CleanAir.

CleanAir Engineering
500 W. Wood Street
Palatine, IL 60067-4975
www.cleanair.com

Wheelabrator North Broward, Inc.
2600 Wiles Road
Pompano Beach, FL 33073

REPORT ON COMPLIANCE TESTING

Performed for:

WHEELABRATOR NORTH BROWARD, INC.
ASH HANDLING SYSTEM, LIME SILO VENT,
UNITS 1, 2 AND 3 SDA INLETS, FF OUTLETS AND STACKS
POMPANO BEACH, FL
VOLUME II OF III

Client Reference No: Service Agreement
CleanAir Project No: 12218-1
Revision 0: April 30, 2013

TEST METHOD SPECIFICATIONS

B

I herby certify that all pages contained within this Appendix have been reviewed and, to the best of my ability, verified as accurate.

QA/QC Initials: SB

Date: 4/30

CleanAir

This Page Intentionally Left Blank

Specification Sheet for EPA Method 5/29

Source Location Name(s)	Units 1, 2 and 3 FF Outlets
Pollutant(s) to be Determined	Particulate Matter (PM) and Trace Metals (including Mercury)
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	125 minutes
No. of Sample Traverse Points	N/A	25
Sample Time per Point	N/A	5 minutes
Sampling Rate	Isokinetic (90-110%)	Isokinetic (90-110%)
Sampling Probe		
Nozzle Material	Borosilicate or Quartz Glass	Borosilicate Glass
Nozzle Design	Button-Hook or Elbow	Button-Hook
Probe Liner Material	Borosilicate or Quartz Glass	Borosilicate Glass
Effective Probe Length	N/A	8 feet
Probe Temperature Set-Point	248°F±25°F	248°F±25°F
Velocity Measuring Equipment		
Pitot Tube Design	Type S	Type S
Pitot Tube Coefficient	N/A	varied
Pitot Tube Calibration by	Geometric or Wind Tunnel	Wind-Tunnel
Pitot Tube Attachment	Attached to Probe	Attached to Probe
Metering System Console		
Meter Type	Dry Gas Meter	Dry Gas Meter
Meter Accuracy	±2%	±1%
Meter Resolution	N/A	0.01 cubic feet
Meter Size	N/A	0.1 dcf/revolution
Meter Calibrated Against	Wet Test Meter or Standard DGM	Wet Test Meter
Pump Type	N/A	Rotary Vane
Temperature Measurements	N/A	Type K Thermocouple/Pyrometer
Temperature Resolution	5.4°F	1.0°F
ΔP Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
ΔH Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
Barometer	Mercury or Aneroid	Digital Barometer calibrated w/Mercury Aneroid
Filter Description		
Filter Location	After Probe	Exit of Probe
Filter Holder Material	Borosilicate Glass	Borosilicate Glass
Filter Support Material	Teflon (or other non-metallic material)	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	248°F±25°F	248°F±25°F
Filter Material	Quartz or Fiberglass Fiber	Quartz Fiber
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

Specification Sheet for EPA Method 5/29

	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types		
Impinger 1	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 2	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 3	Greenburg-Smith	Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 6	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 7	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 8		
Gas Density Determination		
Sample Collection	Multi-point integrated	Multi-Point Integrated
Sample Collection Medium	Flexible Gas Bag	Vinyl Bag
Sample Analysis	Orsat or Fyrite Analyzer	CEM
Sample Recovery Information		
Probe Brush Material	Non-metallic swab or bristle	Teflon Mat
Probe Rinse Reagent	Acetone/0.1N Nitric Acid	Acetone/0.1N. Nitric Acid
Probe Rinse Wash Bottle Material	Glass or Teflon	Teflon
Probe Rinse Storage Container	See Method 29 Recovery Flow Chart	See Recovery Flow Chart
Filter Recovered?	Yes	Yes
Filter Storage Container	Petri Dish - Glass or Polystyrene	Glass
Impinger Contents Recovered?	Yes	Yes
Impinger Rinse Reagent	See Method 29 Recovery Flow Chart	See Recovery Flow Chart
Impinger Wash Bottle	Glass or Teflon	Teflon
Impinger Storage Container	See Recovery Flow Chart	See Recovery Flow Chart
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric and Volumetric
Filter Preparation Conditions	See Method 29 Analytical Flow Chart	For Metals Analysis
Front-Half Rinse Preparation	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Back-Half Analysis	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Additional Analysis	Gravimetric (EPA Method 5)	Gravimetric (EPA Method 5)

Specification Sheet for EPA Method 29

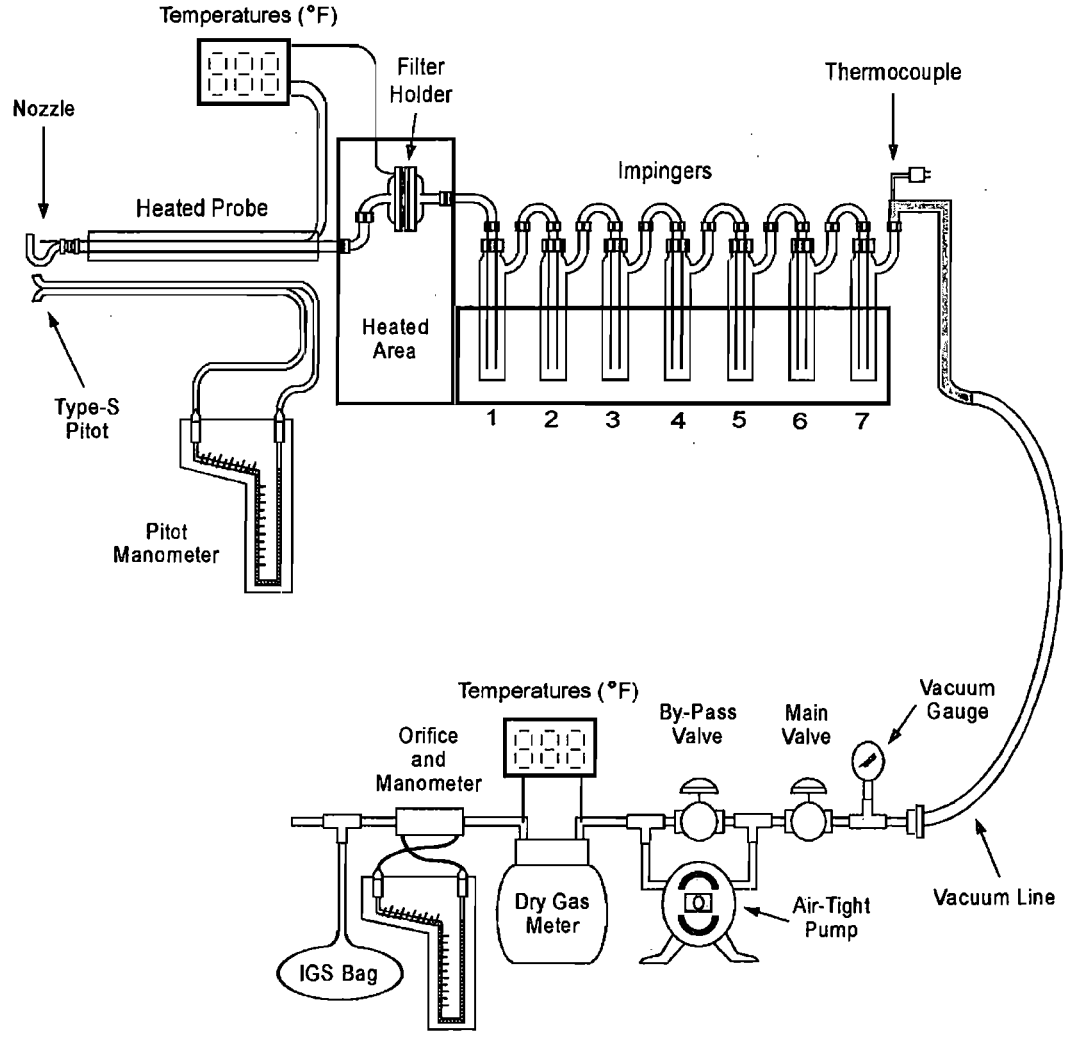
Source Location Name(s)	Unit 1, 2 and3 FF Outlets (Run 4 on each unit)
Pollutant(s) to be Determined	Trace Metals (including Mercury)
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	125 minutes
No. of Sample Traverse Points	N/A	25
Sample Time per Point	N/A	5 minutes
Sampling Rate	Isokinetic (90-110%)	Isokinetic (90-110%)
Sampling Probe		
Nozzle Material	Borosilicate or Quartz Glass	Borosilicate Glass
Nozzle Design	Button-Hook or Elbow	Button-Hook
Probe Liner Material	Borosilicate or Quartz Glass	Borosilicate Glass
Effective Probe Length	N/A	8 feet
Probe Temperature Set-Point	248°F±25°F	248°F±25°F
Velocity Measuring Equipment		
Pitot Tube Design	Type S	Type S
Pitot Tube Coefficient	N/A	varied
Pitot Tube Calibration by	Geometric or Wind Tunnel	Geometric
Pitot Tube Attachment	Attached to Probe	Attached to Probe
Metering System Console		
Meter Type	Dry Gas Meter	Dry Gas Meter
Meter Accuracy	±2%	±1%
Meter Resolution	N/A	0.01 cubic feet
Meter Size	N/A	0.1 dcf/revolution
Meter Calibrated Against	Wet Test Meter or Standard DGM	Wet Test Meter
Pump Type	N/A	Rotary Vane
Temperature Measurements	N/A	Type K Thermocouple/Pyrometer
Temperature Resolution	5.4°F	1.0°F
ΔP Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
ΔH Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
Barometer	Mercury or Aneroid	Digital Barometer calibrated w/Mercury Aneroid
Filter Description		
Filter Location	After Probe	Exit of Probe
Filter Holder Material	Borosilicate Glass	Borosilicate Glass
Filter Support Material	Teflon (or other non-metallic)	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	248°F±25°F	248°F±25°F
Filter Material	Quartz or Glass Fiber	Quartz Fiber
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

Specification Sheet for EPA Method 29

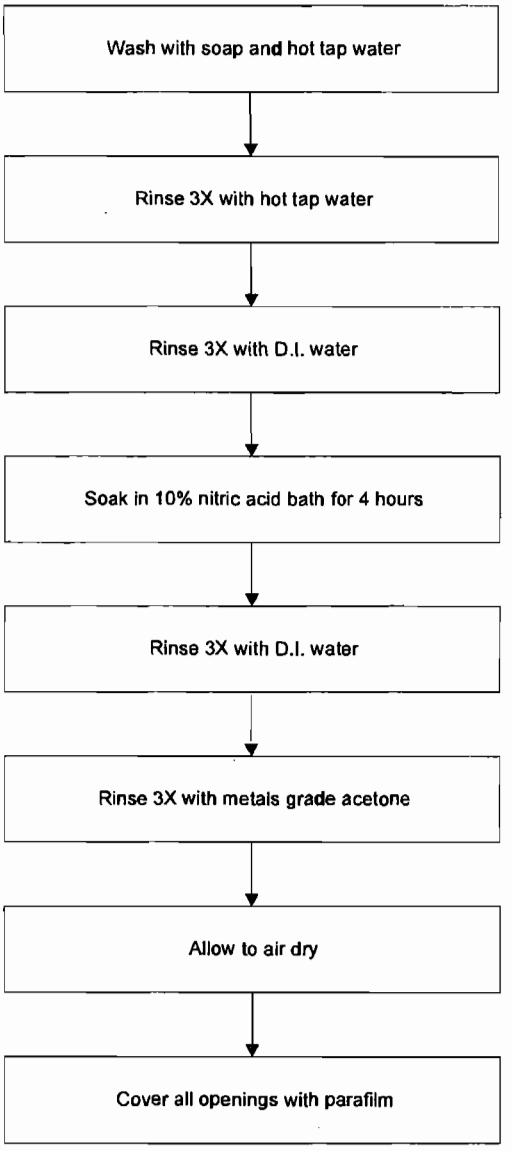
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	7	7
Impinger Stem Types		
Impinger 1	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 2	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 3	Greenburg-Smith	Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 6	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 7	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 8		
Gas Density Determination		
Sample Collection	Multi-point integrated	Multi-Point Integrated
Sample Collection Medium	Flexible Gas Bag	Vinyl Bag
Sample Analysis	Orsat or Fyrite Analyzer	CEM
Sample Recovery Information		
Probe Brush Material	Non-metallic swab or bristle	Teflon Mat
Probe Rinse Reagent	0.1N Nitric Acid	0.1 N Nitric Acid
Probe Rinse Wash Bottle Material	Glass or Teflon	Teflon
Probe Rinse Storage Container	Polyethylene or glass	Polyethylene
Filter Recovered?	Yes	Yes
Filter Storage Container	Petri Dish - Glass or Polystyrene	Glass
Impinger Contents Recovered?	Yes	Yes
Impinger Rinse Reagent	See Method 29 Recovery Flow Chart	See Recovery Flow Chart
Impinger Wash Bottle	Glass or Teflon	Teflon
Impinger Storage Container	See Recovery Flow Chart	See Recovery Flow Chart
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric
Filter Preparation Conditions	See Method 29 Analytical Flow Chart	For Metals Analysis
Front-Half Rinse Preparation	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Back-Half Analysis	See Method 29 Analytical Flow Chart	See Analytical Flow Chart
Additional Analysis	None	None

EPA Method 5/29 and 29
Sampling Train Configuration



	Impinger Contents
Impinger 1	Empty
Impinger 2	100 ml 5% HNO_3 / 10% H_2O_2
Impinger 3	100 ml 5% HNO_3 / 10% H_2O_2
Impinger 4	Empty
Impinger 5	100 ml 4% $KMnO_4$ / 10% H_2SO_4
Impinger 6	100 ml 4% $KMnO_4$ / 10% H_2SO_4
Impinger 7	Silica Gel

EPA Method 29
Glassware Preparation Procedures



EPA Method 29
Sample Recovery Flowchart
(includes Mercury and Particulate Matter)

- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)
- Collect one complete blank set per field test

Container 1
Tared Quartz Filter Petrl Dish

Remove with acid washed polypropylene or Teflon tweezers to plastic container.

Remove any particulate or filter fiber to sample container

If necessary, fold the filter and transfer to the container.

Container 2
Acetone Rinse
250 ml Glass

Probe liner, nozzle, cyclone bypass and front half (FH) filter housing

Brush/rinse 3X with a total of 100 ml acetone

Visual Inspection

Label container and measure volume by weight

Container 3
Probe Rinse
250 ml HDPE

Probe liner, nozzle, cyclone bypass and front half (FH) filter housing

Rinse 3X with a total of 100 ml 0.1N HNO_3

Visual Inspection

Label container and measure volume by weight

Container 7
Acetone Blank
250 ml Glass

100 ml of acetone

Container 8A
0.1 N HNO_3
1000 ml HDPE

300 ml of 0.1N HNO_3

Container 8B
D.I. Water Blank
250 ml HDPE

100 ml of water

Container 4
1000 ml HDPE

Back half (BH) filter housing, Z-piece, impingers 1, 2, 3 and U-bends

Measure impinger volume by weight

Transfer to sample container

Rinse each piece 3X with a total of 100 ml 0.1N HNO_3

Visual Inspection

Label container and measure volume by weight

Container 9
5% HNO_3 / 10% H_2O_2
250 ml HDPE

200 ml of absorbing solution

Container 5A
250 ml HDPE

Impinger 4 and U-bend

Measure impinger volume by weight

Transfer to sample container

Rinse with 100 ml of 0.1N HNO_3

Visual Inspection

Label container and measure volume by weight

Container 10
4% $KMnO_4$ / 10% H_2SO_4
250 ml Amber Glass

100 ml $KMnO_4$ solution

Container 5B
950 ml Amber Glass

Impingers 5, 6 and U-bends

Measure impinger volume by weight

Transfer to sample container

Rinse each piece 3X with 100 ml of acidic permanganate solution

Rinse 3X with 100 ml of water

Visual Inspection

Label container and measure volume by weight

Container 5C
250 ml Amber Glass

If brown spots remain in impingers, remove residue with 25 ml of 8N HCl total for both impingers

Pour HCl rinse into bottle containing 200 ml of water

Label container and measure volume by weight

Container 6
Silica Gel

Measure and record impinger, volume by weight, record condition of indicating gel

Recycle silica gel

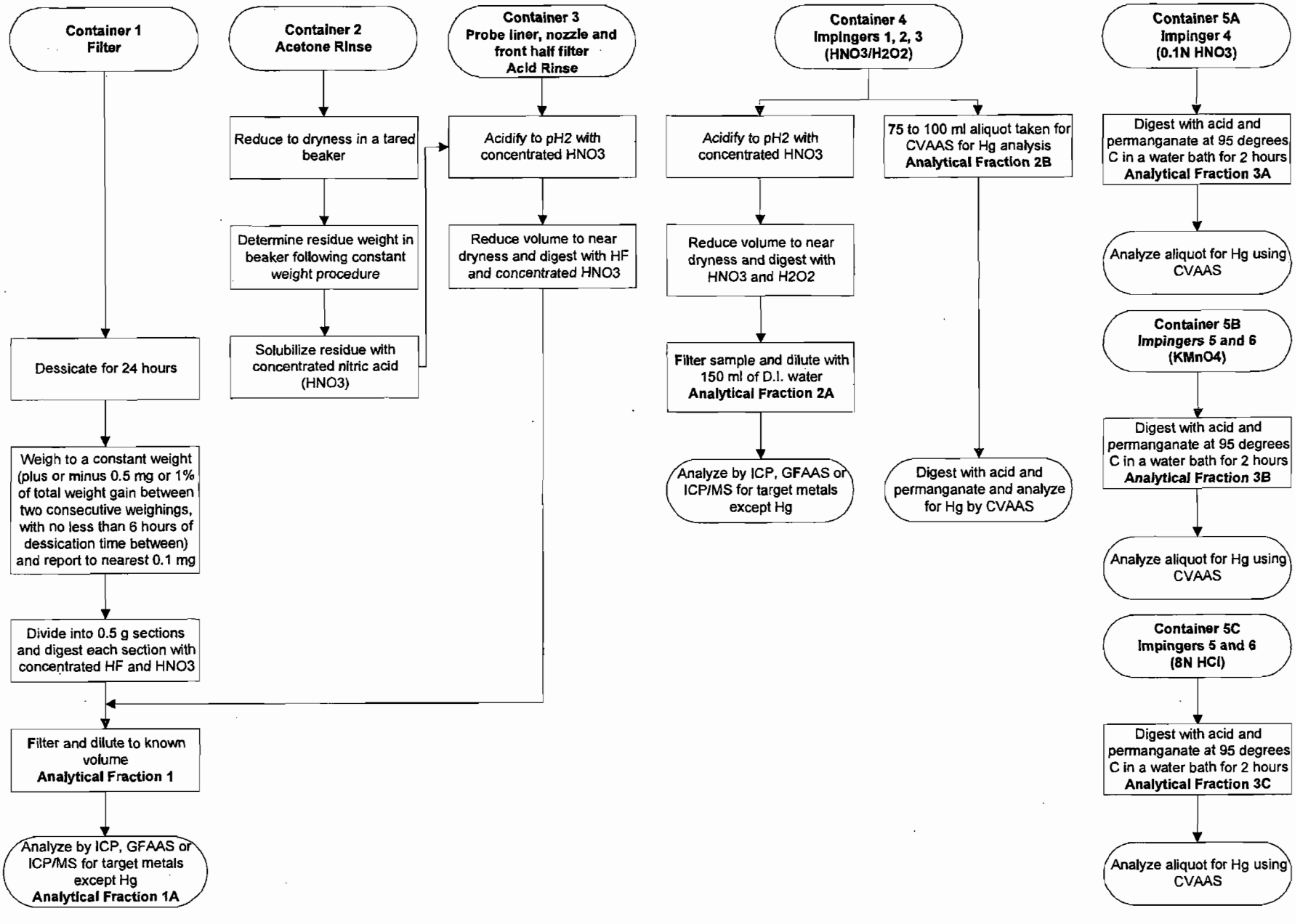
Container 11
HCl Rinse Blank
250 ml Amber Glass

200 ml water, add 25 ml of 8N HCl. Mix well and seal

Container 12
Filter Blanks
250 ml HDPE

3 clean, unused filters

EPA Method 29
Analytical Flowchart
(includes Mercury and Particulate Matter)



EPA Method 29
Sample Recovery Flowchart
(Including mercury)

- Tare all sample containers before sample collection
- Mark all liquid levels and final weights on the outside of each sample container
- Seal all sample containers with Teflon tape
- If recycling, bake silica gel for two hours at 350 degrees F (175 degrees C)
- Collect one complete blank set per field test

Container 1
Quartz Filter
250 ml HDPE

Remove with acid washed polypropylene or Teflon tweezers to plastic container.

Remove any particulate or filter fiber to sample container

If necessary, fold the filter and transfer to the container.

Container 3
Probe Rinse
250 ml HDPE

Probe liner, nozzle, cyclone bypass and front half (FH) filter housing

Brush/rinse 3X with a total of 100 ml 0.1N HNO3

Visual Inspection

Label container and measure volume by weight

Container 4
1000 ml HDPE

Back half (BH) filter housing, Z-piece, impingers 1, 2, 3 and U-bends

Measure impinger volume by weight

Transfer to sample container

Rinse each piece 3X with a total of 100 ml 0.1N HNO3

Visual Inspection

Label container and measure volume by weight

Container 5A
250 ml HDPE

Impinger 4 and U-bend

Measure impinger volume by weight to within 0.5 ml

Transfer to sample container

Rinse with 100 ml of 0.1N HNO3

Visual Inspection

Label container and measure volume by weight

Container 5B
950 ml Amber Glass

Impingers 5, 6 and U-bends

Measure impinger volume by weight

Transfer to sample container

Rinse each piece 3X with 100 ml of acidic permanganate solution

Rinse 3X with 100 ml of water

Visual Inspection

Label container and measure volume by weight

Container 6
Silica Gel

Measure and record impinger, volume by weight, record condition of indicating gel

Recycle silica gel

Container 8A
0.1 N HNO3
1000 ml HDPE

300 ml of 0.1N HNO3

Container 8B
D.I. Water Blank
250 ml HDPE

100 ml of water

Container 9
5% HNO3 / 10% H2O2
Blank
250 ml HDPE

200 ml of absorbing solution

Container 10
4% KMnO4 / 10% H2SO4
Blank
250 ml Amber Glass

100 ml KMnO4 solution

Container 11
HCl Rinse Blank
250 ml Amber Glass

200 ml water, add 25 ml of 8N HCl. Mix well and seal

Container 12
Filter Blanks
250 ml HDPE or Petri Dish

3 clean, unused filters

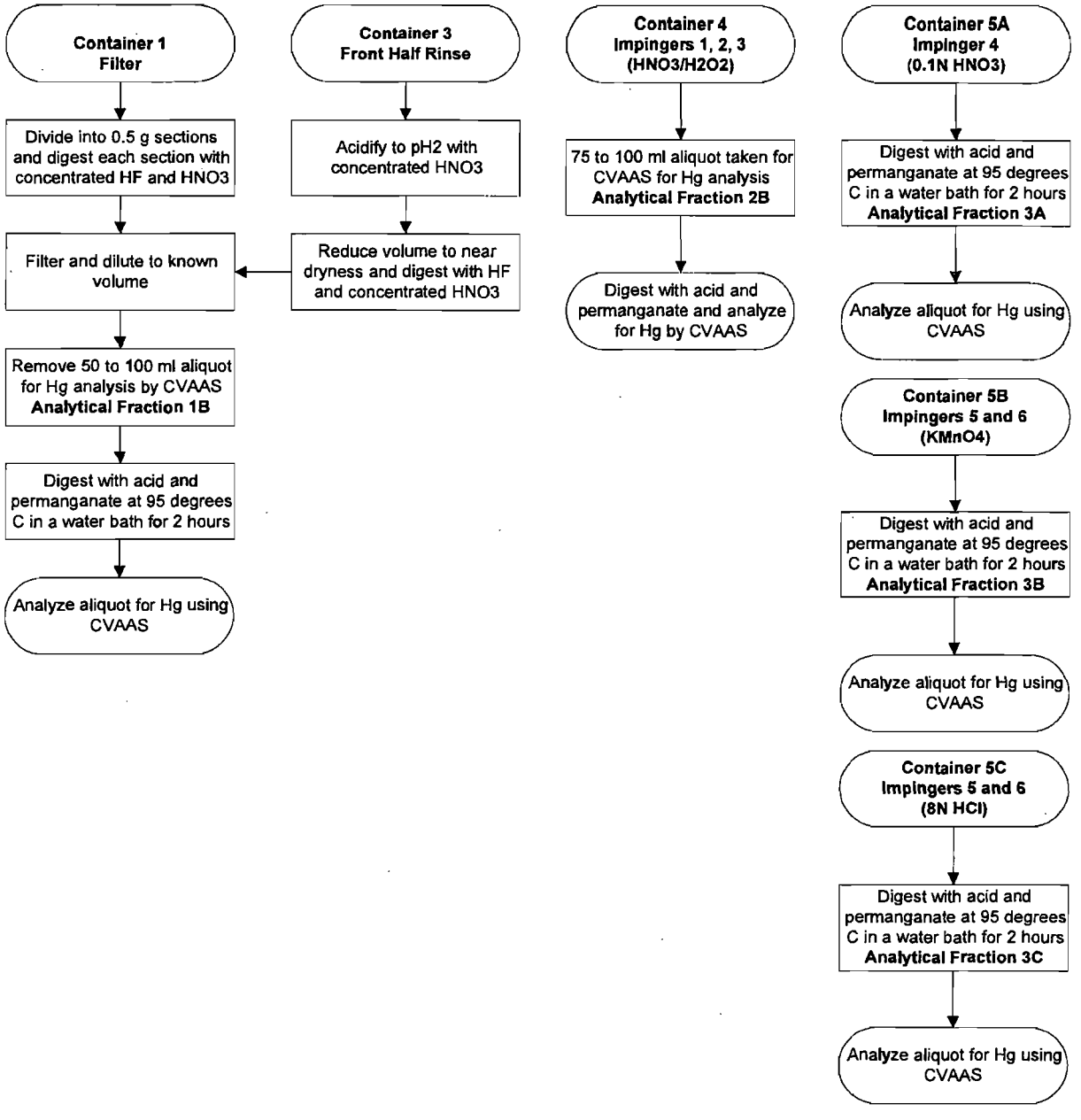
Container 5C
250 ml Amber Glass

If brown spots remain in impingers, remove residue with 25 ml of 8N HCl total for both impingers

Pour HCl rinse into bottle containing 200 ml of water

Label container and measure volume by weight

EPA Method 29
Analytical Flowchart
(Mercury only)



Specification Sheet for EPA Method 23

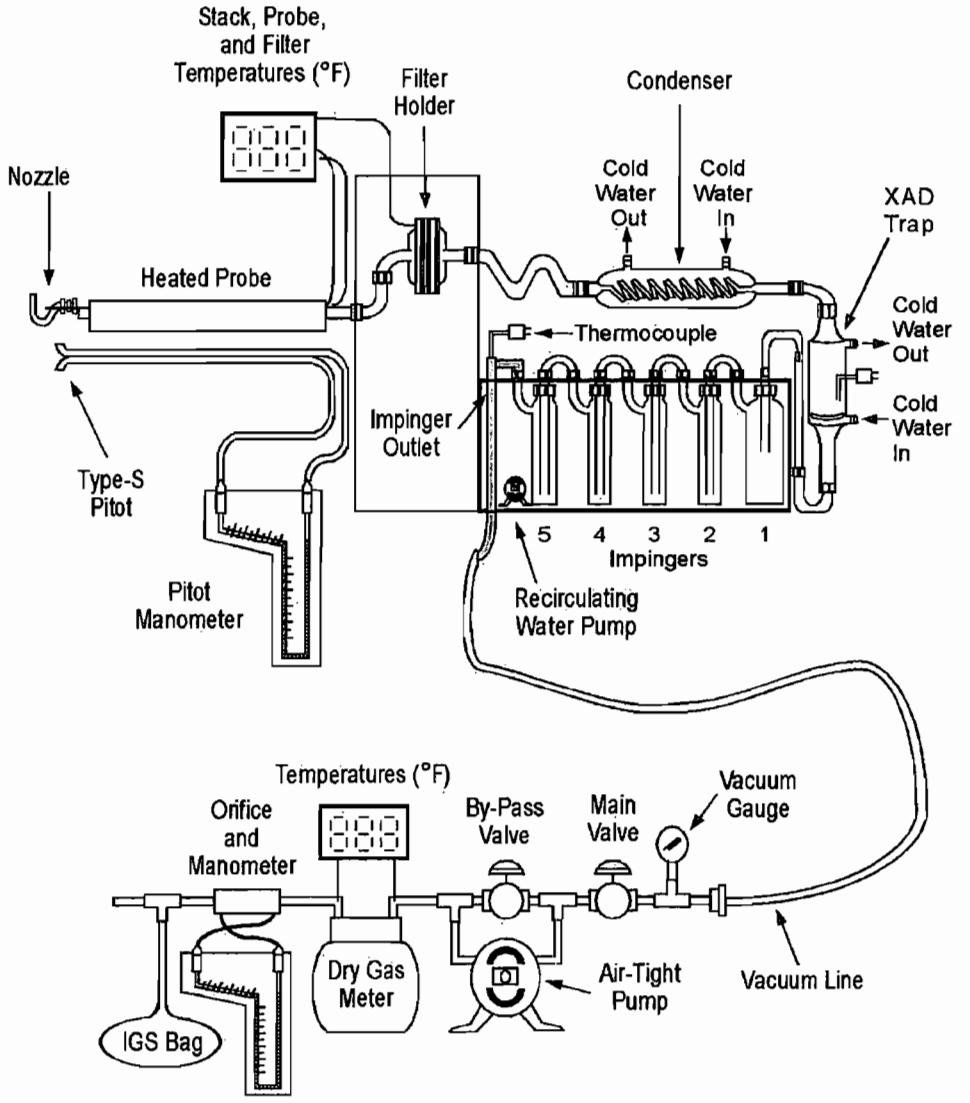
Source Location Name(s)	Unit 2 FF Outlet
Pollutant(s) to be Determined	Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans (PCDD/PCDF)
Other Parameters to be Determined from Train	Gas Density, Moisture, Flow Rate

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	250 minutes
No. of Sample Traverse Points	N/A	25
Sample Time per Point	N/A	10 minutes
Sampling Rate	Isokinetic (90-110%)	Isokinetic (90-110%)
Sampling Probe		
Nozzle Material	Nickel, Quartz, Stainless Steel or Glass	Borosilicate Glass
Nozzle Design	Button-Hook or Elbow	Button-Hook
Probe Liner Material	Borosilicate or Quartz Glass	Borosilicate Glass
Effective Probe Length	N/A	8 feet
Probe Temperature Set-Point	248°F±25°F	248°F±25°F
Velocity Measuring Equipment		
Pitot Tube Design	Type S	Type S
Pitot Tube Coefficient	N/A	0.813
Pitot Tube Calibration by	Geometric or Wind Tunnel	Wind-Tunnel
Pitot Tube Attachment	Attached to Probe	Attached to Probe
Metering System Console		
Meter Type	Dry Gas Meter	Dry Gas Meter
Meter Accuracy	±2%	±1%
Meter Resolution	N/A	0.01 cubic feet
Meter Size	N/A	0.1 dcf/revolution
Meter Calibrated Against	Wet Test Meter or Standard DGM	Wet Test Meter
Pump Type	N/A	Rotary Vane
Temperature Measurements	N/A	Type K Thermocouple/Pyrometer
Temperature Resolution	5.4°F	1.0°F
ΔP Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
ΔH Differential Pressure Gauge	Inclined Manometer or Equivalent	Inclined Manometer
Barometer	Mercury or Aneroid	Digital Barometer calibrated w/Mercury Aneroid
Filter Description		
Filter Location	After Probe	Exit of Probe
Filter Holder Material	Borosilicate Glass	Borosilicate Glass
Filter Support Material	Glass Frit	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	248°F±25°F	248°F±25°F
Filter Material	Glass Fiber - Toluene Extracted	Glass Fiber - Toluene Extracted
Other Components		
Adsorbent Module	XAD-2 Trap	XAD-II Adsorbent Trap
Location	After filter and condenser	After filter and condenser
Operating Temperature	< 68°F	<68°F

Specification Sheet for EPA Method 23

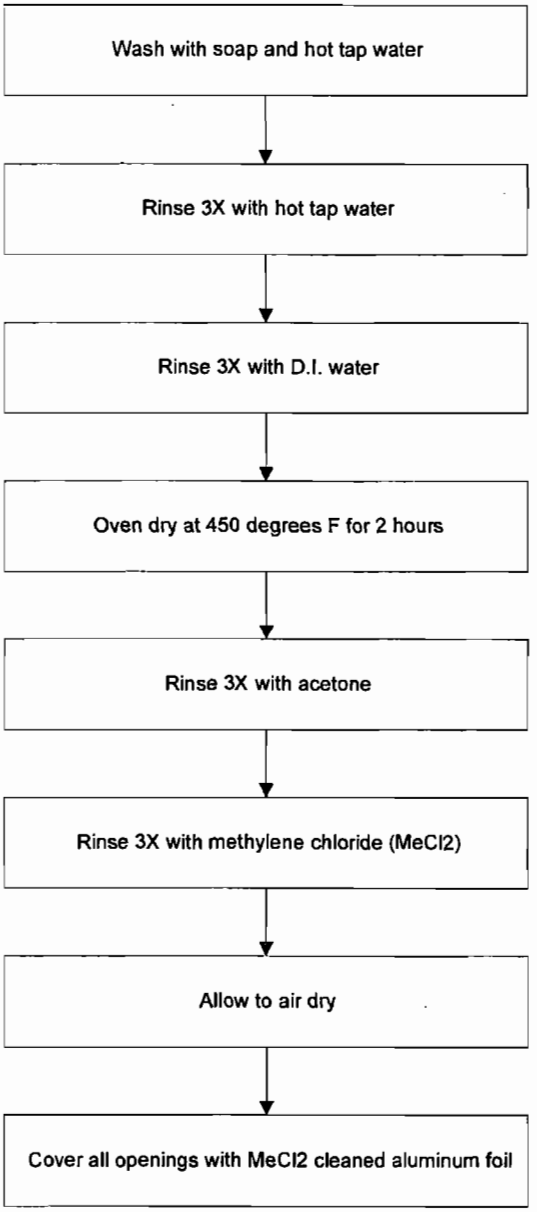
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	5	5
Impinger Stem Types		
Impinger 1	Modified Greenburg-Smith	Shortened Stem (open tip)
Impinger 2	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 3	Greenburg-Smith	Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 6		
Impinger 7		
Impinger 8		
Gas Density Determination		
Sample Collection	Multi-point integrated	Multi-Point Integrated
Sample Collection Medium	Flexible Gas Bag	Vinyl Bag
Sample Analysis	Orsat or Fyrite Analyzer	CEM
Sample Recovery Information		
Probe Brush Material	Inert Bristle	Teflon Mat
Probe Rinse Reagent	Acetone/Methylene Chloride/Toluene	Acetone/Toluene (see Appendix J)
Probe Rinse Wash Bottle Material	Glass or Teflon	Teflon
Probe Rinse Storage Container	Glass	Glass
Filter Recovered?	Yes	Yes
Filter Storage Container	Petri Dish - Glass or Polystyrene	Glass
Impinger Contents Recovered?	No	Archived
Impinger Rinse Reagent	N/A	HPLC Water
Impinger Wash Bottle	N/A	Teflon
Impinger Storage Container	N/A	Polyethylene
Analytical Information		
Method 4 H_2O Determination by	Volumetric or Gravimetric	Gravimetric
Filter Preparation Conditions	See Method 23 Analytical Flow Chart	For Organic Analysis
Front-Half Rinse Preparation	See Method 23 Analytical Flow Chart	Organic Analysis
Back-Half Analysis	N/A	Archive
Additional Analysis	None	None

EPA Method 23
Sampling Train Configuration



Impinger Contents	
Impinger 1	Empty
Impinger 2	100 ml HPLC H_2O
Impinger 3	100 ml HPLC H_2O
Impinger 4	Empty
Impinger 5	Silica Gel

EPA Method 23
Glassware Preparation Procedures



EPA Method 23
Analytical Flowchart

- Log each sample in shipment and verify against chain-of-custody sheet
- Note liquid levels in the sample containers and confirm on the chain-of-custody sheet condition
- All samples must be extracted within 30 days of collection
- All samples must be analyzed within 45 days of extraction
- All laboratory glassware must be cleaned as described in Section 3A of the "Manual of Analytical Methods for the Analysis of Pesticides"

Container 1
Glass fiber filter

Transfer to extraction thimble

XAD-II Resin Absorbent Module

Transfer to extraction thimble

Container 2
acetone/methylene chloride (MeCl2)

Concentrate sample to volume of 1 to 5 ml and add to extraction thimble

Container 3
Toluene

Add internal standard solution and concentrate to 1 - 5 ml

Dissolve sample in 5 ml of hexane and analyze by GC/MS

Add internal standard solution

Place thimble in extractor and extract for 16 hours

Concentrate to approximately 10 ml (split sample into two 5 ml portions for future use, optional)

Dissolve sample in 5 ml of hexane and analyze by gas chromatography coupled to a mass spectrometer (GC/MS)
DB-5 capillary column

If tetra-chlorinated dibenzofurans are detected, analyze separate aliquot using DB-225 capillary column

Containers 5, 6, 7, 8
Reagent blanks

Glass fiber filter
acetone
MeCl2
toluene
XAD-II Resin

Analysis by GC/MS, DB-5 capillary column

If tetra-chlorinated dibenzofurans are detected, analyze separate aliquot using DB-225 capillary column

Audit Sample

Audit samples must be analyzed subject to availability

Specification Sheet for EPA Method 26A (modified)

Note: Modification includes the use of full-size impingers instead of midget impingers.

