	$KMnO_4$	780.1	780.9	0.8
Impinger 8	Silica Gel	739.8	757.1	17.3
Total		6149.2	6469.1	319.9

Gas Analysis

% CO_2	12.2
% O_2	5.4
% CO	0.0
% N_2	82.4

Coal Analysis

% S	3.0
ppm Hg	0.318
% H_2O	0.8
% Ash	50.2
BTU/lb.	5765

00306C

	Contents	Initial (g)	Final (g)	Diff. (g)
Impinger 1	KCl	769.3	944.2	174.9
Impinger 2	KCl	765	868.9	103.9
Impinger 3	KCl	781.1	807	25.9
Impinger 4	H_2O_2 / HNO_3	776	782.5	6.5
Impinger 5	$KMnO_4$	769.5	771.8	2.3
Impinger 6	$KMnO_4$	774.6	774.9	0.3
Impinger 7	$KMnO_4$	771.5	771.8	0.3
Impinger 8	Silica Gel	815.3	829.7	14.4
Total		6222.3	6550.8	328.5

Gas Analysis

% CO_2	12.9
% O_2	3.6
% CO	0.0
% N_2	83.5

Coal Analysis

% S	2.5
ppm Hg	0.276
% H_2O	0.8
% Ash	52.3
BTU/lb.	6180

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

Sample Traverse Data 00306A

Point	Time	Vm (dcf)	Δp (in. WG)	ΔH (in. WG)	Ts °F	Tmi °F	Tmo °F	Probe °F	Filter °F	Imp. °F	Vac. (in. Hg)
D-2	12:28pm	521.079	3.70	3.40	169	90	89	248	248	71	5.0
D-2	+ 6	527.280	3.70	3.40	169	90	89	248	248	55	3.0
D-2	12:34pm	527.280	3.70	3.40	169	92	89	248	250	55	3.0
D-2	+ 6	533.440	3.70	3.40	169	93	89	248	249	57	3.0
D-2	12:40pm	533.440	3.70	3.40	169	95	89	248	249	58	3.0
D-2	+ 6	539.570	3.70	3.30	169	97	89	248	250	58	3.0
D-2	12:46pm	539.570	3.70	3.30	169	98	90	249	249	58	3.0
D-2	+ 6	545.620	3.70	3.40	169	99	90	248	249	58	3.0
D-2	12:52pm	545.620	3.70	3.40	169	101	90	248	247	58	3.0
D-2	+ 6	551.850	3.70	3.40	169	102	91	248	248	58	3.0
D-2	12:58pm	551.850	3.70	3.40	169	102	91	249	249	58	3.0
D-2	+ 6	558.090	3.70	3.40	169	102	92	248	249	58	3.0
D-2	1:04pm	558.090	3.70	3.40	169	103	92	249	248	58	3.0
D-2	+ 6	564.340	3.70	3.40	169	103	93	249	248	58	3.0
D-2	1:10pm	564.340	3.70	3.40	169	104	93	249	248	58	3.0
D-2	+ 6	570.560	3.70	3.40	169	105	93	249	248	57	3.5
D-2	1:16pm	570.560	3.70	3.40	169	105	93	248	248	57	3.5
D-2	+ 6	576.810	3.70	3.40	169	105	94	249	248	55	3.5
D-2	1:22pm	576.810	3.70	3.40	169	106	95	248	249	54	3.5
D-2	+ 6	583.080	3.70	3.40	169	106	95	248	248	54	3.5
D-2	1:28pm	583.080	3.70	3.40	169	106	95	248	248	54	3.5
D-2	+ 6	589.340	3.70	3.40	169	107	95	248	248	53	3.5
D-2	1:34pm	589.340	3.70	3.40	169	107	96	248	248	51	3.5
D-2	+ 6	595.580	3.70	3.40	169	107	96	248	248	51	4.0
D-2	1:40pm	595.580	3.70	3.40	169	107	96	249	249	51	4.0
D-2	+ 6	601.900	3.70	3.40	169	107	97	248	248	50	4.0
D-2	1:46pm	601.900	3.70	3.40	169	108	97	248	249	50	4.0
D-2	+ 6	608.210	3.70	3.40	169	108	98	248	248	50	4.0
D-2	1:52pm	608.210	3.70	3.40	169	108	98	248	248	50	4.0
D-2	+ 6	614.550	3.70	3.40	169	108	98	249	249	50	4.0
D-2	1:58pm	614.550	3.70	3.40	169	108	98	249	249	51	4.0
D-2	+ 6	620.970	3.70	3.40	169	108	98	249	249	51	4.0
Totals/Averages:		99.9	3.70	3.39	169		98	248	248	55	

Sample Traverse Data 00306B

Point	Time	Vm (dcf)	Δp (in. WG)	ΔH (in. WG)	Ts °F	Tmi °F	Tmo °F	Probe °F	Filter °F	Imp. °F	Vac. (in. Hg)
D-2	4:24 PM	621.173	3.90	3.60	169	94	93	248	245	77	3.5
D-2	+ 6	627.510	3.65	3.40	169	95	93	248	254	65	3.3
D-2	4:30 PM	627.510	3.65	3.40	169	96	93	248	251	63	3.3
D-2	+ 6	633.800	3.70	3.45	169	98	93	248	242	63	3.3
D-2	4:36 PM	633.800	3.70	3.45	169	100	93	249	249	63	3.3
D-2	+ 6	640.100	3.70	3.45	169	101	93	248	249	61	3.3
D-2	4:42 PM	640.100	3.60	3.40	169	102	94	248	246	60	3.3
D-2	+ 6	646.430	3.75	3.55	169	104	95	248	247	58	3.5
D-2	4:48 PM	646.430	3.75	3.55	169	104	95	248	249	58	3.5
D-2	+ 6	652.810	3.70	3.50	169	105	95	248	249	57	3.5
D-2	4:54 PM	652.810	3.70	3.50	169	106	96	248	249	57	3.5
D-2	+ 6	659.160	3.60	3.40	169	107	96	249	248	58	3.5
D-2	5:00 PM	659.160	3.60	3.40	169	107	96	248	248	58	3.5
D-2	+ 6	665.460	3.70	3.50	169	107	97	248	248	58	3.5
D-2	5:06 PM	665.460	3.60	3.40	169	108	97	248	248	58	3.5
D-2	+ 6	671.830	3.70	3.50	169	108	98	248	248	58	3.5
D-2	5:12 PM	671.830	3.75	3.55	167	108	98	248	248	59	3.5
D-2	+ 6	678.210	3.60	3.40	167	109	98	248	248	60	3.5
D-2	5:18 PM	678.210	3.60	3.40	167	109	99	248	248	60	3.5
D-2	+ 6	684.490	3.60	3.40	167	110	99	248	248	60	3.5
D-2	5:24 PM	684.490	3.60	3.40	167	110	99	248	248	60	3.5
D-2	+ 6	690.760	3.60	3.40	167	110	99	248	248	60	3.5
D-2	5:30 PM	690.760	3.60	3.40	167	110	100	248	248	61	3.5
D-2	+ 6	697.070	3.70	3.50	167	110	100	248	248	61	3.5
D-2	5:36 PM	697.070	3.65	3.45	168	110	100	248	248	61	3.5
D-2	+ 6	703.530	3.60	3.45	168	110	101	247	248	61	3.5
D-2	5:42 PM	703.530	3.60	3.45	168	110	101	248	248	61	3.5
D-2	+ 6	709.800	3.65	3.50	168	111	101	248	248	61	3.5
D-2	5:48 PM	709.800	3.70	3.50	169	111	101	248	248	62	3.7
D-2	+ 6	716.170	3.70	3.50	169	111	101	248	248	62	3.5
D-2	5:54 PM	716.170	3.60	3.45	169	111	101	248	248	63	3.7
D-2	+ 6	722.448	3.50	3.50	169	112	101	248	248	63	3.6
Totals/Averages:		101.3	3.66	3.46	168	102		248	248	61	

Sample Traverse Data 00306C

Point	Time	Vm (dcf)	Δp (in. WG)	ΔH (in. WG)	Ts °F	Tmi °F	Tmo °F	Probe °F	Filter °F	Imp. °F	Vac. (in. Hg)
D-2	11:33 AM	739.082	3.70	3.50	169	91	90	248	247	66	12.5
D-2	+ 6	745.160	3.80	3.50	169	89	90	248	248	52	12.0
D-2	11:39 AM	745.160	3.70	3.60	169	90	90	249	248	49	12.5
D-2	+ 6	751.500	3.80	3.60	169	92	90	249	248	49	12.5
D-2	11:45 AM	751.500	3.80	3.60	169	93	90	248	248	52	12.0
D-2	+ 6	757.990	3.90	3.70	169	95	90	248	248	54	12.5
D-2	11:51 AM	757.990	3.90	3.70	169	96	90	248	248	53	12.5
D-2	+ 6	764.340	3.80	3.60	169	98	90	248	248	52	12.5
D-2	11:57 AM	764.340	3.80	3.60	169	98	91	248	248	52	12.5
D-2	+ 6	770.770	3.90	3.60	169	99	92	248	248	52	12.5
D-2	12:03 PM	770.770	3.90	3.60	169	100	92	248	248	52	12.5
D-2	+ 6	777.190	3.80	3.60	169	101	92	248	248	53	12.5
D-2	12:09 PM	777.190	3.90	3.60	169	101	92	248	248	53	12.5
D-2	+ 6	783.480	3.80	3.60	169	102	93	248	248	53	12.5
D-2	12:15 PM	783.480	3.80	3.60	169	102	93	248	248	54	12.5
D-2	+ 6	789.970	3.80	3.60	169	102	93	248	248	54	12.5
D-2	12:21 PM	789.970	3.80	3.60	169	103	94	248	248	54	12.5
D-2	+ 6	796.280	3.80	3.60	169	103	94	248	248	54	12.5
D-2	12:27 PM	796.280	3.80	3.60	169	104	95	248	248	55	12.5
D-2	+ 6	802.700	3.80	3.60	169	104	95	248	248	55	12.5
D-2	12:33 PM	802.700	3.80	3.60	169	104	95	248	248	55	12.5
D-2	+ 6	809.100	3.80	3.60	169	105	96	248	248	55	12.5
D-2	12:39 PM	809.100	3.80	3.60	169	105	96	248	248	55	12.5
D-2	+ 6	815.570	3.90	3.70	169	105	96	248	248	55	12.5
D-2	12:45 PM	815.570	4.00	3.80	169	105	96	248	248	55	12.5
D-2	+ 6	822.130	4.00	3.80	169	105	96	248	248	55	13.0
D-2	12:51 PM	822.130	4.00	3.80	169	105	96	248	248	55	13.5
D-2	+ 6	828.790	4.00	3.80	169	105	97	248	248	55	14.0
D-2	12:57 PM	828.790	4.00	3.80	169	105	97	248	248	55	14.0
D-2	+ 6	835.420	4.00	3.80	169	105	97	248	248	55	14.0
D-2	1:03 PM	835.420	4.00	3.90	169	105	98	248	248	57	15.0
D-2	+ 6	841.907	4.00	3.90	169	103	98	248	248	58	14.0
Totals/Averages:		102.8	3.86	3.66	169	97		248	248	54	

TEST NO.: 0406A

SAMPLE TRAVERSE DATA

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
A-1	11:20 AM	189.520	3.00	3.200	166	90	90
A-1	+ 8	197.480	3.00	3.300	167	92	89
A-2	11:28 AM	197.480	3.90	4.100	167	96	89
A-2	+ 8	206.460	3.90	4.100	167	98	90
A-3	11:36 AM	206.460	4.20	4.400	167	99	90
A-3	+ 8	215.850	4.20	4.400	167	99	90
A-4	11:44 AM	215.850	4.00	4.200	167	99	91
A-4	+ 8	225.062	4.00	4.200	167	100	92
B-1	12.02 PM	225.350	2.90	3.100	165	94	93
B-1	+ 8	233.240	2.90	3.100	169	98	92
B-2	12:10 PM	233.240	3.70	3.900	169	102	93
B-2	+ 8	242.060	3.70	3.900	169	106	93
B-3	12:18 PM	242.060	4.10	4.200	169	106	93
B-3	+ 8	251.320	4.00	4.100	169	107	95
B-4	12:26 PM	251.320	3.90	4.000	169	106	95
B-4	+ 8	260.576	4.10	4.100	169	107	95
C-1	1:20 PM	272.300	2.50	2.600	168	97	95
C-1	+ 8	279.670	2.50	2.600	169	101	96
C-2	1:28 PM	279.670	3.25	3.400	169	105	95
C-2	+ 8	287.910	3.25	3.400	169	110	96
C-3	1:36 PM	287.910	3.90	3.900	169	110	96
C-3	+ 8	296.860	3.80	3.900	169	110	96
C-4	1:44 PM	296.860	3.60	3.800	169	110	98
C-4	+ 8	305.671	3.60	3.800	168	110	98

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
D-1	2:05 PM	305.967	3.20	3.300	168	99	98
D-1	+ 8	314.270	3.20	3.300	168	100	98
D-2	2:13 PM	314.270	3.80	3.800	169	105	98
D-2	+ 8	323.260	3.80	3.800	169	108	98
D-3	2:21 PM	323.260	4.00	3.900	169	108	98
D-3	+ 8	332.480	4.00	3.900	168	108	98
D-4	2:29 PM	332.480	3.80	3.800	168	108	98
D-4	+ 8	341.536	3.80	3.800	168	109	99
		139.400		3.728			

Pre-test leak check <0.005 cfm at 15.0 inches Hg
*Port change leak checks <0.005 cfm at 15.0 inches Hg
Post-test leak check <0.005 cfm at 10.0 inches Hg