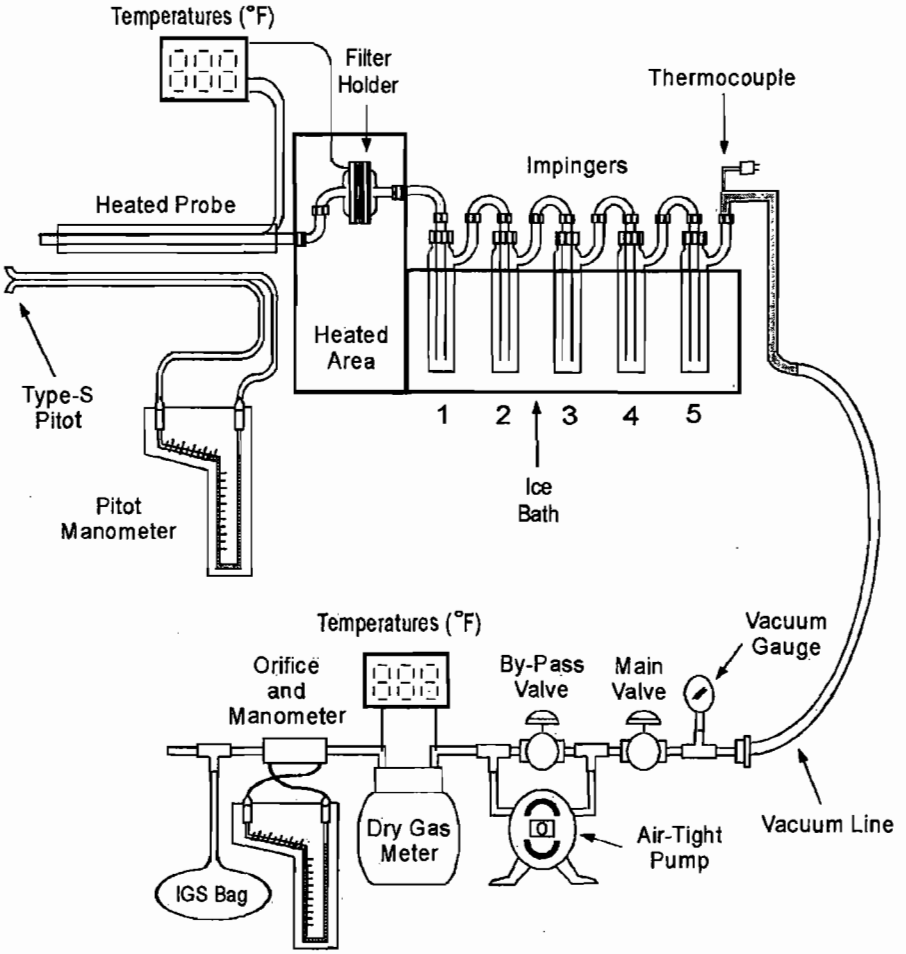
Source Location Name(s)	Units 1-3 SDA Inlets and Units 1-3 FF Outlets
Pollutant(s) to be Determined	Hydrogen Chloride (HCl)
Other Parameters to be Determined from Train	Gas Density, Moisture

	Standard Method Specification	Actual Specification Used
Pollutant Sampling Information		
Duration of Run	N/A	60 minutes
No. of Sample Traverse Points	N/A	1
Sample Time per Point	N/A	60 minutes
Sampling Rate	Constant Rate (±10%)	Constant Rate (±10%)
Sampling Probe		
Nozzle Material	N/A	None
Nozzle Design	N/A	N/A
Probe Liner Material	Borosilicate Glass	Borosilicate Glass
Effective Probe Length	N/A	4 feet
Probe Temperature Set-Point	>248°F	350°F @ Inlet, Stack Temp @ FF Outlet
Velocity Measuring Equipment		
Pitot Tube Design	None	None
Pitot Tube Coefficient	N/A	N/A
Pitot Tube Calibration by	N/A	N/A
Pitot Tube Attachment	N/A	N/A
Metering System Console		
Meter Type	Dry Gas Meter or Critical Orifice	Dry Gas Meter
Meter Accuracy	±2%	±1%
Meter Resolution	N/A	0.01 cubic feet
Meter Size	2 liters/minute	0.1 dcf/revolution
Meter Calibrated Against	Wet Test Meter	Wet Test Meter
Pump Type	Diaphragm or equivalent	Rotary Vane
Temperature Measurements	Dial Thermometer or equivalent	Type K Thermocouple/Pyrometer
Temperature Resolution	2°F-5.4°F	1.0°F
ΔP Differential Pressure Gauge	N/A	N/A
ΔH Differential Pressure Gauge	N/A	Inclined Manometer
Barometer	Mercury, anerold or other.	Digital Barometer calibrated w/Mercury Aneroid
Filter Description		
Filter Location	After Probe	Exit of Probe
Filter Holder Material	Teflon or Quartz	Borosilicate Glass
Filter Support Material	Teflon Frit	Teflon
Cyclone Material	N/A	None
Filter Heater Set-Point	>248°F	350°F @ Inlet, Stack Temp @ FF Outlet
Filter Material	Teflon/Glass Mat (Quartz, Optional High Temp>410F)	Quartz Fiber @ Inlet, Teflon on Glass @ Outlet
Other Components		
Description	N/A	N/A
Location	N/A	N/A
Operating Temperature	N/A	N/A

Specification Sheet for EPA Method 26A (modified)

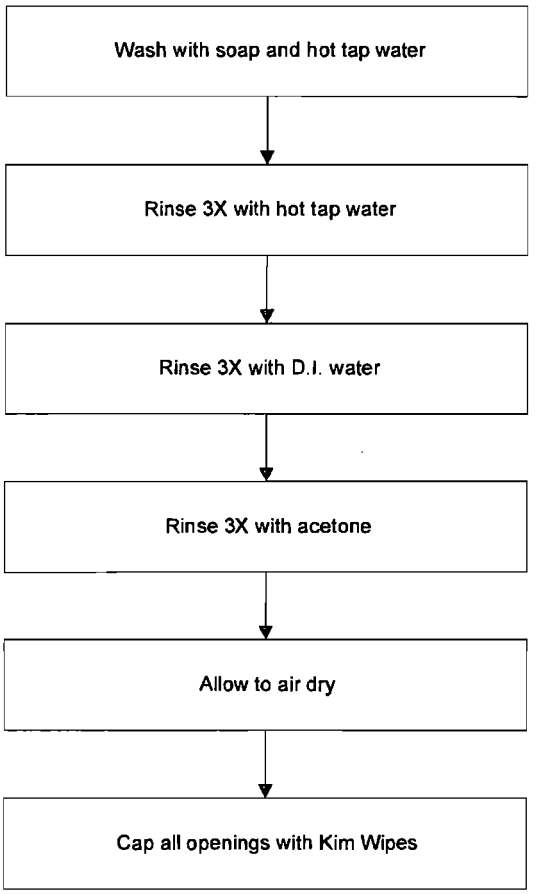
	Standard Method Specification	Actual Specification Used
Impinger Train Description		
Type of Glassware Connections	Ground Glass or Equivalent	Screw Joint with Silicone Gasket
Connection to Probe or Filter by	Direct Glass Connection	Direct Glass Connection
Number of Impingers	5 or 6 (Midget Impingers)	5
Impinger Stem Types		
Impinger 1	Shortened Stem	Shortened Stem (open tip)
Impinger 2	Greenburg-Smith	Greenburg-Smith
Impinger 3	Greenburg-Smith	Greenburg-Smith
Impinger 4	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 5	Modified Greenburg-Smith	Modified Greenburg-Smith
Impinger 6		
Impinger 7		
Impinger 8		
Gas Density Determination		
Sample Collection	N/A	Single Point Integrated
Sample Collection Medium	N/A	Vinyl Bag
Sample Analysis	N/A	CEM
Sample Recovery Information		
Probe Brush Material	N/A	N/A
Probe Rinse Reagent	N/A	N/A
Probe Rinse Wash Bottle Material	N/A	N/A
Probe Rinse Storage Container	N/A	N/A
Filter Recovered?	No	No
Filter Storage Container	N/A	N/A
Impinger Contents Recovered?	Yes	Yes
Impinger Rinse Reagent	Deionized Distilled Water	Deionized Distilled Water
Impinger Wash Bottle	Polyethylene or glass	Polyethylene
Impinger Storage Container	Polyethylene	Polyethylene
Analytical Information		
Method 4 H_2O Determination by	N/A	Gravimetric
Filter Preparation Conditions	N/A	N/A
Front-Half Rinse Preparation	N/A	N/A
Back-Half Analysis	Ion Chromatography	Ion Chromatography
Additional Analysis	None	None

Modified EPA Method 26A
Sampling Train Configuration



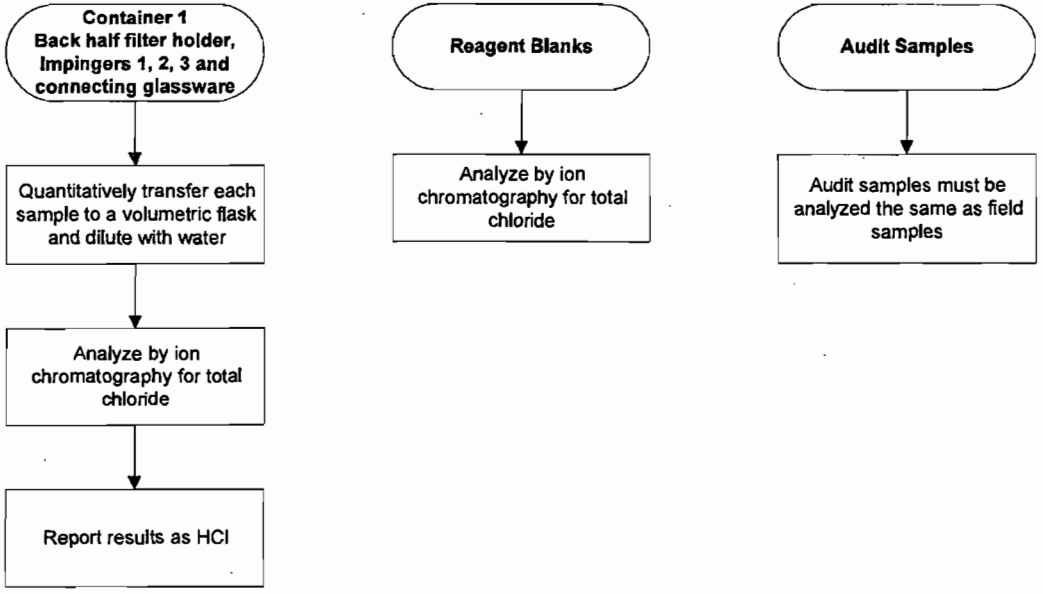
Impinger Contents	
Impinger 1	50 ml 0.1 N H_2SO_4
Impinger 2	100 ml 0.1 N H_2SO_4
Impinger 3	100 ml 0.1 N H_2SO_4
Impinger 4	Empty
Impinger 5	Silica Gel

EPA Method 26A
Glassware Preparation Procedures

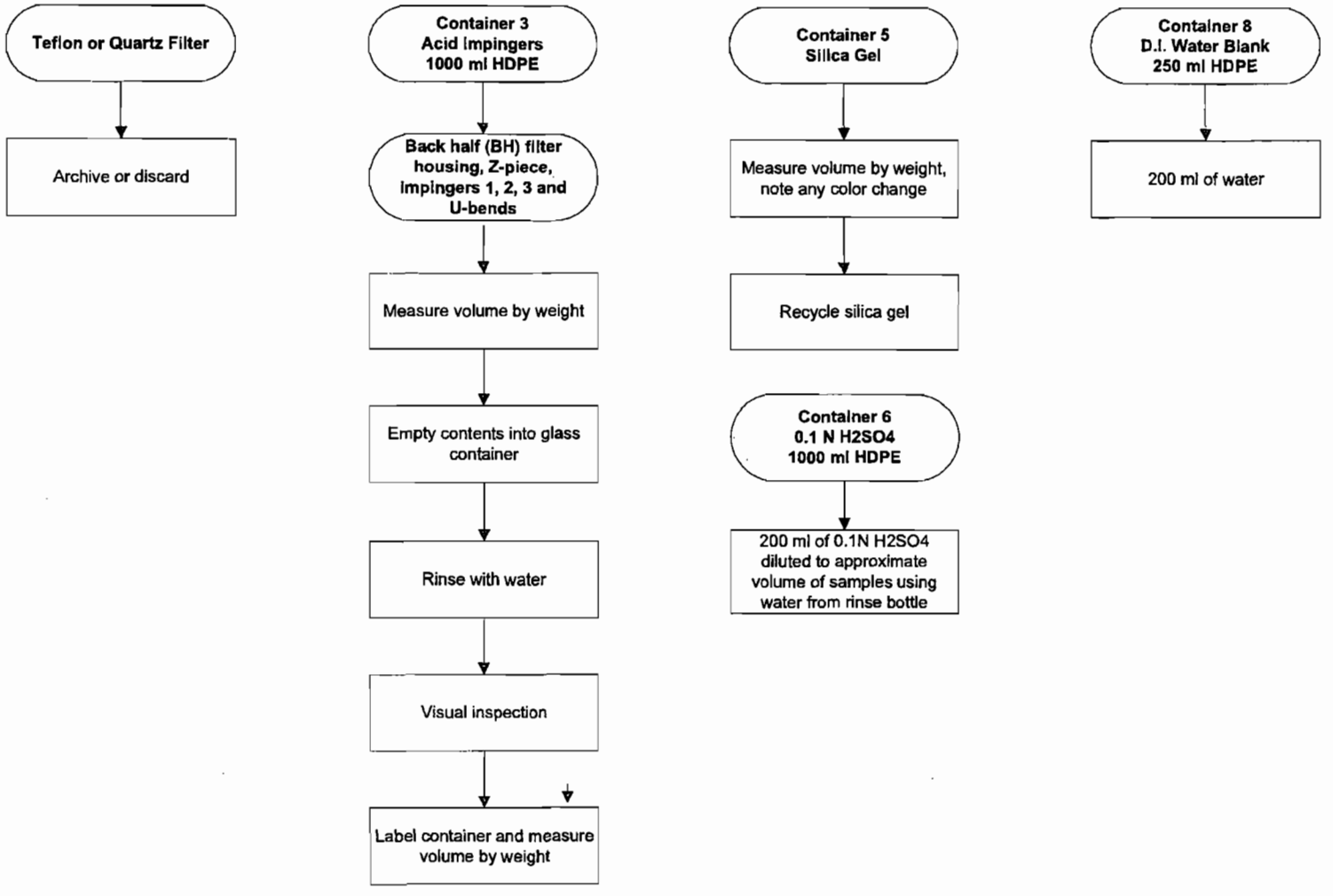


EPA Method 26
Analytical Flowchart
(without Cl2)
(Modified)

- Log each sample in shipment and verify against chain-of-custody sheet
- Note liquid levels in the sample containers and confirm on the chain-of-custody sheet condition



Modified EPA Method 26A
Sample Recovery Flowchart
(without Halogens)



This Page Intentionally Left Blank

SAMPLE CALCULATIONS

C

I herby certify that all pages contained within this Appendix have been reviewed and, to the best of my ability, verified as accurate.

QA/QC Initials: SB

Date: 4/30

CleanAir.

This Page Intentionally Left Blank

USEPA Method 5/29 (Particulate/Metals)
Sampling, Velocity and Moisture Sample Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 134313
O

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

V_{lc}	= total volume of liquid collected in impingers and silica gel (ml)	=	427.6	ml
0.04706	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	20.12	ft^3

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.80	in. Hg
T_m	= average dry gas meter temperature (°F)	=	83.34	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	66.31	dcf
Y_d	= gas meter correction factor (dimensionless)	=	1.0050	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	0.87	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	64.613	dscf

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.80	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-8.70	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg

4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

$$P_v = \frac{e^{\left(18.3036 - \frac{3816.44}{\frac{5}{9}(T_s - 32) + 273.15 - 46.13}\right)}}{25.4}$$

Where:

T_s	= average sample gas temperature (°F)	=	305.96	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	29.16	in. Hg

5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_v = P_s$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.16	in. Hg

6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	64.613	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	20.12	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2375	
		=	23.75	%

7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_v}{P_s}$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.16	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

8. Actual water vapor in gas (% by volume)

$$B_w = MINIMUM \quad [B_{wo}, B_{ws}]$$

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2375	
B_w	= actual water vapor in gas	=	0.2375	
		=	23.75	%

9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.7	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.10	%

10. Molecular weight of dry gas stream (lb/lb·mole)

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.7	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	81.1	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.16	lb/lb·mole

11. Molecular weight of sample gas (lb/lb·mole)

$$M_s = (M_d)(1 - B_w) + (M_{H_2O})(B_w)$$

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2375	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.16	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.27	lb/lb·mole

12. Velocity of sample gas (ft/sec)

$$V_s = (K_p)(C_p)\left(\overline{\sqrt{\Delta P}}\right)\left(\sqrt{\frac{(\overline{T_s}+460)}{(M_s)(P_s)}}\right)$$

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.82	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.27	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
T_s	= average sample gas temperature (°F)	=	305.96	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.595	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	41.12	ft/sec

13. Volumetric flow rate of sample gas at actual gas conditions (acfm)

$$Q_a = (60)(A_s)(V_s)$$

Where:

A_s	= cross sectional area of sampling location (ft^2)	=	64.00	ft^2
V_s	= sample gas velocity (ft/sec)	=	41.12	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	157,890	acfm

14. Total flow of sample gas (scfm)

$$Q_s = (Q_a)\left(\frac{P_s}{29.92}\right)\left(\frac{68+460}{T_s+460}\right)$$

Where:

Q_a	= volumetric flow rate at actual conditions (acfm)	=	157,890	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	306.0	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	106,075	scfm

15. Dry flow of sample gas (dscfm)

$$Q_{std} = (Q_s)(1 - B_w)$$

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2375	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	106,075	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm

16. Dry flow of sample gas corrected to 7%O_2 (dscfm)

$$Q_{std\,7} = (Q_{std})\left(\frac{20.9 - O_2}{20.9 - 7}\right)$$

Where:

Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
7	= oxygen content of corrected gas (%)	=	7.0	%
Q_{std7}	= volumetric flow rate at STP and 7%O_2, dry basis (dscfm)	=	79,721	dscfm

17. Hourly time basis conversion of volumetric flow rate (Q_{std} example)

$$Q_{std-hr} = (Q_{std-min})(60)$$

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	4,853,077	dscf/hr

18. Metric Conversion of Gas Volumes (Q_{std} example)

$$Q_{std-metric} = (Q_{std-english})\left(\frac{60}{35.31}\right)$$

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft^3/min)	=	80,885	dscfm
35.31	= conversion factor (ft^3/m^3)	=	35.31	ft^3/m^3
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m^3/hr)	=	137,442	dry std m^3/hr

19. Standard to Normal Conversion of Gas Volumes (Q_{std} example)

$$Q_{Normal} = (Q_{std-metric})\left(\frac{32 + 460}{68 + 460}\right)$$

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m^3/hr)	=	137,442	dry std m^3/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm^3/hr)	=	128,071	dry Nm^3/hr

20. Percent isokinetic (%)

$$I = \frac{(0.09450)(\overline{T_s} + 460)(V_{mstd})}{(P_s)(V_s)\left(\frac{(D_n)^2(\pi)}{(144)(4)}\right)(\Theta)(1 - B_w)}$$

Where:

D_n	= diameter of nozzle (in)	=	0.273	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2375	
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
T_s	= average sample gas temperature (°F)	=	306.0	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	64.613	dscf
V_s	= sample gas velocity (ft/sec)	=	41.12	ft/sec
θ	= total sampling time (min)	=	125	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
I	= percent of isokinetic sampling (%)	=	101.05	%

21. Alternative Method 5 Post-Test Meter Calibration Factor

$$Y_{qa} = \frac{\Theta}{V_m}\sqrt{\frac{(0.0319)(T_m + 460)(28.96)}{(\Delta H_@)(P_{bar} + \frac{\Delta H}{13.6})(M_d)}}(\sqrt{\Delta H})_{avg}$$

Where:

θ	= total sampling time (min)	=	125	min
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	66.31	dcf
T_m	= average dry gas meter temperature (°F)	=	83.34	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.6964	
P_{bar}	= barometric pressure (in. Hg)	=	29.80	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	0.873	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.16	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	0.932	√in. H_2O
0.0319	= conversion constant	=	0.0319	
28.96	= molecular weight of ambient air (lb/lb-mole)	=	28.96	lb/lb-mole
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
Y_{qa}	= alternative Method 5 post-test meter calibration factor	=	1.0072	

USEPA Method 5/202 (FPM/CPM)
Sample Laboratory Analysis Calculations for FPM

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 134716

1. Residue mass of filter used in calculation

$$m_{fi-calc} = m_{fi} \quad \text{if } m_{fi} \geq MDL_f$$
$$m_{fi-calc} = (MDL_f)(F_r) \quad \text{if } m_{fi} < MDL_f$$

Where:

m_{f1}	= reported mass of filter "1" from gravimetric analysis (g)	=	0.00120	g
m_{f2}	= reported mass of filter "2" from gravimetric analysis (g)	=		g
m_{f3}	= reported mass of filter "3" from gravimetric analysis (g)	=		g
MDL_f	= reported minimum gravimetric detection limit for filter fraction (g)	=	0.00010	g
F_r	= fraction of MDL applied to non-detectable run sample (g)	=	0.00	
$m_{f1-calc}$	= residue mass of filter "1" used in calculation (g)	=	0.00120	g
$m_{f2-calc}$	= residue mass of filter "2" used in calculation (g)	=		g
$m_{f3-calc}$	= residue mass of filter "3" used in calculation (g)	=		g

2. Total filter residue (g)

$$m_{filter} = \sum_{i=1}^{n} m_{fi-calc}$$

Where:

$m_{f1-calc}$	= residue mass of filter "1" used in calculation (g)	=	0.00120	g
$m_{f2-calc}$	= residue mass of filter "2" used in calculation (g)	=		g
$m_{f3-calc}$	= residue mass of filter "3" used in calculation (g)	=		g
m_{filter}	= total particulate collected on filters (g)	=	0.00120	g

3. Aliquot residue mass of blank sample used in calculation (g)

$$r_{ai-blank-calc} = r_{ai-blank} \quad \text{if } r_{ai-blank} \geq MDL_s$$
$$r_{ai-blank-calc} = (MDL_s)(F_b) \quad \text{if } r_{ai-blank} < MDL_s$$

Where:

			Acetone	
$r_{ai-blank}$	= aliquot residue mass of blank sample for solvent "i" (g)	=	0.00030	g
MDL_s	= reported minimum gravimetric detection limit for solvent rinse (g)	=	0.00010	g
F_b	= fraction of MDL applied to non-detectable blank sample (g)	=	0.00	
$r_{ai-blank-calc}$	= aliquot residue mass of blank sample for solvent "i" used in calculation (g)	=	0.00030	g

4. Aliquot residue mass of run sample used in calculation (g)

$$r_{ai-calc} = r_{ai} \quad \text{if } r_{ai} \geq MDL_s$$
$$r_{ai-calc} = (MDL_s)(F_r) \quad \text{if } r_{ai} < MDL_s$$

Where:

			Acetone	
r_{ai}	= aliquot residue mass of run sample for solvent "i" (g)	=	0.00210	g
MDL_s	= reported minimum gravimetric detection limit for solvent rinse (g)	=	0.00010	g
F_r	= fraction of MDL applied to non-detectable run sample (g)	=	1.00	
$r_{ai-calc}$	= aliquot residue mass of run sample for solvent "i" used in calculation (g)	=	0.00210	g

5. Residue mass of run sample (g)

$$r_{si} = \left(r_{ai-calc}\right)\left(\frac{v_{si}}{v_{ai}}\right)$$

Where:			Acetone	
$r_{ai-calc}$	= aliquot residue mass of run sample for solvent "i" used in calculation (g)	=	0.00210	g
v_{si}	= liquid volume of run sample for solvent rinse "i" (mL)	=	106	mL
v_{ai}	= aliquot volume use for solvent rinse "i" (mL) used in gravimetric analysis (mL)	=	106	mL
r_{si}	= residue mass of run sample for solvent rinse "i" (g)	=	0.00210	g

6. Maximum allowable blank correction for solvent rinse (g)

$$m_{bi} = MINIMUM\left[\left(\frac{\left(r_{ai-blank-calc}\right)\left(v_{si}\right)}{v_{ai-blank}}\right) \; or \; \left(0.00001\right)\left(\rho_i\right)\left(v_{si}\right) \; or \; \left(r_{si}\right)\right]$$

Where:			Acetone	
$r_{ai-blank-calc}$	= *blank aliquot residue mass for solvent "i" used in calculation (g)*	=	0.00030	g
v_{si}	= liquid volume of run sample for solvent rinse "i" (mL)	=	106.0	mL
$v_{ai-blank}$	= liquid volume of blank sample for solvent rinse "i" (mL)	=	158.0	mL
0.00001	= EPA M-5 fraction of total rinse that can be subtracted (g)	=	0.00001	
ρ_i	= density of solvent rinse "i" (g/mL)	=	0.7845	g/ml
r_{si}	= residue mass of run sample for solvent rinse "i" (g)	=	0.00210	g
m_{bi}	= *maximum allowable blank correction for solvent rinse "i" (g)*	=	0.00020	g

The first part of the expression is used for solvent rinse 1; the blank is the concentration of the blank, times the size of the sample

7. Net residue mass of run sample (g)

$$m_i = \left(r_{si} - m_{bi}\right)$$

Where:			Acetone	
r_{si}	= residue mass of run sample for solvent rinse "i" (g)	=	0.00210	g
m_{bi}	= maximum allowable blank correction for solvent rinse "i" (g)	=	0.00020	g
m_i	= net residue mass of run sample for solvent rinse "i" (g)	=	0.00190	g

8. Total solvent residue - (g)

$$m_s = \sum_{i=1}^{n} m_i$$

Where:				
m_1	= net residue mass of solvent rinse "1" (g)	=	0.00190	g
m_2	= net residue mass of solvent rinse "2" (g)	=	N/A	g
m_3	= *net residue mass of solvent rinse "3" (g)*	=	N/A	g
m_s	= total solvent residue (g)	=	0.00190	g

9. Total gravimetric result (g)

$$m_T = m_{filter} + m_s$$

Where:				
m_{filter}	= total particulate collected on filters (g)	=	0.00120	g
m_s	= total solvent residue (g)	=	0.00190	g
m_T	= total gravimetric result (g)	=	0.00310	g

10. Total gravimetric detection limit (g)

$$m_D = (MDL_f)(n_f) + (MDL_s)(n_s)$$

Where:

MDL_f	= reported minimum gravimetric detection limit for filter fraction (g)	=	0.00010	g
n_f	= number of filters in analysis	=	1	
MDL_s	= reported minimum gravimetric detection limit for solvent rinse (g)	=	0.00010	g
n_s	= number of solvent rinses in analysis	=	1	
m_D	= total gravimetric detection limit (g)	=	0.00020	g

11. Total filterable particulate matter (g)

$$m_n = MAXIMUM[m_T \quad or \quad m_D]$$

Where:

m_T	= total gravimetric result (g)	=	0.00310	g
m_D	= total gravimetric detection limit (g)	=	0.00020	g
m_n	= total filterable particulate matter (g)	=	0.00310	g

USEPA Method 5/202 (FPM/CPM)
Sample Emission Calculations for FPM

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 134716

1. Filterable particulate matter concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(2.205\times10^{-3}\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
C_{sd}	= filterable particulate matter concentration (lb/dscf)	=	1.057E-07	lb/dscf

2. Filterable particulate matter concentration (gr/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(15.43\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
15.43	= conversion factor (gr/g)	=	15.43	gr/g
C_{sd}	= filterable particulate matter concentration (gr/dscf)	=	0.00074	gr/dscf

3. Filterable particulate matter concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(1000\right)\left(35.31\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
1000	= conversion factor (mg/g)	=	1000	mg/g
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= filterable particulate matter concentration (mg/dscm)	=	1.69340	mg/dscm

4. Filterable particulate matter concentration (mg/Nm3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(1000\right)\left(35.31\right)\left(\frac{68+460}{32+460}\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
1000	= conversion factor (mg/g)	=	1000	mg/g
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	
C_{sd}	= filterable particulate matter concentration (mg/Nm3 dry)	=	1.81731	mg/Nm³ dry

5. Filterable particulate matter concentration corrected to x% O2 (gr/dscf example)

$$C_{sdx} = C_{sd}\left(\frac{20.9 - x}{20.9 - O_2}\right)$$

Where:

C_{sd}	= filterable particulate matter concentration (gr/dscf)	=	0.00074	gr/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= filterable particulate matter concentration corrected to x%O2 (gr/dscf)	=	0.00075	gr/dscf @ x%O_2

6. Filterable particulate matter concentration corrected to y% CO2 (gr/dscf example)

$$C_{sdy} = C_{sd}\left(\frac{y}{CO_2}\right)$$

Where:

C_{sd}	= filterable particulate matter concentration (gr/dscf)	=	0.00074	gr/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.7	%
C_{sdy}	= filterable particulate matter concentration corrected to y%CO2 (gr/dscf)	=	0.00076	gr/dscf @ y%CO_2

7. Filterable particulate matter concentration at actual gas conditions (gr/acf example)

$$C_a = C_{sd}\left(\frac{Q_{std}}{Q_a}\right)$$

Where:

C_{sd}	= filterable particulate matter concentration (gr/dscf)	=	0.00074	gr/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	157,890	acfm
C_a	= filterable particulate matter concentration at actual gas conditions (gr/acf)	=	0.00038	gr/acf

8. Filterable particulate matter rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(2.205\times10^{-3}\right)\left(Q_{std}\right)\left(60\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205 x 10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= filterable particulate matter rate (lb/hr)	=	0.5132	lb/hr

9. Filterable particulate matter rate (kg/hr)

$$E_{kg/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{(Q_{std})(60)}{1000}\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
1000	= conversion factor (g/kg)	=	1000	g/kg
$E_{kg/hr}$	= filterable particulate matter rate (kg/hr)	=	0.2327	kg/hr

10. Filterable particulate matter rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)(2.205\times10^{-3})(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{T/yr}$	= filterable particulate matter rate (Ton/yr)	=	2.2478	Ton/yr

11. Filterable particulate matter rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)(2.205\times10^{-3})(F_d)\left(\frac{20.9}{20.9-O_2}\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= filterable particulate matter rate - Fd-based (lb/MMBtu)	=	0.00154	lb/MMBtu

12. Filterable particulate matter rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)(2.205\times10^{-3})(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= total filterable particulate matter (g)	=	0.00310	g
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	11.7	%
100	= conversion factor	=	100	
E_{Fc}	= filterable particulate matter rate - Fc-based (lb/MMBtu)	=	0.00164	lb/MMBtu

LOGIC FOR TREATING DETECTION LIMITS

(all metals except mercury)

1. Logic for Determining Maximum Allowable Front-Half Blank Correction ($m_{FB\text{-}allow}$)

	CASE 1	**CASE 2**
	m_{FB} = D	m_{FB} = ND
Rule		
ND = 0	$m_{FB\text{-}allow}$ = M29 Rule	$m_{FB\text{-}allow}$ = 0
ND=1x	$m_{FB\text{-}allow}$ = M29 Rule	$m_{FB\text{-}allow}$ = 0
ND=0.5x	$m_{FB\text{-}allow}$ = M29 Rule	$m_{FB\text{-}allow}$ = 0

2. Logic for Determining Blank-Corrected Front-Half Sample Amount (m_F)

	CASE 1	**CASE 2**
	$m_{FS} - m_{FB\text{-}allow} \geq$ MDL	$m_{FS} - m_{FB\text{-}allow} <$ MDL
Rule		
ND = 0	$m_F = m_{FS} - m_{FB\text{-}allow}$	$m_F =$ < MDL
ND=1x	$m_F = m_{FS} - m_{FB\text{-}allow}$	$m_F =$ < MDL
ND=0.5x	$m_F = m_{FS} - m_{FB\text{-}allow}$	$m_F =$ < MDL

3. Logic for Determining Maximum Allowable Back-Half Blank Correction ($m_{BB\text{-}allow}$)

	CASE 1	**CASE 2**
	m_{BB} = D	m_{BB} = ND
Rule		
ND = 0	$m_{BB\text{-}allow}$ = M29 Rule	$m_{BB\text{-}allow}$ = 0
ND=1x	$m_{BB\text{-}allow}$ = M29 Rule	$m_{BB\text{-}allow}$ = 0
ND=0.5x	$m_{BB\text{-}allow}$ = M29 Rule	$m_{BB\text{-}allow}$ = 0

4. Logic for Determining Blank-Corrected Back-Half Sample Amount (m_B)

	CASE 1	**CASE 2**
	$m_{BS} - m_{BB\text{-}allow} \geq$ MDL	$m_{BS} - m_{BB\text{-}allow} <$ MDL
Rule		
ND = 0	$m_B = m_{BS} - m_{BB\text{-}allow}$	$m_B =$ < MDL
ND=1x	$m_B = m_{BS} - m_{BB\text{-}allow}$	$m_B =$ < MDL
ND=0.5x	$m_B = m_{BS} - m_{BB\text{-}allow}$	$m_B =$ < MDL

5. Logic for Adding Front and Back-Half Corrected Samples (m_n)

	CASE 1	**CASE 2**	**CASE 3**
	Both are D	One is D, other is ND	Both are ND
Rule			
ND = 0	$m_n = m_F + m_B$	m_n = D	$m_n =$ < Sum ND
ND=1x	$m_n = m_F + m_B$	$m_n =$ < [D + ND]	$m_n =$ < Sum ND
ND=0.5x	$m_n = m_F + m_B$	$m_n =$ <[D + 0.5ND]	$m_n =$ < 0.5 Sum ND

Definitions and Notes

The term "Rule" refers to the rule being implemented for hanMDLing non-detectable quantities in summations
MDL = minimum detection limit.
D = Detectable quantity reported as D.
ND = Non-Detectable quantity reported at a value of ND.
If Front and Back-Half fractions are combined, then only Items 1 and 2 are used.

USEPA Method 5/29 (Particulate/Metals) Cadmium Analyte Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: Please see the preceding page concerning treatment of minimum detection limits and mathematical operations on values that are below minimum detection limits.

041113 134715
L

1. Maximum front-half blank correction criteria (µg)

$$A = (1.4)\left(\frac{3.141593}{4}\right)\left(\frac{D}{2.54}\right)^2$$

Where:

D	= diameter of filter used in sample apparatus	=	8.2	cm
1.4	= allowable blank per square inch of filter area	=	1.4	µg/in^2
2.54	= conversion constant	=	2.54	cm/in
4	= conversion constant	=	4	
3.141593	= conversion constant (pi)	=	3.141593	
A	= maximum front-half blank correction criteria	=	12.46	µg

2. Allowable blank correction - combined front and back-half sample fractions (µg)

$$m_{FB-allow} = m_{FB} \text{ if } m_{FB} \le A + 1$$

$$m_{FB-allow} = MAX\left[A + 1,\ MIN\left(m_{FB},\ 0.05 \times m_{FS}\right)\right] \text{ if } m_{FB} > A + 1$$

Where:

m_{FB}	= cadmium amount in combined front- and back-half blank	=	<0.2000	µg
m_{FS}	= cadmium amount in combined front- and back-half sample	=	1.1982	µg
A+1	= max combined front- & back-half blank correction criteria	=	12.46	µg
0.05 x m_{FS}	= 5% of combined front- and back-half sample amount	=	0.0599	µg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{FB-allow}$	= allowable combined Cadmium blank correction	=	0.0000	µg

NOTE: In this case, the first criteria applies.

3. Combined front- and back-half sample corrected for allowable blank (µg)

$$m_n = m_{FS} - m_{FB-allow}$$

Where:

m_{FS}	= cadmium amount in combined front- and back-half sample	=	1.1982	µg
$m_{FB-allow}$	= allowable combined cadmium blank correction	=	0.0000	µg
m_n	= blank-corrected cadmium in combined sample	=	1.1982	µg

USEPA Method 5/29 (Particulate/Metals)
Cadmium Sample Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 134716
O_L

1. Cadmium concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= cadmium concentration (lb/dscf)	=	4.0891E-11	lb/dscf

2. Cadmium concentration (µg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)(35.31)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= cadmium concentration (µg/dscm)	=	6.5481E-01	µg/dscm

3. Cadmium concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{35.31}{1000}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
1000	= conversion factor (µg/mg)	=	1000	µg/mg
C_{sd}	= cadmium concentration (mg/dscm)	=	6.5481E-04	mg/dscm

4. Cadmium concentration (µg/Nm3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)(35.31)\left(\frac{68 + 460}{32 + 460}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	
C_{sd}	= cadmium concentration (µg/Nm3 dry)	=	7.0272E-01	µg/Nm^3 dry

5. Cadmium concentration corrected to x% oxygen (lb/dscf example)

$$C_{sdx} = C_{sd}\left(\frac{20.9 - x}{20.9 - O_2}\right)$$

Where:

C_{sd}	= cadmium concentration (lb/dscf)	=	4.0891E-11	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= cadmium concentration corrected to x% oxygen (lb/dscf)	=	4.1488E-11	lb/dscf @ x%O_2

6. Cadmium concentration corrected to y% carbon dioxide (lb/dscf example)

$$C_{sdy} = C_{sd}\left(\frac{y}{CO_2}\right)$$

Where:

C_{sd}	= cadmium concentration (lb/dscf)	=	4.0891E-11	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.7	%
C_{sdy}	= cadmium conc. corrected to y% carbon dioxide (lb/dscf)	=	4.1939E-11	lb/dscf @ y%CO_2

7. Cadmium concentration at actual gas conditions (lb/acf example)

$$C_a = C_{sd}\left(\frac{Q_{std}}{Q_a}\right)$$

Where:

C_{sd}	= cadmium concentration (lb/dscf)	=	4.0891E-11	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	157,890	acfm
C_a	= cadmium concentration at actual gas conditions (lb/acf)	=	2.0948E-11	lb/acf

8. Cadmium emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{10^6}\right)(Q_{std})(60)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= cadmium emission rate (lb/hr)	=	1.9845E-04	lb/hr

9. Cadmium emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{Q_{std}}{(10^6)(60)}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min
$E_{g/s}$	= cadmium emission rate (g/s)	=	2.5000E-05	g/s

10. Cadmium emission rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{10^6}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{Ton/yr}$	= cadmium emission rate (Ton/yr)	=	8.6920E-04	Ton/yr

11. Cadmium emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{10^6}\right)(F_d)\left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= cadmium emission rate - Fd-based (lb/MMBtu)	=	5.9699E-07	lb/MMBtu

12. Cadmium emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{10^6}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= cadmium collected in sample (total µg)	=	1.1982	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	11.7	%
100	= conversion factor	=	100	
E_{Fc}	= cadmium emission rate - Fc-based (lb/MMBtu)	=	6.3608E-07	lb/MMBtu

LOGIC FOR TREATING DETECTION LIMITS

(mercury only)

1. Logic for Determining Total Blank ($m_{Total-B}$) from 5 Fractions

	CASE 1 All 5 fractions are D.	CASE 2 1 to 4 fractions are ND	CASE 3 All 5 fractions are ND
Rule			
ND = 0	$m_{Total-B}$ = Sum D, 1-5	$m_{Total-B}$ = Sum D	$m_{Total-B}$ = < Sum ND
ND=1x	$m_{Total-B}$ = Sum D, 1-5	$m_{Total-B}$ = Sum D	$m_{Total-B}$ = < Sum ND
ND=0.5x	$m_{Total-B}$ = Sum D, 1-5	$m_{Total-B}$ = Sum D	$m_{Total-B}$ = < 0.5 Sum ND

2. Logic for Determining Total Sample ($m_{Total-S}$) from 5 Fractions

	CASE 1 All 5 fractions are D.	CASE 2 1 to 4 fractions are ND	CASE 3 All 5 fractions are ND
Rule			
ND = 0	$m_{Total-S}$ = Sum D, 1-5	$m_{Total-S}$ = Sum D	$m_{Total-S}$ = < Sum ND
ND=1x	$m_{Total-S}$ = Sum D, 1-5	$m_{Total-S}$ = < [Sum D + Sum ND]	$m_{Total-S}$ = < Sum ND
ND=0.5x	$m_{Total-S}$ = Sum D, 1-5	$m_{Total-S}$ = < [SumD+0.5 SumND	$m_{Total-S}$ = < 0.5 Sum ND

3. Logic for Determining Maximum Allowable Blank Correction ($m_{T-B-allow}$)

	CASE 1 All 5 fractions are D. $m_{Total-B}$ = D	CASE 2 1 to 4 sample fractions are ND $m_{Total-B}$ = D	CASE 3 All 5 fractions are ND $m_{Total-B}$ = D	CASE 4 Any type of fractions $m_{Total-B}$ = ND
Rule				
ND = 0	$m_{T-B-allow}$ = M29 Rule	$m_{T-B-allow}$ = M29 Rule*	$m_{T-B-allow}$ = 0	$m_{T-B-allow}$ = 0
ND=1x	$m_{T-B-allow}$ = M29 Rule	$m_{T-B-allow}$ = M29 Rule*	$m_{T-B-allow}$ = 0	$m_{T-B-allow}$ = 0
ND=0.5x	$m_{T-B-allow}$ = M29 Rule	$m_{T-B-allow}$ = M29 Rule*	$m_{T-B-allow}$ = 0	$m_{T-B-allow}$ = 0

* M29 rule using only detected sample quantities for logical comparisons.

4. Logic for Determining Blank-Corrected Sample Amount (m_n)

	CASE 1 All 5 fractions are D. $m_{Total-S} - m_{T-B-allow} \geq$ MIN(MDL)	CASE 2 1 to 4 sample fractions are ND $m_{Total-S} - m_{T-B-allow} \geq$ MIN(MDL)	CASE 3 All 5 fractions are ND $m_{Total-S}$ and $m_{T-B-allow}$ anything	CASE 4 Any type of fractions $m_{Total-S} - m_{T-B-allow}$ < MIN(MDL)
Rule				
ND = 0	$m_n = m_{Total-S} - m_{T-B-allow}$	$m_n = m_{Total-S} - m_{T-B-allow}$	m_n = < $m_{Total-S}$	m_n = < MIN[MDL]
ND=1x	$m_n = m_{Total-S} - m_{T-B-allow}$	m_n = < [$m_{Total-S} - m_{T-B-allow}$]	m_n = < $m_{Total-S}$	m_n = < MIN[MDL]
ND=0.5x	$m_n = m_{Total-S} - m_{T-B-allow}$	m_n = < [$m_{Total-S} - m_{T-B-allow}$]	m_n = < $m_{Total-S}$	m_n = < MIN[MDL]

Definitions and Notes

The term "Rule" refers to the rule being implemented for handling non-detectable quantities in summations.
MDL = minimum detection limit.
D = Detectable quantity reported as D.
ND = Non-Detectable quantity reported at a value of ND.
MIN[MDL] = lowest quantity of all detection limits for 5 fractions.

USEPA Method 29 (Mercury)
Mercury Analyte Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: Please see the preceding page concerning treatment of minimum detection limits and mathematical operations on values that are below minimum detection limits.

041113 134834
M

1. Total blank amount (µg)

$$m_{total-B} = \sum_{i=1}^{n} m_{i-B}$$

Where:

m_{1b-B}	= mercury amount in blank for Fraction 1b	=	<0.1000	µg
m_{2b-B}	= mercury amount in blank for Fraction 2b	=	<0.2000	µg
m_{3a-B}	= mercury amount in blank for Fraction 3a	=	<0.2000	µg
m_{3b-B}	= mercury amount in blank for Fraction 3b	=	<0.5000	µg
m_{3c-B}	= mercury amount in blank for Fraction 3c	=	<0.4000	µg
$m_{total-B}$	= total amount of mercury in blank	=	<1.4000	µg

2. Total sample amount (µg)

$$m_{total-S} = \sum_{i=1}^{n} m_{i-S}$$

Where:

m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	7.1159	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	7.1159	µg

3. Allowable blank correction (µg)

$$m_{T-B-allow} = m_{total-B} \text{ if } m_{total-B} \leq 0.6$$

$$m_{T-B-allow} = MAX\left[0.6,\ MIN\left(m_{total-B},\ 0.05 \times m_{total-S}\right)\right] \text{ if } m_{total-B} > 0.6$$

Where:

$m_{total-B}$	= total amount of mercury in blank	=	<1.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	7.1159	µg
0.05 x $m_{total-S}$	= 5% of $m_{total-S}$	=	0.3558	µg
MAX	= arithmetic operator that returns the maximum of two values			
MIN	= arithmetic operator that returns the minimum of two values			
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg

NOTE: In this case, the second criteria applies.

4. Sample corrected for allowable blank - Total (µg)

$$m_n = m_{total-S} - m_{T-B-allow}$$

Where:

$m_{total-S}$	= total amount of mercury in sample	=	7.1159	µg
$m_{T-B-allow}$	= total allowable blank correction	=	0.0000	µg
m_n	= total mercury in sample corrected for allowable blank	=	7.1159	µg

5. Sample corrected for allowable blank - Prorated for each fraction (µg)

$$m_{n-i} = \left(\frac{m_{i-S}}{m_{total-S}}\right)(m_n)$$

Where:

m_n	= total mercury in sample corrected for allowable blank	=	7.1159	µg
m_{1b-S}	= mercury amount in sample for Fraction 1b	=	<0.1000	µg
m_{2b-S}	= mercury amount in sample for Fraction 2b	=	7.1159	µg
m_{3a-S}	= mercury amount in sample for Fraction 3a	=	<0.2000	µg
m_{3b-S}	= mercury amount in sample for Fraction 3b	=	<0.5000	µg
m_{3c-S}	= mercury amount in sample for Fraction 3c	=	<0.4000	µg
$m_{total-S}$	= total amount of mercury in sample	=	7.1159	µg
m_{n-1b}	= mercury corrected for blank - prorated for Fraction 1b	=	<0.1000	µg
m_{n-2b}	= mercury corrected for blank - prorated for Fraction 2b	=	7.1159	µg
m_{n-3a}	= mercury corrected for blank - prorated for Fraction 3a	=	<0.2000	µg
m_{n-3b}	= mercury corrected for blank - prorated for Fraction 3b	=	<0.5000	µg
m_{n-3c}	= mercury corrected for blank - prorated for Fraction 3c	=	<0.4000	µg

USEPA Method 29 (Mercury)
Mercury Sample Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 134834
O_M

1. Mercury concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^{6}}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
C_{sd}	= mercury concentration (lb/dscf)	=	2.4284E-10	lb/dscf

2. Mercury concentration (µg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)(35.31)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= mercury concentration (µg/dscm)	=	3.8887E+00	µg/dscm

3. Mercury concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{35.31}{1000}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
1000	= conversion factor (µg/mg)	=	1000	µg/mg
C_{sd}	= mercury concentration (mg/dscm)	=	3.8887E-03	mg/dscm

4. Mercury concentration (µg/Nm3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)(35.31)\left(\frac{68+460}{32+460}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	
C_{sd}	= mercury concentration (µg/Nm3 dry)	=	4.1732E+00	µg/Nm^3 dry

5. Mercury concentration corrected to x% oxygen (lb/dscf example)

$$C_{sdx} = C_{sd}\left(\frac{20.9-x}{20.9-O_2}\right)$$

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	2.4284E-10	lb/dscf
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= mercury concentration corrected to x% oxygen (lb/dscf)	=	2.4638E-10	lb/dscf @ x%O_2

6. Mercury concentration corrected to y% carbon dioxide (lb/dscf example)

$$C_{sdy} = C_{sd}\left(\frac{y}{CO_2}\right)$$

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	2.4284E-10	lb/dscf
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.7	%
C_{sdy}	= mercury conc. corrected to y% carbon dioxide (lb/dscf)	=	2.4906E-10	lb/dscf @ y%CO_2

7. Mercury concentration at actual gas conditions (lb/acf example)

$$C_a = C_{sd}\left(\frac{Q_{std}}{Q_a}\right)$$

Where:

C_{sd}	= mercury concentration (lb/dscf)	=	2.4284E-10	lb/dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
Q_a	= volumetric flow rate at actual conditions (acfm)	=	157,890	acfm
C_a	= mercury concentration at actual gas conditions (lb/acf)	=	1.2440E-10	lb/acf

8. Mercury emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
$E_{lb/hr}$	= mercury emission rate (lb/hr)	=	1.1785E-03	lb/hr

9. Mercury emission rate (g/s)

$$E_{g/s} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{Q_{std}}{(10^6)(60)}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
60	= conversion factor (sec/min)	=	60	sec/min
$E_{g/s}$	= mercury emission rate (g/s)	=	1.4846E-04	g/s

10. Mercury emission rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^6}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	80,885	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2000	lb/Ton
$E_{T/yr}$	= mercury emission rate (Ton/yr)	=	5.1619E-03	Ton/yr

11. Mercury emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{10^6}\right)(F_d)\left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= mercury emission rate - Fd-based (lb/MMBtu)	=	3.5453E-06	lb/MMBtu

12. Mercury emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{10^6}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= mercury collected in sample (total µg)	=	7.1159	µg
V_{mstd}	= volume metered, standard (dscf)	=	64.6134	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
10^6	= conversion factor (µg/g)	=	1.0E+06	µg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	11.7	%
100	= conversion factor	=	100	
E_{Fc}	= mercury emission rate - Fc-based (lb/MMBtu)	=	3.7775E-06	lb/MMBtu

USEPA Method 23 (PCDD/PCDF)
Sampling, Velocity and Moisture Sample Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 134903
N

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

V_{lc}	= total volume of liquid collected in impingers and silica gel (ml)	=	809.3	ml
0.04706	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	38.09	ft^3

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.80	in. Hg
T_m	= average dry gas meter temperature (°F)	=	87.98	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	128.74	dcf
Y_d	= gas meter correction factor (dimensionless)	=	0.9972	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	0.89	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	123.424	dscf

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.80	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-8.70	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg

4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

$$P_v = \frac{e^{\left(18.3036 - \frac{3816.44}{\frac{5}{9}(T_s - 32) + 273.15 - 46.13}\right)}}{25.4}$$

Where:

T_s	= average sample gas temperature (°F)	=	303.76	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	29.16	in. Hg

5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_v = P_s$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.16	in. Hg

6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	123.424	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	38.09	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2358	
		=	23.58	%

7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_v}{P_s}$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.16	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

8. Actual water vapor in gas (% by volume)

$$B_w = MINIMUM \quad [B_{wo}, B_{ws}]$$

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2358	
B_w	= actual water vapor in gas	=	0.2358	
		=	23.58	%

9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.9	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.91	%

10. Molecular weight of dry gas stream (lb/lb·mole)

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.9	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.9	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.19	lb/lb·mole

11. Molecular weight of sample gas (lb/lb·mole)

$$M_s = (M_d)(1 - B_w) + (M_{H_2O})(B_w)$$

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2358	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.19	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.31	lb/lb·mole

12. *Velocity of sample gas (ft/sec)*

$$V_s = (K_p)(C_p)\left(\overline{\sqrt{\Delta P}}\right)\left(\sqrt{\frac{(\overline{T_s}+460)}{(M_s)(P_s)}}\right)$$

Where:

K_p	= velocity pressure constant	=	85.49	
C_p	= pitot tube coefficient	=	0.81	
M_s	= wet molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.31	lb/lb·mole
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
T_s	= average sample gas temperature (°F)	=	303.76	°F
$\sqrt{\Delta P}$	= average square roots of velocity heads of sample gas (in. H_2O)	=	0.580	$\sqrt{}$in. H_2O
460	= °F to °R conversion constant	=	460	
V_s	= sample gas velocity (ft/sec)	=	39.50	ft/sec

13. Volumetric flow rate of sample gas at actual gas conditions (acfm)

$$Q_a = (60)(A_s)(V_s)$$

Where:

A_s	= cross sectional area of sampling location (ft^2)	=	64.00	ft^2
V_s	= sample gas velocity (ft/sec)	=	39.50	ft/sec
60	conversion factor (sec/min)	=	60	sec/min
Q_a	= volumetric flow rate at actual conditions (acfm)	=	151,683	acfm

14. Total flow of sample gas (scfm)

$$Q_s = (Q_a)\left(\frac{P_s}{29.92}\right)\left(\frac{68+460}{T_s+460}\right)$$

Where:

Q_a	= volumetric flow rate at actual conditions (acfm)	=	151,683	acfm
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
29.92	= standard pressure (in. Hg)	=	29.92	in. Hg
T_s	= average sample gas temperature (°F)	=	303.8	°F
68	= standard temperature (°F)	=	68	°F
460	= °F to °R conversion constant	=	460	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	102,199	scfm

15. Dry flow of sample gas (dscfm)

$$Q_{std} = (Q_s)(1 - B_w)$$

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2358	
Q_s	= volumetric flow rate at standard conditions, wet basis (scfm)	=	102,199	scfm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	78,099	dscfm

16. Dry flow of sample gas corrected to 7%O_2 (dscfm)

$$Q_{std\,7} = (Q_{std})\left(\frac{20.9 - O_2}{20.9 - 7}\right)$$

Where:

Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	78,099	dscfm
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
7	= oxygen content of corrected gas (%)	=	7.0	%
Q_{std7}	= volumetric flow rate at STP and 7%O_2, dry basis (dscfm)	=	76,751	dscfm

17. Hourly time basis conversion of volumetric flow rate (Q_{std} example)

$$Q_{std-hr} = (Q_{std-min})(60)$$

Where

$Q_{std-min}$	= volumetric flow rate, english units (ft^3/min)	=	78,099	dscfm
60	= conversion factor (min/hr)	=	60	min/hr
Q_{std-hr}	= volumetric flow rate, hourly basis (dscf/hr)	=	4,685,952	dscf/hr

18. Metric Conversion of Gas Volumes (Q_{std} example)

$$Q_{std-metric} = (Q_{std-english})\left(\frac{60}{35.31}\right)$$

Where:

$Q_{std-english}$	= volumetric flow rate, english units (ft^3/min)	=	78,099	dscfm
35.31	= conversion factor (ft^3/m^3)	=	35.31	ft^3/m^3
60	= conversion factor (min/hr)	=	60	min/hr
$Q_{std-metric}$	= volumetric flow rate, metric units (m^3/hr)	=	132,709	dry std m^3/hr

19. Standard to Normal Conversion of Gas Volumes (Q_{std} example)

$$Q_{Normal} = (Q_{std-metric})\left(\frac{32 + 460}{68 + 460}\right)$$

Where:

$Q_{std-metric}$	= volumetric flow rate, metric units (dry std m^3/hr)	=	132,709	dry std m^3/hr
32	= normal temperature (°F)	=	32	°F
68	standard temperature (°F)	=	68	°F
460	= standard temperature in Rankine (68°F)	=	460	
Q_{Normal}	= volumetric flow rate, metric units (dry Nm^3/hr)	=	123,661	dry Nm^3/hr

20. Percent isokinetic (%)

$$I = \frac{(0.09450)(\overline{T_s} + 460)(V_{mstd})}{(P_s)(V_s)\left(\frac{(D_n)^2(\pi)}{(144)(4)}\right)(\Theta)(1 - B_w)}$$

Where:

D_n	= diameter of nozzle (in)	=	0.272	in.
B_w	= proportion of water vapor in the gas stream by volume	=	0.2358	
P_s	= absolute sample gas pressure (in. Hg)	=	29.16	in. Hg
T_s	= average sample gas temperature (°F)	=	303.8	°F
V_{mstd}	= volume of gas sample through the dry gas meter at standard conditions (dscf)	=	123.424	dscf
V_s	= sample gas velocity (ft/sec)	=	39.50	ft/sec
θ	= total sampling time (min)	=	250	min
0.0945	= conversion constant	=	0.0945	
460	= °F to °R conversion constant	=	460	
I	= percent of isokinetic sampling (%)	=	100.17	%

21. Alternative Method 5 Post-Test Meter Calibration Factor

$$Y_{ga} = \frac{\Theta}{V_m}\sqrt{\frac{(0.0319)(T_m + 460)(28.96)}{(\Delta H_@)(P_{bar} + \frac{\Delta H}{13.6})(M_d)}}\,(\sqrt{\Delta H})_{avg}$$

Where:

θ	= total sampling time (min)	=	250	min
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	128.74	dcf
T_m	= average dry gas meter temperature (°F)	=	87.98	°F
$\Delta H_@$	= dry gas meter orifice coefficient	=	1.8840	
P_{bar}	= barometric pressure (in. Hg)	=	29.80	in. Hg
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	0.891	in. H_2O
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.19	lb/lb·mole
$\sqrt{\Delta H_{avg}}$	= average of square root of pressure drop across meter orifice	=	0.938	√in. H_2O
0.0319	= conversion constant	=	0.0319	
28.96	= molecular weight of ambient air (lb/lb-mole)	=	28.96	lb/lb-mole
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
Y_{qa}	= alternative Method 5 post-test meter calibration factor	=	0.9944	

USEPA Method 23 (PCDD/PCDF)
PCDD/PCDF Emissions Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

Note: PCDD/F results may be presented in two formats - normally expected levels and the maximum possible levels. In the normal case, data classified as ND (non-detect) or EMPC (estimated maximum possible concentration) are not counted. In the maximum possible emissions case, NDs and EMPCs are fully counted.

041113 139003
N_M

			Normal Case (ND & EMPC = 0)		Maximum Case (ND & EMPC fully counted)	
1. PCDDF concentration (ng/dscm)						
$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right) \times 35.31$						
Where:						
m_n	= total mass for PCDDs and PCDFs (ng)	=	1.9700E+01	ng	1.9800E+01	ng
V_{mstd}	= volume metered, standard (dscf)	=	123.4241	dscf	123.4241	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm	35.31	dscf/dscm
C_{sd}	= PCDD/F concentration (ng/dscm)	=	5.6359E+00	ng/dscm	5.6645E+00	ng/dscm
2. PCDDF concentration (ng/Nm3 dry)						
$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)(35.31)\left(\frac{68+460}{32+460}\right)$						
Where:						
m_n	= total mass for PCDDs and PCDFs (ng)	=	1.9700E+01	ng	1.9800E+01	ng
V_{mstd}	= volume metered, standard (dscf)	=	123.4241	dscf	123.4241	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F	68	°F
32	= normal temperature (°F)	=	32	°F	32	°F
460	= °F to °R conversion constant	=	460		460	
C_{sd}	= PCDD/F concentration (ng/Nm3 dry)	=	6.0483E+00	ng/Nm^3 dry	6.0790E+00	ng/Nm^3 dry
3. PCDDF concentration at actual gas conditions (ng/acm example)						
$C_a = C_{sd}\left(\frac{Q_{std}}{Q_a}\right)$						
Where:						
C_{sd}	= PCDD/F concentration (ng/dscm)	=	5.6359E+00	ng/dscm	5.6645E+00	ng/dscm
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscm/h)	=	132,709	dry std m^3/hr	132,709	dry std m^3/hr
Q_a	= volumetric flow rate at actual conditions (acm/h)	=	257,746	actual m^3/hr	257,746	actual m^3/hr
C_a	= PCDD/F TEQ concentration at actual gas conditions (ng/acm)	=	2.9018E+00	ng/acm	2.9166E+00	ng/acm
4. PCDDF concentration corrected to x% O2 (ng/dscm example)						
$C_{sdx} = C_{sd}\left(\frac{20.9-x}{20.9-O_2}\right)$						
Where:						
C_{sd}	= PCDD/F concentration (ng/dscm)	=	5.6359E+00	ng/dscm	5.6645E+00	ng/dscm
x	= oxygen content of corrected gas (%)	=	7.0	%	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%	20.9	%
C_{sdx}	= PCDD/F concentration (ng/dscm corrected to x% O_2)	=	5.7349E+00	ng/dscm @ x% O_2	5.7640E+00	ng/dscm @ x% O_2

5. PCDDF concentration corrected to y% CO2 (ng/dscm example)

$$C_{sdy} = C_{sd}\left(\frac{y}{CO_2}\right)$$

Where:

C_{sd}	= PCDD/F concentration (ng/dscm)	=	5.6359E+00	ng/dscm	5.6645E+00	ng/dscm
y	= carbon dioxide content of corrected gas (%)	=	12.0	%	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.9	%	11.9	%
C_{sdy}	= PCDD/F concentration (ng/dscm corrected to y% CO_2)	=	5.7073E+00	ng/dscm @ y% CO_2	5.7362E+00	ng/dscm @ y% CO_2

6. PCDDF Emission rate (lb/hr)

$$E_{lb/hr} = \left(\frac{m_n}{V_{mstd}}\right)(2.205\times10^{-3})(Q_{std})\frac{(60)}{(10^9)}$$

Where:

m_n	= total mass for PCDDs and PCDFs (ng)	=	1.9700E+01	ng	1.9800E+01	ng
V_{mstd}	= volume metered, standard (dscf)	=	123.4241	dscf	123.4241	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	78,099	dscfm	78,099	dscfm
60	= conversion factor (min/hr)	=	60	min/hr	60	min/hr
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
$E_{lb/hr}$	= PCDDF Emission rate (lb/hr)	=	1.6492E-06	lb/hr	1.6576E-06	lb/hr

7. PCDDF Emission rate (g/sec)

$$E_{g/sec} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{Q_{std}}{60\times10^9}\right)$$

Where:

m_n	= total mass for PCDDs and PCDFs (ng)	=	1.9700E+01	ng	1.9800E+01	ng
V_{mstd}	= volume metered, standard (dscf)	=	123.4241	dscf	123.4241	dscf
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	78,099	dscfm	78,099	dscfm
60	= conversion factor (sec/min)	=	60	sec/min	60	sec/min
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
$E_{g/sec}$	= PCDDF Emission rate (g/sec)	=	2.0776E-07	g/sec	2.0881E-07	g/sec

8. PCDDF emission rate (Ton/yr)

$$E_{T/yr} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^9}\right)(Q_{std})(60)\left(\frac{Cap}{2000}\right)$$

Where:

m_n	= total mass for PCDDs and PCDFs (ng)	=	1.9700E+01	ng	1.9800E+01	ng
V_{mstd}	= volume metered, standard (dscf)	=	123.4241	dscf	123.4241	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
Q_{std}	= volumetric flow rate at standard conditions, dry basis (dscfm)	=	78,099	dscfm	78,099	dscfm
60	= conversion factor (min/hr)	=	60	min/hr	60	min/hr
Cap	= capacity factor for process (hours operated/year)	=	8,760	hours/yr	8,760	hours/yr
2000	= conversion factor (lb/Ton)	=	2,000	lb/Ton	2,000	lb/Ton
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
$E_{T/yr}$	= PCDDF Emission rate (Ton/yr)	=	7.2235E-06	Ton/yr	7.2602E-06	Ton/yr

9. PCDDF emission rate - Fd-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^9}\right)(F_d)\left(\frac{20.9}{20.9-O_2}\right)$$

Where:

m_n	= total mass for PCDDs and PCDFs (ng)	=	1.9700E+01	ng	1.9800E+01	ng
V_{mstd}	= volume metered, standard (dscf)	=	123.4241	dscf	123.4241	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.2	%	7.2	%
20.9	= oxygen content of ambient air (%)	=	20.9	%	20.9	%
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E_{Fd}	= PCDDF Emission rate (lb/MMBtu)	=	5.1533E-09	lb/MMBtu	5.1794E-09	lb/MMBtu

10. PCDDF emission rate - Fc-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205\times10^{-3}}{10^9}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= total mass for PCDDs and PCDFs (ng)	=	1.9700E+01	ng	1.9800E+01	ng
V_{mstd}	= volume metered, standard (dscf)	=	123.4241	dscf	123.4241	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g	2.205E-03	lb/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu	1,820	dscf/MMBtu
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.9	%	11.9	%
100	= conversion factor	=	100		100	
10^9	= conversion factor to convert from ng to grams	=	1.0E+09	ng/g	1.0E+09	ng/g
E_{Fc}	= PCDDF Emission rate (lb/MMBtu)	=	5.4054E-09	lb/MMBtu	5.4328E-09	lb/MMBtu

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Sample Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 135102
K

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04706)(V_{lc})$$

Where:

V_{lc}	= total volume of liquid collected in impingers and silica gel (ml)	=	268.0	ml
0.04706	= ideal gas conversion factor (ft^3 water vapor/ml or gm)	=	0.04706	ft^3/ml
V_{wstd}	= volume of water vapor collected at standard conditions (ft^3)	=	12.61	ft^3

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)\left(P_{bar} + \frac{\Delta H}{13.6}\right)(Y_d)}{(460 + T_m)}$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.75	in. Hg
T_m	= average dry gas meter temperature (°F)	=	74.71	°F
V_m	= volume of gas sample through the dry gas meter at meter conditions (dcf)	=	41.32	dcf
Y_d	= gas meter correction factor (dimensionless)	=	1.0050	
ΔH	= average pressure drop across meter box orifice (in. H_2O)	=	1.50	in. H_2O
17.64	= standard temperature to pressure ratio (°R/in. Hg)	=	17.64	°R/in. Hg
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in.H_2O/in. Hg
460	= °F to °R conversion constant	=	460	
V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	40.902	dscf

3. Sample gas pressure (in. Hg)

$$P_s = P_{bar} + \left(\frac{P_g}{13.6}\right)$$

Where:

P_{bar}	= barometric pressure (in. Hg)	=	29.75	in. Hg
P_g	= sample gas static pressure (in. H_2O)	=	-9.80	in. H_2O
13.6	= conversion factor (in. H_2O/in. Hg)	=	13.6	in. H_2O/in. Hg
P_s	= absolute sample gas pressure (in. Hg)	=	29.03	in. Hg

4. Actual water vapor pressure at sample gas temperature less than 212°F (in. Hg)

$$P_v = \frac{e^{\left(18.3036 - \frac{3816.44}{\frac{5}{9}(T_s - 32) + 273.15 - 46.13}\right)}}{25.4}$$

Where:

T_s	= average sample gas temperature (°F)	=	307.17	°F
18.3036	= Antoine coefficient	=	18.3036	°K
3816.44	= Antoine coefficient	=	3816.44	°K
273.15	= temperature conversion factor	=	273.15	°K
46.13	= Antoine coefficient	=	46.13	°K
25.4	= conversion factor	=	25.4	mm Hg/in. Hg
5/9	= Fahrenheit to Celsius conversion factor	=	5/9	°C/°F
32	= temperature conversion (°F)	=	32	°F
P_v	= vapor pressure, actual (in. Hg)	=	29.03	in. Hg

5. Water vapor pressure at gas temperature greater than 212°F (in. Hg)

$$P_v = P_s$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.03	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.03	in. Hg

6. Moisture measured in sample (% by volume)

$$B_{wo} = \frac{V_{wstd}}{(V_{mstd} + V_{wstd})}$$

Where:

V_{mstd}	= volume of gas sampled through the dry gas meter at standard conditions (dscf)	=	40.902	dscf
V_{wstd}	= volume of water collected at standard conditions (scf)	=	12.61	scf
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2357	
		=	23.57	%

7. Saturated moisture content (% by volume)

$$B_{ws} = \frac{P_v}{P_s}$$

Where:

P_s	= absolute sample gas pressure (in. Hg)	=	29.03	in. Hg
P_v	= water vapor pressure, actual (in. Hg)	=	29.03	in. Hg
B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions		1.0000	
		=	100.00	%

8. Actual water vapor in gas (% by volume)

$$B_w = MINIMUM \quad [B_{wo}, B_{ws}]$$

Where:

B_{ws}	= proportion of water vapor in the gas stream by volume at saturated conditions	=	1.0000	
B_{wo}	= proportion of water measured in the gas stream by volume	=	0.2357	
B_w	= actual water vapor in gas	=	0.2357	
		=	23.57	%

9. Nitrogen (plus carbon monoxide) in gas stream (% by volume, dry)

$$N_2 + CO = 100 - CO_2 - O_2$$

Where:

CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.3	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.9	%
100	= conversion factor (%)	=	100	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.90	%

10. Molecular weight of dry gas stream (lb/lb·mole)

$$M_d = (M_{CO_2})\frac{(CO_2)}{(100)} + (M_{O_2})\frac{(O_2)}{(100)} + (M_{N_2+CO})\frac{(N_2+CO)}{(100)}$$

Where:

M_{CO2}	= molecular weight of carbon dioxide (lb/lb·mole)	=	44.00	lb/lb·mole
M_{O2}	= molecular weight of oxygen (lb/lb·mole)	=	32.00	lb/lb·mole
M_{N2+CO}	= molecular weight of nitrogen and carbon monoxide (lb/lb·mole)	=	28.00	lb/lb·mole
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.3	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.9	%
N_2+CO	= proportion of nitrogen and CO in the gas stream by volume (%)	=	80.9	%
100	= conversion factor (%)	=	100	%
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.11	lb/lb·mole

11. Molecular weight of sample gas (lb/lb·mole)

$$M_s = (M_d)(1 - B_w) + (M_{H_2O})(B_w)$$

Where:

B_w	= proportion of water vapor in the gas stream by volume	=	0.2357	
M_d	= dry molecular weight of sample gas (lb/lb·mole)	=	30.11	lb/lb·mole
M_{H2O}	= molecular weight of water (lb/lb·mole)	=	18.00	lb/lb·mole
M_s	= molecular weight of sample gas, wet basis (lb/lb·mole)	=	27.26	lb/lb·mole

USEPA Method 26A (HCl)
HCl Analyte Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 135119

1. Chloride to HCl conversion factor

$$K_{HCl} = \frac{MW_{HCl}}{n \times MW_{Cl^-}}$$

Where:

MW_{HCl}	= molecular weight of HCl (mg/mg-mole)	=	36.461	mg/mg-mole
MW_{Cl-}	= molecular weight of chloride ion (mg/mg-mole)	=	35.453	mg/mg-mole
n	= molar ratio of chloride to HCl	=	1.0	mole Cl/mole HCl
K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	

2. Total HCl collected (mg)

$$m_{HCl} = K_{HCl} \times \frac{(S_{Cl\text{-}1} v_1 + S_{Cl\text{-}2} v_2)}{1000}$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	
S_{Cl-1}	= chloride concentration of sample fraction 1 (mg/liter)	=	2.3900	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	780.0	ml
S_{Cl-2}	= chloride concentration of sample fraction 2 (mg/liter)	=	0.0000	mg/liter
v_2	= liquid volume of sample fraction 2 (ml)	=	0.0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m_{HCl}	= total HCl collected in sample (mg)	=	1.9164	mg

Note: Non-detects are treated as zero in summations.

DEFINITION
Fraction 1 = entire sample except last impinger containing applicable absorbing reagent.
Fraction 2 = last impinger containing applicable absorbing reagent, analyzed separately to evaluate collection efficiency.
If entire sample is analyzed as a single fraction, then data is included as Fraction 1 (Fraction 2 = 0).