*Port B volume metered corrected for leak rate = 0.03 cfm at 11.0 inches Hg

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

TEST NO.: 00406B

SAMPLE TRAVERSE DATA

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
A-1	4:52 PM	341.828	2.60	2.900	169	95	94
A-1	+ 8	349.370	2.60	2.900	168	96	94
A-2	5:00 PM	349.370	3.50	3.900	169	99	93
A-2	+ 8	358.000	3.50	3.900	168	104	94
A-3	5:08 PM	358.000	4.00	4.200	167	107	95
A-3	+ 8	367.180	4.00	4.200	167	108	95
A-4	5:16 PM	367.180	3.90	4.100	167	109	96
A-4	+ 8	376.347	3.90	4.100	167	110	96
B-1	5:30 PM	376.579	3.00	3.200	167	101	98
B-1	+ 8	384.620	3.00	3.100	168	103	98
B-2	5:38 PM	384.620	3.50	3.800	169	107	98
B-2	+ 8	393.300	3.50	3.800	169	111	99
B-3	5:46 PM	393.300	3.50	3.800	169	112	99
B-3	+ 8	402.000	3.50	3.800	169	113	99
B-4	5:54 PM	402.000	3.40	3.700	169	114	100
B-4	+ 8	410.591	3.40	3.700	168	114	101
C-1	6:12 PM	410.775	2.40	2.700	168	104	101
C-1	+ 8	418.090	2.40	2.700	167	104	101
C-2	6:20 PM	418.090	2.80	3.200	167	108	101
C-2	+ 8	425.870	2.80	3.200	167	112	101
C-3	6:28 PM	425.870	3.30	3.700	167	112	101
C-3	+ 8	434.180	3.20	3.600	167	114	101
C-4	6:36 PM	434.180	3.10	3.500	167	114	101
C-4	+ 8	442.462	3.20	3.600	167	114	101

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
D-1	6:55 PM	442.667	2.65	3.000	163	102	101
D-1	+ 8	450.040	2.65	3.000	167	105	101
D-2	7:03 PM	450.040	3.35	3.800	166	109	101
D-2	+ 8	458.280	3.30	3.600	166	111	101
D-3	7:11 PM	458.280	3.30	3.600	166	113	101
D-3	+ 8	466.610	3.30	3.600	166	113	101
D-4	7:19 PM	466.610	3.40	3.750	166	114	101
D-4	+ 8	475.047	3.40	3.700	167	114	101
		132.598		3.542			

Pre-test leak check <0.005 cfm at 15.0 inches Hg
Port change leak checks <0.005 cfm at 4.0 inches Hg
Post-test leak check 0.0 cfm at 5.0 inches Hg

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

TEST NO.: 00406C

SAMPLE TRAVERSE DATA

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
A-1	10:50 AM	488.520	2.80	3.150	161	90	89
A-1	+ 8	496.030	2.80	3.150	168	91	89
A-2	10:58 AM	496.030	3.45	3.900	167	95	89
A-2	+ 8	504.500	3.60	4.100	167	97	89
A-3	11:06 AM	504.500	3.80	4.200	167	99	90
A-3	+ 8	513.170	3.80	4.150	167	99	90
A-4	11:14 AM	513.170	3.80	4.150	169	101	90
A-4	+ 8	521.913	3.80	4.150	169	101	91
B-1	11:32 AM	522.249	2.75	3.000	161	93	92
B-1	+ 8	529.750	2.75	2.900	170	101	92
B-2	11:40 AM	529.750	3.30	3.550	169	104	92
B-2	+ 8	537.940	3.30	3.600	169	105	93
B-3	11:48 AM	537.940	3.50	3.800	169	106	93
B-3	+ 8	546.620	3.80	4.000	169	106	94
B-4	11:56 AM	546.620	3.80	4.000	168	106	95
B-4	+ 8	555.365	3.70	3.900	169	106	95
C-1	12:12 PM	555.557	2.40	2.550	163	98	96
C-1	+ 8	562.610	2.40	2.600	169	103	96
C-2	12:20 PM	562.610	3.20	3.400	169	107	96
C-2	+ 8	570.630	3.10	3.300	169	108	96
C-3	12:28 PM	570.630	3.50	3.700	169	108	96
C-3	+ 8	579.170	3.50	3.600	169	108	97
C-4	12:36 PM	579.170	3.70	3.800	169	108	97
C-4	+ 8	587.915	3.80	3.900	169	108	98

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
D-1	12:52 PM	588.100	3.10	3.300	166	99	98
D-1	+ 8	596.110	3.30	3.650	169	104	98
D-2	1:00 PM	596.110	3.70	3.900	169	107	98
D-2	+ 8	604.790	3.50	3.700	170	107	98
D-3	1:08 PM	604.790	3.70	3.800	169	108	98
D-3	+ 8	613.530	3.60	3.750	169	108	98
D-4	1:16 PM	613.530	3.65	3.750	170	108	98
D-4	+ 8	622.373	3.80	3.900	169	108	98
		133.140		3.634			

Pre-test leak check <0.0 cfm at 15.0 inches Hg.
Port change leak checks <0.01 cfm at 15.0 inches Hg
Post-test leak check <0.005 cfm at 10.0 inches Hg

TEST NO.: 0506A

SAMPLE TRAVERSE DATA

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
D-1	12:29 PM	817.875	2.50	2.800	163	77	75
D-1	+ 5	822.270	2.50	2.800	165	77	75
D-2	12:34 PM	822.270	2.40	2.700	165	77	75
D-2	+ 5	826.680	2.80	3.200	166	77	75
D-3	12:39 PM	826.680	2.90	3.200	166	79	75
D-3	+ 5	831.370	3.00	3.300	166	80	75
D-4	12:44 PM	831.370	2.90	3.200	166	81	75
D-4	+ 5	836.036	3.00	3.300	166	83	75
C-1	1:10 PM	836.290	2.40	2.600	164	80	78
C-1	+ 5	840.370	2.40	2.600	166	81	78
C-2	1:15 PM	840.370	2.50	2.800	166	82	78
C-2	+ 5	844.730	2.60	2.900	166	82	78
C-3	1:20 PM	844.730	2.80	3.100	166	84	78
C-3	+ 5	849.300	2.80	3.100	166	84	78
C-4	1:25 PM	849.300	3.20	3.600	166	86	78
C-4	+ 5	854.203	3.20	3.500	167	87	78
B-1	1:38 PM	854.442	2.50	2.800	167	83	80
B-1	+ 5	858.790	2.50	2.800	166	85	80
B-2	1:43 PM	858.790	3.20	3.500	166	86	80
B-2	+ 5	863.670	3.20	3.500	166	87	80
B-3	1:48 PM	863.670	3.20	3.500	166	87	80
B-3	+ 5	868.580	3.20	3.500	166	88	80
B-4	1:53 PM	868.580	3.20	3.500	166	89	80
B-4	+ 5	873.526	3.30	3.600	166	89	81

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
A-1	2:06 PM	873.766	2.90	3.200	166	84	81
A-1	+ 5	878.490	3.00	3.200	166	86	81
A-2	2:11 PM	878.490	3.30	3.600	166	87	81
A-2	+ 5	883.530	3.40	3.700	166	87	81
A-3	2:16 PM	883.530	3.50	3.800	166	88	81
A-3	+ 5	888.680	3.50	3.800	166	89	81
A-4	2:21 PM	888.680	3.60	3.900	166	89	82
A-4	+ 5	893.832	3.40	3.700	166	89	82
		75.224		3.259			

Pre-test leak check <0.005 cfm at 15.5 inches Hg
*Port change leak checks <0.01 cfm at 15.5 inches Hg
Post-test leak check <0.01 cfm at 17.0 inches Hg

Commonwealth of Pennsylvania
Department of Environmental Protection
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TEST NO.: 00506B

SAMPLE TRAVERSE DATA

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
A-1	3.28 PM	897.802	2.60	2.900	166	82	81
A-1	+ 5	902.240	2.60	2.900	166	82	81
A-2	3:33 PM	902.240	3.20	3.500	166	83	81
A-2	+ 5	907.040	3.10	3.400	166	84	81
A-3	3:38 PM	907.040	3.20	3.500	166	85	81
A-3	+ 5	911.970	3.30	3.600	166	86	81
A-4	3:43 PM	911.970	3.30	3.600	166	86	81
A-4	+ 5	916.889	3.20	3.500	166	87	81
B-1	3:58 PM	917.184	2.40	2.600	166	85	82
B-1	+ 5	921.430	2.40	2.600	166	86	82
B-2	4:03 PM	921.430	2.80	3.100	166	87	82
B-2	+ 5	926.030	2.90	3.200	166	88	82
B-3	4:08 PM	926.030	3.00	3.300	167	89	83
B-3	+ 5	930.750	3.00	3.300	166	90	83
B-4	4:13 PM	930.750	3.00	3.300	166	90	83
B-4	+ 5	935.481	3.00	3.300	166	91	83
C-1	4:29 PM	935.784	2.40	2.600	166	87	84
C-1	+ 5	940.040	2.40	2.600	166	88	84
C-2	4:34 PM	940.040	2.50	2.700	166	89	84
C-2	+ 5	944.380	2.50	2.700	166	90	84
C-3	4:39 PM	944.380	2.80	3.100	166	90	84
C-3	+ 5	948.950	2.80	3.100	166	91	84
C-4	4:44 PM	948.950	3.00	3.200	166	92	84
C-4	+ 5	953.683	3.00	3.200	167	92	84

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
D-1	4:57 PM	953.934	2.80	3.000	166	88	85
D-1	+ 5	958.140	2.80	3.000	166	90	86
D-2	5:02 PM	958.140	3.00	3.200	166	90	86
D-2	+ 5	962.780	3.00	3.200	166	91	85
D-3	5:07 PM	962.780	3.00	3.200	166	92	86
D-3	+ 5	967.540	3.00	3.200	166	92	85
D-4	5:12 PM	967.540	2.90	3.100	166	92	86
D-4	+ 5	972.231	2.90	3.100	166	92	86
		73.580		3.119			

Pre-test leak check <0.01 cfm at 15.0 inches Hg
*Port change leak checks <0.01 cfm at 16.0 inches Hg
Post-test leak check <0.01 cfm at 14.5 inches Hg

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TEST NO.: 0506C

SAMPLE TRAVERSE DATA

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
D-1	8:41 AM	985.151	2.80	3.200	166	71	69
D-1	+ 5	989.670	2.80	3.200	164	72	69
D-2	8:46 AM	989.670	3.10	3.500	165	73	70
D-2	+ 5	994.460	3.10	3.500	166	74	70
D-3	8:51 AM	994.460	3.10	3.500	166	76	70
D-3	+ 5	999.180	3.00	3.400	166	76	70
D--4	8:56 AM	999.180	3.00	3.400	165	78	71
D--4	+ 5	1003.905	3.00	3.400	166	78	71
C-1	9:14 AM	1004.159	2.40	2.700	166	75	72
C-1	+ 5	1008.400	2.40	2.700	166	77	72
C-2	9:19 AM	1008.400	2.60	3.000	166	78	72
C-2	+ 5	1012.800	2.60	2.900	166	78	72
C-3	9:24 AM	1012.800	2.80	3.200	166	80	73
C-3	+ 5	1017.400	2.80	3.200	165	80	73
C-4	9:29 AM	1017.400	3.10	3.500	166	81	73
C-4	+ 5	1022.166	3.00	3.400	166	83	74
B-1	9:41 AM	1022.166	2.70	3.000	166	78	74
B-1	+ 5	1026.940	2.80	3.100	166	80	74
B-2	9:46 AM	1026.940	3.30	3.700	166	81	75
B-2	+ 5	1031.870	3.30	3.700	166	81	75
B-3	9:51 AM	1031.870	3.30	3.700	166	83	75
B-3	+ 5	1036.830	3.30	3.700	166	83	75
B-4	9:56 PM	1036.830	3.40	3.800	166	83	75
B-4	+ 5	1041.701	3.00	3.500	165	83	75

Point	Time	Sample Volume (ft^3)	Orifice DH (in WG)	V.H. (in WG)	Tss (°F)	Tmi (°F)	Tmo (°F)
A-1	10:07 AM	1041.922	2.90	3.300	166	79	75
A-1	+ 5	1046.540	2.90	3.300	165	81	75
A-2	10:12 AM	1046.540	3.40	3.800	166	81	75
A-2	+ 5	1051.540	3.40	3.800	166	82	76
A-3	10:17 AM	1051.540	3.40	3.800	166	83	76
A-3	+ 5	1056.640	3.50	3.900	166	83	76
A-4	10:22 AM	1056.640	3.30	3.700	166	83	76
A-4	+ 5	1061.574	3.20	3.600	166	83	76
		75.948		3.409			

Pre-test leak check <0.01 cfm at 15.0 inches Hg
*Port change leak checks <0.01 cfm at 15.0 inches Hg
Post-test leak check <0.01 cfm at 12.0 inches Hg

TEST NO.: 0406A

VOLUMETRIC FLOW RATE DETERMINATION

VELOCITY

$Vss = 85.49 * Cps * average[(V.H.)^{1/2}] * [(Tss + 460) / (Mss * Pss)]^{1/2}$

$= 85.49 * 0.840 * 1.927 * [(168 + 460) / (28.68 * 2^{1/2}$

$= 121.1$ fps

Probe: CEM-7-2
Cps: 0.840
Pbs: 28.76 inches of Hg
Pg: -2.350 inches H2O

VOLUMETRIC FLOW RATE

$Qss = Vss * A * 60 * [528 / (Tss + 460)] * (Pss / 29.92) * (1 - Bws)$

$= 121.1 * 233.71 * 60 * [528 / (168 + 460)] * (28.59 / 29.92) * (1 - 0.132)$

$= 1,184,184$ dscfm

STACK PRESSURE

$Pss = Pbs + (Pg / 13.6)$

$= 28.76 + (-2.35 / 13.6)$

$= 28.59$ inches Hg

EMISSION RATE DETERMINATION

METERED VOLUME

$Vms = Vm * Yf * [528 / (Tm + 460)] * \{[Pbs + (DH/13.6)] / 29.92\}$

$= 139.40 * 1.000 * 528 / 559 * \{[28.76 + (3.61 / 13.6)] / 29.92\}$

$= 127.7$ dscf

Barometric Pressure (inches of Hg): 28.76
Avg. Probe Temp. (°F): 247
Avg. Filter Temp. (°F): 248
Avg. Impinger Temp. (°F): 58