3. Allowable blank subtraction (mg)

$$m_b = K_{HCl} \times B_{Cl} \times \frac{(v_1 + v_2)}{1000}$$

$$m_b = 0 \quad \text{if } B_{Cl} < MDL$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.0280	
B_{Cl}	= chloride concentration of blank (mg/liter)	=	<0.0	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	780.0	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000.0000	ml/liter
m_b	= *allowable blank subtraction (mg)*	=	0.0000	mg

4. Total HCl collected, corrected for blank (mg)

$$m_{nb} = m_{HCl} - m_b$$

Where:

m_{HCl}	= total HCl collected in sample (mg)	=	1.9164	mg
m_b	= allowable blank subtraction (mg)	=	0.0000	mg
m_{nb}	= *total HCl collected, corrected for blank (mg)*	=	1.9163976	mg

5. Minimum detectable HCl (mg)

$$m_{MDL} = K_{HCl} \times MDL \times \frac{(v_1 + v_2)}{1000}$$

Where:

K_{HCl}	= conversion factor to convert mass Cl^- to mass HCl	=	1.028	
MDL	= minimum detectable chloride concentration	=	0.0	mg/liter
v_1	= liquid volume of sample fraction 1 (ml)	=	780.0	ml
v_2	= liquid volume of sample fraction 2 (ml)	=	0	ml
1000	= conversion factor (ml/liter)	=	1000	ml/liter
m_{MDL}	= minimum detectable HCl (mg)	=	0.00641472	mg

6. Total HCl value used in emission calculations (mg)

$$m_n = MAXIMUM \left[m_{nb} \quad or \quad < m_{MDL} \right]$$

Where:

m_{nb}	= total HCl collected, corrected for blank (mg)	=	1.9164	mg
m_{MDL}	= minimum detectable HCl (mg)	=	0.00641472	mg
m_n	= total HCl value used in emission calculations (mg)	=	1.9163976	mg

USEPA Method 26A (HCl)
HCl Sample Calculations

Sample data taken from Run 1

Note: The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results, and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

041113 135119
K_@

1. HCl concentration (lb/dscf)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{1000}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	1.9164	mg
V_{mstd}	= volume metered, standard (dscf)	=	40.9025	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
C_{sd}	= HCl concentration (lb/dscf)	=	1.0331E-07	lb/dscf

2. HCl concentration (ppmdv)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{0.850}{1000}\right)\left(\frac{10^6}{MW}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	1.9164	mg
V_{mstd}	= volume metered, standard (dscf)	=	40.9025	dscf
MW	= molecular weight of HCl (g/g-mole)	=	36.461	g/g-mole
0.850	= conversion factor (dscf/g-mole)	=	0.850	dscf/g-mole
1000	= conversion factor (mg/g)	=	1,000	mg/g
10^6	= conversion factor (ppm)	=	10^6	ppm
C_{sd}	= HCl concentration (ppmdv)	=	1.0923	ppmdv

3. HCl concentration (ppmwv)

$$C_w = C_{sd}\left(1 - \frac{B_w}{100}\right)$$

Where:

C_{sd}	= HCl concentration (ppmdv)	=	1.0923	ppmdv
B_w	= actual water vapor in gas (% v/v)	=	23.5676	% v/v
100	= conversion factor (%)	=	100	%
C_w	= HCl concentration (ppmwv)	=	0.8348	ppmwv

4. HCl concentration (mg/dscm)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)(35.31)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	1.9164	mg
V_{mstd}	= volume metered, standard (dscf)	=	40.9025	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
C_{sd}	= HCl concentration (mg/dscm)	=	1.6544	mg/dscm

5. HCl concentration (mg/Nm^3 dry)

$$C_{sd} = \left(\frac{m_n}{V_{mstd}}\right)(35.31)\left(\frac{68 + 460}{32 + 460}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	1.9164	mg
V_{mstd}	= volume metered, standard (dscf)	=	40.9025	dscf
35.31	= conversion factor (dscf/dscm)	=	35.31	dscf/dscm
68	= standard temperature (°F)	=	68	°F
32	= normal temperature (°F)	=	32	°F
460	= °F to °R conversion constant	=	460	
C_{sd}	= HCl concentration (mg/Nm^3 dry)	=	1.7754	mg/Nm^3 dry

6. HCl concentration corrected to x% O_2 (ppmdv example)

$$C_{sdx} = C_{sd}\left(\frac{20.9 - x}{20.9 - O_2}\right)$$

Where:

C_{sd}	= HCl concentration (ppmdv)	=	1.0923	ppmdv
x	= oxygen content of corrected gas (%)	=	7.0	%
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.9	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
C_{sdx}	= HCl concentration corrected to x%O_2 (ppmdv)	=	1.1634	ppmdv @ x%O_2

7. HCl concentration corrected to y% CO_2 (ppmdv example)

$$C_{sdy} = C_{sd}\left(\frac{y}{CO_2}\right)$$

Where:

C_{sd}	= HCl concentration (ppmdv)	=	1.0923	ppmdv
y	= carbon dioxide content of corrected gas (%)	=	12.0	%
CO_2	= proportion of carbon dioxide in the gas stream by volume (%)	=	11.3	%
C_{sdy}	= HCl concentration corrected to y%CO2 (ppmdv)	=	1.1651	ppmdv @ y%CO_2

8. HCl rate - F_d-based (lb/MMBtu)

$$E_{Fd} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{1000}\right)(F_d)\left(\frac{20.9}{20.9 - O_2}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	1.9164	mg
V_{mstd}	= volume metered, standard (dscf)	=	40.9025	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F_d	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	9,570	dscf/MMBtu
O_2	= proportion of oxygen in the gas stream by volume (%)	=	7.9	%
20.9	= oxygen content of ambient air (%)	=	20.9	%
E_{Fd}	= HCl rate (lb/MMBtu)	=	1.5834E-03	lb/MMBtu

9. HCl rate - F_c-based (lb/MMBtu)

$$E_{Fc} = \left(\frac{m_n}{V_{mstd}}\right)\left(\frac{2.205 \times 10^{-3}}{1000}\right)(F_c)\left(\frac{100}{CO_2}\right)$$

Where:

m_n	= total HCl collected, corrected for applicable blank (mg)	=	1.9164	mg
V_{mstd}	= volume metered, standard (dscf)	=	40.9025	dscf
2.205×10^{-3}	= conversion factor (lb/g)	=	2.205E-03	lb/g
1000	= conversion factor (mg/g)	=	1,000	mg/g
F_c	= ratio of gas volume to heat content of fuel (dscf/MMBtu)	=	1,820	dscf/MMBtu
CO_2	= proportion of oxygen in the gas stream by volume (%)	=	11.3	%
100	= conversion factor	=	100	
E_{Fc}	= HCl rate (lb/MMBtu)	=	1.6713E-03	lb/MMBtu

PLANT DATA

D

I herby certify that all pages contained within this Appendix have been reviewed and, to the best of my ability, verified as accurate.

QA/QC Initials: SB

Date: 4/30

CleanAir.

This Page Intentionally Left Blank

WHEELABRATOR NORTH BROWARD
TONS OF REFUSE PROCESSED PER STACK TEST RUN LOG (2013)

UNIT #1

Date	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (tons)
3/19/2013	HCl	26A	1	184.5	1.00	33.9
3/19/2013	HCl	26A	2	183.7	1.00	33.8
3/19/2013	HCl	26A	3	184.2	1.00	33.9
3/19/2013	Particulate/Metals	5/29	1	184.0	2.27	76.8
3/20/2013	Particulate/Metals	5/29	2	183.7	2.20	74.3
3/20/2013	Particulate/Metals	5/29	3	183.7	2.18	73.6
3/20/2013	Metals (mercury)	29	4	184.0	2.18	73.7
N/A	Fluorides	13B	1	N/A	N/A	N/A
N/A	Fluorides	13B	2	N/A	N/A	N/A
N/A	Fluorides	13B	3	N/A	N/A	N/A
N/A	Dioxins/Furans	23	1	N/A	N/A	N/A
N/A	Dioxins/Furans	23	2	N/A	N/A	N/A
N/A	Dioxins/Furans	23	3	N/A	N/A	N/A

UNIT #2

Date	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (tons)
3/21/2013	HCl	26A	1	183.6	1.00	33.8
3/21/2013	HCl	26A	2	184.2	1.00	33.9
3/21/2013	HCl	26A	3	183.7	1.00	33.8
3/19/2013	Particulate/Metals	5/29	1	184.2	2.22	75.2
3/19/2013	Particulate/Metals	5/29	2	183.6	2.22	74.9
3/19/2013	Particulate/Metals	5/29	3	183.7	2.20	74.3
3/21/2013	Metals (mercury)	29	4	183.9	2.35	79.4
N/A	Fluorides	13B	1	N/A	N/A	N/A
N/A	Fluorides	13B	2	N/A	N/A	N/A
N/A	Fluorides	13B	3	N/A	N/A	N/A
3/19/2013	Dioxins/Furans	23	1	184.0	4.20	142.1
3/20/2013	Dioxins/Furans	23	2	184.2	4.32	146.2
3/20/2013	Dioxins/Furans	23	3	183.7	4.32	145.9

UNIT #3

Date	Test	Method #	Run #	Steam (klb/hr)	Run Length (hr)	Trash Processed (tons)
3/20/2013	HCl	26A	1	185.6	1.00	34.1
3/20/2013	HCl	26A	2	182.8	1.00	33.6
3/20/2013	HCl	26A	3	182.8	1.00	33.6
3/20/2013	Particulate/Metals	5/29	1	183.4	2.25	75.9
3/21/2013	Particulate/Metals	5/29	2	184.3	2.20	74.5
3/21/2013	Particulate/Metals	5/29	3	184.3	2.20	74.5
3/21/2013	Metals (mercury)	29	4	183.9	2.18	73.7
N/A	Fluorides	13B	1	N/A	N/A	N/A
N/A	Fluorides	13B	2	N/A	N/A	N/A
N/A	Fluorides	13B	3	N/A	N/A	N/A
N/A	Dioxins/Furans	23	1	N/A	N/A	N/A
N/A	Dioxins/Furans	23	2	N/A	N/A	N/A
N/A	Dioxins/Furans	23	3	N/A	N/A	N/A

Metals: Cd (cadmium) Hg (mercury) Pb (lead)

Florides and Beryllium in 2016

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 8:15
End Time: 9:15

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	26A run 1	481.19	319.35	30.57	20.63	9.94	31.97	298.38	6.28	-8.67
Unit 2		488.25	320.07	31.11	21.21	9.91	31.39	290.95	6.04	-9.22
Unit 3		495.59	320.65	35.57	25.44	10.13	27.46	308.01	6.31	-5.88

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	191.69	887.51	838.00	81.92	-0.11	262.48	1110.71	17.33	184.50
Unit 2	191.51	889.70	828.35	77.97	-0.10	0.00	1151.90	1.99	184.03
Unit 3	189.09	891.50	830.32	74.17	-0.08	282.69	1161.59	6.39	181.73

U1 lime (#/hr)	673.83	
U2 lime (#/hr)	671.31	
U3 lime (#/hr)	686.53	
Specific Gravity	1.108	
Round Down	1.100	1.050
Round Up	1.110	1.150

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 9:48
End Time: 10:48

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	26A run 2	489.96	320.27	32.64	22.82	9.81	30.05	299.77	6.25	-8.75
Unit 2		488.28	319.52	31.14	21.17	9.97	31.57	291.27	6.08	-9.23
Unit 3		497.82	319.81	36.17	26.09	10.09	27.06	307.33	6.39	-5.90

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH RODL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.94	887.00	832.29	84.93	-0.10	262.95	1088.28	11.38	183.67
Unit 2	194.23	889.87	832.95	76.46	-0.09	0.00	1132.60	6.09	185.76
Unit 3	190.96	891.58	827.92	72.71	-0.09	283.18	1193.16	7.15	184.02

U1 lime (#/hr)	661.72	
U2 lime (#/hr)	672.73	
U3 lime (#/hr)	680.38	
Specific Gravity	1.107	
Round Down	1.100	1.050
Round Up	1.110	1.150

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 11:19
End Time: 12:19

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	26A run 3	494.06	319.94	33.33	23.38	9.95	29.65	299.74	6.25	-8.73
Unit 2		480.66	320.21	29.69	19.77	9.93	33.24	291.51	6.25	-9.31
Unit 3		499.28	320.06	36.64	26.41	10.22	26.99	307.60	6.39	-5.94

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.59	887.06	826.52	85.13	-0.10	263.17	1113.14	12.52	184.23
Unit 2	191.06	889.77	830.19	78.39	-0.09	0.00	1137.26	3.92	183.58
Unit 3	191.46	892.13	831.79	73.36	-0.09	283.34	1196.83	8.75	183.93

U1 lime (#/hr)	665.33	
U2 lime (#/hr)	663.70	
U3 lime (#/hr)	683.43	
Specific Gravity	1.106	
Round Down	1.100	1.050
Round Up	1.110	1.150

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 12:58
End Time: 15:14

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	5/29 run 1	498.49	320.12	34.19	21.36	12.83	37.49	299.74	6.27	-8.68
Unit 2		486.77	320.13	31.06	17.99	13.07	41.18	292.13	6.24	-9.38
Unit 3		500.45	320.12	36.36	23.41	12.96	35.23	307.99	6.29	-5.60

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.62	887.10	829.23	85.04	-0.10	263.48	1101.70	14.30	183.99
Unit 2	191.61	889.86	830.30	78.38	-0.11	0.00	1130.98	2.74	183.94
Unit 3	190.93	891.88	828.20	73.15	-0.09	283.53	1196.42	8.50	183.90

U1 lime (#/hr)	709.42	
U2 lime (#/hr)	722.88	
U3 lime (#/hr)	716.57	
Specific Gravity	1.088	
Round Down	1.080	0.833
Round Up	1.090	0.941

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 7:43
End Time: 9:55

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	5/29 run 2	508.21	319.45	38.51	27.20	11.31	29.18	300.49	6.35	-9.35
Unit 2		502.86	320.05	36.88	25.58	11.29	30.43	292.25	6.34	-10.02
Unit 3		495.04	320.01	35.73	22.11	13.62	31.47	307.76	6.37	-5.89

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.32	887.04	829.90	89.74	-0.23	263.29	1105.05	11.73	183.69
Unit 2	191.71	889.91	829.27	84.18	-0.23	0.00	1157.15	4.01	184.28
Unit 3	191.84	892.15	830.63	73.41	-0.10	283.49	1186.78	7.64	184.46

U1 lime (#/hr)	680.55	
U2 lime (#/hr)	679.65	
U3 lime (#/hr)	819.63	
Specific Gravity	1.096	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 10:17
End Time: 12:28

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	5/29 run 3	500.46	319.92	38.18	27.51	10.67	27.68	300.38	6.40	-9.37
Unit 2		505.09	320.06	37.52	26.83	10.70	28.14	292.96	6.32	-9.99
Unit 3		505.13	320.27	38.89	27.92	10.97	27.25	309.01	6.33	-4.61

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.68	886.97	827.46	91.61	-0.22	263.11	1124.08	9.82	183.73
Unit 2	191.78	889.82	829.03	84.42	-0.23	0.00	1163.06	4.92	184.09
Unit 3	191.24	892.01	831.75	76.32	-0.21	283.17	1208.93	8.18	183.74

U1 lime (#/hr)	664.85	
U2 lime (#/hr)	666.83	
U3 lime (#/hr)	683.73	
Specific Gravity	1.099	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 12:52
End Time: 15:03

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1	29 run 4	504.80	319.99	38.33	27.42	10.91	28.21	300.49	6.39	-9.25
Unit 2		509.03	320.38	39.34	25.46	13.89	27.62	293.44	6.38	-10.08
Unit 3		517.56	320.28	43.87	32.53	11.33	24.63	309.66	6.35	-3.21

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.43	887.02	829.71	90.36	-0.25	263.38	1137.83	12.34	184.01
Unit 2	191.13	889.59	829.62	85.26	-0.24	0.00	1169.78	2.24	183.54
Unit 3	190.43	891.66	827.65	80.46	-0.25	283.16	1200.76	5.17	183.42

U1 lime (#/hr)	670.95	
U2 lime (#/hr)	853.88	
U3 lime (#/hr)	696.78	
Specific Gravity	1.098	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/21/13
Start Time: 7:54
End Time: 8:54

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		503.98	320.25	36.07	23.90	12.18	33.62	300.25	6.17	-8.93
Unit 2	26A run 1	500.97	319.80	36.13	23.84	12.29	33.50	293.54	6.31	-9.96
Unit 3		508.25	319.20	40.54	28.39	12.15	29.88	307.40	6.41	-6.17

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.82	886.99	827.12	86.10	-0.09	262.66	1166.46	5.98	183.47
Unit 2	191.53	889.91	829.45	84.41	-0.10	0.00	1157.55	5.79	183.60
Unit 3	192.72	892.55	835.47	77.56	-0.09	283.44	1180.61	4.93	184.63

U1 lime (#/hr)	699.63	
U2 lime (#/hr)	706.25	
U3 lime (#/hr)	698.18	
Specific Gravity	1.092	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/21/13
Start Time: 9:15
End Time: 10:15

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		507.23	320.22	36.92	23.48	13.45	36.41	299.49	6.38	-9.13
Unit 2	26A run 2	497.88	319.90	34.55	21.00	13.55	38.76	292.60	6.31	-9.84
Unit 3		504.63	320.06	39.11	25.51	13.59	34.26	307.31	6.43	-6.37

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	187.91	886.64	829.74	86.08	-0.08	262.47	1163.95	3.94	181.56
Unit 2	191.68	889.82	826.65	81.88	-0.09	0.00	1184.64	4.51	184.20
Unit 3	191.96	892.39	836.66	76.27	-0.08	283.12	1190.61	6.83	184.08

U1 lime (#/hr)	718.31	
U2 lime (#/hr)	723.97	
U3 lime (#/hr)	726.15	
Specific Gravity	1.085	
Round Down	1.080	0.833
Round Up	1.090	0.941

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/21/13
Start Time: 10:35
End Time: 11:35

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		504.50	320.45	35.34	21.88	13.46	38.13	299.35	6.34	-8.94
Unit 2	26A run 3	502.91	320.31	36.08	22.38	13.69	37.27	292.75	6.30	-9.88
Unit 3		501.06	319.76	37.13	23.60	13.54	36.14	307.02	6.24	-5.88

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	188.81	886.84	828.38	85.48	-0.09	262.59	1169.21	3.86	182.44
Unit 2	191.61	890.32	838.08	83.17	-0.09	0.00	1192.36	11.64	183.66
Unit 3	191.63	892.20	828.71	74.27	-0.09	283.18	1182.74	8.45	184.51

U1 lime (#/hr)	717.51	
U2 lime (#/hr)	730.26	
U3 lime (#/hr)	721.80	
Specific Gravity	1.085	
Round Down	1.080	0.833
Round Up	1.090	0.941

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 7:54
End Time: 10:07

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		484.16	319.79	31.15	21.10	10.05	31.45	298.69	6.31	-8.70
Unit 2	5/29 run 1	489.58	320.11	31.46	21.51	9.95	31.12	291.05	6.16	-9.35
Unit 3		495.31	320.35	35.52	25.30	10.22	27.57	307.68	6.33	-5.87

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	191.29	887.20	836.53	82.68	-0.10	262.76	1088.50	15.16	184.11
Unit 2	191.71	889.66	829.26	78.40	-0.10	0.00	1154.36	3.71	184.19
Unit 3	189.39	891.42	828.94	73.14	-0.09	282.95	1172.29	6.53	182.33

U1 lime (#/hr)	680.36	
U2 lime (#/hr)	673.75	
U3 lime (#/hr)	691.72	
Specific Gravity	1.108	
Round Down	1.100	1.050
Round Up	1.110	1.150

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 10:35
End Time: 12:48

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		493.48	320.07	33.27	23.28	9.99	29.97	299.70	6.23	-8.72
Unit 2	5/29 run 2	479.70	319.91	29.33	19.18	10.15	34.03	291.03	6.19	-9.27
Unit 3		497.98	320.00	36.09	25.63	10.46	27.65	307.39	6.36	-5.24

	FEED H2O FLOW	SH OUT. STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.10	886.81	825.91	85.35	-0.10	262.97	1114.70	12.93	183.95
Unit 2	191.13	889.54	829.40	77.71	-0.10	0.00	1134.21	3.12	183.64
Unit 3	191.43	891.89	831.20	72.90	-0.10	283.14	1188.95	8.70	183.97

U1 lime (#/hr)	661.56	
U2 lime (#/hr)	671.96	
U3 lime (#/hr)	692.67	
Specific Gravity	1.105	
Round Down	1.100	1.050
Round Up	1.110	1.150

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 13:25
End Time: 15:37

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		499.31	320.07	34.42	21.29	13.13	38.15	299.82	6.30	-8.72
Unit 2	5/29 run 3	488.03	320.16	31.35	17.98	13.36	41.77	292.31	6.22	-9.36
Unit 3		501.56	320.23	36.72	23.47	13.25	35.73	308.15	6.33	-5.70

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.24	886.94	827.54	85.25	-0.10	263.41	1106.33	15.41	183.93
Unit 2	191.37	889.69	829.71	78.97	-0.10	0.00	1132.93	2.33	183.66
Unit 3	190.89	891.75	828.20	73.64	-0.09	283.45	1203.30	8.16	183.74

U1 lime (#/hr)	713.70	
U2 lime (#/hr)	726.40	
U3 lime (#/hr)	720.05	
Specific Gravity	1.087	
Round Down	1.080	0.833
Round Up	1.090	0.941

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/21/13
Start Time: 12:05
End Time: 14:26

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		508.15	320.31	36.58	22.17	14.41	37.30	299.34	6.32	-8.93
Unit 2	29 run 4	499.50	320.11	34.52	20.77	13.75	39.48	292.65	6.32	-9.70
Unit 3		503.43	320.15	37.69	23.63	14.06	36.15	307.96	6.33	-5.70

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.33	886.76	827.79	86.17	-0.10	262.73	1192.85	2.81	183.21
Unit 2	191.64	889.79	831.00	81.11	-0.10	0.00	1187.49	12.29	183.89
Unit 3	191.12	891.86	828.79	74.68	-0.09	283.04	1187.89	8.20	183.86

U1 lime (#/hr)	760.27	
U2 lime (#/hr)	725.42	
U3 lime (#/hr)	742.04	
Specific Gravity	1.084	
Round Down	1.080	0.833
Round Up	1.090	0.941

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/19/13
Start Time: 10:16
End Time: 14:38

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		494.96	320.04	33.48	22.43	11.05	32.91	299.69	6.26	-8.71
Unit 2	23 run 1	482.99	319.98	30.15	18.91	11.24	36.51	291.44	6.23	-9.35
Unit 3		498.48	319.98	36.04	24.66	11.38	30.62	307.54	6.32	-5.38

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.40	887.01	828.54	85.05	-0.10	263.21	1104.12	12.64	183.96
Unit 2	191.85	889.80	831.14	77.78	-0.10	0.00	1132.71	3.33	184.00
Unit 3	191.41	891.95	829.93	72.72	-0.09	283.33	1193.56	8.57	184.07

U1 lime (#/hr)	688.20	
U2 lime (#/hr)	699.81	
U3 lime (#/hr)	708.84	
Specific Gravity	1.099	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 7:40
End Time: 11:59

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		504.61	319.63	38.56	27.45	11.11	28.47	300.52	6.37	-9.38
Unit 2	23 run 2	503.83	320.04	37.09	26.06	11.03	29.57	292.54	6.32	-10.00
Unit 3		498.88	320.13	36.90	24.54	12.36	29.84	308.26	6.35	-5.69

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.97	886.89	829.30	90.84	-0.23	263.07	1112.04	11.07	183.57
Unit 2	191.67	889.78	829.31	84.37	-0.23	0.00	1159.30	4.49	184.15
Unit 3	191.43	891.98	831.37	74.80	-0.14	283.21	1195.15	7.89	184.02

U1 lime (#/hr)	677.76	
U2 lime (#/hr)	672.67	
U3 lime (#/hr)	753.89	
Specific Gravity	1.097	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 12:21
End Time: 16:40

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		505.31	320.04	38.31	27.39	10.92	28.30	300.47	6.38	-9.23
Unit 2	23 run 3	508.82	320.09	39.09	25.00	14.09	27.79	293.51	6.32	-10.02
Unit 3		516.63	320.03	43.38	31.59	11.79	24.97	309.47	6.43	-2.95

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.25	886.88	828.76	90.20	-0.25	263.45	1142.39	10.41	183.90
Unit 2	191.34	889.52	829.87	84.94	-0.25	0.00	1166.67	1.98	183.69
Unit 3	190.73	891.66	827.38	79.50	-0.24	283.20	1206.08	5.33	183.86

U1 lime (#/hr)	670.91	
U2 lime (#/hr)	865.35	
U3 lime (#/hr)	724.38	
Specific Gravity	1.098	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 8:13
End Time: 9:13

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		509.46	320.10	38.68	27.40	11.28	29.12	300.75	6.35	-9.42
Unit 2		502.97	320.09	37.06	25.75	11.31	30.34	292.15	6.35	-10.08
Unit 3	26A run 1	493.52	319.51	34.98	21.81	13.17	32.19	307.47	6.31	-5.75

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.92	887.58	830.55	89.75	-0.25	263.33	1100.44	11.52	183.71
Unit 2	192.16	890.61	832.07	83.83	-0.25	0.00	1158.20	4.04	184.74
Unit 3	193.03	892.96	831.67	71.16	-0.09	283.55	1188.07	7.69	185.63

U1 lime (#/hr)	677.55	
U2 lime (#/hr)	679.49	
U3 lime (#/hr)	791.49	
Specific Gravity	1.096	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 9:39
End Time: 10:39

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		501.58	319.71	38.63	27.72	10.91	28.33	300.53	6.40	-9.45
Unit 2		503.77	319.89	36.86	25.86	11.00	29.68	292.28	6.35	-9.97
Unit 3	26A run 2	501.37	320.57	38.05	26.46	11.59	28.84	308.60	6.38	-6.01

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.93	886.17	831.62	91.97	-0.20	262.22	1120.62	11.01	183.01
Unit 2	191.06	889.03	827.83	84.36	-0.20	0.00	1161.76	5.05	183.71
Unit 3	190.21	891.18	832.74	77.15	-0.10	282.29	1194.59	7.90	182.81

U1 lime (#/hr)	666.56	
U2 lime (#/hr)	671.98	
U3 lime (#/hr)	707.85	
Specific Gravity	1.097	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 11:00
End Time: 12:00

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		501.81	319.92	38.41	27.82	10.59	27.48	300.60	6.40	-9.36
Unit 2		505.95	319.95	37.60	26.98	10.61	28.07	293.12	6.27	-9.97
Unit 3	26A run 3	505.33	320.92	39.03	28.09	10.94	27.13	309.42	6.32	-4.92

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.82	886.96	827.03	91.26	-0.26	263.34	1116.04	10.01	184.17
Unit 2	192.39	889.92	831.58	84.17	-0.25	0.00	1158.83	4.96	184.48
Unit 3	190.03	891.59	829.18	77.54	-0.25	283.39	1202.18	7.93	182.82

U1 lime (#/hr)	659.83	
U2 lime (#/hr)	661.54	
U3 lime (#/hr)	681.83	
Specific Gravity	1.099	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/20/13
Start Time: 12:35
End Time: 14:50

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		504.79	319.96	38.45	27.68	10.78	28.03	300.55	6.37	-9.24
Unit 2		508.19	320.19	38.97	25.39	13.58	27.64	293.35	6.34	-10.01
Unit 3	5/29 run 1	516.38	320.28	43.49	31.34	12.15	24.76	309.58	6.40	-3.28

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.20	886.96	829.02	90.54	-0.25	263.39	1136.55	12.19	183.90
Unit 2	190.88	889.52	829.10	85.07	-0.25	0.00	1164.76	2.23	183.40
Unit 3	190.63	891.70	828.74	80.20	-0.24	283.17	1202.11	5.29	183.40

U1 lime (#/hr)	664.24	
U2 lime (#/hr)	836.74	
U3 lime (#/hr)	748.78	
Specific Gravity	1.098	
Round Down	1.090	0.941
Round Up	1.100	1.050

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/21/13
Start Time: 7:42
End Time: 9:54

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		504.69	320.20	36.19	23.57	12.62	34.79	299.88	6.23	-8.98
Unit 2		500.12	319.83	35.67	22.91	12.77	35.35	293.44	6.27	-9.88
Unit 3	5/29 run 2	506.77	319.57	40.07	27.29	12.78	31.46	307.35	6.45	-6.31

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.96	887.14	829.19	86.23	-0.10	262.61	1171.30	5.25	183.38
Unit 2	191.66	890.04	829.29	83.50	-0.10	0.00	1168.59	5.48	183.89
Unit 3	192.36	892.56	836.10	77.34	-0.09	283.36	1181.39	5.40	184.26

U1 lime (#/hr)	706.65	
U2 lime (#/hr)	714.86	
U3 lime (#/hr)	715.47	
Specific Gravity	1.089	
Round Down	1.080	0.833
Round Up	1.090	0.941

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/21/13
Start Time: 10:15
End Time: 12:27

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		504.52	319.89	35.13	20.97	14.16	38.45	299.22	6.34	-8.89
Unit 2		500.42	319.91	35.04	21.45	13.59	38.45	292.45	6.30	-9.78
Unit 3	5/29 run 3	502.05	319.80	37.46	23.78	13.68	35.96	307.20	6.23	-5.39

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	190.08	887.39	828.14	83.88	-0.10	262.64	1177.34	4.95	183.72
Unit 2	191.80	890.34	830.58	82.22	-0.10	0.00	1192.07	11.08	184.10
Unit 3	191.60	892.53	829.70	74.58	-0.09	283.16	1183.41	7.69	184.34

U1 lime (#/hr)	753.84	
U2 lime (#/hr)	723.47	
U3 lime (#/hr)	728.23	
Specific Gravity	1.085	
Round Down	1.080	0.833
Round Up	1.090	0.941

Wheelabrator
NORTH BROWARD
Emission Test Log

Date: 03/21/13
Start Time: 12:41
End Time: 14:52

	Test	SDA INLET TEMP	SDA OUTLET TEMP	TOTAL SLURRY FL	DIL WATER FLOW	TOTAL LIME	LIME CONC	FF OUT TEMP	FF DP	ID INLET PRESS
		DEG F	DEG F	GPM	GPM	GPM	%	DEG F	" H2O	" H2O
Unit 1		509.22	320.04	36.76	23.07	13.69	37.24	299.28	6.30	-8.91
Unit 2		500.39	320.04	34.81	20.99	13.81	39.30	292.49	6.33	-9.71
Unit 3	29 run 4	504.26	320.12	38.05	23.84	14.21	35.92	307.99	6.37	-5.90

	FEED H2O FLOW	SH OUT STM PRESS	FINAL STM TEMP	TOT AIR FLOW	FURNACE DRAFT	ECONO OUT TEMP	SH ROLL AVG	SNCR CHEM FLOW	STEAM FLOW
	KLBs/hr	DEG F	DEG F	KSCFM	" H2O	DEG F	DEG F	GPH	KLBs/hr
Unit 1	189.21	886.81	829.29	85.78	-0.10	262.73	1190.02	2.69	182.77
Unit 2	191.90	889.87	831.52	80.85	-0.10	0.00	1182.48	10.74	183.96
Unit 3	190.99	891.88	828.56	74.74	-0.10	283.03	1186.04	8.67	183.90

U1 lime (#/hr)	720.59	
U2 lime (#/hr)	727.07	
U3 lime (#/hr)	748.23	
Specific Gravity	1.084	
Round Down	1.080	0.833
Round Up	1.090	0.941

Plant Name: MBWD
General Average Report
Reporting Period: 03/19/2013 to 03/19/2013

Site Name: UNIT1
Data Averaging Type: 6m

5/29 RUN 1

Time of Report: 03/21/13 15:15
Rolling Average Interval: 1

Date	Time	OPACITY1 (PERCENT)
03/19/13	12:54	0
	13:00	0
	13:06	0
	13:12	0
	13:18	0
	13:24	0
	13:30	0
	13:36	1
	13:42	0
	13:48	0
	13:54	1
	14:00	1
	14:06	1
	14:12	1
	14:18	1
	14:24	1
	14:30	1
	14:36	1
	14:42	1
	14:48	1
	14:54	1
	15:00	1
	15:06	1
	15:12	1
Average =		1
Geometric Avg. =		1
Maximum =		1
Minimum =		0
Possible Values =		24
Included Values =		24
Total =		13

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
H - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NBWD

Page: 1

General Average Report

Reporting Period: 03/20/2013 to 03/20/2013

Site Name: UNIT1

Data Averaging Type: 6m

5/29 RUN 2

Time of Report: 03/21/13 15:16

Rolling Average Interval: 1

Date	Time	OPACITY1 (PERCENT)
03/20/13	07:42	1
	07:48	1
	07:54	1
	08:00	1
	08:06	1
	08:12	1
	08:18	1
	08:24	1
	08:30	1
	08:36	1
	08:42	1
	08:48	1
	08:54	1
	09:00	1
	09:06	1
	09:12	1
	09:18	1
	09:24	1
	09:30	1
	09:36	1
	09:42	2
	09:48	2
	09:54	1

Average =	1
Geometric Avg. =	1
Maximum =	2
Minimum =	1
Possible Values =	23
Included Values =	23
Total =	28

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
E - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NBWD

Page: 1

General Average Report

Reporting Period: 03/20/2013 to 03/20/2013

Site Name: UNIT1

5/29 Run 3

Time of Report: 03/21/13 15:16

Data Averaging Type: 6m

Rolling Average Interval: 1

Date	Time	OPACITY1 (PERCENT)
03/20/13	10:12	1
	10:18	1
	10:24	1
	10:30	1
	10:36	1
	10:42	1
	10:48	1
	10:54	1
	11:00	1
	11:06	1
	11:12	1
	11:18	1
	11:24	1
	11:30	1
	11:36	1
	11:42	2
	11:48	2
	11:54	2
	12:00	2
	12:06	2
	12:12	2
	12:18	2
	12:24	2

Average =	1
Geometric Avg. =	1
Maximum =	2
Minimum =	1
Possible Values =	23
Included Values =	23
Total =	30

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
H - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NBWD
General Average Report
Reporting Period: 03/19/2013 to 03/19/2013

Site Name: UNIT2
Data Averaging Type: 6m

5/29 run 1

Time of Report: 03/21/13 15:16
Rolling Average Interval: 1

Date	Time	OPACITY2 (PERCENT)
03/19/13	07:54	1
	08:00	1
	08:06	1
	08:12	1
	08:18	1
	08:24	1
	08:30	1
	08:36	1
	08:42	1
	08:48	1
	08:54	1
	09:00	1
	09:06	1
	09:12	1
	09:18	1
	09:24	1
	09:30	1
	09:36	1
	09:42	1
	09:48	1
	09:54	1
	10:00	1
	10:06	1

Average =	1
Geometric Avg. =	1
Maximum =	1
Minimum =	1
Possible Values =	23
Included Values =	23
Total =	22

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
E - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NEWD

General Average Report

Reporting Period: 03/19/2013 to 03/19/2013

Page: 1

Site Name: UNIT2

Data Averaging Type: 6m

5/29 RUN 2

Time of Report: 03/21/13 15:17

Rolling Average Interval: 1

Date	Time	OPACITY2 (PERCENT)
03/19/13	10:30	1
	10:36	1
	10:42	1
	10:48	1
	10:54	1
	11:00	1
	11:06	1
	11:12	1
	11:18	1
	11:24	1
	11:30	1
	11:36	1
	11:42	1
	11:48	1
	11:54	1
	12:00	1
	12:06	1
	12:12	1
	12:18	1
	12:24	1
	12:30	1
	12:36	1
	12:42	1
	12:48	1

Average =	1
Geometric Avg. =	1
Maximum =	1
Minimum =	1
Possible Values =	24
Included Values =	24
Total =	22

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
E - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NBWD
General Average Report
Reporting Period: 03/19/2013 to 03/19/2013

Site Name: UNIT2
Data Averaging Type: 6m

5/29 RUN 3

Time of Report: 03/21/13 15:17
Rolling Average Interval: 1

Date	Time	OPACITY2 (PERCENT)
03/19/13	13:24	1
	13:30	1
	13:36	1
	13:42	1
	13:48	1
	13:54	1
	14:00	1
	14:06	1
	14:12	1
	14:18	1
	14:24	1
	14:30	1
	14:36	1
	14:42	1
	14:48	1
	14:54	1
	15:00	1
	15:06	1
	15:12	1
	15:18	1
	15:24	1
	15:30	1
	15:36	1

Average =	1
Geometric Avg. =	1
Maximum =	1
Minimum =	1
Possible Values =	23
Included Values =	23
Total =	21

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
E - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NBWD

General Average Report

Reporting Period: 03/20/2013 to 03/20/2013

Site Name: UNIT3

Data Averaging Type: 6m

5/29 nwn1

Time of Report: 03/21/13 15:18

Rolling Average Interval: 1

Date	Time	OPACITY3 (PERCENT)
03/20/13	12:30	2
	12:36	2
	12:42	2
	12:48	2
	12:54	2
	13:00	2
	13:06	2
	13:12	2
	13:18	2
	13:24	2
	13:30	2
	13:36	1
	13:42	2
	13:48	2
	13:54	2
	14:00	2
	14:06	2
	14:12	1
	14:18	1
	14:24	1
	14:30	1
	14:36	2
	14:42	2
	14:48	2

Average =	2
Geometric Avg. =	2
Maximum =	2
Minimum =	1
Possible Values =	24
Included Values =	24
Total =	43

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
E - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NBWD

Page: 1

General Average Report

Reporting Period: 03/21/2013 to 03/21/2013

Site Name: UNIT3

Time of Report: 03/21/13 15:18

Data Averaging Type: 6m

5/29 NWN 2

Rolling Average Interval: 1

Date	Time	OPACITY3 (PERCENT)
03/21/13	07:42	0
	07:48	0
	07:54	0
	08:00	0
	08:06	0
	08:12	0
	08:18	0
	08:24	0
	08:30	0
	08:36	0
	08:42	0
	08:48	0
	08:54	0
	09:00	0
	09:06	0
	09:12	0
	09:18	0
	09:24	0
	09:30	0
	09:36	0
	09:42	0
	09:48	0
	09:54	0

Average =	0
Geometric Avg. =	0
Maximum =	0
Minimum =	0
Possible Values =	23
Included Values =	23
Total =	0

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
H - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

Plant Name: NBWD
General Average Report
Reporting Period: 03/21/2013 to 03/21/2013

Site Name: UNIT3
Data Averaging Type: 6m

5/29 RUN 3

Time of Report: 03/21/13 15:18
Rolling Average Interval: 1

Date	Time	OPACITY3 (PERCENT)
03/21/13	10:12	0
	10:18	0
	10:24	0
	10:30	0
	10:36	0
	10:42	0
	10:48	0
	10:54	0
	11:00	0
	11:06	0
	11:12	0
	11:18	0
	11:24	0
	11:30	0
	11:36	0
	11:42	0
	11:48	0
	11:54	0
	12:00	0
	12:06	0
	12:12	0
	12:18	0
	12:24	0

Average =	0
Geometric Avg. =	0
Maximum =	0
Minimum =	0
Possible Values =	23
Included Values =	23
Total =	0

* - excluded values (missing, OOC, invalid, suspect)
< - missing
T - out-of-control
I - invalid
S - suspect
H - exceedance
F - stack not operating
B - invalid (PADER)
U - missing data substituted
-999 - missing value
-888 - value could not be calculated

WASTE MANAGEMENT

Wheelabrator North Broward Inc
2600 Northwest 48th Street
Pompano Beach, FL, 33073 Ph: 954-971-8701

Reprint
Ticket# 199886

Customer Name CHEMICALLIME CHEMICAL LIME
Ticket Date 03/20/2013
Payment Type Credit Account
Manual Ticket#
Route
Manifest# 109905583
Destination
PO# 109905583

Carrier CHEMICAL LIME CHEMICAL LIME
Tag # LIME1
Container
Truck # TRACTOR
Check#
Billing# 0000218
Grid
Volume

	Time	Scale	Operator	Inbound		
In	03/20/2013 09:03:44	Scale 2	lp		Gross	79200 lb
Out	03/20/2013 11:35:10	Scale 3	lp		Tare	28740 lb
					Net	50460 lb
					Tons	25.23

Comments

Product		LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	LIME-LIME	100	25.23	Tons				WHEELABRA

This Page Intentionally Left Blank

PARAMETERS

E

I herby certify that all pages contained within this Appendix have been reviewed and, to the best of my ability, verified as accurate.

QA/QC Initials: SB

Date: 4/30

CleanAir.

This Page Intentionally Left Blank

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	
Stop Time (approx.)		15:14	09:55	12:28	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9854	0.9854	0.9854	
C_p	Pitot tube coefficient	0.8250	0.8250	0.8250	
P_g	Static pressure (in. H_2O)	-9.8000	-10.4000	-10.4000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	**29.8000**
D_n	Nozzle diameter (in.)	0.2760	0.2760	0.2760	
O_2	Oxygen (dry volume %)	8.6700	9.2700	9.3200	**9.0867**
CO_2	Carbon dioxide (dry volume %)	10.6500	9.9900	9.5500	**10.0633**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.6800	80.7400	81.1300	**80.8500**
V_{lc}	Total Liquid collected (ml)	453.70	493.20	467.60	
V_m	Volume metered, meter conditions (ft^3)	79.3900	83.0800	84.1050	
T_m	Dry gas meter temperature (°F)	90.0600	78.7400	88.3400	
T_s	Sample temperature (°F)	304.4000	305.2800	304.9600	**304.8800**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2704	1.3600	1.3876	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	21.3511	23.2100	22.0053	**22.1888**
V_{mstd}	Volume metered, standard (dscf)	74.9967	80.1493	79.7230	**78.2897**
P_s	Sample gas pressure, absolute (in. Hg)	29.0794	29.0353	29.0353	**29.0500**
P_v	Vapor pressure, actual (in. Hg)	29.0794	29.0353	29.0353	**29.0500**
B_{wo}	Moisture measured in sample (% by volume)	22.1605	22.4556	21.6314	**22.0825**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	22.1605	22.4556	21.6314	**22.0825**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.6645	0.6924	0.6981	**0.6850**
M_d	MW of sample gas, dry (lb/lb-mole)	30.0508	29.9692	29.9008	**29.9736**
M_s	MW of sample gas, wet (lb/lb-mole)	27.3803	27.2814	27.3265	**27.3294**
V_s	Velocity of sample (ft/sec)	45.9197	47.9980	48.3432	**47.4203**
%I	Isokinetic sampling (%)	100.3586	103.2753	100.8777	**101.5039**
Q_a	Volumetric flow rate, actual (acfm)	176,331	184,312	185,638	**182,094**
Q_s	Volumetric flow rate, standard (scfm)	118,377	123,405	124,344	**122,042**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	92,144	95,694	97,447	**95,095**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	81,074	80,066	81,182	**80,774**
Q_a	Volumetric flow rate, actual (acf/hr)	10,579,888	11,058,744	11,138,274	**10,925,635**
Q_s	Volumetric flow rate, standard (scf/hr)	7,102,616	7,404,300	7,460,668	**7,322,528**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,528,644	5,741,616	5,846,821	**5,705,694**
Q_a	Volumetric flow rate, actual (m^3/hr)	299,629	313,190	315,442	**309,420**
Q_s	Volumetric flow rate, standard (m^3/hr)	201,150	209,694	211,291	**207,378**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	156,574	162,606	165,585	**161,589**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	137,763	136,051	137,948	**137,254**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	187,435	195,397	196,884	**193,239**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	145,899	151,519	154,295	**150,571**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	128,370	126,775	128,543	**127,896**

Comments:
Average includes 3 runs.

041113 140808
LLP@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 5/202 (FPM/CPM)
Emission Parameters for FPM

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	
Stop Time (approx.)		15:14	09:55	12:28	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	184.0	183.7	183.7	183.8
P_1	Fabroc Filter Inlet Temperature (°F)	320	319	320	320
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Conditions					
O_2	Oxygen (dry volume %)	8.6700	9.2700	9.3200	9.0867
CO_2	Carbon dioxide (dry volume %)	10.6500	9.9900	9.5500	10.0633
T_s	Sample temperature (°F)	304.4000	305.2800	304.9600	304.8800
B_w	Actual water vapor in gas (% by volume)	22.1605	22.4556	21.6314	22.0825
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,331	184,312	185,638	182,094
Q_s	Volumetric flow rate, standard (scfm)	118,377	123,405	124,344	122,042
Q_{std}	Volumetric flow rate, dry standard (dscfm)	92,144	95,694	97,447	95,095
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	81,074	80,066	81,182	80,774
Q_a	Volumetric flow rate, actual (acf/hr)	10,579,888	11,058,744	11,138,274	10,925,635
Q_s	Volumetric flow rate, standard (scf/hr)	7,102,616	7,404,300	7,460,668	7,322,528
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,528,644	5,741,616	5,846,821	5,705,694
Q_a	Volumetric flow rate, actual (m^3/hr)	299,629	313,190	315,442	309,420
Q_s	Volumetric flow rate, standard (m^3/hr)	201,150	209,694	211,291	207,378
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	156,574	162,606	165,585	161,589
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	137,763	136,051	137,948	137,254
Q_s	Volumetric flow rate, normal (Nm^3/hr)	187,435	195,397	196,884	193,239
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	145,899	151,519	154,295	150,571
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	128,370	126,775	128,543	127,896
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.9967	80.1493	79.7230	78.2897
%I	Isokinetic sampling (%)	100.3586	103.2753	100.8777	101.5039
Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00020	0.00030	0.00010	
m_a	Matter collected in solvent rinse(s) (g)	0.00085	0.00109	0.00157	
m_n	Total filterable particulate matter (g)	0.00105	0.00139	0.00167	
n_{MDL}	Number of non-detectable fractions	N/A	N/A	N/A	
DLC	Detection level classification	ADL	ADL	ADL	
Filterable Particulate Matter Results					
C_{sd}	Particulate Concentration (lb/dscf)	3.0778E-08	3.8272E-08	4.6319E-08	3.8456E-08
C_{sd7}	Particulate Concentration @7% O_2 (lb/dscf)	3.4981E-08	4.5742E-08	5.5599E-08	4.5441E-08
C_{sd12}	Particulate Concentration @12% CO_2 (lb/dscf)	3.4680E-08	4.5972E-08	5.8202E-08	4.6285E-08
C_a	Particulate Concentration (lb/acf)	1.6084E-08	1.9870E-08	2.4314E-08	2.0089E-08
C_{sd}	Particulate Concentration (gr/dscf)	0.0002	0.0003	0.0003	0.0003
C_{sd7}	Particulate Concentration @7% O_2 (gr/dscf)	0.0002	0.0003	0.0004	0.0003
C_{sd12}	Particulate Concentration @12% CO_2 (gr/dscf)	0.0002	0.0003	0.0004	0.0003
C_a	Particulate Concentration (gr/acf)	0.0001	0.0001	0.0002	0.0001
C_{sd}	Particulate Concentration (mg/dscm)	0.4929	0.6129	0.7417	0.6158
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	0.5602	0.7325	0.8903	0.7277
C_{sd12}	Particulate Concentration @12% CO_2 (mg/dscm)	0.5553	0.7362	0.9320	0.7412
C_a	Particulate Concentration (mg/m^3(actual,wet))	0.2576	0.3182	0.3894	0.3217
C_{sd}	Particulate Concentration (mg/Nm^3 dry)	0.5289	0.6577	0.7960	0.6609
C_{sd7}	Particulate Concentration @7% O_2 (mg/Nm^3 dry)	0.6012	0.7861	0.9555	0.7809
C_{sd12}	Particulate Concentration @12% CO_2 (mg/Nm^3 dry)	0.5960	0.7900	1.0002	0.7954
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.1702	0.2197	0.2708	0.2202
$E_{kg/hr}$	Particulate Rate (kg/hr)	0.0772	0.0997	0.1228	0.0999
$E_{T/yr}$	Particulate Rate (Ton/yr)	0.7453	0.9625	1.1862	0.9647
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0005	0.0007	0.0008	0.0007
E_{Fc}	Particulate Rate - F_c-based (lb/MMBtu)	0.0005	0.0007	0.0009	0.0007

Comments:

Average includes 3 runs.

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

DLL = Detection Level Limited - some fractions are below detection limit

BDL = Below Detection Limit - all fractions are below detection limit

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Cadmium (Cd) Emission Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	
Stop Time (approx.)		15:14	09:55	12:28	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.0	183.7	183.7	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	319	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.6700	9.2700	9.3200	**9.0867**
CO_2	Carbon dioxide (dry volume %)	10.6500	9.9900	9.5500	**10.0633**
T_s	Sample temperature (°F)	304.4000	305.2800	304.9600	**304.8800**
B_w	Actual water vapor in gas (% by volume)	22.1605	22.4556	21.6314	**22.0825**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,331	184,312	185,638	**182,094**
Q_s	Volumetric flow rate, standard (scfm)	118,377	123,405	124,344	**122,042**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	92,144	95,694	97,447	**95,095**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.9967	80.1493	79.7230	**78.2897**
%I	Isokinetic sampling (%)	100.3586	103.2753	100.8777	**101.5039**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	<0.2000	0.2790	<0.2000	
Cadmium Results - Total					
C_{sd}	Concentration (lb/dscf)	<5.8803E-12	7.6756E-12	<5.5317E-12	**<6.3625E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.6832E-12	9.1738E-12	<6.6399E-12	**<7.4990E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<6.6256E-12	9.2200E-12	<6.9508E-12	**<7.5988E-12**
C_a	Concentration (lb/acf)	<3.0728E-12	3.9851E-12	<2.9037E-12	**<3.3206E-12**
C_{sd}	Concentration (µg/dscm)	<9.4164E-02	1.2291E-01	<8.8582E-02	**<1.0189E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.0702E-01	1.4691E-01	<1.0633E-01	**<1.2009E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.0610E-01	1.4765E-01	<1.1131E-01	**<1.2168E-01**
C_{sd}	Concentration (mg/dscm)	<9.4164E-05	1.2291E-04	<8.8582E-05	**<1.0189E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.0702E-04	1.4691E-04	<1.0633E-04	**<1.2009E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.0610E-04	1.4765E-04	<1.1131E-04	**<1.2168E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<4.9207E-02	6.3816E-02	<4.6499E-02	**<5.3174E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.0105E-01	1.3191E-01	<9.5063E-02	**<1.0934E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.1485E-01	1.5766E-01	<1.1411E-01	**<1.2887E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.1386E-01	1.5845E-01	<1.1945E-01	**<1.3059E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.2510E-05	4.4071E-05	<3.2343E-05	**<3.6308E-05**
$E_{g/s}$	Rate (g/s)	<4.0955E-06	5.5519E-06	<4.0744E-06	**<4.5739E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4239E-04	1.9303E-04	<1.4166E-04	**<1.5903E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<9.6167E-08	1.3201E-07	<9.5544E-08	**<1.0791E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.0049E-07	1.3984E-07	<1.0542E-07	**<1.1525E-07**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2008-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Lead (Pb) Emission Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	
Stop Time (approx.)		15:14	09:55	12:28	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.0	183.7	183.7	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	319	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.6700	9.2700	9.3200	**9.0867**
CO_2	Carbon dioxide (dry volume %)	10.6500	9.9900	9.5500	**10.0633**
T_s	Sample temperature (°F)	304.4000	305.2800	304.9600	**304.8800**
B_w	Actual water vapor in gas (% by volume)	22.1605	22.4556	21.6314	**22.0825**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	176,331	184,312	185,638	**182,094**
Q_s	Volumetric flow rate, standard (scfm)	118,377	123,405	124,344	**122,042**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	92,144	95,694	97,447	**95,095**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	74.9967	80.1493	79.7230	**78.2897**
%I	Isokinetic sampling (%)	100.3586	103.2753	100.8777	**101.5039**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	0.2173	<0.2000	<0.2000	
Lead Results - Total					
C_{sd}	Concentration (lb/dscf)	6.3900E-12	<5.5022E-12	<5.5317E-12	**<5.8080E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	7.2626E-12	<6.5762E-12	<6.6399E-12	**<6.8262E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	7.2000E-12	<6.6093E-12	<6.9508E-12	**<6.9200E-12**
C_a	Concentration (lb/acf)	3.3392E-12	<2.8567E-12	<2.9037E-12	**<3.0332E-12**
C_{sd}	Concentration (µg/dscm)	1.0233E-01	<8.8111E-02	<8.8582E-02	**<9.3006E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	1.1630E-01	<1.0531E-01	<1.0633E-01	**<1.0931E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	1.1530E-01	<1.0584E-01	<1.1131E-01	**<1.1081E-01**
C_{sd}	Concentration (mg/dscm)	1.0233E-04	<8.8111E-05	<8.8582E-05	**<9.3006E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	1.1630E-04	<1.0531E-04	<1.0633E-04	**<1.0931E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.1530E-04	<1.0584E-04	<1.1131E-04	**<1.1081E-04**
C_a	Concentration (µg/m^3 (actual,wet))	5.3472E-02	<4.5746E-02	<4.6499E-02	**<4.8573E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	1.0981E-01	<9.4558E-02	<9.5063E-02	**<9.9812E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	1.2481E-01	<1.1301E-01	<1.1411E-01	**<1.1731E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.2373E-01	<1.1358E-01	<1.1945E-01	**<1.1892E-01**
$E_{lb/hr}$	Rate (lb/hr)	3.5328E-05	<3.1592E-05	<3.2343E-05	**<3.3087E-05**
$E_{g/s}$	Rate (g/s)	4.4505E-06	<3.9798E-06	<4.0744E-06	**<4.1682E-06**
$E_{T/yr}$	Rate (Ton/yr)	1.5474E-04	<1.3837E-04	<1.4166E-04	**<1.4492E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.0450E-07	<9.4628E-08	<9.5544E-08	**<9.8225E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.0920E-07	<1.0024E-07	<1.0542E-07	**<1.0495E-07**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2006-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 29 (Mercury)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 20	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	12:52	
Stop Time (approx.)		15:14	09:55	12:28	15:03	
Sampling Conditions						
Y_d	Dry gas meter correction factor	0.9854	0.9854	0.9854	0.9854	
C_p	Pitot tube coefficient	0.8250	0.8250	0.8250	0.8250	
P_g	Static pressure (In. H_2O)	-9.8000	-10.4000	-10.4000	-10.4000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	29.80	**29.8000**
D_n	Nozzle diameter (in.)	0.2760	0.2760	0.2760	0.2760	
O_2	Oxygen (dry volume %)	8.6700	9.2700	9.3200	9.2000	**9.1150**
CO_2	Carbon dioxide (dry volume %)	10.6500	9.9900	9.5500	9.7500	**9.9850**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.6800	80.7400	81.1300	81.0500	**80.9000**
V_{lc}	Total Liquid collected (ml)	453.70	493.20	467.60	481.30	
V_m	Volume metered, meter conditions (ft^3)	79.3900	83.0800	84.1050	86.5200	
T_m	Dry gas meter temperature (°F)	90.0600	78.7400	88.3400	95.0200	
T_s	Sample temperature (°F)	304.4000	305.2800	304.9600	304.7600	**304.8500**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2704	1.3600	1.3876	1.4400	
θ	Total sampling time (min)	125.0	125.0	125.0	125.0	
Flow Results						
V_{wstd}	Volume of water collected (ft^3)	21.3511	23.2100	22.0053	22.6500	**22.3041**
V_{mstd}	Volume metered, standard (dscf)	74.9967	80.1493	79.7230	81.0356	**78.9761**
P_s	Sample gas pressure, absolute (in. Hg)	29.0794	29.0353	29.0353	29.0353	**29.0463**
P_v	Vapor pressure, actual (in. Hg)	29.0794	29.0353	29.0353	29.0353	**29.0463**
B_{wo}	Moisture measured in sample (% by volume)	22.1605	22.4556	21.6314	21.8449	**22.0231**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	22.1605	22.4556	21.6314	21.8449	**22.0231**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.6645	0.6924	0.6981	0.7092	**0.6910**
M_d	MW of sample gas, dry (lb/lb-mole)	30.0508	29.9692	29.9008	29.9280	**29.9622**
M_s	MW of sample gas, wet (lb/lb-mole)	27.3803	27.2814	27.3265	27.3223	**27.3276**
V_s	Velocity of sample (ft/sec)	45.9197	47.9980	48.3432	49.1126	**47.8434**
%I	Isokinetic sampling (%)	100.3586	103.2753	100.8777	101.1813	**101.4232**
Q_a	Volumetric flow rate, actual (acfm)	176,331	184,312	185,638	188,592	**183,719**
Q_s	Volumetric flow rate, standard (scfm)	118,377	123,405	124,344	126,357	**123,121**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	92,144	95,694	97,447	98,754	**96,010**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	81,074	80,066	81,182	83,124	**81,361**
Q_a	Volumetric flow rate, actual (acf/hr)	10,579,888	11,058,744	11,138,274	11,315,547	**11,023,113**
Q_s	Volumetric flow rate, standard (scf/hr)	7,102,616	7,404,300	7,460,668	7,581,392	**7,387,244**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,528,644	5,741,616	5,846,821	5,925,246	**5,760,582**
Q_a	Volumetric flow rate, actual (m^3/hr)	299,629	313,190	315,442	320,463	**312,181**
Q_s	Volumetric flow rate, standard (m^3/hr)	201,150	209,694	211,291	214,709	**209,211**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	156,574	162,606	165,585	167,806	**163,143**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	137,763	136,051	137,948	141,247	**138,252**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	187,435	195,397	196,884	200,070	**194,947**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	145,899	151,519	154,295	156,365	**152,020**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	128,370	126,775	128,543	131,617	**128,826**

Comments:

Average includes 4 runs.

041113 140949
LLM@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 20	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	12:52	
Stop Time (approx.)		15:14	09:55	12:28	15:03	
Process Conditions						
R_P	Steam Production Rate - (Klbs/hour)	184.0	183.7	183.7	184.0	**183.9**
P_1	Fabric Filter Inlet Temperature - (°F)	320	319	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760	**8,760**
Gas Conditions						
O_2	Oxygen (dry volume %)	8.6700	9.2700	9.3200	9.2000	**9.1150**
CO_2	Carbon dioxide (dry volume %)	10.6500	9.9900	9.5500	9.7500	**9.9850**
T_s	Sample temperature (°F)	304.4000	305.2800	304.9600	304.7600	**304.8500**
B_w	Actual water vapor in gas (% by volume)	22.1605	22.4556	21.6314	21.8449	**22.0231**
Gas Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	176,331	184,312	185,638	188,592	**183,719**
Q_s	Volumetric flow rate, standard (scfm)	118,377	123,405	124,344	126,357	**123,121**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	92,144	95,694	97,447	98,754	**96,010**
Sampling Data						
V_{mstd}	Volume metered, standard (dscf)	74.9967	80.1493	79.7230	81.0356	**78.9761**
%I	Isokinetic sampling (%)	100.3586	103.2753	100.8777	101.1813	**101.4232**
Laboratory Data						
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	3.0256	2.7628	2.5297	2.2635	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	3.0256	2.7628	2.5297	2.2635	
Mercury Results - Total						
C_{sd}	Concentration (lb/dscf)	8.8958E-11	7.6009E-11	6.9968E-11	6.1589E-11	**7.4131E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.0110E-10	9.0845E-11	8.3986E-11	7.3170E-11	**8.7276E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.0023E-10	9.1302E-11	8.7918E-11	7.5802E-11	**8.8814E-11**
C_a	Concentration (lb/acf)	4.6486E-11	3.9463E-11	3.6728E-11	3.2251E-11	**3.8732E-11**
C_{sd}	Concentration (µg/dscm)	1.4245E+00	1.2172E+00	1.1204E+00	9.8627E-01	**1.1871E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	1.6190E+00	1.4547E+00	1.3449E+00	1.1717E+00	**1.3976E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	1.6051E+00	1.4621E+00	1.4079E+00	1.2139E+00	**1.4222E+00**
C_{sd}	Concentration (mg/dscm)	1.4245E-03	1.2172E-03	1.1204E-03	9.8627E-04	**1.1871E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	1.6190E-03	1.4547E-03	1.3449E-03	1.1717E-03	**1.3976E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.6051E-03	1.4621E-03	1.4079E-03	1.2139E-03	**1.4222E-03**
C_a	Concentration (µg/m^3 (actual,wet))	7.4441E-01	6.3195E-01	5.8816E-01	5.1645E-01	**6.2024E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	1.5288E+00	1.3062E+00	1.2024E+00	1.0584E+00	**1.2740E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	1.7375E+00	1.5612E+00	1.4433E+00	1.2575E+00	**1.4999E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.7226E+00	1.5691E+00	1.5109E+00	1.3027E+00	**1.5263E+00**
$E_{lb/hr}$	Rate (lb/hr)	4.9181E-04	4.3641E-04	4.0909E-04	3.6493E-04	**4.2556E-04**
$E_{g/s}$	Rate (g/s)	6.1957E-05	5.4978E-05	5.1536E-05	4.5973E-05	**5.3611E-05**
$E_{T/yr}$	Rate (Ton/yr)	2.1541E-03	1.9115E-03	1.7918E-03	1.5984E-03	**1.8640E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.4548E-06	1.3072E-06	1.2085E-06	1.0529E-06	**1.2559E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.5202E-06	1.3847E-06	1.3334E-06	1.1497E-06	**1.3470E-06**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2006-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Front Half Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 20	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	12:52	
Stop Time (approx.)		15:14	09:55	12:28	15:03	
Mercury Results - Front Half						
C_{sd}	Concentration (lb/dscf)	<2.9401E-12	<2.7511E-12	<2.7658E-12	<2.7210E-12	**<2.7945E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.3416E-12	<3.2881E-12	<3.3199E-12	<3.2327E-12	**<3.2956E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.3128E-12	<3.3046E-12	<3.4754E-12	<3.3490E-12	**<3.3605E-12**
C_a	Concentration (lb/acf)	<1.5364E-12	<1.4284E-12	<1.4519E-12	<1.4248E-12	**<1.4604E-12**
C_{sd}	Concentration (µg/dscm)	<4.7082E-02	<4.4055E-02	<4.4291E-02	<4.3573E-02	**<4.4750E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<5.3511E-02	<5.2654E-02	<5.3164E-02	<5.1767E-02	**<5.2774E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<5.3050E-02	<5.2919E-02	<5.5653E-02	<5.3629E-02	**<5.3813E-02**
C_{sd}	Concentration (mg/dscm)	<4.7082E-05	<4.4055E-05	<4.4291E-05	<4.3573E-05	**<4.4750E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<5.3511E-05	<5.2654E-05	<5.3164E-05	<5.1767E-05	**<5.2774E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.3050E-05	<5.2919E-05	<5.5653E-05	<5.3629E-05	**<5.3813E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.4603E-02	<2.2873E-02	<2.3250E-02	<2.2817E-02	**<2.3386E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.0527E-02	<4.7279E-02	<4.7532E-02	<4.6762E-02	**<4.8025E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<5.7427E-02	<5.6507E-02	<5.7054E-02	<5.5555E-02	**<5.6636E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<5.6932E-02	<5.6791E-02	<5.9726E-02	<5.7553E-02	**<5.7750E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.6255E-05	<1.5796E-05	<1.6171E-05	<1.6123E-05	**<1.6086E-05**
$E_{g/s}$	Rate (g/s)	<2.0477E-06	<1.9899E-06	<2.0372E-06	<2.0311E-06	**<2.0265E-06**
$E_{T/yr}$	Rate (Ton/yr)	<7.1197E-05	<6.9186E-05	<7.0830E-05	<7.0618E-05	**<7.0458E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<4.8084E-08	<4.7314E-08	<4.7772E-08	<4.6516E-08	**<4.7421E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<5.0244E-08	<5.0120E-08	<5.2710E-08	<5.0793E-08	**<5.0967E-08**

041113 140949
L L M @_I

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 20	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	12:52	
Stop Time (approx.)		15:14	09:55	12:28	15:03	
Mercury Results - Impingers 1-3 Solution						
C_{sd}	Concentration (lb/dscf)	8.8958E-11	7.6009E-11	6.9968E-11	6.1589E-11	**7.4131E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	1.0110E-10	9.0845E-11	8.3986E-11	7.3170E-11	**8.7276E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	1.0023E-10	9.1302E-11	8.7918E-11	7.5802E-11	**8.8814E-11**
C_a	Concentration (lb/acf)	4.6486E-11	3.9463E-11	3.6728E-11	3.2251E-11	**3.8732E-11**
C_{sd}	Concentration (µg/dscm)	1.4245E+00	1.2172E+00	1.1204E+00	9.8627E-01	**1.1871E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	1.6190E+00	1.4547E+00	1.3449E+00	1.1717E+00	**1.3976E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	1.6051E+00	1.4621E+00	1.4079E+00	1.2139E+00	**1.4222E+00**
C_{sd}	Concentration (mg/dscm)	1.4245E-03	1.2172E-03	1.1204E-03	9.8627E-04	**1.1871E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	1.6190E-03	1.4547E-03	1.3449E-03	1.1717E-03	**1.3976E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	1.6051E-03	1.4621E-03	1.4079E-03	1.2139E-03	**1.4222E-03**
C_a	Concentration (µg/m^3 (actual,wet))	7.4441E-01	6.3195E-01	5.8816E-01	5.1645E-01	**6.2024E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	1.5288E+00	1.3062E+00	1.2024E+00	1.0584E+00	**1.2740E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	1.7375E+00	1.5612E+00	1.4433E+00	1.2575E+00	**1.4999E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	1.7226E+00	1.5691E+00	1.5109E+00	1.3027E+00	**1.5263E+00**
$E_{lb/hr}$	Rate (lb/hr)	4.9181E-04	4.3641E-04	4.0909E-04	3.6493E-04	**4.2556E-04**
$E_{g/s}$	Rate (g/s)	6.1957E-05	5.4978E-05	5.1536E-05	4.5973E-05	**5.3611E-05**
$E_{T/yr}$	Rate (Ton/yr)	2.1541E-03	1.9115E-03	1.7918E-03	1.5984E-03	**1.8640E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	1.4548E-06	1.3072E-06	1.2085E-06	1.0529E-06	**1.2559E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	1.5202E-06	1.3847E-06	1.3334E-06	1.1497E-06	**1.3470E-06**

041113 140949
LLM@_I

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 20	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	12:52	
Stop Time (approx.)		15:14	09:55	12:28	15:03	
Mercury Results - Impinger 4 Solution						
C_{sd}	Concentration (lb/dscf)	<5.8803E-12	<5.5022E-12	<5.5317E-12	<5.4421E-12	**<5.5890E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.6832E-12	<6.5762E-12	<6.6399E-12	<6.4653E-12	**<6.5912E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<6.6256E-12	<6.6093E-12	<6.9508E-12	<6.6979E-12	**<6.7209E-12**
C_a	Concentration (lb/acf)	<3.0728E-12	<2.8567E-12	<2.9037E-12	<2.8497E-12	**<2.9207E-12**
C_{sd}	Concentration (µg/dscm)	<9.4164E-02	<8.8111E-02	<8.8582E-02	<8.7147E-02	**<8.9501E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.0702E-01	<1.0531E-01	<1.0633E-01	<1.0353E-01	**<1.0555E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.0610E-01	<1.0584E-01	<1.1131E-01	<1.0726E-01	**<1.0763E-01**
C_{sd}	Concentration (mg/dscm)	<9.4164E-05	<8.8111E-05	<8.8582E-05	<8.7147E-05	**<8.9501E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.0702E-04	<1.0531E-04	<1.0633E-04	<1.0353E-04	**<1.0555E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.0610E-04	<1.0584E-04	<1.1131E-04	<1.0726E-04	**<1.0763E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<4.9207E-02	<4.5746E-02	<4.6499E-02	<4.5633E-02	**<4.6771E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.0105E-01	<9.4558E-02	<9.5063E-02	<9.3524E-02	**<9.6050E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.1485E-01	<1.1301E-01	<1.1411E-01	<1.1111E-01	**<1.1327E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.1386E-01	<1.1358E-01	<1.1945E-01	<1.1511E-01	**<1.1550E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.2510E-05	<3.1592E-05	<3.2343E-05	<3.2246E-05	**<3.2172E-05**
$E_{g/s}$	Rate (g/s)	<4.0955E-06	<3.9798E-06	<4.0744E-06	<4.0622E-06	**<4.0530E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4239E-04	<1.3837E-04	<1.4166E-04	<1.4124E-04	**<1.4092E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<9.6167E-08	<9.4628E-08	<9.5544E-08	<9.3033E-08	**<9.4843E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.0049E-07	<1.0024E-07	<1.0542E-07	<1.0159E-07	**<1.0193E-07**

041113 140949
LLM@_I

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 20	Mar 20	Mar 20	
Start Time (approx.)		12:58	07:43	10:17	12:52	
Stop Time (approx.)		15:14	09:55	12:28	15:03	
Mercury Results - Filtered Permanganate Solution						
C_{sd}	Concentration (lb/dscf)	<1.4701E-11	<1.3756E-11	<1.3829E-11	<1.3605E-11	**<1.3973E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.6708E-11	<1.6440E-11	<1.6600E-11	<1.6163E-11	**<1.6478E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.6564E-11	<1.6523E-11	<1.7377E-11	<1.6745E-11	**<1.6802E-11**
C_a	Concentration (lb/acf)	<7.6820E-12	<7.1418E-12	<7.2593E-12	<7.1242E-12	**<7.3018E-12**
C_{sd}	Concentration (µg/dscm)	<2.3541E-01	<2.2028E-01	<2.2145E-01	<2.1787E-01	**<2.2375E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.6756E-01	<2.6327E-01	<2.6582E-01	<2.5883E-01	**<2.6387E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.6525E-01	<2.6460E-01	<2.7827E-01	<2.6814E-01	**<2.6906E-01**
C_{sd}	Concentration (mg/dscm)	<2.3541E-04	<2.2028E-04	<2.2145E-04	<2.1787E-04	**<2.2375E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.6756E-04	<2.6327E-04	<2.6582E-04	<2.5883E-04	**<2.6387E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.6525E-04	<2.6460E-04	<2.7827E-04	<2.6814E-04	**<2.6906E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.2302E-01	<1.1437E-01	<1.1625E-01	<1.1408E-01	**<1.1693E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.5264E-01	<2.3639E-01	<2.3766E-01	<2.3381E-01	**<2.4012E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.8713E-01	<2.8253E-01	<2.8527E-01	<2.7777E-01	**<2.8318E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.8466E-01	<2.8396E-01	<2.9863E-01	<2.8776E-01	**<2.8875E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.1275E-05	<7.8979E-05	<8.0856E-05	<8.0614E-05	**<8.0431E-05**
$E_{g/s}$	Rate (g/s)	<1.0239E-05	<9.9495E-06	<1.0186E-05	<1.0155E-05	**<1.0132E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.5598E-04	<3.4593E-04	<3.5415E-04	<3.5309E-04	**<3.5229E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.4042E-07	<2.3657E-07	<2.3886E-07	<2.3258E-07	**<2.3711E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.5122E-07	<2.5060E-07	<2.6355E-07	<2.5396E-07	**<2.5483E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate						
C_{sd}	Concentration (lb/dscf)	<1.1761E-11	<1.1004E-11	<1.1063E-11	<1.0884E-11	**<1.1178E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.3366E-11	<1.3152E-11	<1.3280E-11	<1.2931E-11	**<1.3182E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.3251E-11	<1.3219E-11	<1.3902E-11	<1.3396E-11	**<1.3442E-11**
C_a	Concentration (lb/acf)	<6.1456E-12	<5.7134E-12	<5.8075E-12	<5.6993E-12	**<5.8415E-12**
C_{sd}	Concentration (µg/dscm)	<1.8833E-01	<1.7622E-01	<1.7716E-01	<1.7429E-01	**<1.7900E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.1404E-01	<2.1062E-01	<2.1266E-01	<2.0707E-01	**<2.1110E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.1220E-01	<2.1168E-01	<2.2261E-01	<2.1452E-01	**<2.1525E-01**
C_{sd}	Concentration (mg/dscm)	<1.8833E-04	<1.7622E-04	<1.7716E-04	<1.7429E-04	**<1.7900E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.1404E-04	<2.1062E-04	<2.1266E-04	<2.0707E-04	**<2.1110E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.1220E-04	<2.1168E-04	<2.2261E-04	<2.1452E-04	**<2.1525E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<9.8413E-02	<9.1493E-02	<9.2998E-02	<9.1267E-02	**<9.3543E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.0211E-01	<1.8912E-01	<1.9013E-01	<1.8705E-01	**<1.9210E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.2971E-01	<2.2603E-01	<2.2822E-01	<2.2222E-01	**<2.2654E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.2773E-01	<2.2717E-01	<2.3890E-01	<2.3021E-01	**<2.3100E-01**
$E_{lb/hr}$	Rate (lb/hr)	<6.5020E-05	<6.3183E-05	<6.4685E-05	<6.4491E-05	**<6.4345E-05**
$E_{g/s}$	Rate (g/s)	<8.1909E-06	<7.9596E-06	<8.1488E-06	<8.1243E-06	**<8.1059E-06**
$E_{T/yr}$	Rate (Ton/yr)	<2.8479E-04	<2.7674E-04	<2.8332E-04	<2.8247E-04	**<2.8183E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.9233E-07	<1.8926E-07	<1.9109E-07	<1.8607E-07	**<1.8969E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.0098E-07	<2.0048E-07	<2.1084E-07	<2.0317E-07	**<2.0387E-07**

041113 140949
LLM@_I

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 SDA Inlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		08:15	09:48	11:19	
Stop Time (approx.)		09:15	10:48	12:19	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0008	1.0008	1.0008	
C_p	Pitot tube coefficient	0.8340	0.8340	0.8340	
P_g	Static pressure (in. H_2O)	-1.1000	-1.3000	-1.2000	
A_s	Sample location area (ft^2)	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	**29.8000**
O_2	Oxygen (dry volume %)	7.8600	8.2200	7.9400	**8.0067**
CO_2	Carbon dioxide (dry volume %)	11.2100	11.0600	11.4500	**11.2400**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.9300	80.7200	80.6100	**80.7533**
V_{lc}	Total Liquid collected (ml)	160.60	163.60	159.20	
V_m	Volume metered, meter conditions (ft^3)	34.2000	34.6100	34.7100	
T_m	Dry gas meter temperature (°F)	79.9583	86.5833	89.9583	
T_s	Sample temperature (°F)	471.1667	479.5000	482.2500	**477.6389**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2000	1.2000	1.2000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	7.5578	7.6990	7.4920	**7.5829**
V_{mstd}	Volume metered, standard (dscf)	33.4204	33.4111	33.3021	**33.3779**
P_s	Sample gas pressure, absolute (in. Hg)	29.7191	29.7044	29.7118	**29.7118**
P_v	Vapor pressure, actual (in. Hg)	29.7191	29.7044	29.7118	**29.7118**
B_{wo}	Moisture measured in sample (% by volume)	18.4435	18.7278	18.3653	**18.5122**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	18.4435	18.7278	18.3653	**18.5122**
M_d	MW of sample gas, dry (lb/lb-mole)	30.1080	30.0984	30.1496	**30.1187**
M_s	MW of sample gas, wet (lb/lb-mole)	27.8749	27.8326	27.9183	**27.8753**

Comments:

Average includes 3 runs.

041113 141042
MLF@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 SDA Inlet

USEPA Method 26A (HCl)
HCl Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		08:15	09:48	11:19	
Stop Time (approx.)		09:15	10:48	12:19	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.5	183.7	184.2	**184.1**
P_1	Fabric Filter Inlet Temperature - (°F)	319	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.8600	8.2200	7.9400	**8.0067**
CO_2	Carbon dioxide (dry volume %)	11.2100	11.0600	11.4500	**11.2400**
T_s	Sample temperature (°F)	471.1667	479.5000	482.2500	**477.6389**
B_w	Actual water vapor in gas (% by volume)	18.4435	18.7278	18.3653	**18.5122**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	33.4204	33.4111	33.3021	**33.3779**
Laboratory Data					
m_n	Total HCl collected (mg)	847.8255	768.1473	588.4414	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	5.5938E-05	5.0695E-05	3.8962E-05	**4.8531E-05**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	5.9627E-05	5.5572E-05	4.1788E-05	**5.2329E-05**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	5.9880E-05	5.5003E-05	4.0833E-05	**5.1905E-05**
C_{sd}	HCl Concentration (ppmdv)	591.4048	535.9737	411.9292	**513.1026**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	630.4085	587.5422	441.8068	**553.2525**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	633.0827	581.5266	431.7162	**548.7752**
C_w	HCl Concentration (ppmwv)	482.3289	435.5978	336.2771	**418.0679**
C_{sd}	HCl Concentration (mg/dscm)	895.7611	811.8034	623.9215	**777.1620**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	954.8374	889.9107	669.1751	**837.9744**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	958.8879	880.7993	653.8915	**831.1929**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	961.3046	871.2036	669.5743	**834.0275**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	1024.7035	955.0261	718.1391	**899.2896**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	1029.0504	945.2481	701.7372	**892.0119**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.8580	0.7997	0.6013	**0.7530**
E_{Fc}	HCl Rate - Fc-based (lb/MMBtu)	0.9082	0.8342	0.6193	**0.7872**

041613 082709
MLF@_@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		08:15	09:48	11:19	
Stop Time (approx.)		09:15	10:48	12:19	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9879	0.9879	0.9879	
P_g	Static pressure (in. H_2O)	-9.2000	-9.9000	-9.9000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	**29.8000**
O_2	Oxygen (dry volume %)	8.5200	8.8100	9.0600	**8.7967**
CO_2	Carbon dioxide (dry volume %)	10.6100	10.5000	10.3300	**10.4800**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.8700	80.6900	80.6100	**80.7233**
V_{lc}	Total Liquid collected (ml)	236.50	237.30	233.10	
V_m	Volume metered, meter conditions (ft^3)	40.7850	40.9650	40.9400	
T_m	Dry gas meter temperature (°F)	78.0417	77.5833	79.5417	
T_s	Sample temperature (°F)	300.5833	301.7500	302.3333	**301.5556**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.5000	1.5000	1.5000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	11.1297	11.1673	10.9697	**11.0889**
V_{mstd}	Volume metered, standard (dscf)	39.5109	39.7191	39.5508	**39.5936**
P_s	Sample gas pressure, absolute (in. Hg)	29.1235	29.0721	29.0721	**29.0892**
P_v	Vapor pressure, actual (in. Hg)	29.1235	29.0721	29.0721	**29.0892**
B_{wo}	Moisture measured in sample (% by volume)	21.9778	21.9456	21.7133	**21.8789**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.9778	21.9456	21.7133	**21.8789**
M_d	MW of sample gas, dry (lb/lb-mole)	30.0384	30.0324	30.0152	**30.0287**
M_s	MW of sample gas, wet (lb/lb-mole)	27.3926	27.3918	27.4063	**27.3969**

Comments:
Average includes 3 runs.