EMISSION RATE

$Cs = Mn * 15.43 / Vms$
$= 0.3523 * 15.43 / 127.7$
$= 0.043$ gr/dscf

$E = Cs * Qss * 60 / 7000$
$= 0.043 * 1,184,184 * 60 / 7000$
$= 436.46$ lb/hr

$E' = E/HI$
$= 436.5 / 5076.3$
$= 0.09$ lb/mmBTU

PERCENT ISOKINETIC

$I = 1.667 * (Tss + 460) * \{(0.00267 * Vlc) + [(Vm * Yf) / (Tm + 460) * (Pbs + (DH / 13.6))]\} / (q * Vss * Pss * An)$

$= 1.667 * (168 + 460) * \{(0.00267 * 414.8) + [(139.4 * 1.000) / (99 + 460) * (28.76 + (3.61 / 13.6))]\} / (128.0 * 121.1 * 28.59 * 0.000197)$

$= 100.1$ %

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TEST NO.: 00406B

VOLUMETRIC FLOW RATE DETERMINATION

VELOCITY

$Vss = 85.49 * Cps * average[(V.H.)^{1/2}] * [(Tss + 460) / (Mss * Pss)]^{1/2}$

$= 85.49 * 0.840 * 1.879 * [(167 + 460) / (28.55 * 2^{1/2}$

$= 118.4$ fps

Probe: CEM-7-2
Cps: 0.840
Pbs: 28.70 inches of Hg
Pg: -2.350 inches H2O

VOLUMETRIC FLOW RATE

$Qss = Vss * A * 60 * [528 / (Tss + 460)] * (Pss / 29.92) * (1 - Bws)$

$= 118.4 * 233.71 * 60 * [528 / (167 + 460)] * (28.53 / 29.92) * (1 - 0.142)$

$= 1{,}143{,}863$ dscfm

STACK PRESSURE

$Pss = Pbs + (Pg / 13.6)$

$= 28.70 + (-2.35 / 13.6)$

$= 28.53$ inches Hg

EMISSION RATE DETERMINATION

METERED VOLUME

$Vms = Vm * Yf * [528 / (Tm + 460)] * \{[Pbs + (DH/13.6)] / 29.92\}$

$= 132.60 * 1.000 * 528 / 564 * \{[28.7 + (3.23 / 13.6)] / 29.92\}$

$= 120.1$ dscf

Barometric Pressure (inches of Hg): 28.70
Avg. Probe Temp. (°F): 250
Avg. Filter Temp. (°F): 248
Avg. Impinger Temp. (°F): 57

EMISSION RATE

$Cs = Mn * 15.43 / Vms$
$= 0.3875 * 15.43 / 120.1$
$= 0.050$ gr/dscf

$E = Cs * Qss * 60 / 7000$
$= 0.050 * 1{,}143{,}863 * 60 / 7000$
$= 490.23$ lb/hr

$E' = E/HI$
$= 490.2 / 5064$
$= 0.10$ lb/mmBTU

PERCENT ISOKINETIC

$I = 1.667 * (Tss + 460) * \{(0.00267 * Vlc) + [(Vm * Yf) / (Tm + 460) * (Pbs + (DH / 13.6))]\} / (q * Vss * Pss * An)$

$= 1.667 * (167 + 460) * \{(0.00267 * 420.0) + [(132.6 * 1.000) / (104 + 460) * (28.70 + (3.23 / 13.6))]\} / (128.0 * 118.4 * 28.53 * 0.000192)$

$= 99.6$ %

TEST NO.: 00406B

VOLUMETRIC FLOW RATE DETERMINATION

VELOCITY

$Vss = 85.49 * Cps * average[(V.H.)^{1/2}] * [(Tss + 460) / (Mss * Pss)]^{1/2}$

$= 85.49 * 0.840 * 1.879 * [(167 + 460) / (28.55 * 2^{1/2}$

$= 118.4$ fps

Probe: CEM-7-2
Cps: 0.840
Pbs: 28.70 inches of Hg
Pg: -2.350 inches H2O

VOLUMETRIC FLOW RATE

$Qss = Vss * A * 60 * [528 / (Tss + 460)] * (Pss / 29.92) * (1 - Bws)$

$= 118.4 * 233.71 * 60 * [528 / (167 + 460)] * (28.53 / 29.92) * (1 - 0.142)$

$= 1{,}143{,}863$ dscfm

STACK PRESSURE

$Pss = Pbs + (Pg / 13.6)$

$= 28.70 + (-2.35 / 13.6)$

$= 28.53$ inches Hg

EMISSION RATE DETERMINATION

METERED VOLUME

$Vms = Vm * Yf * [528 / (Tm + 460)] * \{[Pbs + (DH/13.6)] / 29.92\}$

$= 132.60 * 1.000 * 528 / 564 * \{[28.7 + (3.23 / 13.6)] / 29.92\}$

$= 120.1$ dscf

Barometric Pressure (inches of Hg): 28.70
Avg. Probe Temp. (°F): 250
Avg. Filter Temp. (°F): 248
Avg. Impinger Temp. (°F): 57

EMISSION RATE

$Cs = Mn * 15.43 / Vms$
$= 0.3875 * 15.43 / 120.1$
$= 0.050$ gr/dscf

$E = Cs * Qss * 60 / 7000$
$= 0.050 * 1{,}143{,}863 * 60 / 7000$
$= 490.23$ lb/hr

$E' = E/HI$
$= 490.2 / 5064$
$= 0.10$ lb/mmBTU

PERCENT ISOKINETIC

$I = 1.667 * (Tss + 460) * \{(0.00267 * Vlc) + [(Vm * Yf) / (Tm + 460) * (Pbs + (DH / 13.6))]\} / (q * Vss * Pss * An)$

$= 1.667 * (167 + 460) * \{(0.00267 * 420.0) + [(132.6 * 1.000) / (104 + 460) * (28.70 + (3.23 / 13.6))]\} / (128.0 * 118.4 * 28.53 * 0.000192)$

$= 99.6$ %

TEST NO.: 00406C

VOLUMETRIC FLOW RATE DETERMINATION

VELOCITY

$Vss = 85.49 * Cps * average[(V.H.)^{1/2}] * [(Tss + 460) / (Mss * Pss)]^{1/2}$

$= 85.49 * 0.840 * 1.903 * [(168 + 460) / (28.51 * 2^{1/2}$

$= 120.0$ fps

Probe: CEM-7-2
Cps: 0.840
Pbs: 28.73 inches of Hg
Pg: -2.350 inches H2O

VOLUMETRIC FLOW RATE

$Qss = Vss * A * 60 * [528 / (Tss + 460)] * (Pss / 29.92) * (1 - Bws)$

$= 120.0 * 233.71 * 60 * [528 / (168 + 460)] * (28.56 / 29.92) * (1 - 0.139)$

$= 1{,}162{,}743$ dscfm

STACK PRESSURE

$Pss = Pbs + (Pg / 13.6)$

$= 28.73 + (-2.35 / 13.6)$

$= 28.56$ inches Hg

EMISSION RATE DETERMINATION

METERED VOLUME

$Vms = Vm * Yf * [528 / (Tm + 460)] * \{[Pbs + (DH/13.6)] / 29.92\}$

$= 133.14 * 1.000 * 528 / 559 * \{[28.73 + (3.40 / 13.6)] / 29.92\}$

$= 121.8$ dscf

Barometric Pressure (inches of Hg): 28.73
Avg. Probe Temp. (°F): 248
Avg. Filter Temp. (°F): 248
Avg. Impinger Temp. (°F): 55

EMISSION RATE

$Cs = Mn * 15.43 / Vms$
$= 0.1435 * 15.43 / 121.8$
$= 0.018$ gr/dscf

$E = Cs * Qss * 60 / 7000$
$= 0.018 * 1{,}162{,}743 * 60 / 7000$
$= 179.40$ lb/hr

$E' = E/HI$
$= 179.4 / 5125.7$
$= 0.040$ lb/mmBTU

PERCENT ISOKINETIC

$I = 1.667 * (Tss + 460) * \{(0.00267 * Vlc) + [(Vm * Yf) / (Tm + 460) * (Pbs + (DH / 13.6))]\} / (q * Vss * Pss * An)$

$= 1.667 * (168 + 460) * \{(0.00267 * 415.5) + [(133.1 * 1.000) / (99 + 460) * (28.73 + (3.40 / 13.6))]\} / (128.0 * 120.0 * 28.56 * 0.000192)$

$= 99.4$ %

TEST NO.: 0506A

VOLUMETRIC FLOW RATE DETERMINATION

VELOCITY

$Vss = 85.49 * Cps * average[(V.H.)^{1/2}] * [(Tss + 460) / (Mss * Pss)]^{1/2}$

$= 85.49 * 0.840 * 1.802 * [(166 + 460) / (28.60 * 2^{1/2}$

$= 112.4$ fps

Probe: CEM-7-2
Cps: 0.840
Pbs: 29.18 inches of Hg
Pg: -2.350 inches H2O

VOLUMETRIC FLOW RATE

$Qss = Vss * A * 60 * [528 / (Tss + 460)] * (Pss / 29.92) * (1 - Bws)$

$= 112.4 * 233.71 * 60 * [528 / (166 + 460)] * (29.01 / 29.92) * (1 - 0.128)$

$= 1{,}123{,}976$ dscfm

STACK PRESSURE

$Pss = Pbs + (Pg / 13.6)$

$= 29.18 + (-2.35 / 13.6)$

$= 29.01$ inches Hg

EMISSION RATE DETERMINATION

METERED VOLUME

$Vms = Vm * Yf * [528 / (Tm + 460)] * \{[Pbs + (DH/13.6)] / 29.92\}$

$= 75.22 * 0.990 * 528 / 541 * \{[29.18 + (2.96 / 13.6)] / 29.92\}$

$= 71.4$ dscf

Barometric Pressure (inches of Hg): 29.18
Avg. Probe Temp. (°F): 245
Avg. Filter Temp. (°F): 256
Avg. Impinger Temp. (°F): 56

EMISSION RATE

$Cs = Mn * 15.43 / Vms$
$= 0.0599 * 15.43 / 71.4$
$= 0.013$ gr/dscf

$E = Cs * Qss * 60 / 7000$
$= 0.013 * 1{,}123{,}976 * 60 / 7000$
$= 125.24$ lb/hr

$E' = E/HI$
$= 125.2 / 5108.2$
$= 0.03$ lb/mmBTU

PERCENT ISOKINETIC

$I = 1.667 * (Tss + 460) * \{(0.00267 * Vlc) + [(Vm * Yf) / (Tm + 460) * (Pbs + (DH / 13.6))]\} / (q * Vss * Pss * An)$

$= 1.667 * (166 + 460) * \{(0.00267 * 223.5) + [(75.2 * 0.990) / (81 + 460) * (29.18 + (2.96 / 13.6))]\} / (80.0 * 112.4 * 29.01 * 0.000183)$

$= 101.7$ %

TEST NO.: 00506B

VOLUMETRIC FLOW RATE DETERMINATION

VELOCITY

$Vss = 85.49 * Cps * average[(V.H.)^{1/2}] * [(Tss + 460) / (Mss * Pss)]^{1/2}$

$= 85.49 * 0.840 * 1.764 * [(166 + 460) / (28.79 * 2^{1/2}$

$= 109.5$ fps

Probe: CEM-7-2
Cps: 0.840
Pbs: 29.26 inches of Hg
Pg: -2.350 inches H2O

VOLUMETRIC FLOW RATE

$Qss = Vss * A * 60 * [528 / (Tss + 460)] * (Pss / 29.92) * (1 - Bws)$

$= 109.5 * 233.71 * 60 * [528 / (166 + 460)] * (29.09 / 29.92) * (1 - 0.124)$

$= 1{,}103{,}033$ dscfm

STACK PRESSURE

$Pss = Pbs + (Pg / 13.6)$

$= 29.26 + (-2.35 / 13.6)$

$= 29.09$ inches Hg

EMISSION RATE DETERMINATION

METERED VOLUME

$Vms = Vm * Yf * [528 / (Tm + 460)] * \{[Pbs + (DH/13.6)] / 29.92\}$

$= 73.58 * 0.990 * 528 / 546 * \{[29.26 + (2.87 / 13.6)] / 29.92\}$

$= 69.4$ dscf

Barometric Pressure (inches of Hg): 29.26
Avg. Probe Temp. (°F): 247
Avg. Filter Temp. (°F): 248
Avg. Impinger Temp. (°F): 57

EMISSION RATE

$Cs = Mn * 15.43 / Vms$
$= 0.0909 * 15.43 / 69.4$
$= 0.020$ gr/dscf

$E = Cs * Qss * 60 / 7000$
$= 0.020 * 1{,}103{,}033 * 60 / 7000$
$= 189.09$ lb/hr

$E' = E/HI$
$= 189.1 / 5052.7$
$= 0.04$ lb/mmBTU

PERCENT ISOKINETIC

$I = 1.667 * (Tss + 460) * \{(0.00267 * Vlc) + [(Vm * Yf) / (Tm + 460) * (Pbs + (DH / 13.6))]\} / (q * Vss * Pss * An)$