041113 141205
SON@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 1 FF Outlet

USEPA Method 26A (HCl)
HCl Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		08:15	09:48	11:19	
Stop Time (approx.)		09:15	10:48	12:19	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.5	183.7	184.2	**184.1**
P_1	Fabric Filter Inlet Temperature - (°F)	319	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.5200	8.8100	9.0600	**8.7967**
CO_2	Carbon dioxide (dry volume %)	10.6100	10.5000	10.3300	**10.4800**
T_s	Sample temperature (°F)	300.5833	301.7500	302.3333	**301.5556**
B_w	Actual water vapor in gas (% by volume)	21.9778	21.9456	21.7133	**21.8789**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	39.5109	39.7191	39.5508	**39.5936**
Laboratory Data					
m_n	Total HCl collected (mg)	5.1420	4.8573	4.0030	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	2.8696E-07	2.6965E-07	2.2317E-07	**2.5993E-07**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	3.2220E-07	3.1002E-07	2.6200E-07	**2.9807E-07**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	3.2456E-07	3.0818E-07	2.5925E-07	**2.9733E-07**
C_{sd}	HCl Concentration (ppmdv)	3.0340	2.8509	2.3595	**2.7481**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	3.4065	3.2778	2.7700	**3.1514**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	3.4314	3.2582	2.7410	**3.1435**
C_w	HCl Concentration (ppmwv)	2.3672	2.2253	1.8472	**2.1465**
C_{sd}	HCl Concentration (mg/dscm)	4.5953	4.3181	3.5738	**4.1624**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	5.1595	4.9646	4.1956	**4.7732**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	5.1973	4.9350	4.1516	**4.7613**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	4.9316	4.6341	3.8353	**4.4670**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	5.5371	5.3279	4.5026	**5.1225**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	5.5776	5.2961	4.4553	**5.1097**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.0046	0.0045	0.0038	**0.0043**
E_{Fc}	HCl Rate - Fc-based (lb/MMBtu)	0.0049	0.0047	0.0039	**0.0045**

041613 082225
S O N @_@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		07:54	10:35	13:25	
Stop Time (approx.)		10:07	12:48	15:37	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0050	1.0050	1.0050	
C_p	Pitot tube coefficient	0.8240	0.8240	0.8240	
P_g	Static pressure (In. H_2O)	-8.7000	-9.2000	-8.6000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	**29.8000**
D_n	Nozzle diameter (in.)	0.2725	0.2725	0.2725	
O_2	Oxygen (dry volume %)	7.2000	7.2800	7.3400	**7.2733**
CO_2	Carbon dioxide (dry volume %)	11.7000	11.7300	11.8300	**11.7533**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.1000	80.9900	80.8300	**80.9733**
V_{lc}	Total Liquid collected (ml)	427.60	392.00	403.20	
V_m	Volume metered, meter conditions (ft^3)	66.3100	63.2750	64.9550	
T_m	Dry gas meter temperature (°F)	83.3400	88.4600	96.6200	
T_s	Sample temperature (°F)	305.9600	305.2400	305.7600	**305.6533**
ΔH	Meter box orifice pressure drop (in. H_2O)	0.8728	0.7912	0.8176	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	20.1229	18.4475	18.9746	**19.1817**
V_{mstd}	Volume metered, standard (dscf)	64.6134	61.0682	61.7746	**62.4854**
P_s	Sample gas pressure, absolute (in. Hg)	29.1603	29.1235	29.1676	**29.1505**
P_v	Vapor pressure, actual (in. Hg)	29.1603	29.1235	29.1676	**29.1505**
B_{wo}	Moisture measured in sample (% by volume)	23.7476	23.1998	23.4982	**23.4819**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	23.7476	23.1998	23.4982	**23.4819**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.5947	0.5733	0.5755	**0.5812**
M_d	MW of sample gas, dry (lb/lb-mole)	30.1600	30.1680	30.1864	**30.1715**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2723	27.3450	27.3228	**27.3134**
V_s	Velocity of sample (ft/sec)	41.1172	39.5875	39.7362	**40.1470**
%I	Isokinetic sampling (%)	101.0466	98.5168	99.5873	**99.7169**
Q_a	Volumetric flow rate, actual (acfm)	157,890	152,016	152,587	**154,164**
Q_s	Volumetric flow rate, standard (scfm)	106,075	102,096	102,565	**103,579**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	80,885	78,410	78,464	**79,253**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	79,721	76,830	76,545	**77,699**
Q_a	Volumetric flow rate, actual (acf/hr)	9,473,397	9,120,950	9,155,228	**9,249,859**
Q_s	Volumetric flow rate, standard (scf/hr)	6,364,494	6,125,743	6,153,897	**6,214,711**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,853,077	4,704,580	4,707,843	**4,755,167**
Q_a	Volumetric flow rate, actual (m^3/hr)	268,292	258,311	259,281	**261,961**
Q_s	Volumetric flow rate, standard (m^3/hr)	180,246	173,485	174,282	**176,004**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	137,442	133,236	133,329	**134,669**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	135,464	130,553	130,068	**132,028**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	167,957	161,656	162,399	**164,004**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	128,071	124,152	124,238	**125,487**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	126,228	121,651	121,199	**123,026**

Comments:

Average includes 3 runs.

041113 141248
OJQ@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 5/202 (FPM/CPM)
Emission Parameters for FPM

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		07:54	10:35	13:25	
Stop Time (approx.)		10:07	12:48	15:37	
Process Conditions					
R_p	Steam Production Rate (Klbs/hr)	184	184	184	184
P_1	Fabroc Filter Inlet Temperature (°F)	320	320	320	320
P_2	Carbon Feed Rate - (lbs/hr)				
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Conditions					
O_2	Oxygen (dry volume %)	7.2000	7.2800	7.3400	7.2733
CO_2	Carbon dioxide (dry volume %)	11.7000	11.7300	11.8300	11.7533
T_s	Sample temperature (°F)	305.9600	305.2400	305.7600	305.6533
B_w	Actual water vapor in gas (% by volume)	23.7476	23.1998	23.4982	23.4819
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	157,890	152,016	152,587	154,164
Q_s	Volumetric flow rate, standard (scfm)	106,075	102,096	102,565	103,579
Q_{std}	Volumetric flow rate, dry standard (dscfm)	80,885	78,410	78,464	79,253
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	79,721	76,830	76,545	77,699
Q_a	Volumetric flow rate, actual (acf/hr)	9,473,397	9,120,950	9,155,228	9,249,859
Q_s	Volumetric flow rate, standard (scf/hr)	6,364,494	6,125,743	6,153,897	6,214,711
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,853,077	4,704,580	4,707,843	4,755,167
Q_a	Volumetric flow rate, actual (m^3/hr)	268,292	258,311	259,281	261,961
Q_s	Volumetric flow rate, standard (m^3/hr)	180,246	173,485	174,282	176,004
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	137,442	133,236	133,329	134,669
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	135,464	130,553	130,068	132,028
Q_s	Volumetric flow rate, normal (Nm^3/hr)	167,957	161,658	162,399	164,004
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	128,071	124,152	124,238	125,487
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	126,228	121,651	121,199	123,026
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	64.6134	61.0682	61.7746	62.4854
%I	Isokinetic sampling (%)	101.0468	98.5168	99.5873	99.7169
Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00120	0.00100	0.00110	
m_s	Matter collected in solvent rinse(s) (g)	0.00190	0.00041	0.00207	
m_n	Total filterable particulate matter (g)	0.00310	0.00141	0.00317	
n_{MDL}	Number of non-detectable fractions	N/A	N/A	N/A	
DLC	Detection level classification	ADL	ADL	ADL	
Filterable Particulate Matter Results					
C_{sd}	Particulate Concentration (lb/dscf)	1.0575E-07	5.1053E-08	1.1323E-07	9.0009E-08
C_{sd7}	Particulate Concentration @7% O_2 (lb/dscf)	1.0729E-07	5.2102E-08	1.1607E-07	9.1820E-08
C_{sd12}	Particulate Concentration @12% CO_2 (lb/dscf)	1.0846E-07	5.2228E-08	1.1485E-07	9.1847E-08
C_a	Particulate Concentration (lb/acf)	5.4173E-08	2.6333E-08	5.8224E-08	4.6243E-08
C_{sd}	Particulate Concentration (gr/dscf)	0.0007	0.0004	0.0008	0.0006
C_{sd7}	Particulate Concentration @7% O_2 (gr/dscf)	0.0008	0.0004	0.0008	0.0006
C_{sd12}	Particulate Concentration @12% CO_2 (gr/dscf)	0.0008	0.0004	0.0008	0.0006
C_a	Particulate Concentration (gr/acf)	0.0004	0.0002	0.0004	0.0003
C_{sd}	Particulate Concentration (mg/dscm)	1.6934	0.8175	1.8132	1.4414
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	1.7181	0.8343	1.8586	1.4704
C_{sd12}	Particulate Concentration @12% CO_2 (mg/dscm)	1.7368	0.8364	1.8392	1.4708
C_a	Particulate Concentration (mg/m^3 (actual,wet))	0.8675	0.4217	0.9324	0.7405
C_{sd}	Particulate Concentration (mg/Nm^3 dry)	1.8173	0.8774	1.9459	1.5468
C_{sd7}	Particulate Concentration @7% O_2 (mg/Nm^3 dry)	1.8438	0.8954	1.9946	1.5780
C_{sd12}	Particulate Concentration @12% CO_2 (mg/Nm^3 dry)	1.8639	0.8976	1.9738	1.5784
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.5132	0.2402	0.5331	0.4288
$E_{kg/hr}$	Particulate Rate (kg/hr)	0.2327	0.1089	0.2417	0.1945
$E_{T/yr}$	Particulate Rate (Ton/yr)	2.2478	1.0520	2.3348	1.8782
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0015	0.0007	0.0017	0.0013
E_{Fc}	Particulate Rate - F_c-based (lb/MMBtu)	0.0016	0.0008	0.0017	0.0014

Comments:

Average includes 3 runs.

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

DLL = Detection Level Limited - some fractions are below detection limit

BDL = Below Detection Limit - all fractions are below detection limit

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Cadmium (Cd) Emission Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		07:54	10:35	13:25	
Stop Time (approx.)		10:07	12:48	15:37	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.2	183.6	183.7	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.2000	7.2800	7.3400	**7.2733**
CO_2	Carbon dioxide (dry volume %)	11.7000	11.7300	11.8300	**11.7533**
T_s	Sample temperature (°F)	305.9600	305.2400	305.7600	**305.6533**
B_w	Actual water vapor in gas (% by volume)	23.7476	23.1998	23.4982	**23.4819**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	157,890	152,016	152,587	**154,164**
Q_s	Volumetric flow rate, standard (scfm)	106,075	102,096	102,565	**103,579**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	80,885	78,410	78,464	**79,253**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	64.6134	61.0682	61.7746	**62.4854**
%I	Isokinetic sampling (%)	101.0466	98.5168	99.5873	**99.7169**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	1.1982	1.1173	0.9498	
Cadmium Results - Total					
C_{sd}	Concentration (lb/dscf)	4.0891E-11	4.0341E-11	3.3901E-11	**3.8377E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	4.1488E-11	4.1170E-11	3.4751E-11	**3.9136E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	4.1939E-11	4.1269E-11	3.4388E-11	**3.9199E-11**
C_a	Concentration (lb/acf)	2.0948E-11	2.0808E-11	1.7433E-11	**1.9729E-11**
C_{sd}	Concentration (µg/dscm)	6.5481E-01	6.4600E-01	5.4287E-01	**6.1456E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	6.6437E-01	6.5928E-01	5.5648E-01	**6.2671E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	6.7160E-01	6.6087E-01	5.5067E-01	**6.2772E-01**
C_{sd}	Concentration (mg/dscm)	6.5481E-04	6.4600E-04	5.4287E-04	**6.1456E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	6.6437E-04	6.5928E-04	5.5648E-04	**6.2671E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	6.7160E-04	6.6087E-04	5.5067E-04	**6.2772E-04**
C_a	Concentration (µg/m^3 (actual,wet))	3.3545E-01	3.3321E-01	2.7916E-01	**3.1594E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	7.0272E-01	6.9327E-01	5.8260E-01	**6.5953E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	7.1298E-01	7.0752E-01	5.9720E-01	**6.7257E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	7.2074E-01	7.0923E-01	5.9097E-01	**6.7365E-01**
$E_{lb/hr}$	Rate (lb/hr)	1.9845E-04	1.8979E-04	1.5960E-04	**1.8261E-04**
$E_{g/s}$	Rate (g/s)	2.5000E-05	2.3909E-05	2.0106E-05	**2.3005E-05**
$E_{T/yr}$	Rate (Ton/yr)	8.6920E-04	8.3127E-04	6.9904E-04	**7.9984E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	5.9699E-07	5.9241E-07	5.0004E-07	**5.6315E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	6.3608E-07	6.2592E-07	5.2155E-07	**5.9452E-07**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2006-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Lead (Pb) Emission Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 19	Mar 19	
Start Time (approx.)		07:54	10:35	13:25	
Stop Time (approx.)		10:07	12:48	15:37	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.2	183.6	183.7	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.2000	7.2800	7.3400	**7.2733**
CO_2	Carbon dioxide (dry volume %)	11.7000	11.7300	11.8300	**11.7533**
T_s	Sample temperature (°F)	305.9600	305.2400	305.7600	**305.6533**
B_w	Actual water vapor in gas (% by volume)	23.7476	23.1998	23.4982	**23.4819**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	157,890	152,016	152,587	**154,164**
Q_s	Volumetric flow rate, standard (scfm)	106,075	102,096	102,565	**103,579**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	80,885	78,410	78,464	**79,253**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	64.6134	61.0682	61.7746	**62.4854**
%I	Isokinetic sampling (%)	101.0466	98.5168	99.5873	**99.7169**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	7.9262	10.2772	7.1546	
Lead Results - Total					
C_{sd}	Concentration (lb/dscf)	2.7049E-10	3.7108E-10	2.5538E-10	**2.9898E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.7444E-10	3.7871E-10	2.6178E-10	**3.0498E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.7742E-10	3.7962E-10	2.5905E-10	**3.0537E-10**
C_a	Concentration (lb/acf)	1.3857E-10	1.9140E-10	1.3132E-10	**1.5376E-10**
C_{sd}	Concentration (µg/dscm)	4.3315E+00	5.9423E+00	4.0896E+00	**4.7878E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	4.3947E+00	6.0645E+00	4.1921E+00	**4.8838E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	4.4426E+00	6.0791E+00	4.1483E+00	**4.8900E+00**
C_{sd}	Concentration (mg/dscm)	4.3315E-03	5.9423E-03	4.0896E-03	**4.7878E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	4.3947E-03	6.0645E-03	4.1921E-03	**4.8838E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	4.4426E-03	6.0791E-03	4.1483E-03	**4.8900E-03**
C_a	Concentration (µg/m^3 (actual,wet))	2.2190E+00	3.0651E+00	2.1029E+00	**2.4623E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	4.6484E+00	6.3771E+00	4.3888E+00	**5.1381E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.7163E+00	6.5082E+00	4.4988E+00	**5.2411E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.7676E+00	6.5239E+00	4.4519E+00	**5.2478E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.3127E-03	1.7458E-03	1.2023E-03	**1.4203E-03**
$E_{g/s}$	Rate (g/s)	1.6537E-04	2.1993E-04	1.5146E-04	**1.7892E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.7496E-03	7.6465E-03	5.2660E-03	**6.2207E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.9490E-06	5.4494E-06	3.7669E-06	**4.3884E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	4.2076E-06	5.7576E-06	3.9289E-06	**4.6314E-06**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2006-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	4*	Average
Date (2013)		Mar 19	Mar 19	Mar 19	Mar 21	
Start Time (approx.)		07:54	10:35	13:25	12:05	
Stop Time (approx.)		10:07	12:48	15:37	14:26	
Sampling Conditions						
Y_d	Dry gas meter correction factor	1.0050	1.0050	1.0050	0.9972	
C_p	Pitot tube coefficient	0.8240	0.8240	0.8240	0.8130	
P_g	Static pressure (in. H_2O)	-8.7000	-9.2000	-8.6000	-9.4000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	29.75	**29.8000**
D_n	Nozzle diameter (in.)	0.2725	0.2725	0.2725	0.2760	
O_2	Oxygen (dry volume %)	7.2000	7.2800	7.3400	7.2000	**7.2733**
CO_2	Carbon dioxide (dry volume %)	11.7000	11.7300	11.8300	11.7000	**11.7533**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.1000	80.9900	80.8300	81.1000	**80.9733**
V_{lc}	Total Liquid collected (ml)	427.60	392.00	403.20	427.60	
V_m	Volume metered, meter conditions (ft^3)	66.3100	63.2750	64.9550	70.8100	
T_m	Dry gas meter temperature (°F)	83.3400	88.4600	96.6200	84.4400	
T_s	Sample temperature (°F)	305.9600	305.2400	305.7600	304.0000	**305.6533**
ΔH	Meter box orifice pressure drop (in. H_2O)	0.8728	0.7912	0.8176	1.0840	
θ	Total sampling time (min)	125.0	125.0	125.0	125.0	
Flow Results						
V_{wstd}	Volume of water collected (ft^3)	20.1229	18.4475	18.9746	20.1229	**19.1817**
V_{mstd}	Volume metered, standard (dscf)	64.6134	61.0682	61.7746	68.2456	**62.4854**
P_s	Sample gas pressure, absolute (in. Hg)	29.1603	29.1235	29.1676	29.0588	**29.1505**
P_v	Vapor pressure, actual (in. Hg)	29.1603	29.1235	29.1676	29.0588	**29.1505**
B_{wo}	Moisture measured in sample (% by volume)	23.7476	23.1998	23.4982	22.7715	**23.4819**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	23.7476	23.1998	23.4982	22.7715	**23.4819**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.5947	0.5733	0.5755	0.6270	**0.5812**
M_d	MW of sample gas, dry (lb/lb-mole)	30.1600	30.1680	30.1864	30.1600	**30.1715**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2723	27.3450	27.3228	27.3910	**27.3134**
V_s	Velocity of sample (ft/sec)	41.1172	39.5875	39.7362	42.6931	**40.1470**
%I	Isokinetic sampling (%)	101.0466	98.5168	99.5873	99.0218	**99.7169**
Q_a	Volumetric flow rate, actual (acfm)	157,890	152,016	152,587	163,942	**154,164**
Q_s	Volumetric flow rate, standard (scfm)	106,075	102,096	102,565	110,039	**103,579**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	80,885	78,410	78,464	84,981	**79,253**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	79,721	76,830	76,545	83,759	**77,699**
Q_a	Volumetric flow rate, actual (acf/hr)	9,473,397	9,120,950	9,155,228	9,836,491	**9,249,859**
Q_s	Volumetric flow rate, standard (scf/hr)	6,364,494	6,125,743	6,153,897	6,602,330	**6,214,711**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,853,077	4,704,580	4,707,843	5,098,877	**4,755,167**
Q_a	Volumetric flow rate, actual (m^3/hr)	268,292	258,311	259,281	278,575	**261,961**
Q_s	Volumetric flow rate, standard (m^3/hr)	180,246	173,485	174,282	186,982	**176,004**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	137,442	133,236	133,329	144,403	**134,669**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	135,464	130,553	130,068	142,325	**132,028**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	167,957	161,656	162,399	174,233	**164,004**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	128,071	124,152	124,238	134,558	**125,487**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	126,228	121,651	121,199	132,621	**123,026**

Comments:

Average includes 3 runs. * indicates that the run is not included in the average.

041113 145940
OJQL

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 19	Mar 19	Mar 21	
Start Time (approx.)		07:54	10:35	13:25	12:05	
Stop Time (approx.)		10:07	12:48	15:37	14:26	
Process Conditions						
R_P	Steam Production Rate - (Klbs/hour)	184.2	183.6	183.7	183.9	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760	**8,760**
Gas Conditions						
O_2	Oxygen (dry volume %)	7.2000	7.2800	7.3400	7.2000	**7.2550**
CO_2	Carbon dioxide (dry volume %)	11.7000	11.7300	11.8300	11.7000	**11.7400**
T_s	Sample temperature (°F)	305.9600	305.2400	305.7600	304.0000	**305.2400**
B_w	Actual water vapor in gas (% by volume)	23.7476	23.1998	23.4982	22.7715	**23.3043**
Gas Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	157,890	152,016	152,587	163,942	**156,609**
Q_s	Volumetric flow rate, standard (scfm)	106,075	102,096	102,565	110,039	**105,194**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	80,885	78,410	78,464	84,981	**80,685**
Sampling Data						
V_{mstd}	Volume metered, standard (dscf)	64.6134	61.0682	61.7746	68.2456	**63.9254**
%I	Isokinetic sampling (%)	101.0466	98.5168	99.5873	99.0218	**99.5431**
Laboratory Data						
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	7.1159	6.2235	7.3137	4.8649	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	<0.5000	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	7.1159	6.2235	7.3137	4.8649	
Mercury Results - Total						
C_{sd}	Concentration (lb/dscf)	2.4284E-10	2.2471E-10	2.6106E-10	1.5718E-10	**2.2145E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.4638E-10	2.2933E-10	2.6760E-10	1.5948E-10	**2.2570E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.4906E-10	2.2989E-10	2.6481E-10	1.6121E-10	**2.2624E-10**
C_a	Concentration (lb/acf)	1.2440E-10	1.1591E-10	1.3424E-10	8.1478E-11	**1.1401E-10**
C_{sd}	Concentration (µg/dscm)	3.8887E+00	3.5985E+00	4.1804E+00	2.5171E+00	**3.5462E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.9455E+00	3.6724E+00	4.2853E+00	2.5538E+00	**3.6142E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.9884E+00	3.6813E+00	4.2405E+00	2.5816E+00	**3.6230E+00**
C_{sd}	Concentration (mg/dscm)	3.8887E-03	3.5985E-03	4.1804E-03	2.5171E-03	**3.5462E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.9455E-03	3.6724E-03	4.2853E-03	2.5538E-03	**3.6142E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.9884E-03	3.6813E-03	4.2405E-03	2.5816E-03	**3.6230E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.9921E+00	1.8561E+00	2.1497E+00	1.3047E+00	**1.8257E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	4.1732E+00	3.8618E+00	4.4863E+00	2.7012E+00	**3.8056E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.2342E+00	3.9412E+00	4.5988E+00	2.7407E+00	**3.8787E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.2802E+00	3.9507E+00	4.5508E+00	2.7705E+00	**3.8880E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.1785E-03	1.0572E-03	1.2290E-03	8.0145E-04	**1.0665E-03**
$E_{g/s}$	Rate (g/s)	1.4846E-04	1.3318E-04	1.5483E-04	1.0096E-04	**1.3436E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.1619E-03	4.6305E-03	5.3831E-03	3.5104E-03	**4.6714E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.5453E-06	3.3000E-06	3.8506E-06	2.2948E-06	**3.2477E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.7775E-06	3.4866E-06	4.0162E-06	2.4451E-06	**3.4313E-06**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2006-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Front Half Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 19	Mar 19	Mar 21	
Start Time (approx.)		07:54	10:35	13:25	12:05	
Stop Time (approx.)		10:07	12:48	15:37	14:26	
Mercury Results - Front Half						
C_{sd}	Concentration (lb/dscf)	<3.4126E-12	<3.6107E-12	<3.5694E-12	<3.2310E-12	**<3.4559E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.4624E-12	<3.6849E-12	<3.6589E-12	<3.2781E-12	**<3.5211E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.5001E-12	<3.6938E-12	<3.6207E-12	<3.3138E-12	**<3.5321E-12**
C_a	Concentration (lb/acf)	<1.7482E-12	<1.8624E-12	<1.8355E-12	<1.6748E-12	**<1.7802E-12**
C_{sd}	Concentration (µg/dscm)	<5.4648E-02	<5.7821E-02	<5.7159E-02	<5.1740E-02	**<5.5342E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<5.5446E-02	<5.9009E-02	<5.8593E-02	<5.2495E-02	**<5.6386E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<5.6049E-02	<5.9152E-02	<5.7981E-02	<5.3066E-02	**<5.6562E-02**
C_{sd}	Concentration (mg/dscm)	<5.4648E-05	<5.7821E-05	<5.7159E-05	<5.1740E-05	**<5.5342E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<5.5446E-05	<5.9009E-05	<5.8593E-05	<5.2495E-05	**<5.6386E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<5.6049E-05	<5.9152E-05	<5.7981E-05	<5.3066E-05	**<5.6562E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.7995E-02	<2.9824E-02	<2.9393E-02	<2.6820E-02	**<2.8508E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.8647E-02	<6.2051E-02	<6.1342E-02	<5.5525E-02	**<5.9391E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<5.9503E-02	<6.3327E-02	<6.2880E-02	<5.6336E-02	**<6.0511E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<6.0151E-02	<6.3480E-02	<6.2223E-02	<5.6949E-02	**<6.0701E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.6562E-05	<1.6987E-05	<1.6804E-05	<1.6474E-05	**<1.6707E-05**
$E_{g/s}$	Rate (g/s)	<2.0864E-06	<2.1399E-06	<2.1169E-06	<2.0754E-06	**<2.1047E-06**
$E_{T/yr}$	Rate (Ton/yr)	<7.2540E-05	<7.4403E-05	<7.3603E-05	<7.2158E-05	**<7.3176E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<4.9822E-08	<5.3024E-08	<5.2650E-08	<4.7171E-08	**<5.0667E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<5.3085E-08	<5.6023E-08	<5.4914E-08	<5.0260E-08	**<5.3570E-08**

041113 145940
DJOL_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 19	Mar 19	Mar 21	
Start Time (approx.)		07:54	10:35	13:25	12:05	
Stop Time (approx.)		10:07	12:48	15:37	14:26	
Mercury Results - Impingers 1-3 Solution						
C_{sd}	Concentration (lb/dscf)	2.4284E-10	2.2471E-10	2.6106E-10	1.5718E-10	**2.2145E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.4638E-10	2.2933E-10	2.6760E-10	1.5948E-10	**2.2570E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.4906E-10	2.2989E-10	2.6481E-10	1.6121E-10	**2.2624E-10**
C_a	Concentration (lb/acf)	1.2440E-10	1.1591E-10	1.3424E-10	8.1478E-11	**1.1401E-10**
C_{sd}	Concentration (µg/dscm)	3.8887E+00	3.5985E+00	4.1804E+00	2.5171E+00	**3.5462E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.9455E+00	3.6724E+00	4.2853E+00	2.5538E+00	**3.6142E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.9884E+00	3.6813E+00	4.2405E+00	2.5816E+00	**3.6230E+00**
C_{sd}	Concentration (mg/dscm)	3.8887E-03	3.5985E-03	4.1804E-03	2.5171E-03	**3.5462E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.9455E-03	3.6724E-03	4.2853E-03	2.5538E-03	**3.6142E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.9884E-03	3.6813E-03	4.2405E-03	2.5816E-03	**3.6230E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.9921E+00	1.8561E+00	2.1497E+00	1.3047E+00	**1.8257E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	4.1732E+00	3.8618E+00	4.4863E+00	2.7012E+00	**3.8056E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	4.2342E+00	3.9412E+00	4.5988E+00	2.7407E+00	**3.8787E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	4.2802E+00	3.9507E+00	4.5508E+00	2.7705E+00	**3.8880E+00**
$E_{lb/hr}$	Rate (lb/hr)	1.1785E-03	1.0572E-03	1.2290E-03	8.0145E-04	**1.0665E-03**
$E_{g/s}$	Rate (g/s)	1.4846E-04	1.3318E-04	1.5483E-04	1.0096E-04	**1.3436E-04**
$E_{T/yr}$	Rate (Ton/yr)	5.1619E-03	4.6305E-03	5.3831E-03	3.5104E-03	**4.6714E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	3.5453E-06	3.3000E-06	3.8506E-06	2.2948E-06	**3.2477E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.7775E-06	3.4866E-06	4.0162E-06	2.4451E-06	**3.4313E-06**

041113 145940
OJQL_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 19	Mar 19	Mar 21	
Start Time (approx.)		07:54	10:35	13:25	12:05	
Stop Time (approx.)		10:07	12:48	15:37	14:26	
Mercury Results - Impinger 4 Solution						
C_{sd}	Concentration (lb/dscf)	<6.8252E-12	<7.2214E-12	<7.1389E-12	<6.4620E-12	**<6.9119E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<6.9248E-12	<7.3699E-12	<7.3179E-12	<6.5563E-12	**<7.0422E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.0002E-12	<7.3877E-12	<7.2414E-12	<6.6277E-12	**<7.0642E-12**
C_a	Concentration (lb/acf)	<3.4965E-12	<3.7248E-12	<3.6710E-12	<3.3496E-12	**<3.5605E-12**
C_{sd}	Concentration (µg/dscm)	<1.0930E-01	<1.1564E-01	<1.1432E-01	<1.0348E-01	**<1.1068E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1089E-01	<1.1802E-01	<1.1719E-01	<1.0499E-01	**<1.1277E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.1210E-01	<1.1830E-01	<1.1596E-01	<1.0613E-01	**<1.1312E-01**
C_{sd}	Concentration (mg/dscm)	<1.0930E-04	<1.1564E-04	<1.1432E-04	<1.0348E-04	**<1.1068E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1089E-04	<1.1802E-04	<1.1719E-04	<1.0499E-04	**<1.1277E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.1210E-04	<1.1830E-04	<1.1596E-04	<1.0613E-04	**<1.1312E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<5.5991E-02	<5.9648E-02	<5.8786E-02	<5.3640E-02	**<5.7016E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.1729E-01	<1.2410E-01	<1.2268E-01	<1.1105E-01	**<1.1878E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.1901E-01	<1.2665E-01	<1.2576E-01	<1.1267E-01	**<1.2102E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.2030E-01	<1.2696E-01	<1.2445E-01	<1.1390E-01	**<1.2140E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.3123E-05	<3.3974E-05	<3.3609E-05	<3.2949E-05	**<3.3414E-05**
$E_{g/s}$	Rate (g/s)	<4.1727E-06	<4.2799E-06	<4.2339E-06	<4.1508E-06	**<4.2093E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4508E-04	<1.4881E-04	<1.4721E-04	<1.4432E-04	**<1.4635E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<9.9645E-08	<1.0605E-07	<1.0530E-07	<9.4341E-08	**<1.0133E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.0617E-07	<1.1205E-07	<1.0983E-07	<1.0052E-07	**<1.0714E-07**

041113 145940
OJQL_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 19	Mar 19	Mar 19	Mar 21	
Start Time (approx.)		07:54	10:35	13:25	12:05	
Stop Time (approx.)		10:07	12:48	15:37	14:26	
Mercury Results - Filtered Permanganate Solution						
C_{sd}	Concentration (lb/dscf)	<1.7063E-11	<1.8054E-11	<1.7847E-11	<1.6155E-11	**<1.7280E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.7312E-11	<1.8425E-11	<1.8295E-11	<1.6391E-11	**<1.7606E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.7501E-11	<1.8469E-11	<1.8104E-11	<1.6569E-11	**<1.7661E-11**
C_a	Concentration (lb/acf)	<8.7411E-12	<9.3120E-12	<9.1774E-12	<8.3741E-12	**<8.9012E-12**
C_{sd}	Concentration (µg/dscm)	<2.7324E-01	<2.8910E-01	<2.8580E-01	<2.5870E-01	**<2.7671E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.7723E-01	<2.9505E-01	<2.9296E-01	<2.6247E-01	**<2.8193E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.8025E-01	<2.9576E-01	<2.8990E-01	<2.6533E-01	**<2.8281E-01**
C_{sd}	Concentration (mg/dscm)	<2.7324E-04	<2.8910E-04	<2.8580E-04	<2.5870E-04	**<2.7671E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.7723E-04	<2.9505E-04	<2.9296E-04	<2.6247E-04	**<2.8193E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.8025E-04	<2.9576E-04	<2.8990E-04	<2.6533E-04	**<2.8281E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.3998E-01	<1.4912E-01	<1.4696E-01	<1.3410E-01	**<1.4254E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.9323E-01	<3.1026E-01	<3.0671E-01	<2.7763E-01	**<2.9696E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.9751E-01	<3.1664E-01	<3.1440E-01	<2.8168E-01	**<3.0256E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.0075E-01	<3.1740E-01	<3.1112E-01	<2.8475E-01	**<3.0350E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.2808E-05	<8.4935E-05	<8.4022E-05	<8.2372E-05	**<8.3534E-05**
$E_{g/s}$	Rate (g/s)	<1.0432E-05	<1.0700E-05	<1.0585E-05	<1.0377E-05	**<1.0523E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.6270E-04	<3.7201E-04	<3.6801E-04	<3.6079E-04	**<3.6588E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.4911E-07	<2.6512E-07	<2.6325E-07	<2.3585E-07	**<2.5333E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.6542E-07	<2.8012E-07	<2.7457E-07	<2.5130E-07	**<2.6785E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate						
C_{sd}	Concentration (lb/dscf)	<1.3650E-11	<1.4443E-11	<1.4278E-11	<1.2924E-11	**<1.3824E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.3850E-11	<1.4740E-11	<1.4636E-11	<1.3113E-11	**<1.4084E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.4000E-11	<1.4775E-11	<1.4483E-11	<1.3255E-11	**<1.4128E-11**
C_a	Concentration (lb/acf)	<6.9929E-12	<7.4496E-12	<7.3420E-12	<6.6993E-12	**<7.1209E-12**
C_{sd}	Concentration (µg/dscm)	<2.1859E-01	<2.3128E-01	<2.2864E-01	<2.0696E-01	**<2.2137E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.2178E-01	<2.3604E-01	<2.3437E-01	<2.0998E-01	**<2.2554E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.2420E-01	<2.3661E-01	<2.3192E-01	<2.1227E-01	**<2.2625E-01**
C_{sd}	Concentration (mg/dscm)	<2.1859E-04	<2.3128E-04	<2.2864E-04	<2.0696E-04	**<2.2137E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.2178E-04	<2.3604E-04	<2.3437E-04	<2.0998E-04	**<2.2554E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.2420E-04	<2.3661E-04	<2.3192E-04	<2.1227E-04	**<2.2625E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.1198E-01	<1.1930E-01	<1.1757E-01	<1.0728E-01	**<1.1403E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.3459E-01	<2.4821E-01	<2.4537E-01	<2.2210E-01	**<2.3757E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.3801E-01	<2.5331E-01	<2.5152E-01	<2.2534E-01	**<2.4205E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.4060E-01	<2.5392E-01	<2.4889E-01	<2.2780E-01	**<2.4280E-01**
$E_{lb/hr}$	Rate (lb/hr)	<6.6247E-05	<6.7948E-05	<6.7217E-05	<6.5897E-05	**<6.6827E-05**
$E_{g/s}$	Rate (g/s)	<8.3455E-06	<8.5598E-06	<8.4678E-06	<8.3015E-06	**<8.4186E-06**
$E_{T/yr}$	Rate (Ton/yr)	<2.9016E-04	<2.9761E-04	<2.9441E-04	<2.8863E-04	**<2.9270E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.9929E-07	<2.1210E-07	<2.1060E-07	<1.8868E-07	**<2.0267E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.1234E-07	<2.2409E-07	<2.1966E-07	<2.0104E-07	**<2.1428E-07**

041113 145940
OJQL_M

Wheelabrator
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 23 (PCDD/PCDF)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 20	Mar 20	
Start Time (approx.)		10:16	07:40	12:21	
Stop Time (approx.)		14:38	11:59	16:40	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9972	0.9972	0.9972	
C_p	Pitot tube coefficient	0.8130	0.8130	0.8130	
P_g	Static pressure (in. H_2O)	-8.7000	-9.7000	-9.8000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	**29.8000**
D_n	Nozzle diameter (in.)	0.2722	0.2722	0.2722	
O_2	Oxygen (dry volume %)	7.2400	7.9800	7.9850	**7.7350**
CO_2	Carbon dioxide (dry volume %)	11.8500	11.1500	10.9010	**11.3003**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.9100	80.8700	81.1140	**80.9647**
V_{lc}	Total Liquid collected (ml)	809.30	894.50	879.10	
V_m	Volume metered, meter conditions (ft^3)	128.7400	139.0250	141.7150	
T_m	Dry gas meter temperature (°F)	87.9800	84.5600	88.0400	
T_s	Sample temperature (°F)	303.7600	304.2800	304.9600	**304.3333**
ΔH	Meter box orifice pressure drop (in. H_2O)	0.8912	1.0380	1.0600	
θ	Total sampling time (min)	250.0	250.0	250.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	38.0857	42.0952	41.3704	**40.5171**
V_{mstd}	Volume metered, standard (dscf)	123.4241	134.1699	135.9049	**131.1663**
P_s	Sample gas pressure, absolute (in. Hg)	29.1603	29.0868	29.0794	**29.1088**
P_v	Vapor pressure, actual (in. Hg)	29.1603	29.0868	29.0794	**29.1088**
B_{wo}	Moisture measured in sample (% by volume)	23.5810	23.8817	23.3368	**23.5999**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	23.5810	23.8817	23.3368	**23.5999**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.5804	0.6272	0.6346	**0.6141**
M_d	MW of sample gas, dry (lb/lb-mole)	30.1856	30.1032	30.0636	**30.1175**
M_s	MW of sample gas, wet (lb/lb-mole)	27.3121	27.2127	27.2483	**27.2577**
V_s	Velocity of sample (ft/sec)	39.5009	42.8361	43.3370	**41.8913**
%I	Isokinetic sampling (%)	100.1717	101.1350	100.6540	**100.6536**
Q_a	Volumetric flow rate, actual (acfm)	151,683	164,491	166,414	**160,863**
Q_s	Volumetric flow rate, standard (scfm)	102,199	110,473	111,637	**108,103**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	78,099	84,090	85,585	**82,591**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,751	78,162	79,520	**78,144**
Q_a	Volumetric flow rate, actual (acf/hr)	9,101,005	9,869,442	9,984,839	**9,651,762**
Q_s	Volumetric flow rate, standard (scf/hr)	6,131,922	6,628,387	6,698,234	**6,486,181**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,685,952	5,045,413	5,135,078	**4,955,481**
Q_a	Volumetric flow rate, actual (m^3/hr)	257,746	279,508	282,777	**273,344**
Q_s	Volumetric flow rate, standard (m^3/hr)	173,660	187,720	189,698	**183,692**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	132,709	142,889	145,428	**140,342**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	130,418	132,815	135,123	**132,785**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	161,819	174,921	176,764	**171,168**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	123,661	133,147	135,513	**130,773**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,525	123,759	125,910	**123,732**

Comments:

Average includes 3 runs. * indicates that the run is not included in the average.