$= 1.667 * (166 + 460) * \{(0.00267 * 207.8) + [(73.6 * 0.990) / (86 + 460) * (29.26 + (2.87 / 13.6))]\} / (80.0 * 109.5 * 29.09 * 0.000183)$

$= 100.6$ %

TEST NO.: 0506C

VOLUMETRIC FLOW RATE DETERMINATION

VELOCITY

$Vss = 85.49 * Cps * average[(V.H.)^{1/2}] * [(Tss + 460) / (Mss * Pss)]^{1/2}$

$= 85.49 * 0.840 * 1.844 * [(166 + 460) / (28.77 * 2^{1/2}$

$= 116.4$ fps

Probe: CEM-7-2
Cps: 0.840
Pbs: 28.32 inches of Hg
Pg: -2.350 inches H2O

VOLUMETRIC FLOW RATE

$Qss = Vss * A * 60 * [528 / (Tss + 460)] * (Pss / 29.92) * (1 - Bws)$

$= 116.4 * 233.71 * 60 * [528 / (166 + 460)] * (28.15 / 29.92) * (1 - 0.114)$

$= 1{,}147{,}603$ dscfm

STACK PRESSURE

$Pss = Pbs + (Pg / 13.6)$

$= 28.32 + (-2.35 / 13.6)$

$= 28.15$ inches Hg

EMISSION RATE DETERMINATION

METERED VOLUME

$Vms = Vm * Yf * [528 / (Tm + 460)] * \{[Pbs + (DH/13.6)] / 29.92\}$

$= 75.95 * 0.990 * 528 / 536 * \{[28.32 + (3.02 / 13.6)] / 29.92\}$

$= 70.7$ dscf

Barometric Pressure (inches of Hg): 28.32
Avg. Probe Temp. (°F): 247
Avg. Filter Temp. (°F): 246
Avg. Impinger Temp. (°F): 55

EMISSION RATE

$Cs = Mn * 15.43 / Vms$
$= 0.0661 * 15.43 / 70.7$
$= 0.014$ gr/dscf

$E = Cs * Qss * 60 / 7000$
$= 0.014 * 1{,}147{,}603 * 60 / 7000$
$= 137.71$ lb/hr

$E' = E * (1/Qss) * (1/60) * Fd * (20.9/(20.9 - \% O_2))$
$= 137.7 / 5042.8$
$= 0.03$ lb/mmBTU

PERCENT ISOKINETIC

$I = 1.667 * (Tss + 460) * \{(0.00267 * Vlc) + [(Vm * Yf) / (Tm + 460) * (Pbs + (DH / 13.6))]\} / (q * Vss * Pss * An)$

$= 1.667 * (166 + 460) * \{(0.00267 * 193.7) + [(75.9 * 0.990) / (76 + 460) * (28.32 + (3.02 / 13.6))]\} / (80.0 * 116.4 * 28.15 * 0.000183)$

$= 98.5$ %

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SAMPLING TRAIN

TEST NO.: 0406A

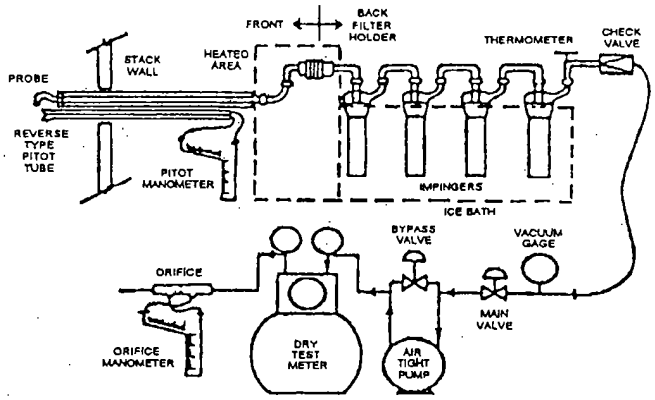
Nozzle No. GA-5 (Dn = 0.1900 in.)

Sample Box No. 554

Probe No. CEM-7-2 (Cps = 0.840)

Module No. 606

Impinger Solution: H2O



LABORATORY RESULTS

SAMPLE WEIGHTS Total PM10

Train Component	weight
Front Half Rinse:	0.1737 g
Filter No.:05003	0.0000 g
Inorganic CPM	0.1786 g
Organic CPM	0.1737 g
Total:	0.3523 g

CONDENSATE:

Impinger No.	Final (ml)	Initial (ml)
1 H2O	911.8	705.1
2 H2O	889.6	702.9
3 H2O	740.3	728.9
4 Silica Gel	769	759
Total	414.8 ml	

GAS ANALYSIS:

	Sampling
%CO:	0.0
$\%CO_2$:	13.0
$\%O_2$:	5.4
$\%N_2$:	81.6

CONDENSATE VOLUME:

Vwc = 0.0471 * Vlc
= 0.0471 * 414.8
= 19.5 SCF

MOISTURE BY VOLUME:

Bws = Vwc / (Vwc + Vms) = 19.5 / (19.5 + 127.7)
= 13.2 %

DRY MOLECULAR WEIGHT:

Mds = (%CO * 0.28) + ($\%CO_2$ * 0.44) + ($\%O_2$ * 0.32) + ($\%N_2$ * 0.28)
= (0.0 * 0.28) + (13.0 * 0.44) + (5.4 * 0.32) + (81.6 * 0.28)
= 30.30

MOLECULAR WEIGHT:

Mss = (Bws * 18.00) + [Mds * (1 - Bws)]
= (0.132 * 18.00) + [30.30 * (1-0.132)]
= 28.68

RESULTS OF COAL ANALYSIS:

BTU/LB:	6497.6
% Ash:	50.15 %
% H_2O Residual:	0.8 %
% H_2O Surface:	<0.05 %
% Sulfur:	2.989 %

SAMPLING TRAIN

TEST NO.: 00406B

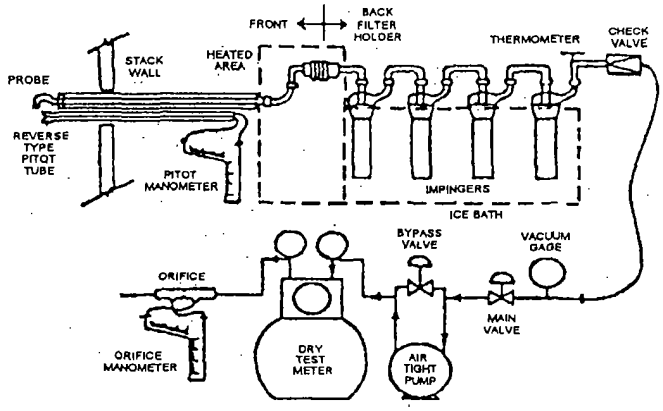
Nozzle No. GA-1 (Dn = 0.1878 in.)

Sample Box No. 552

Probe No. CEM-7-2 (Cps = 0.840)

Module No. 606

Impinger Solution: H2O



LABORATORY RESULTS

SAMPLE WEIGHT: Total PM10

Train Component	weight
Front Half Rinse:	0.1968 g
Filter Nc 110022	0.0000 g
Inorganic CPM	0.1836 g
Organic CPM	0.0071 g
Total:	0.3875 g

CONDENSATE:

Impinger No.	Final (ml)	Initial (ml)
1 H2O	907.6	852.1
2 H2O	986.1	845.2
3 H2O	952.1	812.5
Silica Gel	932.3	848.3
Total:	420.0 m	

CONDENSATE VOLUME:

Vwc = 0.0471 * Vlc
= 0.0471 * 420.0
= 19.8 SCF

MOISTURE BY VOLUME:

Bws = Vwc / (Vwc + Vms) = 19.8 / (19.8 + 120.1)
= 14.2 %

DRY MOLECULAR WEIGHT:

Mds = (%CO * 0.28) + (%CO_2 * 0.44) + (%O_2 * 0.32) + (%N_2 * 0.28)
= (0.0 * 0.28) + (13.0 * 0.44) + (5.4 * 0.32) + (81.6 * 0.28)
= 30.30

MOLECULAR WEIGHT:

Mss = (Bws * 18.00) + [Mds * (1 - Bws)]
= (0.142 * 18.00) + [30.30 * (1-0.142)]
= 28.55

GAS ANALYSIS:

	Sampling
%CO:	0.0
%CO_2:	13.0
%O_2:	5.4
%N_2:	81.6

RESULTS OF COAL ANALYSIS:

BTU/LB:	5765.15
% Ash:	54.8 %
% H_2O Residual:	0.8 %
% H_2O Surface:	<0.05 %
% Sulfur:	3.042 %

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SAMPLING TRAIN

TEST NO.: 00406C

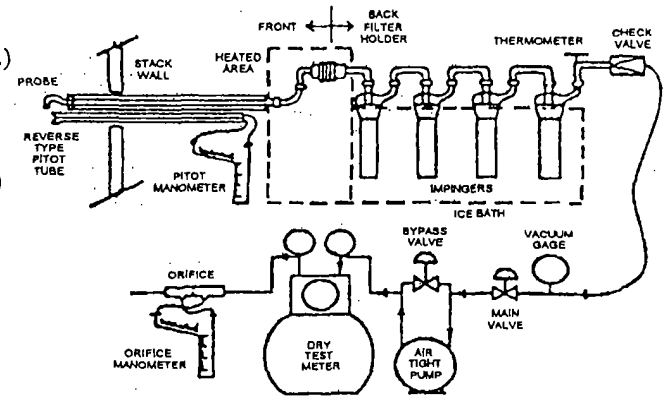
Nozzle No. GA-1 (Dn = 0.1878 in.)

Sample Box No. 552

Probe No. CEM-7-2 (Cps = 0.840)

Module No. 606

Impinger Solution: H2O



LABORATORY RESULTS

SAMPLE WEIGHT: Total PM10

Train Component	weight
Front Half Rinse:	0.0086 g
Filter Nc 06012	0.0014 g
Inorganic CPM	0.1329 g
Organic CPM	0.0006 g
Total:	0.1435 g

CONDENSATE:

Impinger No.	Final (ml)	Initial (ml)
1 H2O	904.5	692.1
2 H2O	856	702.4
3 H2O	739.8	722.8
Silica Gel	861.2	828.7
Total:	415.5 ml	

GAS ANALYSIS:

	Sampling
%CO:	0.0
$\%CO_2$:	12.9
$\%O_2$:	3.6
$\%N_2$:	83.5

CONDENSATE VOLUME:

Vwc = 0.0471 * Vlc
= 0.0471 * 415.5
= 19.6 SCF

MOISTURE BY VOLUME:

Bws = Vwc / (Vwc + Vms) = 19.6 / (19.6 + 121.8)
= 13.9 %

DRY MOLECULAR WEIGHT:

Mds = (%CO * 0.28) + ($\%CO_2$ * 0.44) + ($\%O_2$ * 0.32) + ($\%N_2$ * 0.28)
= (0.0 * 0.28) + (12.9 * 0.44) + (3.6 * 0.32) + (83.5 * 0.28)
= 30.21

MOLECULAR WEIGHT:

Mss = (Bws * 18.00) + [Mds * (1 - Bws)]
= (0.139 * 18.00) + [30.21 * (1-0.139)]
= 28.51

RESULTS OF COAL ANALYSIS:

BTU/LB:	6180.36
% Ash:	52.3 %
% H_2O Residual:	0.8 %
% H_2O Surface:	<0.05 %
% Sulfur:	2.458 %

SAMPLING TRAIN

TEST NO.: 0506A

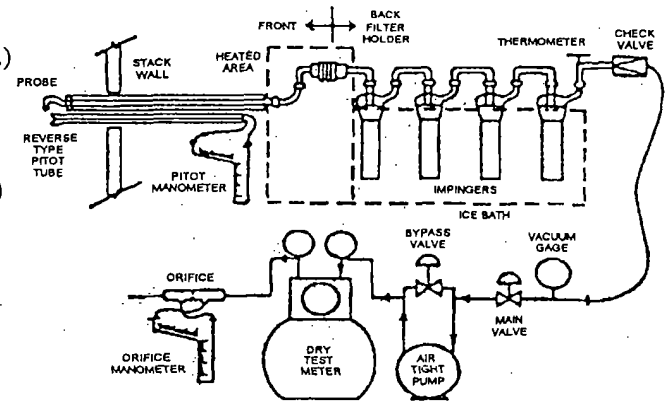
Nozzle No. GA-2 (Dn = 0.1830 in.)

Sample Box No.