041113 150008
NNK@

Wheelabrator
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 23 (PCDD/PCDF) Parameters (NDs & EMPCs counted as Zero)
Total Tetra- through Octa-PCDD/F Results (using USEPA/INTL 2005 TEFs)

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 20	Mar 20	
Start Time (approx.)		10:16	07:40	12:21	
Stop Time (approx.)		14:38	11:59	16:40	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	184.0	184.2	183.7	**183.9**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.2400	7.9800	7.9850	**7.7350**
CO_2	Carbon dioxide (dry volume %)	11.8500	11.1500	10.9010	**11.3003**
T_s	Sample temperature (°F)	303.8	304.3	305.0	**304.3**
B_w	Actual water vapor in gas (% by volume)	23.5810	23.8817	23.3368	**23.5999**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	151,683	164,491	166,414	**160,863**
Q_s	Volumetric flow rate, standard (scfm)	102,199	110,473	111,637	**108,103**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	78,099	84,090	85,585	**82,591**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,751	78,162	79,520	**78,144**
Q_a	Volumetric flow rate, actual (acf/hr)	9,101,005	9,869,442	9,984,839	**9,651,762**
Q_s	Volumetric flow rate, standard (scf/hr)	6,131,922	6,628,387	6,698,234	**6,486,181**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,685,952	5,045,413	5,135,078	**4,955,481**
Q_a	Volumetric flow rate, actual (m^3/hr)	257,748	279,508	282,777	**273,344**
Q_s	Volumetric flow rate, standard (m^3/hr)	173,660	187,720	189,698	**183,692**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	132,709	142,889	145,428	**140,342**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	130,418	132,815	135,123	**132,785**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	161,819	174,921	176,764	**171,168**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	123,661	133,147	135,513	**130,773**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,525	123,759	125,910	**123,732**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	123.4241	134.1699	135.9049	**131.1663**
%I	Isokinetic sampling (%)	100.1717	101.1350	100.6540	**100.6536**
Laboratory Data from USEPA Method 23 (PCDD/PCDF)					
	Total PCDDs (ng)	16.33000	16.41000	17.80000	
	Total PCDFs (ng)	3.37590	3.50490	3.80940	
m_n	Total PCDDs & PCDFs (ng)	19.70000	19.90000	21.60000	
m_{n_TEQ}	Total TEQ PCDDs & PCDFs (ng)	0.15200	0.15500	0.16900	
Total PCDD/F Results (TEF=1)					
C_{sd}	PCDD/F Concentration (ng/dscm)	5.6359E+00	5.2372E+00	5.6120E+00	**5.4950E+00**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/dscm)	5.7349E+00	5.6344E+00	6.0400E+00	**5.8031E+00**
C_{sd12}	PCDD/F Concentration @12% CO_2 (ng/dscm)	5.7073E+00	5.6364E+00	6.1778E+00	**5.8405E+00**
C_{sd}	PCDD/F Concentration (ng/Nm^3 dry)	6.0483E+00	5.6204E+00	6.0226E+00	**5.8971E+00**
C_{sd7}	PCDD/F Concentration @7% O_2 (ng/Nm^3 dry)	6.1546E+00	6.0467E+00	6.4819E+00	**6.2277E+00**
C_{sd12}	PCDD/F Concentration @12% CO_2 (ng/Nm^3 dry)	6.1249E+00	6.0488E+00	6.6298E+00	**6.2678E+00**
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.6492E-06	1.6501E-06	1.7996E-06	**1.6996E-06**
$E_{g/s}$	PCDD/F Rate (g/s)	2.0776E-07	2.0787E-07	2.2671E-07	**2.1411E-07**
$E_{T/yr}$	PCDD/F Rate (Ton/yr)	7.2235E-06	7.2273E-06	7.8822E-06	**7.4443E-06**
E_{Fd}	PCDD/F Rate - F_d-based (lb/MMBtu)	5.1533E-09	5.0629E-09	5.4274E-09	**5.2145E-09**
E_{Fc}	PCDD/F Rate - F_c-based (lb/MMBtu)	5.4054E-09	5.3383E-09	5.8510E-09	**5.5316E-09**
Total PCDD/F TEQ Results (using USEPA/INTL 2005 TEFs)					
C_{sdTEQ}	TEQ Concentration (ng/dscm)	4.3485E-02	4.0792E-02	4.3909E-02	**4.2729E-02**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	4.4249E-02	4.3886E-02	4.7257E-02	**4.5131E-02**
$C_{sd12TEQ}$	TEQ Concentration @12% CO_2 (ng/dscm)	4.4036E-02	4.3902E-02	4.8335E-02	**4.5424E-02**
C_{sdTEQ}	TEQ Concentration (ng/Nm^3 dry)	4.6667E-02	4.3777E-02	4.7121E-02	**4.5855E-02**
C_{sd7TEQ}	TEQ Concentration @7% O_2 (ng/Nm^3 dry)	4.7487E-02	4.7097E-02	5.0715E-02	**4.8433E-02**
$C_{sd12TEQ}$	TEQ Concentration @12% CO_2 (ng/Nm^3 dry)	4.7258E-02	4.7114E-02	5.1872E-02	**4.8748E-02**
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	1.2725E-08	1.2852E-08	1.4080E-08	**1.3219E-08**
$E_{g/sTEQ}$	TEQ Rate (g/sec)	1.6030E-09	1.6191E-09	1.7738E-09	**1.6653E-09**
$E_{T/yrTEQ}$	TEQ Rate (Ton/yr)	5.5735E-08	5.6293E-08	6.1671E-08	**5.7900E-08**
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	3.9761E-11	3.9435E-11	4.2464E-11	**4.0553E-11**
E_{FcTEQ}	TEQ Rate - F_c-based (lb/MMBtu)	4.1707E-11	4.1580E-11	4.5779E-11	**4.3022E-11**

041113 150008
NNK@_M

Prepared by Clean Air Engineering Proprietary Software
SS PCDD-F v2011-01b

Wheelabrator
Clean Air Project No: 12218
Unit 2 FF Outlet

Max

USEPA Method 23 (PCDD/PCDF) Maximum Emissions Parameters (NDs & EMPCs included)
Total Tetra- through Octa-PCDD/F Results (TEQ based on USEPA/INTL 2005 TEFs)

Run No.		1	2	3	Average
Date (2013)		Mar 19	Mar 20	Mar 20	
Start Time (approx.)		10:16	07:40	12:21	
Stop Time (approx.)		14:38	11:59	16:40	
Process Conditions					
R_p	Steam Production Rate - (Klbs/hour)	184.0	184.2	183.7	**183.9**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.2400	7.9800	7.9850	**7.7350**
CO_2	Carbon dioxide (dry volume %)	11.8500	11.1500	10.9010	**11.3003**
T_s	Sample temperature (°F)	303.8	304.3	305.0	**304.3**
B_w	Actual water vapor in gas (% by volume)	23.5810	23.8817	23.3368	**23.5999**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	151,683	164,491	166,414	**160,863**
Q_o	Volumetric flow rate, standard (scfm)	102,199	110,473	111,637	**108,103**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	78,099	84,090	85,585	**82,591**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,751	78,162	79,520	**78,144**
Q_a	Volumetric flow rate, actual (acf/hr)	9,101,005	9,869,442	9,984,839	**9,651,762**
Q_s	Volumetric flow rate, standard (scf/hr)	6,131,922	6,628,387	6,698,234	**6,486,181**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	4,685,952	5,045,413	5,135,078	**4,955,481**
Q_a	Volumetric flow rate, actual (m^3/hr)	257,746	279,508	282,777	**273,344**
Q_s	Volumetric flow rate, standard (m^3/hr)	173,660	187,720	189,698	**183,692**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	132,709	142,889	145,428	**140,342**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	130,418	132,815	135,123	**132,785**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	161,819	174,921	176,764	**171,168**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	123,661	133,147	135,513	**130,773**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,525	123,759	125,910	**123,732**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	123.4241	134.1699	135.9049	**131.1663**
%I	Isokinetic sampling (%)	100.1717	101.1350	100.6540	**100.6536**
Laboratory Data from USEPA Method 23 (PCDD/PCDF), including NDs and EMPCs					
m_n	Total PCDDs & PCDFs (ng)	19.80000	20.00000	21.70000	
m_{n_TEQ}	Total TEQ PCDDs & PCDFs (ng)	0.15200	0.16200	0.17100	
Total PCDD/F Results (TEF=1)					
C_{ad}	PCDD/F Concentration (ng/dscm)	5.6645E+00	5.2635E+00	5.6380E+00	**5.5220E+00**
C_{ad7}	PCDD/F Concentration @7% O_2 (ng/dscm)	5.7640E+00	5.6627E+00	6.0680E+00	**5.8316E+00**
C_{ad12}	PCDD/F Concentration @12% CO_2 (ng/dscm)	5.7362E+00	5.6647E+00	6.2064E+00	**5.8691E+00**
C_{ad}	PCDD/F Concentration (ng/Nm^3 dry)	6.0790E+00	5.6486E+00	6.0505E+00	**5.9260E+00**
C_{ad7}	PCDD/F Concentration @7% O_2 (ng/Nm^3 dry)	6.1858E+00	6.0771E+00	6.5120E+00	**6.2583E+00**
C_{ad12}	PCDD/F Concentration @12% CO_2 (ng/Nm^3 dry)	6.1559E+00	6.0792E+00	6.6605E+00	**6.2986E+00**
$E_{lb/hr}$	PCDD/F Rate (lb/hr)	1.6576E-06	1.6584E-06	1.8079E-06	**1.7080E-06**
$E_{g/s}$	PCDD/F Rate (g/s)	2.0881E-07	2.0891E-07	2.2776E-07	**2.1516E-07**
$E_{T/yr}$	PCDD/F Rate (Ton/yr)	7.2602E-06	7.2636E-06	7.9187E-06	**7.4808E-06**
E_{Fd}	PCDD/F - F_d-based (lb/MMBtu)	5.1794E-09	5.0884E-09	5.4525E-09	**5.2401E-09**
E_{Fc}	PCDD/F Rate - F_c-based (lb/MMBtu)	5.4328E-09	5.3651E-09	5.8781E-09	**5.5587E-09**
Total PCDD/F TEQ Results (using USEPA/INTL 2005 TEFs)					
C_{adTEQ}	TEQ Concentration (ng/dscm)	4.3485E-02	4.2634E-02	4.4428E-02	**4.3516E-02**
C_{ad7TEQ}	TEQ Concentration @7% O_2 (ng/dscm)	4.4249E-02	4.5868E-02	4.7817E-02	**4.5978E-02**
$C_{ad12TEQ}$	TEQ Concentration @12% CO_2 (ng/dscm)	4.4036E-02	4.5884E-02	4.8907E-02	**4.6276E-02**
C_{adTEQ}	TEQ Concentration (ng/Nm^3 dry)	4.6667E-02	4.5754E-02	4.7679E-02	**4.6700E-02**
C_{ad7TEQ}	TEQ Concentration @7% O_2 (ng/Nm^3 dry)	4.7487E-02	4.9224E-02	5.1315E-02	**4.9342E-02**
$C_{ad12TEQ}$	TEQ Concentration @12% CO_2 (ng/Nm^3 dry)	4.7258E-02	4.9242E-02	5.2486E-02	**4.9662E-02**
$E_{lb/hrTEQ}$	TEQ Rate (lb/hr)	1.2725E-08	1.3433E-08	1.4247E-08	**1.3468E-08**
$E_{g/sTEQ}$	TEQ Rate (g/sec)	1.6030E-09	1.6922E-09	1.7948E-09	**1.6967E-09**
$E_{T/yrTEQ}$	TEQ Rate (Ton/yr)	5.5735E-08	5.8835E-08	6.2401E-08	**5.8990E-08**
E_{FdTEQ}	TEQ Rate - F_d-based (lb/MMBtu)	3.9761E-11	4.1216E-11	4.2967E-11	**4.1315E-11**
E_{FcTEQ}	TEQ Rate - F_c-based (lb/MMBtu)	4.1707E-11	4.3458E-11	4.6321E-11	**4.3828E-11**

041113 150008
NNK@_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 SDA Inlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 21	Mar 21	Mar 21	
Start Time (approx.)		07:54	09:15	10:35	
Stop Time (approx.)		08:54	10:15	11:35	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0008	1.0008	1.0008	
C_p	Pitot tube coefficient	0.8340	0.8340	0.8340	
P_g	Static pressure (in. H_2O)	-1.5000	-1.5000	-1.4000	
A_s	Sample location area (ft^2)	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	29.75	29.75	29.75	**29.7500**
O_2	Oxygen (dry volume %)	6.3800	6.0800	6.4700	**6.3100**
CO_2	Carbon dioxide (dry volume %)	12.4900	12.8700	12.5400	**12.6333**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.1300	81.0500	80.9900	**81.0567**
V_{lc}	Total Liquid collected (ml)	181.80	184.10	185.20	
V_m	Volume metered, meter conditions (ft^3)	34.0700	33.8900	34.3800	
T_m	Dry gas meter temperature (°F)	72.4583	74.9583	80.4167	
T_s	Sample temperature (°F)	503.6667	500.5833	503.8333	**502.6944**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2000	1.2000	1.2000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	8.5555	8.6637	8.7155	**8.6449**
V_{mstd}	Volume metered, standard (dscf)	33.7059	33.3711	33.5117	**33.5296**
P_s	Sample gas pressure, absolute (in. Hg)	29.6397	29.6397	29.6471	**29.6422**
P_v	Vapor pressure, actual (in. Hg)	29.6397	29.6397	29.6471	**29.6422**
B_{wo}	Moisture measured in sample (% by volume)	20.2443	20.6109	20.6396	**20.4982**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	20.2443	20.6109	20.6396	**20.4982**
M_d	MW of sample gas, dry (lb/lb-mole)	30.2536	30.3024	30.2652	**30.2737**
M_s	MW of sample gas, wet (lb/lb-mole)	27.7729	27.7668	27.7337	**27.7578**

Comments:

Average includes 3 runs.

041113 150041
OPL@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 SDA Inlet

USEPA Method 26A (HCl)
HCl Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 21	Mar 21	Mar 21	
Start Time (approx.)		07:54	09:15	10:35	
Stop Time (approx.)		08:54	10:15	11:35	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	183.6	184.2	183.7	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	6.3800	6.0800	6.4700	**6.3100**
CO_2	Carbon dioxide (dry volume %)	12.4900	12.8700	12.5400	**12.6333**
T_s	Sample temperature (°F)	503.6667	500.5833	503.8333	**502.6944**
B_w	Actual water vapor in gas (% by volume)	20.2443	20.6109	20.6396	**20.4982**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	33.7059	33.3711	33.5117	**33.5296**
Laboratory Data					
m_n	Total HCl collected (mg)	762.4984	717.4268	811.6841	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	4.9882E-05	4.7404E-05	5.3407E-05	**5.0231E-05**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	4.7752E-05	4.4461E-05	5.1446E-05	**4.7886E-05**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	4.7925E-05	4.4200E-05	5.1107E-05	**4.7744E-05**
C_{sd}	HCl Concentration (ppmdv)	527.3802	501.1841	564.6525	**531.0723**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	504.8612	470.0715	543.9134	**506.2820**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	506.6903	467.3046	540.3373	**504.7774**
C_w	HCl Concentration (ppmwv)	420.6159	397.8858	448.1106	**422.2041**
C_{sd}	HCl Concentration (mg/dscm)	798.7873	759.1100	855.2412	**804.3795**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	764.6793	711.9857	823.8290	**766.8314**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	767.4498	707.7948	818.4126	**764.5524**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	857.2352	814.6546	917.8198	**863.2365**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	820.6315	764.0823	884.1092	**822.9410**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	823.6046	759.5847	878.2965	**820.4953**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.6871	0.6398	0.7403	**0.6891**
E_{Fc}	HCl Rate - Fc-based (lb/MMBtu)	0.7269	0.6704	0.7751	**0.7241**

041613 082543
OPL@_@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 21	Mar 21	Mar 21	
Start Time (approx.)		07:54	09:15	10:35	
Stop Time (approx.)		08:54	10:15	11:35	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0050	1.0050	1.0050	
P_g	Static pressure (in. H_2O)	-9.8000	-9.5000	-9.4000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.75	29.75	29.75	**29.7500**
O_2	Oxygen (dry volume %)	7.8500	7.4500	7.2400	**7.5133**
CO_2	Carbon dioxide (dry volume %)	11.2500	11.6600	11.8700	**11.5933**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.9000	80.8900	80.8900	**80.8933**
V_{lc}	Total Liquid collected (ml)	268.00	267.60	269.00	
V_m	Volume metered, meter conditions (ft^3)	41.3150	41.4550	41.3950	
T_m	Dry gas meter temperature (°F)	74.7083	77.5000	81.5000	
T_s	Sample temperature (°F)	307.1667	306.0000	306.2500	**306.4722**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.5000	1.5000	1.5000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	12.6121	12.5933	12.6591	**12.6215**
V_{mstd}	Volume metered, standard (dscf)	40.9025	40.8279	40.4677	**40.7327**
P_s	Sample gas pressure, absolute (in. Hg)	29.0294	29.0515	29.0588	**29.0466**
P_v	Vapor pressure, actual (in. Hg)	29.0294	29.0515	29.0588	**29.0466**
B_{wo}	Moisture measured in sample (% by volume)	23.5676	23.5735	23.8282	**23.6564**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	23.5676	23.5735	23.8282	**23.6564**
M_d	MW of sample gas, dry (lb/lb-mole)	30.1140	30.1636	30.1888	**30.1555**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2590	27.2962	27.2844	**27.2799**

Comments:

Average includes 3 runs.

041113 150102
KLP@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 2 FF Outlet

USEPA Method 26A (HCl)
HCl Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 21	Mar 21	Mar 21	
Start Time (approx.)		07:54	09:15	10:35	
Stop Time (approx.)		08:54	10:15	11:35	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	183.6	184.2	183.7	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.8500	7.4500	7.2400	**7.5133**
CO_2	Carbon dioxide (dry volume %)	11.2500	11.6600	11.8700	**11.5933**
T_s	Sample temperature (°F)	307.1667	306.0000	306.2500	**306.4722**
B_w	Actual water vapor in gas (% by volume)	23.5676	23.5735	23.8282	**23.6564**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	40.9025	40.8279	40.4677	**40.7327**
Laboratory Data					
m_n	Total HCl collected (mg)	1.9004	1.7152	1.9446	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	1.0245E-07	9.2631E-08	1.0596E-07	**1.0034E-07**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	1.0912E-07	9.5730E-08	1.0782E-07	**1.0422E-07**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	1.0928E-07	9.5332E-08	1.0712E-07	**1.0391E-07**
C_{sd}	HCl Concentration (ppmdv)	1.0831	0.9794	1.1202	**1.0609**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	1.1537	1.0121	1.1399	**1.1019**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	1.1553	1.0079	1.1325	**1.0986**
C_w	HCl Concentration (ppmwv)	0.8279	0.7485	0.8533	**0.8099**
C_{sd}	HCl Concentration (mg/dscm)	1.6405	1.4834	1.6967	**1.6069**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	1.7474	1.5330	1.7266	**1.6690**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	1.7499	1.5266	1.7153	**1.6639**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	1.7606	1.5919	1.8209	**1.7245**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	1.8752	1.6452	1.8529	**1.7911**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	1.8779	1.6383	1.8408	**1.7857**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.0016	0.0014	0.0016	**0.0015**
E_{Fc}	HCl Rate - Fc-based (lb/MMBtu)	0.0017	0.0014	0.0016	**0.0016**

041613 082442
K L P @_@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	
Stop Time (approx.)		14:50	09:54	12:27	
Sampling Conditions					
Y_d	Dry gas meter correction factor	0.9906	0.9906	0.9906	
C_p	Pitot tube coefficient	0.8240	0.8240	0.8240	
P_g	Static pressure (in. H_2O)	-9.1000	-10.0000	-8.8000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.75	29.75	**29.7667**
D_n	Nozzle diameter (in.)	0.2725	0.2725	0.2725	
O_2	Oxygen (dry volume %)	8.7400	7.9800	7.8300	**8.1833**
CO_2	Carbon dioxide (dry volume %)	10.1800	11.0400	11.4400	**10.8867**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.0800	80.9800	80.7300	**80.9300**
V_{lc}	Total Liquid collected (ml)	427.90	428.40	412.20	
V_m	Volume metered, meter conditions (ft^3)	72.3500	67.6700	66.4050	
T_m	Dry gas meter temperature (°F)	96.8200	68.5000	74.3800	
T_s	Sample temperature (°F)	309.5200	306.2800	305.9600	**307.2533**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.0820	0.9752	0.9404	
θ	Total sampling time (min)	125.0	125.0	125.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	20.1370	20.1605	19.3981	**19.8985**
V_{mstd}	Volume metered, standard (dscf)	67.8414	66.7238	64.7504	**66.4385**
P_s	Sample gas pressure, absolute (in. Hg)	29.1309	29.0147	29.1029	**29.0828**
P_v	Vapor pressure, actual (in. Hg)	29.1309	29.0147	29.1029	**29.0828**
B_{wo}	Moisture measured in sample (% by volume)	22.8886	23.2039	23.0522	**23.0482**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	22.8886	23.2039	23.0522	**23.0482**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.6371	0.6152	0.5986	**0.6169**
M_d	MW of sample gas, dry (lb/lb-mole)	29.9784	30.0856	30.1436	**30.0692**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2367	27.2813	27.3442	**27.2874**
V_s	Velocity of sample (ft/sec)	44.1951	42.6372	41.3705	**42.7343**
%I	Isokinetic sampling (%)	98.1589	100.4576	99.9278	**99.5148**
Q_a	Volumetric flow rate, actual (acfm)	169,709	163,727	158,863	**164,100**
Q_s	Volumetric flow rate, standard (scfm)	113,373	109,401	106,519	**109,764**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,424	84,016	81,964	**84,468**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,480	78,093	77,069	**77,214**
Q_a	Volumetric flow rate, actual (acf/hr)	10,182,544	9,823,618	9,531,767	**9,845,976**
Q_s	Volumetric flow rate, standard (scf/hr)	6,802,403	6,564,089	6,391,114	**6,585,869**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,245,431	5,040,967	4,917,819	**5,068,072**
Q_a	Volumetric flow rate, actual (m^3/hr)	288,376	278,211	269,945	**278,844**
Q_s	Volumetric flow rate, standard (m^3/hr)	192,648	185,899	181,000	**186,516**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	148,554	142,763	139,276	**143,531**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,958	132,698	130,959	**131,205**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	179,513	173,224	168,659	**173,799**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	138,425	133,029	129,779	**133,745**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,097	123,650	122,030	**122,259**

Comments:
Average includes 3 runs.

041113 150540
MIM@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 5/202 (FPM/CPM)
Emission Parameters for FPM

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	
Stop Time (approx.)		14:50	09:54	12:27	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	183.4	184.3	184.3	**184.0**
P_1	Fabroc Filter Inlet Temperature (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.7400	7.9800	7.8300	**8.1833**
CO_2	Carbon dioxide (dry volume %)	10.1800	11.0400	11.4400	**10.8867**
T_s	Sample temperature (°F)	309.5200	306.2800	305.9600	**307.2533**
B_w	Actual water vapor in gas (% by volume)	22.8886	23.2039	23.0522	**23.0482**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	169,709	163,727	158,863	**164,100**
Q_s	Volumetric flow rate, standard (scfm)	113,373	109,401	108,519	**109,764**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,424	84,016	81,964	**84,468**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,480	78,093	77,069	**77,214**
Q_a	Volumetric flow rate, actual (acf/hr)	10,182,544	9,823,618	9,531,767	**9,845,976**
Q_s	Volumetric flow rate, standard (scf/hr)	6,802,403	6,564,089	6,391,114	**6,585,869**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,245,431	5,040,967	4,917,819	**5,068,072**
Q_a	Volumetric flow rate, actual (m^3/hr)	288,376	278,211	269,945	**278,844**
Q_s	Volumetric flow rate, standard (m^3/hr)	192,648	185,899	181,000	**186,516**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	148,554	142,763	139,276	**143,531**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,958	132,698	130,959	**131,205**
Q_a	Volumetric flow rate, normal (Nm^3/hr)	179,513	173,224	168,659	**173,799**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	138,425	133,029	129,779	**133,745**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,097	123,650	122,030	**122,259**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	67.8414	66.7238	64.7504	**66.4385**
%I	Isokinetic sampling (%)	98.1589	100.4576	99.9278	**99.5148**
Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00010	0.00010	0.00010	
m_s	Matter collected in solvent rinse(s) (g)	0.00131	0.00105	0.00151	
m_n	Total filterable particulate matter (g)	0.00141	0.00115	0.00161	
n_{MDL}	Number of non-detectable fractions	1 out of 2	1 out of 2	N/A	
DLC	Detection level classification	DLL	DLL	ADL	
Filterable Particulate Matter Results					
C_{sd}	Particulate Concentration (lb/dscf)	4.5750E-08	3.7941E-08	5.4831E-08	**4.6174E-08**
C_{sd7}	Particulate Concentration @7% O_2 (lb/dscf)	5.2297E-08	4.0819E-08	5.8313E-08	**5.0476E-08**
C_{sd12}	Particulate Concentration @12% CO_2 (lb/dscf)	5.3929E-08	4.1240E-08	5.7515E-08	**5.0895E-08**
C_a	Particulate Concentration (lb/acf)	2.3568E-08	1.9469E-08	2.8289E-08	**2.3775E-08**
C_{sd}	Particulate Concentration (gr/dscf)	0.0003	0.0003	0.0004	**0.0003**
C_{sd7}	Particulate Concentration @7% O_2 (gr/dscf)	0.0004	0.0003	0.0004	**0.0004**
C_{sd12}	Particulate Concentration @12% CO_2 (gr/dscf)	0.0004	0.0003	0.0004	**0.0004**
C_a	Particulate Concentration (gr/acf)	0.0002	0.0001	0.0002	**0.0002**
C_{sd}	Particulate Concentration (mg/dscm)	0.7326	0.6076	0.8780	**0.7394**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	0.8375	0.6537	0.9338	**0.8083**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/dscm)	0.8636	0.6604	0.9210	**0.8150**
C_a	Particulate Concentration (mg/m^3 (actual,wet))	0.3774	0.3118	0.4530	**0.3807**
C_{sd}	Particulate Concentration (mg/Nm^3 dry)	0.7862	0.6520	0.9423	**0.7935**
C_{sd7}	Particulate Concentration @7% O_2 (mg/Nm^3 dry)	0.8987	0.7015	1.0021	**0.8674**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/Nm^3 dry)	0.9268	0.7087	0.9884	**0.8746**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.2400	0.1913	0.2696	**0.2336**
$E_{kg/hr}$	Particulate Rate (kg/hr)	0.1088	0.0867	0.1223	**0.1060**
$E_{T/yr}$	Particulate Rate (Ton/yr)	1.0511	0.8377	1.1811	**1.0233**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0008	0.0006	0.0008	**0.0007**
E_{Fc}	Particulate Rate - F_c-based (lb/MMBtu)	0.0008	0.0006	0.0009	**0.0008**
E_{Hi}	Particulate Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
E_{Rp}	Particulate Rate - Production-based (lb/Klbs)	0.0013	0.0010	0.0015	**0.0013**
E_{Rp}	Particulate Rate - Production-based (kg/Klbs)	0.0006	0.0005	0.0007	**0.0006**

Comments:

Average includes 3 runs.

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

DLL = Detection Level Limited - some fractions are below detection limit

BDL = Below Detection Limit - all fractions are below detection limit

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 5/202 (FPM/CPM)
Emission Parameters for FPM

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	
Stop Time (approx.)		14:50	09:54	12:27	
Process Conditions					
R_P	Steam Production Rate (Klbs/hr)	183.4	184.3	184.3	**184.0**
P_1	Fabroc Filter Inlet Temperature (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.7400	7.9800	7.8300	**8.1833**
CO_2	Carbon dioxide (dry volume %)	10.1800	11.0400	11.4400	**10.8867**
T_s	Sample temperature (°F)	309.5200	306.2800	305.9600	**307.2533**
B_w	Actual water vapor in gas (% by volume)	22.8886	23.2039	23.0522	**23.0482**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	169,709	163,727	158,863	**164,100**
Q_s	Volumetric flow rate, standard (scfm)	113,373	109,401	106,519	**109,764**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,424	84,016	81,964	**84,468**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,480	78,093	77,069	**77,214**
Q_a	Volumetric flow rate, actual (acf/hr)	10,182,544	9,823,618	9,531,767	**9,845,976**
Q_s	Volumetric flow rate, standard (scf/hr)	6,802,403	6,564,089	6,391,114	**6,585,869**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,245,431	5,040,967	4,917,819	**5,068,072**
Q_a	Volumetric flow rate, actual (m^3/hr)	288,376	278,211	269,945	**278,844**
Q_s	Volumetric flow rate, standard (m^3/hr)	192,648	185,899	181,000	**186,516**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	148,554	142,763	139,276	**143,531**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,958	132,698	130,959	**131,205**
Q_s	Volumetric flow rate, normal (Nm^3/hr)	179,513	173,224	168,659	**173,799**

Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	138,425	133,029	129,779	**133,745**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,097	123,650	122,030	**122,259**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	67.8414	66.7238	64.7504	**66.4385**
%I	Isokinetic sampling (%)	98.1589	100.4576	99.9278	**99.5148**
Laboratory Data					
m_{filter}	Matter collected on filter(s) (g)	0.00010	0.00010	0.00010	
m_s	Matter collected in solvent rinse(s) (g)	0.00131	0.00105	0.00151	
m_n	Total filterable particulate matter (g)	0.00141	0.00115	0.00161	
n_{MDL}	Number of non-detectable fractions	1 out of 2	1 out of 2	N/A	
DLC	Detection level classification	DLL	DLL	ADL	
Filterable Particulate Matter Results					
C_{sd}	Particulate Concentration (lb/dscf)	4.5750E-08	3.7941E-08	5.4831E-08	**4.6174E-08**
C_{sd7}	Particulate Concentration @7% O_2 (lb/dscf)	5.2297E-08	4.0819E-08	5.8313E-08	**5.0476E-08**
C_{sd12}	Particulate Concentration @12% CO_2 (lb/dscf)	5.3929E-08	4.1240E-08	5.7515E-08	**5.0895E-08**
C_a	Particulate Concentration (lb/acf)	2.3568E-08	1.9469E-08	2.8289E-08	**2.3775E-08**
C_{sd}	Particulate Concentration (gr/dscf)	0.0003	0.0003	0.0004	**0.0003**
C_{sd7}	Particulate Concentration @7% O_2 (gr/dscf)	0.0004	0.0003	0.0004	**0.0004**
C_{sd12}	Particulate Concentration @12% CO_2 (gr/dscf)	0.0004	0.0003	0.0004	**0.0004**
C_a	Particulate Concentration (gr/acf)	0.0002	0.0001	0.0002	**0.0002**
C_{sd}	Particulate Concentration (mg/dscm)	0.7326	0.6076	0.8780	**0.7394**
C_{sd7}	Particulate Concentration @7% O_2 (mg/dscm)	0.8375	0.6537	0.9338	**0.8083**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/dscm)	0.8636	0.6604	0.9210	**0.8150**
C_a	Particulate Concentration (mg/m^3 (actual,wet))	0.3774	0.3118	0.4530	**0.3807**
C_{sd}	Particulate Concentration (mg/Nm^3 dry)	0.7862	0.6520	0.9423	**0.7935**
C_{sd7}	Particulate Concentration @7% O_2 (mg/Nm^3 dry)	0.8987	0.7015	1.0021	**0.8674**
C_{sd12}	Particulate Concentration @12% CO_2 (mg/Nm^3 dry)	0.9268	0.7087	0.9884	**0.8746**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.2400	0.1913	0.2696	**0.2336**
$E_{kg/hr}$	Particulate Rate (kg/hr)	0.1088	0.0867	0.1223	**0.1060**
$E_{T/yr}$	Particulate Rate (Ton/yr)	1.0511	0.8377	1.1811	**1.0233**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.0008	0.0006	0.0008	**0.0007**
E_{Fc}	Particulate Rate - F_c-based (lb/MMBtu)	0.0008	0.0006	0.0009	**0.0008**
E_{HI}	Particulate Rate - Heat Input-based (lb/MMBtu)	N/A	N/A	N/A	
E_{Rp}	Particulate Rate - Production-based (lb/Klbs)	0.0013	0.0010	0.0015	**0.0013**
E_{Rp}	Particulate Rate - Production-based (kg/Klbs)	0.0006	0.0005	0.0007	**0.0006**

Comments:

Average includes 3 runs.