Probe No. CEM-7-2 (Cps = 0.840)

Module No. 602

Impinger Solution: H2O



LABORATORY RESULTS

SAMPLE WEIGHT: Total PM10

Train Component	weight
Front Half Rinse:	0.0053 g
Filter Nc 110032	0.0082 g
Inorganic CPM	0.0434 g
Organic CPM	0.0030 g
Total:	0.0599 g

CONDENSATE:

Impinger No.	Final (ml)	Initial (ml)
1 H2O	917.4	748.7
2 H2O	791.3	764.1
3 Empty	766.1	758.8
Silica Gel	750.3	730
Total:	223.5 ml	

GAS ANALYSIS:

	Sampling
%CO:	0.0
$\%CO_2$:	12.0
$\%O_2$:	6.0
$\%N_2$:	82.0

CONDENSATE VOLUME:

Vwc = 0.0471 * Vlc
= 0.0471 * 223.5
= 10.5 SCF

MOISTURE BY VOLUME:

Bws = Vwc / (Vwc + Vms) = 10.5 / (10.5 + 71.4)
= 12.8 %

DRY MOLECULAR WEIGHT:

Mds = (%CO * 0.28) + ($\%CO_2$ * 0.44) + ($\%O_2$ * 0.32) + ($\%N_2$ * 0.28)
= (0.0 * 0.28) + (12.0 * 0.44) + (6.0 * 0.32) + (82.0 * 0.28)
= 30.16

MOLECULAR WEIGHT:

Mss = (Bws * 18.00) + [Mds * (1 - Bws)]
= (0.128 * 18.00) + [30.16 * (1-0.128)]
= 28.60

RESULTS OF COAL ANALYSIS:

BTU/LB:	5863
% Ash:	48.27 %
% H_2O Residual:	7 %
% H_2O Surface:	0 %
% Sulfur:	2.55 %

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SAMPLING TRAIN

TEST NO.: 00506B

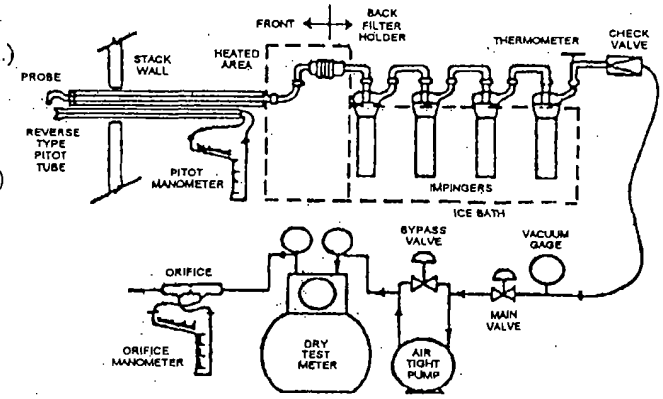
Nozzle No. GA-2 (Dn = 0.1830 in.)

Sample Box No.

Probe No. CEM-7-2 (Cps = 0.840)

Module No. 602

Impinger Solution: H2O



LABORATORY RESULTS

SAMPLE WEIGHT: Total PM10

Train Component	weight
Front Half Rinse:	0.0029 g
Filter Nc 110033	0.0112 g
Inorganic CPM	0.0713 g
Organic CPM	0.0055 g
Total:	0.0909 g

CONDENSATE:

Impinger No.	Final (ml)	Initial (ml)
1 H2O	886.8	722.7
2 H2O	809.2	787.4
3 Empty	738	733.9
Silica Gel	735.4	717.6
Total:	207.8 ml	

GAS ANALYSIS:

	Sampling
%CO:	0.0
$\%CO_2$:	13.0
$\%O_2$:	6.0
$\%N_2$:	81.0

CONDENSATE VOLUME:

Vwc = 0.0471 * Vlc
= 0.0471 * 207.8
= 9.8 SCF

MOISTURE BY VOLUME:

Bws = Vwc / (Vwc + Vms) = 9.8 / (9.8 + 69.4)
= 12.4 %

DRY MOLECULAR WEIGHT:

Mds = (%CO * 0.28) + ($\%CO_2$ * 0.44) + ($\%O_2$ * 0.32) + ($\%N_2$ * 0.28)
= (0.0 * 0.28) + (13.0 * 0.44) + (6.0 * 0.32) + (81.0 * 0.28)
= 30.32

MOLECULAR WEIGHT:

Mss = (Bws * 18.00) + [Mds * (1 - Bws)]
= (0.124 * 18.00) + [30.32 * (1-0.124)]
= 28.79

RESULTS OF COAL ANALYSIS:

BTU/LB:	6106
% Ash:	46.53 %
% H_2O Residual:	7.44 %
% H_2O Surface:	0 %
% Sulfur:	2.58 %

SAMPLING TRAIN

TEST NO.: 0506C

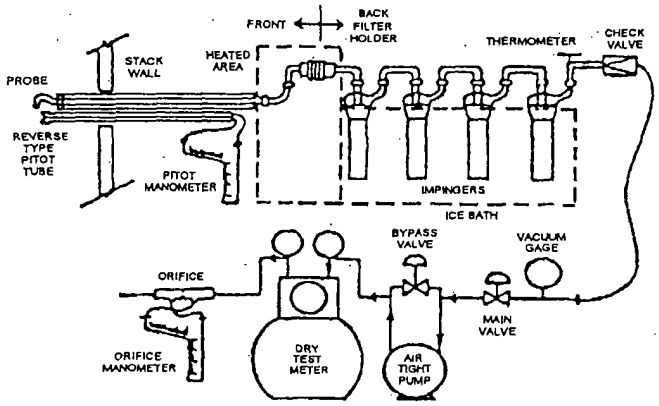
Nozzle No. GA-2 (Dn = 0.1830 in.)

Sample Box No.

Probe No. CEM-7-2 (Cps = 0.840)

Module No. 602

Impinger Solution: H2O



LABORATORY RESULTS

SAMPLE WEIGHT: Total PM10

Train Component	weight
Front Half Rinse:	0.0034 g
Filter Nc 110034	0.0110 g
Inorganic CPM	0.0490 g
Organic CPM	0.0027 g
Total:	0.0661 g

CONDENSATE:

Impinger No.	Final (ml)	Initial (ml)
1 H2O	877.2	731.3
2 H2O	801	781.5
3 Empty	772.8	765.7
Silica Gel	781.1	759.9
Total:	193.7 ml	

GAS ANALYSIS:

	Sampling
%CO:	0.0
$\%CO_2$:	12.0
$\%O_2$:	6.0
$\%N_2$:	82.0

CONDENSATE VOLUME:

$Vwc = 0.0471 * Vlc$
$= 0.0471 * 193.7$
$= 9.1$ SCF

MOISTURE BY VOLUME:

$Bws = Vwc / (Vwc + Vms) = 9.1 / (9.1 + 70.7)$
$= 11.4\ \%$

DRY MOLECULAR WEIGHT:

$Mds = (\%CO * 0.28) + (\%CO_2 * 0.44) + (\%O_2 * 0.32) + (\%N_2 * 0.28)$
$= (0.0 * 0.28) + (12.0 * 0.44) + (6.0 * 0.32) + (82.0 * 0.28)$
$= 30.16$

MOLECULAR WEIGHT:

$Mss = (Bws * 18.00) + [Mds * (1 - Bws)]$
$= (0.114 * 18.00) + [30.16 * (1-0.114)]$
$= 28.77$

RESULTS OF COAL ANALYSIS:

BTU/LB:	6114
% Ash:	47.44 %
% H_2O Residual:	7.56 %
% H_2O Surface:	0 %
% Sulfur:	2.62 %

Example Calculations

Stack Molecular Weight (40 CFR 60, Appendix A, Eqn. 2-6)

$$M_s = (M_d * (1 - B_{ws})) + (18.0 * B_{ws})$$

Stack Velocity (40 CFR 60, Appendix A, Eqn. 2-7)

$$V_s = 85.49 * C_p * \sqrt{\Delta p} * \sqrt{\frac{T_s}{M_s * P_s}}$$

Stack Volumetric Flow Rate (40 CFR 60, Appendix A, Eqn. 2-8)

$$Q_{sd} = 3600 * (1 - B_{ws}) * V_s * A_s * \left(\frac{T_s(std)}{T_s}\right) * \left(\frac{P_s}{P(std)}\right)$$

Dry Molecular Weight (40 CFR 60, Appendix A, Eqn. 3-1)

$$M_d = ((0.44) * (\%CO_2)) + ((0.32) * (\%O_2)) + ((0.28) * (\%CO + \%N_2))$$

Volume of Water Vapor condensed @ standard conditions (40 CFR 60, Appendix A, Eqn. 4-5)

$$V_w(std) = 0.0471 * V_{lc}$$

Metered Volume @ standard conditions (40 CFR 60, Appendix A, Eqn. 4-6)

$$V_m(std) = \left(\frac{528}{29.92}\right) * V_m * Y * \left(\frac{P_b + \left(\frac{\Delta H}{13.6}\right)}{T_m}\right)$$

Fractional Moisture (40 CFR 60, Appendix A, Eqn. 5-3)

$$B_{ws} = \frac{V_w(std)}{(V_m(std) + V_w(std))}$$

Isokinetic Ratio (40 CFR 60, Appendix A, Eqn. 5-8)

$$I = \frac{0.09450 * T_s * V_m(std)}{P_s * V_s * A_n * \theta * (1 - B_{ws})}$$

Emission Concentration

$$C_s(gr./dscf) = M_n(g) * \left(\frac{15.43}{V_m(std)}\right)$$

More Example Calculations

Mass Emission Rate

$$E(lbs./hour) = \frac{C_s}{7000} * 60 * Q_{sd}$$

$$E(lbs./10^{12}\,BTU) = \left(\frac{E(lbs./hour)}{HI}\right) * 1x10^{6}$$

Coal (lbs Hg/10^{12} BTU)

$$= \frac{ppmHg * 1x10^{-6}}{BTU/lb * 1x10^{-12}}$$

Mercury Removal

$$= \frac{\left(Coal(lbsHg/10^{12}\,BTU) - E(lbs/10^{12}\,BTU)\right)}{Coal(lbsHg/10^{12}\,BTU)}$$

Test no - 00306A

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

SAMPLING TRAVERSE FIELD DATA

Company: SEWARD Source: Boiler 1 & 2 Date: 7/19/06 Type of test: Mercury

Sampling location: Exhaust Stack Run #: 1 Module operated by: Raj Singh Y = 0.99

Probe #: ____ Cps: 0.84 Module #: 605 Pbs: 28.76 Pstat: -2.1 Assumed moisture: 12 Meter ΔH@: 1.83

Sample box #: ____ Nozzle #: GA3 Nozzle I.D.: 0.1854 Glass fiber filter #('s): 05001 wt → .5070 grams

Impinger #	Solution	Initial amount	Final	Measurements:	Fyrite sample #	Time	CO	CO2	O2	N2
1	KCl	767.4	917.3	0.185	1			12.2	5.4	
2		763.3	858.1	0.185	2			12.2	5.4	
3	H_2O_2	775.3	812.3	0.185	3			12.2	5.4	
4	$KMnO_4$	769.2	786.1	0.186	Integrated sample #	Time				
5		765.2	769.0	0.186	1					
6		772.1	773.7		2					
7	Silica	769.1	769.1	By: Dave Baker	3					
8		732.5	748.0							

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	1 Tss deg F	6 Tmi deg F	7 Tmo deg F	BOX TEMP deg F	IMPINGER TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
	12:28	521.079	3.4	3.7	169	90	89	248	71	248	3
	+6	527.28	3.4	3.7	169	90	89	248	55	248	3
	12:34	527.28	3.4	3.7	169	92	89	250	55	248	3
12	+6	533.44	3.4	3.7	169	92	89	249	57	248	3
	12:40	533.44	3.4	3.7	169	95	89	248	58	248	3
18	+6	539.57	3.3	3.7	169	97	89	250	58	248	3
	12:46	539.57	3.3	3.7	169	98	90	249	58	249	3
24	+6	545.62	3.4	3.7	169	99	90	249	58	248	3
	12:52	545.62	3.4	3.7	169	101	90	247	58	248	3
30	+6	551.85	3.4	3.7	169	102	91	248	58	248	3
	12:58	551.85	3.4	3.7	169	102	91	249	58	249	3
36	+6	558.09	3.4	3.7	169	102	92	249	58	248	3
	1:04	558.09	3.4	3.7	169	103	92	248	58	249	3
42	+6	564.34	3.4	3.7	169	104	93	248	58	249	3
	1:10	564.34	3.4	3.7	169	104	93	248	58	249	3

OK

METER CALIBRATION CHECK-

$$Yc = \frac{\Theta}{Vm}\left[\frac{0.0319\,Tm}{Pb}\right]^{0.5} \rightarrow 0.9$$

Θ = 10 min.

Vm = cf $\frac{520.956 - 513.00}{7.956}$

Tm = $\frac{87+84}{2}$ °F + 460 = 545.5°R

Pb = 28.76 in. Hg

Yc = 0.960 → 1.020 → 0.98

0.97Y < Yc < 1.03Y

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

initial leak check < 0.00 @ 11"

Final leak check < 0.00 @ 6"

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

Page 2 of 1

Company SEWARD Source Boiler 1 & 2 Date 7/19/06

Sampling Location Exhaust Stack Run # 1 Type Mercury

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	1 Tss deg F	6 Tmi deg F	7 Tmo deg F	3 BOX TEMP deg F	4 IMPING. TEMP deg F	2 PROBE TEMP deg F	V PUMP VACUUM in. Hg
48	+6	570.56	3.4	3.7	169	105	93	248	57	249	3.5
	1:16	570.56	3.4	3.7	169	105	93	248	57	248	3.5
54	+6	576.81	3.4	3.7	169	105	94	248	55	249	3.5
	1:22	576.81	3.4	3.7	169	106	95	249	54	248	3.5
60	+6	583.08	3.4	3.7	169	106	95	248	54	248	3.5
	1:28	583.08	3.4	3.7	169	106	95	248	54	248	3.5
66	+6	589.34	3.4	3.7	169	107	95	248	53	248	3.5
	1:34	589.34	3.4	3.7	169	107	96	248	51	249	3.5
72	+6	595.58	3.4	3.7	169	107	96	248	51	248	4.0
	1:40	595.58	3.4	3.7	169	107	96	249	51	249	4.0
78	+6	601.90	3.4	3.7	169	107	96	248	51	248	4.0
	1:46	601.90	3.4	3.7	169	108	97	248	50	248	4.0
84	+6	608.21	3.4	3.7	169	108	98	248	50	248	4.0
	1:52	608.21	3.4	3.7	169	108	98	248	50	248	4.0
90	+6	614.55	3.4	3.7	169	108	98	249	50	249	4.0
	1:58	614.55	3.4	3.7	169	108	98	249	51	249	4.0
96	+6	620.97	3.4	3.7	169	108	98	249	51	249	4.0

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

SAMPLING TRAVERSE FIELD DATA

ompany RELIANT - SEWARD STN. Source BOILERS 1+2 Date 7/19/06 Type of test Hg (OH-ASTM)

mpling location STACK Run # 2 Module operated by R. SZEKERES

obe # 3K Cps 0.84 Module # 605 Pbs 28.67 Pstat -2.35 Assumed moisture 12% Y = 0.98 Meter ΔH@ 1.83

mple box # Nozzle # GA-3 Nozzle I.D. Glass fiber filter #('s) 00502 0.5098g

pinger #	Solution	Initial amount	Final
1	KCl	763.9	932.9
2		760.2	856.7
3	H_2O_2	782.5	808.5
4	$KMnO_4$	765.4	774.0
5		775.9	777.2
6	silica	781.4	781.8
		780.1	780.9
		738	757.1

ESTIMATED TEMP.