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

DLL = Detection Level Limited - some fractions are below detection limit

BDL = Below Detection Limit - all fractions are below detection limit

041113 151149

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Cadmium (Cd) Emission Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	
Stop Time (approx.)		14:50	09:54	12:27	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	183.4	184.3	184.3	**184.0**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.7400	7.9800	7.8300	**8.1833**
CO_2	Carbon dioxide (dry volume %)	10.1800	11.0400	11.4400	**10.8867**
T_s	Sample temperature (°F)	309.5200	306.2800	305.9600	**307.2533**
B_w	Actual water vapor in gas (% by volume)	22.8886	23.2039	23.0522	**23.0482**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	169,709	163,727	158,863	**164,100**
Q_s	Volumetric flow rate, standard (scfm)	113,373	109,401	106,519	**109,764**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,424	84,016	81,964	**84,468**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	67.8414	66.7238	64.7504	**66.4385**
%I	Isokinetic sampling (%)	98.1589	100.4576	99.9278	**99.5148**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	<0.2000	<0.2000	<0.2000	
Cadmium Results - Total					
C_{sd}	Concentration (lb/dscf)	<6.5005E-12	<6.6093E-12	<6.8108E-12	**<6.6402E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.4306E-12	<7.1107E-12	<7.2433E-12	**<7.2615E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.6626E-12	<7.1841E-12	<7.1442E-12	**<7.3303E-12**
C_a	Concentration (lb/acf)	<3.3486E-12	<3.3916E-12	<3.5139E-12	**<3.4181E-12**
C_{sd}	Concentration (µg/dscm)	<1.0410E-01	<1.0584E-01	<1.0906E-01	**<1.0633E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1899E-01	<1.1387E-01	<1.1599E-01	**<1.1628E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.2271E-01	<1.1504E-01	<1.1440E-01	**<1.1738E-01**
C_{sd}	Concentration (mg/dscm)	<1.0410E-04	<1.0584E-04	<1.0906E-04	**<1.0633E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1899E-04	<1.1387E-04	<1.1599E-04	**<1.1628E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.2271E-04	<1.1504E-04	<1.1440E-04	**<1.1738E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<5.3624E-02	<5.4311E-02	<5.6271E-02	**<5.4735E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.1171E-01	<1.1358E-01	<1.1705E-01	**<1.1411E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.2770E-01	<1.2220E-01	<1.2448E-01	**<1.2479E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.3168E-01	<1.2346E-01	<1.2277E-01	**<1.2597E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.4098E-05	<3.3317E-05	<3.3494E-05	**<3.3636E-05**
$E_{g/s}$	Rate (g/s)	<4.2955E-06	<4.1972E-06	<4.2195E-06	**<4.2374E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4935E-04	<1.4593E-04	<1.4670E-04	**<1.4733E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0692E-07	<1.0232E-07	<1.0423E-07	**<1.0449E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1622E-07	<1.0896E-07	<1.0835E-07	**<1.1118E-07**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2006-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 5/29 (Particulate/Metals)
Lead (Pb) Emission Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	
Stop Time (approx.)		14:50	09:54	12:27	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	183.4	184.3	184.3	**184.0**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	8.7400	7.9800	7.8300	**8.1833**
CO_2	Carbon dioxide (dry volume %)	10.1800	11.0400	11.4400	**10.8867**
T_s	Sample temperature (°F)	309.5200	306.2800	305.9600	**307.2533**
B_w	Actual water vapor in gas (% by volume)	22.8886	23.2039	23.0522	**23.0482**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	169,709	163,727	158,863	**164,100**
Q_s	Volumetric flow rate, standard (scfm)	113,373	109,401	106,519	**109,764**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,424	84,016	81,964	**84,468**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	67.8414	66.7238	64.7504	**66.4385**
%I	Isokinetic sampling (%)	98.1589	100.4576	99.9278	**99.5148**
Laboratory Data					
m_n	Total matter corrected for allowable blanks (µg)	<0.2000	<0.2000	<0.2000	
Lead Results - Total					
C_{sd}	Concentration (lb/dscf)	<6.5005E-12	<6.6093E-12	<6.8108E-12	**<6.6402E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.4306E-12	<7.1107E-12	<7.2433E-12	**<7.2615E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.6626E-12	<7.1841E-12	<7.1442E-12	**<7.3303E-12**
C_a	Concentration (lb/acf)	<3.3486E-12	<3.3916E-12	<3.5139E-12	**<3.4181E-12**
C_{sd}	Concentration (µg/dscm)	<1.0410E-01	<1.0584E-01	<1.0906E-01	**<1.0633E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1899E-01	<1.1387E-01	<1.1599E-01	**<1.1628E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.2271E-01	<1.1504E-01	<1.1440E-01	**<1.1738E-01**
C_{sd}	Concentration (mg/dscm)	<1.0410E-04	<1.0584E-04	<1.0906E-04	**<1.0633E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1899E-04	<1.1387E-04	<1.1599E-04	**<1.1628E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.2271E-04	<1.1504E-04	<1.1440E-04	**<1.1738E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<5.3624E-02	<5.4311E-02	<5.6271E-02	**<5.4735E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.1171E-01	<1.1358E-01	<1.1705E-01	**<1.1411E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.2770E-01	<1.2220E-01	<1.2448E-01	**<1.2479E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.3168E-01	<1.2346E-01	<1.2277E-01	**<1.2597E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.4098E-05	<3.3317E-05	<3.3494E-05	**<3.3636E-05**
$E_{g/s}$	Rate (g/s)	<4.2955E-06	<4.1972E-06	<4.2195E-06	**<4.2374E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4935E-04	<1.4593E-04	<1.4670E-04	**<1.4733E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0692E-07	<1.0232E-07	<1.0423E-07	**<1.0449E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1622E-07	<1.0896E-07	<1.0835E-07	**<1.1118E-07**

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 29 (Mercury)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	4*	Average
Date (2013)		Mar 20	Mar 21	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	12:41	
Stop Time (approx.)		14:50	09:54	12:27	14:52	
Sampling Conditions						
Y_d	Dry gas meter correction factor	0.9906	0.9906	0.9906	0.9906	
C_p	Pitot tube coefficient	0.8240	0.8240	0.8240	0.8240	
P_g	Static pressure (in. H_2O)	-9.1000	-10.0000	-8.8000	-9.3000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.75	29.75	29.75	**29.7667**
D_n	Nozzle diameter (in.)	0.2725	0.2725	0.2725	0.2725	
O_2	Oxygen (dry volume %)	8.7400	7.9800	7.8300	8.7400	**8.1833**
CO_2	Carbon dioxide (dry volume %)	10.1800	11.0400	11.4400	10.1800	**10.8867**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.0800	80.9800	80.7300	81.0800	**80.9300**
V_{lc}	Total Liquid collected (ml)	427.90	428.40	412.20	427.90	
V_m	Volume metered, meter conditions (ft^3)	72.3500	67.6700	66.4050	69.7450	
T_m	Dry gas meter temperature (°F)	96.8200	68.5000	74.3800	84.2200	
T_s	Sample temperature (°F)	309.5200	306.2800	305.9600	308.0400	**307.2533**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.0820	0.9752	0.9404	1.0092	
θ	Total sampling time (min)	125.0	125.0	125.0	125.0	
Flow Results						
V_{wstd}	Volume of water collected (ft^3)	20.1370	20.1605	19.3981	20.1370	**19.8985**
V_{mstd}	Volume metered, standard (dscf)	67.8414	66.7238	64.7504	66.7889	**66.4385**
P_s	Sample gas pressure, absolute (in. Hg)	29.1309	29.0147	29.1029	29.0662	**29.0828**
P_v	Vapor pressure, actual (in. Hg)	29.1309	29.0147	29.1029	29.0662	**29.0828**
B_{wo}	Moisture measured in sample (% by volume)	22.8886	23.2039	23.0522	23.1657	**23.0482**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	22.8886	23.2039	23.0522	23.1657	**23.0482**
$\sqrt{\Delta P}$	Velocity head ($\sqrt{}$in. H_2O)	0.6371	0.6152	0.5986	0.6175	**0.6169**
M_d	MW of sample gas, dry (lb/lb-mole)	29.9784	30.0856	30.1436	29.9784	**30.0692**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2367	27.2813	27.3442	27.2035	**27.2874**
V_s	Velocity of sample (ft/sec)	44.1951	42.6372	41.3705	42.8677	**42.7343**
%I	Isokinetic sampling (%)	98.1589	100.4576	99.9278	100.0175	**99.5148**
Q_a	Volumetric flow rate, actual (acfm)	169,709	163,727	158,863	164,612	**164,100**
Q_s	Volumetric flow rate, standard (scfm)	113,373	109,401	106,519	109,936	**109,764**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,424	84,016	81,964	84,468	**84,468**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dscfm)	76,480	78,093	77,069	73,894	**77,214**
Q_a	Volumetric flow rate, actual (acf/hr)	10,182,544	9,823,618	9,531,767	9,876,722	**9,845,976**
Q_s	Volumetric flow rate, standard (scf/hr)	6,802,403	6,564,089	6,391,114	6,596,130	**6,585,869**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	5,245,431	5,040,967	4,917,819	5,068,092	**5,068,072**
Q_a	Volumetric flow rate, actual (m^3/hr)	288,376	278,211	269,945	279,715	**278,844**
Q_s	Volumetric flow rate, standard (m^3/hr)	192,648	185,899	181,000	186,806	**186,516**
Q_{std}	Volumetric flow rate, dry standard (dry m^3/hr)	148,554	142,763	139,276	143,531	**143,531**
Q_{std7}	Volumetric flow rate, dry std@7%O_2 (dry m^3/hr)	129,958	132,698	130,959	125,564	**131,205**
Q_a	Volumetric flow rate, normal (Nm^3/hr)	179,513	173,224	168,659	174,070	**173,799**
Q_{std}	Volumetric flow rate, dry normal (Nm^3/hr)	138,425	133,029	129,779	133,745	**133,745**
Q_{std7}	Volumetric flow rate, dry normal @7%O_2 (Nm^3/hr)	121,097	123,650	122,030	117,003	**122,259**

Comments:

Average includes 3 runs. * indicates that the run is not included in the average.

041113 151405
MOMM

Prepared by Clean Air Engineering Proprietary Software
SS ISOKINETIC Version 2006-13e

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters

Run No.		1	2	3	4	Average
Date (2013)		Mar 20	Mar 21	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	12:41	
Stop Time (approx.)		14:50	09:54	12:27	14:52	
Process Conditions						
R_P	Steam Production Rate - (Klbs/hour)	183.4	184.3	184.3	183.9	**184.0**
P_1	Fabric Filter Inlet Temperature - (°F)	320	320	320	320	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	1,820	**1,820**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760	**8,760**
Gas Conditions						
O_2	Oxygen (dry volume %)	8.7400	7.9800	7.8300	8.7400	**8.3225**
CO_2	Carbon dioxide (dry volume %)	10.1800	11.0400	11.4400	10.1800	**10.7100**
T_s	Sample temperature (°F)	309.5200	306.2800	305.9600	308.0400	**307.4500**
B_w	Actual water vapor in gas (% by volume)	22.8886	23.2039	23.0522	23.1657	**23.0776**
Gas Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	169,709	163,727	158,863	164,612	**164,228**
Q_s	Volumetric flow rate, standard (scfm)	113,373	109,401	106,519	109,936	**109,807**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	87,424	84,016	81,964	84,468	**84,468**
Sampling Data						
V_{mstd}	Volume metered, standard (dscf)	67.8414	66.7238	64.7504	66.7889	**66.5261**
%I	Isokinetic sampling (%)	98.1589	100.4576	99.9278	100.0175	**99.6405**
Laboratory Data						
$m_{n\text{-}1b}$	Fraction 1B (µg)	<0.1000	<0.1000	<0.1000	<0.1000	
$m_{n\text{-}2b}$	Fraction 2B (µg)	5.5468	6.7204	7.0073	6.8956	
$m_{n\text{-}3a}$	Fraction 3A (µg)	<0.2000	<0.2000	<0.2000	<0.2000	
$m_{n\text{-}3b}$	Fraction 3B (µg)	<0.5000	<0.5000	0.7794	<0.5000	
$m_{n\text{-}3c}$	Fraction 3C (µg)	<0.4000	<0.4000	<0.4000	<0.4000	
m_n	Total matter corrected for allowable blanks (µg)	5.5468	6.7204	7.7867	6.8956	
Mercury Results - Total						
C_{sd}	Concentration (lb/dscf)	1.8028E-10	2.2209E-10	2.6517E-10	2.2765E-10	**2.2380E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.0608E-10	2.3893E-10	2.8201E-10	2.6023E-10	**2.4681E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.1252E-10	2.4140E-10	2.7815E-10	2.6835E-10	**2.5010E-10**
C_a	Concentration (lb/acf)	9.2871E-11	1.1396E-10	1.3681E-10	1.1682E-10	**1.1512E-10**
C_{sd}	Concentration (µg/dscm)	2.8870E+00	3.5564E+00	4.2463E+00	3.6456E+00	**3.5838E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.3001E+00	3.8262E+00	4.5160E+00	4.1672E+00	**3.9524E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.4031E+00	3.8656E+00	4.4542E+00	4.2973E+00	**4.0051E+00**
C_{sd}	Concentration (mg/dscm)	2.8870E-03	3.5564E-03	4.2463E-03	3.6456E-03	**3.5838E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.3001E-03	3.8262E-03	4.5160E-03	4.1672E-03	**3.9524E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.4031E-03	3.8656E-03	4.4542E-03	4.2973E-03	**4.0051E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.4872E+00	1.8250E+00	2.1908E+00	1.8707E+00	**1.8434E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.0982E+00	3.8166E+00	4.5570E+00	3.9123E+00	**3.8460E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	3.5416E+00	4.1061E+00	4.8464E+00	4.4721E+00	**4.2415E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	3.6521E+00	4.1485E+00	4.7801E+00	4.6118E+00	**4.2981E+00**
$E_{lb/hr}$	Rate (lb/hr)	9.4567E-04	1.1195E-03	1.3040E-03	1.1538E-03	**1.1308E-03**
$E_{g/s}$	Rate (g/s)	1.1913E-04	1.4103E-04	1.6428E-04	1.4535E-04	**1.4245E-04**
$E_{T/yr}$	Rate (Ton/yr)	4.1420E-03	4.9035E-03	5.7117E-03	5.0535E-03	**4.9527E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.9654E-06	3.4381E-06	4.0579E-06	3.7445E-06	**3.5515E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.2231E-06	3.6612E-06	4.2186E-06	4.0700E-06	**3.7932E-06**

Prepared by Clean Air Engineering Proprietary Software
SS Metals-1 Version 2006-12c

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Front Half Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 20	Mar 21	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	12:41	
Stop Time (approx.)		14:50	09:54	12:27	14:52	
Mercury Results - Front Half						
C_{sd}	Concentration (lb/dscf)	<3.2502E-12	<3.3047E-12	<3.4054E-12	<3.3014E-12	**<3.3154E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<3.7153E-12	<3.5553E-12	<3.6216E-12	<3.7739E-12	**<3.6665E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<3.8313E-12	<3.5920E-12	<3.5721E-12	<3.8917E-12	**<3.7218E-12**
C_a	Concentration (lb/acf)	<1.6743E-12	<1.6958E-12	<1.7570E-12	<1.6941E-12	**<1.7053E-12**
C_{sd}	Concentration (µg/dscm)	<5.2048E-02	<5.2920E-02	<5.4532E-02	<5.2868E-02	**<5.3092E-02**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<5.9496E-02	<5.6934E-02	<5.7995E-02	<6.0433E-02	**<5.8714E-02**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<6.1353E-02	<5.7521E-02	<5.7202E-02	<6.2320E-02	**<5.9599E-02**
C_{sd}	Concentration (mg/dscm)	<5.2048E-05	<5.2920E-05	<5.4532E-05	<5.2868E-05	**<5.3092E-05**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<5.9496E-05	<5.6934E-05	<5.7995E-05	<6.0433E-05	**<5.8714E-05**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<6.1353E-05	<5.7521E-05	<5.7202E-05	<6.2320E-05	**<5.9599E-05**
C_a	Concentration (µg/m^3 (actual,wet))	<2.6812E-02	<2.7156E-02	<2.8135E-02	<2.7128E-02	**<2.7308E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<5.5856E-02	<5.6792E-02	<5.8523E-02	<5.6736E-02	**<5.6977E-02**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<6.3849E-02	<6.1100E-02	<6.2239E-02	<6.4855E-02	**<6.3011E-02**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<6.5842E-02	<6.1730E-02	<6.1387E-02	<6.6880E-02	**<6.3960E-02**
$E_{lb/hr}$	Rate (lb/hr)	<1.7049E-05	<1.6659E-05	<1.6747E-05	<1.6732E-05	**<1.6797E-05**
$E_{g/s}$	Rate (g/s)	<2.1478E-06	<2.0986E-06	<2.1097E-06	<2.1078E-06	**<2.1160E-06**
$E_{T/yr}$	Rate (Ton/yr)	<7.4674E-05	<7.2965E-05	<7.3352E-05	<7.3286E-05	**<7.3569E-05**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<5.3461E-08	<5.1159E-08	<5.2113E-08	<5.4304E-08	**<5.2759E-08**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<5.8108E-08	<5.4479E-08	<5.4177E-08	<5.9024E-08	**<5.6447E-08**

041113 151405
M O M M_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 1-3 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 20	Mar 21	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	12:41	
Stop Time (approx.)		14:50	09:54	12:27	14:52	
Mercury Results - Impingers 1-3 Solution						
C_{sd}	Concentration (lb/dscf)	1.8028E-10	2.2209E-10	2.3863E-10	2.2765E-10	**2.1716E-10**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	2.0608E-10	2.3893E-10	2.5378E-10	2.6023E-10	**2.3976E-10**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	2.1252E-10	2.4140E-10	2.5031E-10	2.6835E-10	**2.4314E-10**
C_a	Concentration (lb/acf)	9.2871E-11	1.1396E-10	1.2312E-10	1.1682E-10	**1.1169E-10**
C_{sd}	Concentration (µg/dscm)	2.8870E+00	3.5564E+00	3.8213E+00	3.6456E+00	**3.4776E+00**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	3.3001E+00	3.8262E+00	4.0639E+00	4.1672E+00	**3.8393E+00**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	3.4031E+00	3.8656E+00	4.0083E+00	4.2973E+00	**3.8936E+00**
C_{sd}	Concentration (mg/dscm)	2.8870E-03	3.5564E-03	3.8213E-03	3.6456E-03	**3.4776E-03**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	3.3001E-03	3.8262E-03	4.0639E-03	4.1672E-03	**3.8393E-03**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	3.4031E-03	3.8656E-03	4.0083E-03	4.2973E-03	**3.8936E-03**
C_a	Concentration (µg/m^3 (actual,wet))	1.4872E+00	1.8250E+00	1.9715E+00	1.8707E+00	**1.7886E+00**
C_{sd}	Concentration (µg/Nm^3 dry)	3.0982E+00	3.8166E+00	4.1009E+00	3.9123E+00	**3.7320E+00**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	3.5416E+00	4.1061E+00	4.3613E+00	4.4721E+00	**4.1203E+00**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	3.6521E+00	4.1485E+00	4.3016E+00	4.6118E+00	**4.1785E+00**
$E_{lb/hr}$	Rate (lb/hr)	9.4567E-04	1.1195E-03	1.1735E-03	1.1538E-03	**1.0981E-03**
$E_{g/s}$	Rate (g/s)	1.1913E-04	1.4103E-04	1.4784E-04	1.4535E-04	**1.3834E-04**
$E_{T/yr}$	Rate (Ton/yr)	4.1420E-03	4.9035E-03	5.1400E-03	5.0535E-03	**4.8098E-03**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	2.9654E-06	3.4381E-06	3.6517E-06	3.7445E-06	**3.4499E-06**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	3.2231E-06	3.6612E-06	3.7963E-06	4.0700E-06	**3.6877E-06**

041113 151405
MOMM_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 4 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 20	Mar 21	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	12:41	
Stop Time (approx.)		14:50	09:54	12:27	14:52	
Mercury Results - Impinger 4 Solution						
C_{sd}	Concentration (lb/dscf)	<6.5005E-12	<6.6093E-12	<6.8108E-12	<6.6029E-12	**<6.6309E-12**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<7.4306E-12	<7.1107E-12	<7.2433E-12	<7.5477E-12	**<7.3331E-12**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<7.6626E-12	<7.1841E-12	<7.1442E-12	<7.7834E-12	**<7.4436E-12**
C_a	Concentration (lb/acf)	<3.3486E-12	<3.3916E-12	<3.5139E-12	<3.3882E-12	**<3.4106E-12**
C_{sd}	Concentration (µg/dscm)	<1.0410E-01	<1.0584E-01	<1.0906E-01	<1.0574E-01	**<1.0618E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<1.1899E-01	<1.1387E-01	<1.1599E-01	<1.2087E-01	**<1.1743E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<1.2271E-01	<1.1504E-01	<1.1440E-01	<1.2464E-01	**<1.1920E-01**
C_{sd}	Concentration (mg/dscm)	<1.0410E-04	<1.0584E-04	<1.0906E-04	<1.0574E-04	**<1.0618E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<1.1899E-04	<1.1387E-04	<1.1599E-04	<1.2087E-04	**<1.1743E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<1.2271E-04	<1.1504E-04	<1.1440E-04	<1.2464E-04	**<1.1920E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<5.3624E-02	<5.4311E-02	<5.6271E-02	<5.4257E-02	**<5.4616E-02**
C_{sd}	Concentration (µg/Nm^3 dry)	<1.1171E-01	<1.1358E-01	<1.1705E-01	<1.1347E-01	**<1.1395E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<1.2770E-01	<1.2220E-01	<1.2448E-01	<1.2971E-01	**<1.2602E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<1.3168E-01	<1.2346E-01	<1.2277E-01	<1.3376E-01	**<1.2792E-01**
$E_{lb/hr}$	Rate (lb/hr)	<3.4098E-05	<3.3317E-05	<3.3494E-05	<3.3464E-05	**<3.3593E-05**
$E_{g/s}$	Rate (g/s)	<4.2955E-06	<4.1972E-06	<4.2195E-06	<4.2157E-06	**<4.2320E-06**
$E_{T/yr}$	Rate (Ton/yr)	<1.4935E-04	<1.4593E-04	<1.4670E-04	<1.4657E-04	**<1.4714E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<1.0692E-07	<1.0232E-07	<1.0423E-07	<1.0861E-07	**<1.0552E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<1.1622E-07	<1.0896E-07	<1.0835E-07	<1.1805E-07	**<1.1289E-07**

041113 151405
MOMM_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 29 (Mercury)
Mercury (Hg) Emission Parameters (continued)
Separate Impinger 5-6 Results

Run No.		1	2	3	4	Average
Date (2013)		Mar 20	Mar 21	Mar 21	Mar 21	
Start Time (approx.)		12:35	07:42	10:15	12:41	
Stop Time (approx.)		14:50	09:54	12:27	14:52	
Mercury Results - Filtered Permanganate Solution						
C_{sd}	Concentration (lb/dscf)	<1.6251E-11	<1.6523E-11	2.6542E-11	<1.6507E-11	**<1.8956E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.8577E-11	<1.7777E-11	2.8228E-11	<1.8869E-11	**<2.0863E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.9157E-11	<1.7960E-11	2.7841E-11	<1.9458E-11	**<2.1104E-11**
C_a	Concentration (lb/acf)	<8.3716E-12	<8.4789E-12	1.3694E-11	<8.4704E-12	**<9.7538E-12**
C_{sd}	Concentration (µg/dscm)	<2.6024E-01	<2.6460E-01	4.2503E-01	<2.6434E-01	**<3.0355E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.9748E-01	<2.8467E-01	4.5202E-01	<3.0217E-01	**<3.3408E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<3.0677E-01	<2.8761E-01	4.4584E-01	<3.1160E-01	**<3.3795E-01**
C_{sd}	Concentration (mg/dscm)	<2.6024E-04	<2.6460E-04	4.2503E-04	<2.6434E-04	**<3.0355E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.9748E-04	<2.8467E-04	4.5202E-04	<3.0217E-04	**<3.3408E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<3.0677E-04	<2.8761E-04	4.4584E-04	<3.1160E-04	**<3.3795E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.3406E-01	<1.3578E-01	2.1929E-01	<1.3564E-01	**<1.5619E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.7928E-01	<2.8396E-01	4.5613E-01	<2.8368E-01	**<3.2576E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<3.1924E-01	<3.0550E-01	4.8510E-01	<3.2427E-01	**<3.5853E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<3.2921E-01	<3.0865E-01	4.7846E-01	<3.3440E-01	**<3.6268E-01**
$E_{lb/hr}$	Rate (lb/hr)	<8.5244E-05	<8.3294E-05	1.3053E-04	<8.3660E-05	**<9.5682E-05**
$E_{g/s}$	Rate (g/s)	<1.0739E-05	<1.0493E-05	1.6444E-05	<1.0539E-05	**<1.2054E-05**
$E_{T/yr}$	Rate (Ton/yr)	<3.7337E-04	<3.6483E-04	5.7172E-04	<3.6643E-04	**<4.1909E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.6731E-07	<2.5580E-07	4.0618E-07	<2.7152E-07	**<3.0020E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.9054E-07	<2.7240E-07	4.2226E-07	<2.9512E-07	**<3.2008E-07**
Mercury Results - HCl Rinse + HCl/MnO2 Precipitate						
C_{sd}	Concentration (lb/dscf)	<1.3001E-11	<1.3219E-11	<1.3622E-11	<1.3206E-11	**<1.3262E-11**
C_{sd7}	Concentration @7% O_2 (lb/dscf)	<1.4861E-11	<1.4221E-11	<1.4487E-11	<1.5095E-11	**<1.4666E-11**
C_{sd12}	Concentration @12% CO_2 (lb/dscf)	<1.5325E-11	<1.4368E-11	<1.4288E-11	<1.5567E-11	**<1.4887E-11**
C_a	Concentration (lb/acf)	<6.6973E-12	<6.7831E-12	<7.0279E-12	<6.7764E-12	**<6.8212E-12**
C_{sd}	Concentration (µg/dscm)	<2.0819E-01	<2.1168E-01	<2.1813E-01	<2.1147E-01	**<2.1237E-01**
C_{sd7}	Concentration @7% O_2 (µg/dscm)	<2.3798E-01	<2.2773E-01	<2.3198E-01	<2.4173E-01	**<2.3486E-01**
C_{sd12}	Concentration @12% CO_2 (µg/dscm)	<2.4541E-01	<2.3009E-01	<2.2881E-01	<2.4928E-01	**<2.3840E-01**
C_{sd}	Concentration (mg/dscm)	<2.0819E-04	<2.1168E-04	<2.1813E-04	<2.1147E-04	**<2.1237E-04**
C_{sd7}	Concentration @7% O_2 (mg/dscm)	<2.3798E-04	<2.2773E-04	<2.3198E-04	<2.4173E-04	**<2.3486E-04**
C_{sd12}	Concentration @12% CO_2 (mg/dscm)	<2.4541E-04	<2.3009E-04	<2.2881E-04	<2.4928E-04	**<2.3840E-04**
C_a	Concentration (µg/m^3 (actual,wet))	<1.0725E-01	<1.0862E-01	<1.1254E-01	<1.0851E-01	**<1.0923E-01**
C_{sd}	Concentration (µg/Nm^3 dry)	<2.2342E-01	<2.2717E-01	<2.3409E-01	<2.2695E-01	**<2.2791E-01**
C_{sd7}	Concentration @7% O_2 (µg/Nm^3 dry)	<2.5540E-01	<2.4440E-01	<2.4896E-01	<2.5942E-01	**<2.5204E-01**
C_{sd12}	Concentration @12% CO_2 (µg/Nm^3 dry)	<2.6337E-01	<2.4692E-01	<2.4555E-01	<2.6752E-01	**<2.5584E-01**
$E_{lb/hr}$	Rate (lb/hr)	<6.8195E-05	<6.6635E-05	<6.6988E-05	<6.6928E-05	**<6.7187E-05**
$E_{g/s}$	Rate (g/s)	<8.5910E-06	<8.3944E-06	<8.4389E-06	<8.4314E-06	**<8.4639E-06**
$E_{T/yr}$	Rate (Ton/yr)	<2.9870E-04	<2.9186E-04	<2.9341E-04	<2.9315E-04	**<2.9428E-04**
E_{Fd}	Rate - Fd-based (lb/MMBtu)	<2.1384E-07	<2.0464E-07	<2.0845E-07	<2.1721E-07	**<2.1104E-07**
E_{Fc}	Rate - Fc-based (lb/MMBtu)	<2.3243E-07	<2.1792E-07	<2.1671E-07	<2.3610E-07	**<2.2579E-07**

041113 151405
MOMM_M

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 SDA Inlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 20	Mar 20	
Start Time (approx.)		08:13	09:39	11:00	
Stop Time (approx.)		09:13	10:39	12:00	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0008	1.0008	1.0008	
P_g	Static pressure (in. H_2O)	-1.3000	-1.2000	-1.2000	
A_s	Sample location area (ft^2)	60.1320	60.1320	60.1320	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	**29.8000**
O_2	Oxygen (dry volume %)	6.1100	7.3100	6.9600	**6.7933**
CO_2	Carbon dioxide (dry volume %)	12.8300	11.6300	12.1100	**12.1900**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	81.0600	81.0600	80.9300	**81.0167**
V_{lc}	Total Liquid collected (ml)	189.60	188.70	163.70	
V_m	Volume metered, meter conditions (ft^3)	34.2700	34.5100	34.8200	
T_m	Dry gas meter temperature (°F)	83.0000	86.9167	92.2083	
T_s	Sample temperature (°F)	488.1667	497.5833	500.4167	**495.3889**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.2000	1.2000	1.2000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	8.9226	8.8802	7.7037	**8.5022**
V_{mstd}	Volume metered, standard (dscf)	33.3012	33.2943	33.2715	**33.2890**
P_s	Sample gas pressure, absolute (in. Hg)	29.7044	29.7118	29.7118	**29.7093**
P_v	Vapor pressure, actual (in. Hg)	29.7044	29.7118	29.7118	**29.7093**
B_{wo}	Moisture measured in sample (% by volume)	21.1316	21.0559	18.8009	**20.3295**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	21.1316	21.0559	18.8009	**20.3295**
M_d	MW of sample gas, dry (lb/lb-mole)	30.2972	30.1532	30.2160	**30.2221**
M_s	MW of sample gas, wet (lb/lb-mole)	27.6986	27.5942	27.9193	**27.7374**

Comments:

Average includes 3 runs.

041113 151421
HQN@

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 SDA Inlet

USEPA Method 26A (HCl)
HCl Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 20	Mar 20	
Start Time (approx.)		08:13	09:39	11:00	
Stop Time (approx.)		09:13	10:39	12:00	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	185.6	182.8	182.8	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	321	321	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	6.1100	7.3100	6.9600	**6.7933**
CO_2	Carbon dioxide (dry volume %)	12.8300	11.6300	12.1100	**12.1900**
T_s	Sample temperature (°F)	488.1667	497.5833	500.4167	**495.3889**
B_w	Actual water vapor in gas (% by volume)	21.1316	21.0559	18.8009	**20.3295**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	33.3012	33.2943	33.2715	**33.2890**
Laboratory Data					
m_n	Total HCl collected (mg)	823.7837	738.9757	663.2097	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	5.4546E-05	4.8941E-05	4.3953E-05	**4.9146E-05**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	5.1263E-05	5.0057E-05	4.3827E-05	**4.8382E-05**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	5.1017E-05	5.0498E-05	4.3554E-05	**4.8356E-05**
C_{sd}	HCl Concentration (ppmdv)	576.6909	517.4288	464.6963	**519.6053**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	541.9881	529.2318	463.3629	**511.5276**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	539.3836	533.8904	460.4753	**511.2498**
C_w	HCl Concentration (ppmwv)	454.8268	408.4795	377.3290	**413.5451**
C_{sd}	HCl Concentration (mg/dscm)	873.4750	783.7146	703.8443	**787.0113**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	820.9129	801.5918	701.8247	**774.7765**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	816.9680	808.6479	697.4510	**774.3557**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	937.3878	841.0596	755.3451	**844.5975**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	880.9797	860.2449	753.1777	**831.4675**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	876.7462	867.8173	748.4840	**831.0158**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.7377	0.7203	0.6306	**0.6962**
E_{Fc}	HCl Rate - Fc-based (lb/MMBtu)	0.7738	0.7659	0.6606	**0.7334**

041613 082651
HQN@_@

Prepared by Clean Air Engineering Proprietary Software
SS EPA26-1 Version 2006-10b (CI)

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 26A (HCl)
Sampling, Velocity and Moisture Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 20	Mar 20	
Start Time (approx.)		08:13	09:39	11:00	
Stop Time (approx.)		09:13	10:39	12:00	
Sampling Conditions					
Y_d	Dry gas meter correction factor	1.0039	1.0039	1.0039	
P_g	Static pressure (in. H_2O)	-8.0000	-8.8000	-9.1000	
A_s	Sample location area (ft^2)	64.0000	64.0000	64.0000	
P_{bar}	Barometric pressure (in. Hg)	29.80	29.80	29.80	**29.8000**
O_2	Oxygen (dry volume %)	6.9600	7.8400	8.5300	**7.7767**
CO_2	Carbon dioxide (dry volume %)	12.1100	11.2600	10.8000	**11.3900**
N_2+CO	Nitrogen plus carbon monoxide (dry volume %)	80.9300	80.9000	80.6700	**80.8333**
V_{lc}	Total Liquid collected (ml)	274.70	264.30	248.10	
V_m	Volume metered, meter conditions (ft^3)	41.0000	41.9250	42.3650	
T_m	Dry gas meter temperature (°F)	83.1667	87.8750	92.5833	
T_s	Sample temperature (°F)	311.5000	312.7500	313.2500	**312.5000**
ΔH	Meter box orifice pressure drop (in. H_2O)	1.5000	1.5000	1.5000	
θ	Total sampling time (min)	60.0	60.0	60.0	
Flow Results					
V_{wstd}	Volume of water collected (ft^3)	12.9274	12.4380	11.6756	**12.3470**
V_{mstd}	Volume metered, standard (dscf)	39.9816	40.5323	40.6087	**40.3742**
P_s	Sample gas pressure, absolute (in. Hg)	29.2118	29.1529	29.1309	**29.1652**
P_v	Vapor pressure, actual (in. Hg)	29.2118	29.1529	29.1309	**29.1652**
B_{wo}	Moisture measured in sample (% by volume)	24.4332	23.4810	22.3310	**23.4151**
B_{ws}	Saturated moisture content (% by volume)	100.0000	100.0000	100.0000	**100.0000**
B_w	Actual water vapor in gas (% by volume)	24.4332	23.4810	22.3310	**23.4151**
M_d	MW of sample gas, dry (lb/lb-mole)	30.2160	30.1152	30.0692	**30.1335**
M_s	MW of sample gas, wet (lb/lb-mole)	27.2312	27.2704	27.3740	**27.2919**

Comments:

041113 151435
M O J @

Average includes 3 runs.

Moistures obtained from Method 26A Run 3 and Method 5/29 Run 1.

Wheelabrator North Broward, Inc.
Clean Air Project No: 12218
Unit 3 FF Outlet

USEPA Method 26A (HCl)
HCl Parameters

Run No.		1	2	3	Average
Date (2013)		Mar 20	Mar 20	Mar 20	
Start Time (approx.)		08:13	09:39	11:00	
Stop Time (approx.)		09:13	10:39	12:00	
Process Conditions					
R_P	Steam Production Rate - (Klbs/hour)	185.6	182.8	182.8	**183.8**
P_1	Fabric Filter Inlet Temperature - (°F)	320	321	321	**320**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,570	9,570	9,570	**9,570**
F_c	Carbon dioxide-based F-factor (dscf/MMBtu)	1,820	1,820	1,820	**1,820**
Gas Conditions					
O_2	Oxygen (dry volume %)	6.9600	7.8400	8.5300	**7.7767**
CO_2	Carbon dioxide (dry volume %)	12.1100	11.2600	10.8000	**11.3900**
T_s	Sample temperature (°F)	311.5000	312.7500	313.2500	**312.5000**
B_w	Actual water vapor in gas (% by volume)	24.4332	23.4810	22.3310	**23.4151**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	39.9816	40.5323	40.6087	**40.3742**
Laboratory Data					
m_n	Total HCl collected (mg)	9.6838	8.1785	8.9410	
Hydrogen Chloride (HCl) Results					
C_{sd}	HCl Concentration (lb/dscf)	5.3406E-07	4.4492E-07	4.8549E-07	**4.8815E-07**
C_{sd7}	HCl Concentration @7% O_2 (lb/dscf)	5.3253E-07	4.7353E-07	5.4553E-07	**5.1720E-07**
C_{sd12}	HCl Concentration @12% CO_2 (lb/dscf)	5.2921E-07	4.7416E-07	5.3943E-07	**5.1427E-07**
C_{sd}	HCl Concentration (ppmdv)	5.6464	4.7039	5.1328	**5.1611**
C_{sd7}	HCl Concentration @7% O_2 (ppmdv)	5.6302	5.0065	5.7677	**5.4681**
C_{sd12}	HCl Concentration @12% CO_2 (ppmdv)	5.5951	5.0131	5.7032	**5.4371**
C_w	HCl Concentration (ppmwv)	4.2668	3.5994	3.9866	**3.9509**
C_{sd}	HCl Concentration (mg/dscm)	8.5523	7.1247	7.7744	**7.8171**
C_{sd7}	HCl Concentration @7% O_2 (mg/dscm)	8.5277	7.5830	8.7360	**8.2822**
C_{sd12}	HCl Concentration @12% CO_2 (mg/dscm)	8.4746	7.5930	8.6382	**8.2352**
C_{sd}	HCl Concentration (mg/Nm^3 dry)	9.1780	7.6460	8.3432	**8.3891**
C_{sd7}	HCl Concentration @7% O_2 (mg/Nm^3 dry)	9.1517	8.1378	9.3752	**8.8882**
C_{sd12}	HCl Concentration @12% CO_2 (mg/Nm^3 dry)	9.0947	8.1485	9.2702	**8.8378**
E_{Fd}	HCl Rate - Fd-based (lb/MMBtu)	0.0077	0.0068	0.0078	**0.0074**
E_{Fc}	HCl Rate - Fc-based (lb/MMBtu)	0.0080	0.0072	0.0082	**0.0078**

041113 151443
MOJ@_@

Wheelabrator North Broward, Inc.
CleanAir Project No. 12218
Lime Silo

Visible Emission Parameters

Run	**1**
Date (2013)	Mar 20
Start Time	9:23

Time (min)	Time (sec) 15	30	45	60
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Time (min)	Time (sec) 15	30	45	60
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

Average Opacity	**0**
Minimum Reading	**0**
Maximum Reading	**0**
No. of Readings >5%	**0**

Prepared by CleanAir Engineering Proprietary Software
SS EPA M9 Version 01-2003