Measurements: .186, .185, .185, .195, .186

By:

Fyrite sample #	Time	CO	CO2	O2	N2
1					
2					
3					

Integrated sample #	Time
1	
2	

OINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
D-2	4:24PM	621.173	3.6	3.9	169	94	93	245	77	248	3.5
	+6 3	627.51	3.4	3.65	169	95	93	254	65	248	3.3
	4:30PM	627.51	3.4	3.65	169	96	93	251	63	248	3.3
	12 +6 9	633.8	3.45	3.7	169	98	93	248	63	248	3.3
	4:36PM	633.8	3.45	3.7	169	100	93	249	63	249	3.3
	18 +6 15	640.1	3.45	3.7	169	101	93	249	61	248	3.3
	4:42PM	640.1	3.40	3.6	169	102	94	246	60	248	3.3
	24 +6 21	646.43	3.55	3.75	169	104	95	247	58	248	3.5
	4:48PM	646.43	3.55	3.75	169	104	95	249	58	248	3.5
	30 +6 27	652.81	3.50	3.7	169	105	95	249	57	248	3.5
	4:54PM	652.81	3.50	3.7	169	106	96	249	57	248	3.5
	36 + 6 33	659.16	3.40	3.6	169	107	96	248	58	249	3.5
	5:00PM	659.16	3.40	3.6	169	107	96	248	58	248	3.5
	42 + 6 39	665.96	3.50	3.7	169	107	97	248	58	248	3.5
	5:06PM	665.96	3.40	3.6	169	108	97	248	58	248	3.5

METER CALIBRATION CHECK-

$$Yc = \frac{\Theta}{Vm}\left[\frac{0.0319\,Tm}{Pb}\right]^{0.5}$$

Θ = min.

Vm = cf

Tm = °F + 460 = °R

Pb = in. Hg

Yc =

0.97Y < Yc < 1.03Y

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

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Company RELIANT - SEWARD STN. Source BOILERS 1 & 2 Date 7/19/06

Sampling Location STACK Run # 2 Type Hg

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
D-2	48 +6 15	671.83	3.5	3.7	169	108	98	248	58	248	3.5
	5:12PM	671.83	3.55	3.75	167	108	98	248	59	248	3.5
	54 + 6 51	678.21	3.40	3.6	167	109	98	248	60	248	3.5
	5:18PM	678.21	3.40	3.6	167	109	99	248	60	248	3.5
	60 + 6 57	684.49	3.40	3.6	167	110	99	248	60	248	3.5
	5:24PM	684.49	3.40	3.6	167	110	99	248	60	248	3.5
	66 + 6 63	690.76	3.40	3.6	167	110	99	248	60	248	3.5
	5:30PM	690.76	3.40	3.6	167	110	100	248	61	248	3.5
	72 + 6 69	697.07	3.50	3.7	167	110	100	248	61	248	3.5
	5:36PM	697.07	3.45	3.65	168	110	100	248	61	248	3.5
	78 + 6 75	703.53	3.45	3.6	168	110	101	248	61	247	3.5
	5:42PM	703.53	3.45	3.6	168	110	101	248	61	248	3.5
	84 + 6 81	709.80	3.5	3.65	168	111	101	248	61	248	3.5
	5:48PM	709.80	3.5	3.7	169	111	101	248	62	248	3.7
	90 + 6 87	716.17	3.5	3.7	169	111	101	248	62	248	3.5
	5:52PM	716.17	3.45	3.6	169	111	101	248	63	248	3.7
	96 + 6 93	722.48	3.5	3.5	169	112	101	248	63	248	3.6

Post test leak check Ø @ 5 in

1 of 2

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

SAMPLING TRAVERSE FIELD DATA

Company Reliant Energy Source Boiler 1 & 2 Date 7/20/06 Type of test Hg

Sampling location Stack Run # 3 Module operated by Tony Pike

Y = 0.99

Probe # 3K Cps 0.84 Module # 605 Pbs 28.76 Pstat -2.35 Assumed moisture 12% Meter ΔH@ 1.83

Sample box # Nozzle # GA-3 Nozzle I.D. Glass fiber filter #('s) 06-0142 Ø: 5102 g

Impinger #	Solution	Initial amount	Measurements:
1	KCl	769.3	944.2
2		765.0	868.9
3	H_2O_2	781.1	807.0
4		776.0	782.5
5	$KMnO_4$	769.5	771.8
6	silica	774.6	774.9
		771.5	771.8
		815.3	829.7

.186
.185
.185
.185
.186

By: David Baker

Fyrite sample #	Time	CO	CO2	O2	N2
1					
2					
3			12.9	3.6%	

Integrated sample #	Time
1	
2	

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	168 Tss deg F	6 Tmi deg F	7 Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F 4	PROBE TEMP deg F	PUMP VACUUM in. Hg
D-2	11:33 AM	739.082	3.5	3.7	169	91	90	247	66	248	12.5
	6 + 6 3	745.16	3.5	3.8	169	87	90	248	52	248	12
	11:39	745.16	3.6	3.7	169	90	90	248	49	249	12.5
	12 + 6 9	751.51	3.6	3.8	169	92	90	248	49	249	12.5
	11:45	751.51	3.6	3.8	169	93	90	248	52	248	12
	18 + 6 15	757.99	3.7	3.9	169	95	90	248	54	248	12.5
	11:51	757.99	3.7	3.9	169	96	90	248	53	248	12.5
	24 + 6 21	764.34	3.6	3.8	169	98	90	248	52	248	12.5
	11:57	764.34	3.6	3.8	169	98	91	248	52	248	12.5
	30 + 6 27	770.77	3.6	3.9	169	99	92	248	52	248	12.5
	12:03	770.77	3.6	3.9	169	100	92	248	52	248	12.5
	36 + 6 33	777.19	3.6	3.8	169	101	92	248	53	248	12.5
	12:09	777.19	3.6	3.9	169	101	92	248	53	248	12.5
	42 + 6 39	783.48	3.6	3.8	169	102	93	248	53	248	12.5
	12:15	783.48		3.8	169	102	93	248	54	248	12.5

METER CALIBRATION CHECK

$$Yc = \frac{\Theta}{Vm}\left[\frac{0.0319\,Tm}{Pb}\right]^{0.5}$$

Θ = 10 min.

Vm = 7.894 cf 739.894 -731

Tm = 91/86 °F + 460 = 518.5 °R

Pb = 28.73 in. Hg

Yc = 0.989

0.97Y < Yc < 1.03Y OK

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

Pre test leak Ø @ 15 in Hg
Post test leak Ø @ 14 in Hg

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

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Company Reliant Energy Source Boilers 1 & 2 Date 7/20/04

Sampling Location Stack Run # 3 Type Hg

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
D-2	41 to 45	789.97	3.6	3.8	169	102	93	248	54	248	12.5
	12:21	789.97	3.6	3.8	169	103	94	248	54	248	12.5
	54 to 51	796.28	3.6	3.8	169	103	94	248	54	248	12.5
	12:27	796.28	3.6	3.8	169	104	95	248	55	248	12.5
	60 to 57	802.70	3.6	3.8	169	104	95	248	55	248	12.5
	12:33	802.70	3.6	3.8	169	104	95	248	55	248	12.5
	66 to 63	809.10	3.6	3.8	169	105	96	248	55	248	12.5
	12:39	809.10	3.6	3.8	169	105	96	248	55	248	12.5
	72 to 69	815.57	3.7	3.9	169	105	96	248	55	248	12.5
	12:45	815.57	3.8	4.0	169	105	96	248	55	248	12.5
	78 to 75	822.13	3.8	4.0	169	105	96	248	55	248	13
	12:51	822.13	3.8	4.0	169	105	96	248	55	248	13.5
	84 to 81	828.79	3.8	4.0	169	105	97	248	55	248	14
	12:57	828.78	3.8	4.0	169	105	97	248	55	248	14
	90 to 87	835.42	3.8	4.0	169	105	97	248	55	248	14
	1:03	835.42	3.9	4.0	169	105	98	248	57	248	14
	96 to 93	841.907	3.9	4.0	169	103	98	248	58	248	14

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
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SAMPLING TRAVERSE FIELD DATA

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Company RELIANT ENERGY - SEWARD Source BOILER 1/2 Date 7/19/06 Type of test M5/202

Sampling location EXHAUST STACK Run # 1 Module operated by A. BIHL

Y = 1.00

Probe # CEM 7-2 Cps 0.84 Module # 606 Pbs 28.76 Pstat -2.35 Assumed moisture 12% Meter ΔH@ 1.69

Sample box # 554 Nozzle # GA-5 Nozzle I.D. GA-5 Glass filter filter #(s) 05003

Impinger #	Solution	Initial amount	Final Measurements:
1		705.1	911.8
2		702.9	888.6
3			740.3
4	EMPTY	728.9	
5			
6	SILICA	759.0	769.0

By: D. BAKER

Pyrite sample #	Time	CO	CO2	O2	N2
1			13.0	5.4	
2					
3					

Integrated sample #	Time
1	
2	

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Ss deg F	Tm deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
PRE TEST		LEAK CHECK			<0.005 CFM			@	15" Hg		
A-1	11:20 AM	189.520	3.0	3.2	166	90	90	245	63	250	8.0
A-1	+8	197.48	3.0	3.2	167	92	89	248	49	250	8.0
A-2	11:28 AM	197.49	3.9	4.1	167	96	89	248	53	251	11.0
A-2	+16	206.46	3.9	4.1	167	98	90	248	55	251	11.0
A-3	11:36 AM	206.46	4.2	4.4	167	99	90	249	63	251	13.0
A-3	+24	215.85	4.2	4.4	167	99	90	247	65	251	13.0
A-4	11:44 AM	215.85	4.0	4.2	167	99	91	248	71	251	12.0
A-4	+32	225.062	4.0	4.2	167	100	92	248	72	251	12.0
PORT CHANGE		LEAK CHECK			<0.005 CFM @			13" Hg			
PORT CHANGE		LEAK CHECK			<0.005 CFM @			15" Hg			
B-1	12:02 PM	225.350	2.9	2.1	165	94	93	247	68	251	7.5
B-1	+40	233.24	2.9	2.1	169	98	92	247	56	251	7.5
B-2	12:10 PM	233.24	3.7	3.9	169	102	93	248	53	251	10.0
B-2	+48	242.06	3.7	3.9	169	106	93	248	52	251	10.0

METER CALIBRATION CHECK

$$Y_c = \frac{\theta}{V_m}\left[\frac{0.0319\,T_m}{P_b}\right]^{0.5}$$

θ = 10 min.

Vm = 7.730 cf Vf = 189.520 Vi = 181.300

Tm = 95+85 °F + 460 = 550 °R

Pb = 28.76 in. Hg

$Y_c = \frac{7.310}{7.730} = 1.0103$ ✓

0.97Y < Yc < 1.03Y

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

D. BAKER
R. BEGLEY
T. PIRTS
A. PACK
[illegible]

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

00406A

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Company RELIANT ENERGY - SEWARD Source BOILER 1/2 Date 7/19/06

Sampling Location EXHAUST STACK Run # 1 Type M5/202

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Ts deg F	Tm deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
B-3	12:18pm	242.06	4.1	4.2	169	106	93	251	54	246	11.0
B-3	+56	251.32	4.0	4.1	169	107	95	249	55	251	11.0
B-4	12:26pm	251.32	3.9	4.0	169	106	95	248	55	251	10.5
B-4	+64	260.576	4.1	4.1	169	107	95	248	55	251	11.0
PORT CHANGE			LEAK CHECK				<0.005	CFM	@	10" Hg	
PORT CHANGE			LEAK CHECK				<0.005	CFM	@	5.0" Hg	
C-1		BAD	GOOSE NECK				LOOSE	FITTING			FIXED
C-1	+72	PORT CHANGE			LEAK CHECK			<0.005	CFM	@ 15" Hg	
C-1	1:20pm	272.300	2.5	2.6	168	97	95	249	66	251	5.5
C-1	+72	279.67	2.5	2.6	169	101	96	245	61	251	5.5
C-2	1:28pm	279.67	3.25	3.4	169	105	95	252	56	251	7.0
C-2	+80	287.91	3.25	3.4	169	110	96	249	55	251	7.0
C-3	1:36pm	287.91	3.80	3.9	169	110	96	246	54	251	9.0
C-3	+88	296.86	3.80	3.9	169	110	97	250	53	251	[illegible]
C-4	1:44pm	296.86	3.6	3.8	169	110	98	249	53	251	8.5
C-4	+96	305.674	3.6	3.8	168	110	98	248	53	251	8.5
PORT CHANGE			LEAK CHECK				<0.005	CFM	@	30"	
PORT CHANGE			LEAK CHECK				<0.005	CFM	@	[illegible]	
D-1	2:05pm	305.967	3.2	3.3	168	99	98	252	67	251	7.5
D-1	+104	314.27	3.2	3.3	168	100	98	248	56	251	7.5
D-2	2:13pm	314.27	3.8	3.8	169	105	98	249	54	251	10.0
D-2	+112	323.26	3.8	3.8	169	108	98	249	54	251	9.5
D-3	2:21pm	323.26	4.0	3.9	169	108	98	248	55	251	10.0
D-3	+120	332.48	4.0	3.9	168	108	98	248	55	251	10.0

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

0004060A

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Company RELIANT ENERGY, SEWARD Source BOILER 1/2 Date 7/19/06

Sampling Location EXHAUST STACK Run # 1 Type M5/202

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.P. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMP NO. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
D-4	2:29PM	332.48	3.8	3.8	168	108	98	248	56	351	9.5
D-4	+120	341.536	3.8	3.8	168	109	99	247	56	257	9.5
POST TEST LEAK CHECK						< 0.005 CFM @ 10				"Hg 0	

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

00406B

SAMPLING TRAVERSE FIELD DATA

Company: RELIANT ENERGY SEWARD Source: BOILER 1/2 Date: 7/19/06 Type of test: MS/202

Sampling location: EXHAUST STACK Run #: 2 Module operated by: A. BIHL

Probe #: CEM 72 Cps: 0.84 Module #: 606 Pbs: 28.70 Pstat: -2.35 Assumed moisture: 12% Meter ΔH@: 1.69 Y = 1.00

Sample box #: 552 Nozzle #: GA-1 Nozzle I.D. Glass fiber filter #(s): 110022

Impinger #	Solution	Initial amount	Fmo # Measurements	
1		852.1	907.6	.187
2	DI	845.2	986.1	.188
3		812.5	952.1	.188
4				.189
5	silica	843.3	932.3	By: [illegible]
6				

Pyrite sample #	Time	CO	CO2	O2	N2
1					
2					
3					

Integrated sample #	Time
1	
2	

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tm deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
PRE	TEST	LEAK	CHECK	<	0.005	CFM	@	15	"Hg		
A-1	4:52pm	341.828	2.6	2.9	169	95	94	253	65	251	2.5
A-1	+8	349.37	2.6	2.9	168	96	94	252	60	251	2.5
A-2	5:00pm	349.37	3.5	3.9	169	99	93	249	56	251	3.0
A-2	+16	358.00	3.5	3.9	168	104	94	249	56	251	3.0
A-3	5:08pm	358.00	4.0	4.2	167	107	95	248	55	251	3.5
A-3	+24	367.18	4.0	4.2	167	108	95	249	56	251	3.5
A-4	5:16pm	367.18	3.9	4.1	167	109	96	249	58	251	3.5
A-4	+32	376.34	3.9	4.1	167	110	96	248	58	250	3.5
POR	T	[illegible]	LEAK	CHECK	<	0.005	CFM	@	4.0	"Hg	
POR	[illegible]	[illegible]	[illegible]	[illegible]	<	0.005	CFM	@	150	[illegible]	
B-1	5:30pm	376.59	3.0	3.2	167	101	98	248	66	250	3.0
B-1	+40	384.62	3.0	3.1	168	103	98	247	56	251	3.0
B-2	5:38pm	384.62	3.5	3.8	169	107	98	249	52	251	3.0
B-2	+48	393.30	3.5	3.8	169	111	99	248	52	251	3.0

METER CALIBRATION CHECK

$$Yc = \frac{\theta}{Vm}\left[\frac{0.0319\,Tm}{Pb}\right]^{0.5}$$

θ = min.

Vm = cf

Tm = °F + 460 = °R

Pb = in. Hg

Yc = SEE RUN 1

0.97Y < Yc < 1.03Y 00406A

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

004060B

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Company RELIANT ENERGY, SEWARD Source BOILER 1/2 Date 7/19/06

Sampling Location EXHAUST STACK Run # 2 Type MS/EPA

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
B-3	5:46pm	398.30	3.5	3.8	169	112	99	249	55	251	3.0
B-3	+56	408.00	3.5	3.8	169	113	99	248	55	251	3.0
B-4	5:54pm	402.00	3.4	3.7	169	114	100	248	59	251	3.0
B-4	+64	410.591	3.4	3.7	168	114	101	249	60	251	3.0
PORT CHANGE		LEAK CHECK				<0.005 CFM @ 10" Hg					
PORT CHANGE		LEAK CHECK				<0.005 CFM @ 15.0" Hg					
C-1	6:12pm	410.775	2.4	2.7	168	104	101	248	69	251	2.5
C-1	+72	418.09	2.4	2.7	167	104	101	248	62	251	2.5
C-2	6:20pm	418.09	2.8	3.2	167	106	101	246	57	251	3.0
C-2	+80	425.87	2.8	3.2	167	112	101	249	57	251	3.0
C-3	6:28pm	425.87	3.3	3.7	167	112	101	248	57	251	3.0
C-3	+88	434.15	3.2	3.6	167	114	101	249	55	251	3.0
C-4	6:36pm	434.18	3.1	3.5	167	114	101	248	54	251	3.0
C-4	+96	442.462	3.2	3.6	167	114	101	247	54	251	3.0
PORT CHANGE		LEAK CHECK				<0.005 CFM @ 11.0" Hg					
PORT CHANGE		LEAK CHECK				<0.0 CFM @ 15" Hg					
D-1	6:55pm	442.667	2.65	3.0	163	102	101	248	71	248	3.0
D-1	+104	450.04	2.65	3.0	167	105	101	248	52	248	3.0
D-2	7:03pm	450.04	3.35	3.8	166	109	101	249	55	248	3.5
D-2	+8	458.28	3.3	3.5	166	111	101	247	54	248	3.5
D-3	7:11pm	458.28	3.3	3.6	166	113	101	249	55	248	3.5
D-3	+8	466.61	3.3	3.6	166	113	101	249	55	248	3.5
D-4	7:19pm	466.61	3.4	3.75	166	114	101	247	55	248	3.5
D-4	+8	475.047	3.4	3.7	167	114	101	248	55	248	3.5

POST TD LEAK RATE ϕ @ 5" Hg.

00406C

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

SAMPLING TRAVERSE FIELD DATA

Company RELIANT - SEWARD STN Source BOILERS 1 + 2 Date 7/20/06 Type of test M5/202

Sampling location STACK Run # 3 Module operated by R. SZEMERES

Probe # LG-A-7-2 Cps 0.84 Module # 606 Pbs 28.73 Pstat -2.35 Assumed moisture 14% Meter ΔH@ 1.89 Y = 1.00

Sample box # 552 Nozzle # 6A-1 Nozzle I.D. Glass fiber filter #(s) 060:2

Impinger #	Solution	Initial amount	Final Measurements:	Filter sample #	Time	CO	CO2	O2	N2
1	PRE H 0.0 @ 15"	693.1	924.5	1					
2	POST A 0.0 @ 10.5"	702.4	852.0	2					
3	PRE B 0.0 @ 15"	722.8	737.8	3					
4	POST B 0.0 @ 10"	828.7	861.2	Integrated sample #	Time				
5			By:	1					
6				2					

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
A-1	10:50AM	488.520	2.3	3.5	161	90	89	248	71	248	6.7
A-1	+8 "	494.03	2.8	3.15	168	91	89	248	47	248	6.5
A-2	10:58AM	496.03	3.45	3.9	167	95	89	248	54	248	9.0
A-2	+5 "	504.5	3.60	4.1	167	97	89	248	55	248	9.5
A-3	11:06AM	504.5	3.80	4.2	167	99	90	248	56	248	10.0
A-3	+8 "	513.17	3.80	4.15	167	99	90	247	58	248	10.0
A-4	11:14AM	513.17	3.80	4.15	169	101	90	247	63	248	10.0
A-4	+8 "	521.93	3.80	4.15	169	101	91	247	66	248	10.0
B-1	11:32AM	527.249	2.75	3.0	161	93	92	248	65	248	6.5
B-1	+8 "	529.75	2.75	2.90	170	101	92	248	54	248	6.5
B-2	11:40AM	529.75	3.3	3.55	169	104	92	248	52	248	8.3
B-2	+8 "	537.99	3.3	3.6	169	105	93	248	52	248	8.5
B-3	11:48AM	537.99	3.5	3.8	169	106	93	247	53	248	9.8
B-3	+8 "	546.62	3.5	4.0	169	106	94	248	54	248	10.0
B-4	11:56AM	546.62	3.5	4.0	168	106	95	248	[illegible]	248	10.0

METER CALIBRATION CHECK

$Yc = \frac{\theta}{Vm} \left[\frac{0.0319\,Tm}{Pb}\right]^{0.5}$

θ = 10.0 min.

Vm = cf 488.013 − 488.300

Tm = 73.86 °F + 460 = 533.5 °R

Pb = 28.73 in. Hg

Yc = 1.013 OK

0.97Y < Yc < 1.03Y

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Air Quality

00406C

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

Page 2 of 2

Company RELIANT SEWARD STN Source BOILERS 1+2 Date 7/20/06

Sampling Location STACK Run # 3 Type 5/202

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
B-4	+8	555.365	3.7	3.9	169	106	95	249	54	248	10.0
C-1	12:12PM	555.157	2.4	2.55	163	98	96	247	63	248	6.0
C-1	+8 4	562.61	2.4	2.6	169	103	96	248	51	248	6.0
C-2	12:20PM	562.61	3.2	3.4	169	107	96	249	49	248	8.0
C-2	+8 12	570.63	3.1	3.3	169	108	96	248	49	248	8.0
C-3	12:28PM	570.63	3.5	3.7	169	108	96	247	51	248	8.0
C-3	+8 10	579.17	3.5	3.6	169	108	97	248	52	248	9.0
C-4	12:36PM	579.17	3.7	3.8	169	108	97	248	53	248	9.5
C-4	+8 12	587.915	3.8	3.9	169	108	98	248	52	248	10.0
D-1	12:52PM	588.10	3.1	3.3	166	99	98	246	63	248	7.5
D-1	+8 4	596.11	3.3	3.65	169	104	98	248	50	248	8.0
D-2	1:00PM	596.11	3.7	3.9	169	107	98	249	50	248	9.7
D-2	+8 12	604.79	3.5	3.7	170	107	98	247	52	248	9.3
D-3	1:08PM	604.79	3.7	3.8	169	108	98	248	55	249	9.5
D-3	+8 10	613.53	3.6	3.75	169	108	98	248	53	248	9.5
D-4	1:16PM	613.53	3.65	3.75	170	108	98	249	54	248	9.5
D-4	+8 12	622.373	3.8	3.9	169	108	98	248	54	248	10.0

PRE C 0 @ 15"
POST C <0.005" @ 10"
PRE D <0.01" @ 15"
POST D <0.005" @ 10"

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

005D6A

Company RELIANT ENERGY SEWARD Source BOILER 1+2 Date 10/19/06 Type of test M5/202

Sampling location EXHAUST STACK Run # 1 Module operated by A. BIHL

Probe # OCM-7-2 Cps 0.84 Module # 602 Pbs 29.18 Pstat -2.55 Assumed moisture 12 % Meter ΔH@ 1.93 Y = 0.99

Sample box # Nozzle # GA-2 Nozzle I.D. GA-2 Glass fiber filter #(s) 110032 (0.5030g)

Impinger #	Solution	Initial amount
1	917.4	748.7
2	791.3	764.1
3	766.1	758.8
4		
5	SILICA	730.0
6	750.3	

Measurements: 0.183, 0.183, 0.183, 0.183, 0.183

By: D BAKER

Pyrite sample # Time CO CO2 O2 N2
1 0.5 SUMMER 12.0 CO_2
2 6.0 O_2
3 TO START

Integrated sample # Time
1
2

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V. L in. WG	(1) Tss deg F	(6) Tmi deg F	(7) Tmo deg F	BOX (3) TEMP deg F	IMPINGER TEMP deg F	PROBE TEMP (3) deg F	PUMP VACUUM in. Hg
PRETEST		LEAK	CHECK		<0.005	CFM	@	5.5"	Hg		
D-1	12:29 pm	817.875	2.5	2.8	163	77	75	254	60	245	11.0
D-1	+5	822.27	2.5	2.8	165	77	75	253	49	245	11.0
D-2	12:34	822.27	2.4	2.7	165	77	75	254	47	242	10.0
D-2	+5 +10	826.68	2.8	3.2	166	77	75	254	49	244	12.0
D-3	12:39	826.68	2.9	3.2	166	79	75	253	51	243	12.5
D-3	+15 +15	831.37	3.0	3.3	166	80	75	255	52	243	13.0
D-4	12:44	831.37	2.9	3.2	166	81	75	257	55	242	12.5
D-4	+5 +20	836.036	3.0	3.3	166	83	75	255	56	243	13.0
PORT CHANGE		LEAK	CHECK		<0.0	CFM	@	15.0"	Hg		
PORT CHANGE		LEAK	CHECK		<0.0	CFM	@	15.0"	Hg		
C-1	1:10 pm	836.240	2.4	2.6	164	80	78	257	64	243	9.0
C-1	+5 +15	840.37	2.4	2.6	166	81	78	257	53	244	10.5
C-2	1:15 pm	840.37	2.5	2.8	166	82	78	258	51	245	11.0
C-2	+5 +30	844.73	2.6	2.9	166	82	78	258	51	244	11.5

METER CALIBRATION CHECK

$Y_c = \frac{\theta}{V_m}\left[\frac{0.0319\,T_m}{P_b}\right]^{0.5}$

θ = 10.0 min.

Vm = 7.325 cf 817.69 : 809.863

Tm = 78.6°F + 460 = 538.5 °R

Pb = 29.8 in. Hg 3.63695 / Vm

Yc = 0.9756 ✓

0.97Y < Yc < 1.03Y
0.9603 < Yc < 1.0197

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL
D. BAKER
R. STEREPES
A. BIHL

00506A

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

Page 2 of 2

Company RELIANT ENERGY SEWARD Source BOILER 142 Date 10/19/06

Sampling Location EXHAUST STACK Run # 1 Type M5/202

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tm deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
-2	1:20pm	844.72	2.8	3.1	166	84	78	258	52	245	12.5
-3	+5 +35	849.30	2.8	3.1	166	84	78	258	54	245	13.0
-4	1:25pm	849.30	3.2	3.6	166	86	78	258	56	246	14.5
-4	+5 +40	854.203	3.2	3.5	167	87	78	258	56	246	14.5
PORT CHANGE LEAK CHECK <0.01 CFM @ 14.5" Hg											
PORT CHANGE LEAK CHECK <0.01 CFM @ 15.0" Hg											
-1	1:38pm	854.442	2.5	2.8	165	83	80	258	61	246	11.0
-1	+5 +45	858.79	2.5	2.8	166	85	80	258	56	246	11.0
-2	1:43pm	858.79	3.2	3.5	166	86	80	258	54	246	14.0
-2	+5 +50	863.67	3.2	3.5	166	89	80	260	54	246	14.0
-3	1:48pm	863.67	3.2	3.5	166	87	80	255	55	246	14.0
-3	+5 +55	868.58	3.2	3.5	166	88	80	254	55	246	14.0
-4	1:53pm	868.58	3.2	3.5	166	89	81	255	57	246	14.5
-4	+5 +60	873.526	3.3	3.6	166	89	81	254	58	245	14.5
PORT CHANGE LEAK CHECK <0.01 CFM @ 14.5" Hg											13.0
PORT CHANGE LEAK CHECK <0.01 CFM @ 15.5" Hg											
-1	2:06pm	873.766	2.9	3.2	166	84	81	256	54	246	13.0
-1	+5 +65	878.49	3.0	3.3	166	86	81	255	57	246	13.5
-2	2:11pm	878.49	3.3	3.6	166	87	81	254	54	246	15.0
-2	+5 +70	883.53	3.4	3.7	166	89	81	255	56	246	15.0
-3	2:16pm	883.53	3.5	3.8	166	88	81	257	57	247	16.0
-3	+5 +75	888.68	3.5	3.8	166	89	81	256	57	246	16.0
-4	2:21pm	888.68	3.6	3.9	166	89	82	256	58	246	17.0
-4	+5 +80	893.832	3.4	3.7	166	89	82	256	59	247	16.0
POST TEST LEAK CHECK <0.01 CFM @ 17.0" Hg											

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

00506B

SAMPLING TRAVERSE FIELD DATA

Company RELIANT ENERGY - SEWARD Source BOILER 1+2 Date 10/19/06 Type of test M5/202

Sampling location EXHAUST STACK Run # 2 Module operated by A BIHL

Y = 0.99

Probe # CBM-7-2 Cps 0.84 Module # 602 Pbs 29.26 Pstat -2.35 Assumed moisture 12 Meter ΔH@ 1.93

Sample box # _____ Nozzle # GA-2 Nozzle I.D. 0.183 Glass filter filter #(s) 110033 (0.5010g)

Impinger #	Solution	Initial amount	Measurements:
1		722.7	0.183
2		787.4	0.183
3		733.9	0.183
4			0.183
5	BLICK	717.6	By: D. BAKER
6			

Pyrite sample #	Time	CO	CO2	O2	N2
1	O_2 - 6% FROM MONITOR ON PLATFORM				
2	CO_2 - 13% ASSUMED				
3					

Integrated sample #	Time
1	
2	

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	mi deg F	Tmu deg F	BOX TEMP deg F	IMP. NG. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
PRE-TEST LEAK CHECK <0.01 CFM @ 15.0" Hg											
A-1	3:28pm	897.802	2.6	2.9	166	82	81	250	65	245	12.0
A-1	+5	902.24	2.6	2.9	166	82	81	251	60	246	12.6
A-2	3:33pm	902.24	3.2	3.5	166	83	81	249	54	246	14.5
A-2	+5 +10	906.04	3.1	3.4	166	84	81	248	55	246	15.0
A-3	3:38pm	907.04	3.2	3.5	166	85	81	246	56	248	15.0
A-3	+5 +15	911.97	3.3	3.6	166	86	81	248	56	246	16.0
A-4	3:43pm	911.97	3.3	3.6	166	86	81	249	57	248	16.0
A-4	+5 +20	916.839	3.2	3.5	166	87	81	248	57	246	15.5
PORT CHANGE LEAK CHECK <0.01 CFM @ 16" Hg											
PORT CHANGE LEAK CHECK <0.01 CFM @ 15" Hg											
B-1	3:58pm	917.184	2.4	2.6	166	85	82	248	63	246	40.0
B-1	+5 +25	921.43	2.4	2.6	166	86	82	246	57	246	12.0
B-2	4:03pm	921.43	2.8	3.1	166	87	82	247	52	247	13.5
B-2	+5 +30	926.03	2.9	3.2	166	88	82	247	53	247	14.0

METER CALIBRATION CHECK

$$Yc = \frac{\theta}{Vm} \left[\frac{0.0319\,Tm}{Pb}\right]^{0.5}$$

θ = min.

Vm = cf

Tm = °F + 460 = °R

Pb = in. Hg

Yc = SEE 00506A

0.97Y < Yc < 1.03Y

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

D. BAKER
R. SIEKERES
A. BIHL

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

C0 5016 B

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Company RELIANT ENERGY - SEWARD Source BOILER 1+2 Date 10/19/06

Sampling Location EXHAUST STACK Run # 2 Type M5/202

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Tss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
3	4:08pm	926.03	3.0	3.3	167	89	83	248	55	247	14.0
-3	+5 +35	930.75	3.0	3.3	166	90	83	248	55	248	14.5
-4	4:11pm	930.75	3.0	3.3	166	90	83	248	57	247	14.5
-4	+5 +40	935.481	3.0	3.3	166	91	83	248	56	248	
PORT CHANGE		LEAK CHECK < 0.01 CFM @ 14.5" Hg									
PORT CHANGE		LEAK CHECK < 0.01 CFM @ 15.0" Hg									
-1	4:29pm	935.784	2.4	2.6	166	87	84	246	62	248	12.0
-1	+5 +45	940.04	2.4	2.6	166	88	84	246	54	247	12.0
-2	4:34pm	940.04	2.5	2.7	166	89	84	246	54	248	12.0
-2	+5 +50	944.38	2.5	2.7	166	90	84	248	54	246	12.0
-3	4:39pm	944.38	2.8	3.1	166	90	84	248	55	247	13.5
-3	+5 +55	948.95	2.8	3.1	166	91	84	248	55	246	13.5
-4	4:44pm	948.95	3.0	3.2	166	92	84	247	55	247	14.5
-4	+5 +60	953.683	3.0	3.2	167	92	84	247	56	248	14.5
PORT CHANGE		LEAK CHECK < 0.01 CFM @ 14.5" Hg									
PORT CHANGE		LEAK CHECK < 0.01 CFM @ 15.0" Hg									
-1	4:57pm	953.934	2.8	3.0	166	88	85	248	66	246	12.0
-1	+5 +65	958.14	2.8	3.0	166	90	86	247	53	246	11.5
-2	5:02pm	958.14	3.0	3.2	166	90	86	247	54	247	14.5
-2	+5 +70	962.78	3.0	3.2	166	91	85	248	54	248	14.5
-3	5:07pm	962.78	3.0	3.2	166	92	86	248	55	247	14.5
-3	+5 +75	967.54	3.0	3.2	166	92	85	249	56	246	14.5
-4	5:12pm	967.54	2.9	3.1	166	92	86	248	57	247	14.0
-4	+5 +80	972.231	2.9	3.1	166	92	86	248	57	246	14.0
POST TEST LEAK CHECK < 0.01 CFM @ 14.5" Hg											

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

00506C

Company: RELIANT ENERGY - SEWER D Source: BOILER 1+2 Date: 10/20/06 Type of test: M5/202

Sampling location: EXHAUST STACK Run #: 3 Module operated by: A. BIHL

Probe #: CEM-7-2 Cps: 0.84 Module #: 602 Pbs: 28.32 Pstat: -2.35 Assumed moisture: 13 Meter ΔH@: 1.93 Y = 0.99

Sample box #: Nozzle #: GA-2 Nozzle I.D.: 0.183 Glass fiber filter #(s): 110034 (0.4970g)

Impinger #	Solution	Initial amount	Measurements:
1		731.3	0.183
2		781.5	0.183
3			0.183
4		765.7	0.183
5			
6		759.9	

By: D. BAKER

Pyr to sample #: 1, 2, 3

Integrated sample #: 1, 2

Time: CO, CO2, O2, N2

O_2 - 6% OFF STACK MONITOR.
CO_2 - 12% ASSUMED FOR RUN

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Iss deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
PRETEST LEAK CHECK LESS THAN 0.01 CFM @ 15" Hg											
D-1	8:41 AM	985.151	2.8	3.2	166	71	69	249	55	250	9.0
D-1	+5	989.67	2.8	3.2	164	72	69	247	52	246	9.0
D-2	8:46 AM	989.67	3.1	3.5	165	73	70	247	51	246	10.0
D-2	+5 +10	994.46	3.1	3.5	166	74	70	247	52	247	10.0
D-3	8:51 AM	994.46	3.1	3.5	166	76	70	248	55	247	10.0
D-3	+5 +15	999.18	3.0	3.4	166	76	70	248	55	246	10.0
D-4	8:56 AM	999.18	3.0	3.4	165	78	71	246	57	247	10.0
D-4	+5 +20	1003.905	3.0	3.4	166	78	71	243	58	247	10.0
PORT CHANGE LEAK CHECK < 0.01 CFM @ 100" Hg											
PORT CHANGE LEAK CHECK < 0.01 CFM @ 150" Hg											
C-1	9:44 AM	1004.159	2.40	2.7	166	75	72	247	59	245	8.5
C-1	+5 +25	1008.40	2.40	2.7	166	77	72	250	54	245	8.0
C-2	9:49 AM	1008.40	2.60	3.0	166	78	72	246	52	246	9.0
C-2	+5 +30	1012.80	2.60	2.9	166	78	72	245	52	246	9.0

METER CALIBRATION CHECK

$$Yc = \frac{\theta}{Vm} \left[\frac{0.0319\,Tm}{Pb}\right]^{0.5}$$

θ = min

Vm = cf

Tm = °F + 460 = °R

Pb = in. Hg SEE

Yc = 00506A

0.97Y < Yc < 1.03Y

TEMPERATURE CHECKS

DIGITAL		THERMOMETER	
1.	4.	1.	4.
2.	5.	2.	5.
3.	6.	3.	6.

TEST PERSONNEL

D. BAKER
[illegible]
A. BIHL

PA DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY
SAMPLING TRAVERSE FIELD DATA

00506 C

Page 2 of ___

Company RELIANT ENERGY - SEWARD Source BOILER 1-2 Date 10/20/06

Sampling Location EXHAUST STACK Run # 3 Type M5/202

POINT	TIME	SAMPLE VOLUME cf	ORIFICE DH in. WG	V.H. in. WG	Ts deg F	Tmi deg F	Tmo deg F	BOX TEMP deg F	IMPING. TEMP deg F	PROBE TEMP deg F	PUMP VACUUM in. Hg
C-3	9:24 AM	1012.90	2.8	3.2	166	80	73	245	54	247	10.0
C-3	+5 +35	1017.40	2.8	3.2	165	80	73	246	55	248	10.0
C-4	9:29 AM	1017.40	3.1	3.5	166	81	73	248	56	248	11.0
C-4	+5 +40	1022.166	3.0	3.4	166	83	74	246	57	248	10.5
PORT CHANGE		LEAK CHECK				<0.01	CFM @		11.0"	Hg	
PORT CHANGE		LEAK CHECK				<0.01	CFM @		5.0"	Hg	
B-1	9:41 AM	—	2.7	3.0	166	78	74	242	58	248	9.5
B-1	+5 +45	1026.94	2.8	3.1	166	80	74	238	54	246	9.5
B-2	9:46 AM	1026.94	3.3	3.7	166	81	75	246	53	248	11.0
B-2	+5 +50	1031.87	3.3	3.7	166	81	75	245	53	248	11.0
B-3	9:51 AM	1031.87	3.3	3.7	166	83	75	245	55	248	11.0
B-3	+5 +55	1036.83	3.3	3.7	166	83	75	246	55	248	11.0
B-4	9:56 AM	1036.83	3.4	3.8	165	83	75	240	53	248	12.0
B-4	+5 +60	1041.701	3.0	3.5	165	83	75	239	57	248	11.0
PORT CHANGE		LEAK CHECK				<0.01	CFM @		12.0"	Hg	
PORT CHANGE		LEAK CHECK				<0.01	CFM @		5.0"	Hg	
A-1	10:07 AM	1041.922	2.9	3.3	166	79	75	250	59	248	10.0
A-1	+5 +65	1046.54	2.9	3.3	165	81	75	248	55	248	10.0
A-2	10:12 AM	1046.54	3.4	3.8	166	81	75	246	54	248	12.0
A-2	+5 +70	1051.54	3.4	3.9	166	82	76	247	54	248	12.0
A-3	10:17 AM	1051.54	3.4	3.8	166	83	76	248	55	248	10.0
A-3	+5 +75	1056.64	3.5	3.9	166	83	76	248	55	248	12.0
A-4	10:22 AM	1056.64	3.3	3.7	166	83	76	248	56	248	11.5
A-4	+5 +80	1061.574	3.2	3.6	166	83	76	249	57	248	11.0
POST TEST LEAK CHECK						<0.01	CFM @		12.0"	Hg	