Compliance Test Report
Haverhill North Coke Company
Facility ID 0773000182

Unit 2 – Vent Stack

Test Date:
May 19, 2009

Prepared for:

Haverhill North Coke Company
2446 Gallia Pike
Franklin Furnace, Ohio 45629

URS

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Prepared for:

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2446 Gallia Pike
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ACRONYMS

acfm	actual cubic feet per minute
CEM	Continuous Emissions Monitor
CFR	Code of Federal Regulations
dscf	dry standard cubic feet
EPA	Environmental Protection Agency
HAP	Hazardous Air Pollutant
HNCC	Haverhill North Coke Company
MACT	Maximum Achievable Control Technology
OEPA	Ohio Environmental Protection Agency
ppb	parts per billion
SO_2	Sulfur Dioxide
URS	URS Corporation

1.0 INTRODUCTION/OVERVIEW

On May 19, 2009 URS Corporation (URS) performed air emissions compliance testing on the #9 Vent Stack at the Haverhill North Coke Company (HNCC). The tests were performed using the methods and procedures listed in the Permit to Install (07-00511) with the modifications described in the Intent To Test Notification submitted April 20, 2009.

The emission limits from the permit are listed in Table 1-1 along with the measured values. A more detailed list of test results is located in Tables 2-1 and 2-2. The permit also required testing from the vent stack for information purposes. The results of these tests are summarized in Table 2-3.

Personnel on-site during the tests included:

- Kris Kinder, Environmental Manager, HNCC;
- Louis Boerger, Ohio EPA, Portsmouth;
- Todd Gregg, Environmental Scientist, URS Corporation (URS);
- Thomas Brado, Field Technician, URS;
- Brad Johnson, Field Technician, URS.

This report summarizes the test results for each emission unit in Section 2.0 and provides information on how the tests were performed in Section 3.0. The quality assurance program used by URS for this test program is described in Section 4.0. The appendixes contain process data, calculations, analytical reports, field data sheets, calibration information, and a copy of the Intent to Test.

Table 1-1

Compliance Demonstration
Stack Tests at Haverhill North Coke – # 9 Vent Stack (May 19, 2009)

Emission Unit		Pollutant	Emission Limit	Measured Value	Comply?
Name	Number				
# 9 Vent Stack	P902	VEs	20% Opacity	5.13%	Yes
		Mercury	0.008 lb/hour	0.00168 lb/hour	Yes
		Lead	0.30 lb/hour	0.09615 lb/hour	Yes
		PM/PM_{10}[a]	35.57 lb/hour	8.62 lb/hour	Yes
		HCl	2.01 lb/ton coal	1.122 lb/ton coal	Yes
		HCl	48.24 lb/hour	21.03 lb/hr	Yes
		SO_2	480.0 lb/hour	213.27 lb/hour	Yes

[a] Filterable particulate matter

HCl = Hydrogen Chloride
PM = Particulate Matter
PM_{10} = Particulate matter less than 10 microns
SO_2 = Sulfur Dioxide
VEs = Visible Emissions

2.0 TEST RESULTS

HNCC utilizes the Jewell-Thompson heat recovery oven to manufacture metallurgical coke. In coke production from both heat recovery and byproduct ovens, the volatile fraction of the coal is driven off in a reducing atmosphere. Coke is essentially the remaining carbon and ash. With byproduct ovens, the volatiles and combustion products are collected downstream of the oven chamber and refined in a chemical plant to produce coke oven gas and other products such as tar, ammonia, and light oils. In heat recovery ovens, all the coal volatiles are oxidized.

Heat recovery steam generators (HRSGs) recover heat from the oven waste gases. The cooled gases pass through a lime spray dryer/baghouse system prior to being exhausted from the main stack. The oven pushing/charging machine travels on rails between ovens during the production cycle. A traveling hood/baghouse system controls emissions from coal charging that escape the ovens. On the opposite side of the ovens from the pushing/charging machine, coke is pushed into a flat push hot car that travels on rails from the oven to the quench tower. A multicyclone captures and controls emissions from pushing the coke into the car and during travel to the quench tower. A baghouse controls particulate emissions from the coke screening and crushing facilities in the coke processing area.

There are currently 200 ovens at HNCC that operate on a 48-hour coking cycle. There are 100 ovens in Unit 1 and 100 ovens in Unit 2. The operating schedule is arranged such that half of the ovens are charged each day. For example, the 50 even-numbered ovens in Unit 2 are charged one day and the 50 odd-numbered ovens in Unit 2 are charged the next.

During normal facility operations the vent stack lids remain closed. In the event of a process upset, or HRSG outage, that does not allow the oven exhaust to be sent to the waste heat boiler, the vent stack lid will open to allow the oven exhaust to vent to atmosphere. The HRSG waste heat boiler # 9 was out of service for scheduled maintenance during this vent stack test period.

Since emissions from the ovens are essentially continuous, testing on the vent stack can be performed anytime. However, Ohio EPA (OEPA) requires that at least one set of test runs on

the vent stack be performed during the oven push/charge production cycle. Each production cycle consists of pushing and charging 25 ovens.

2.1 Vent Stack

The tests for particulate matter, acid gases, visible emissions, lead, mercury and sulfur dioxide (SO_2) were performed on May 19, 2009. The results are summarized in Table 2-1.

Table 2-1

Vent Stack #9 Particulate Matter, Acid Gases and SO_2 Test Results

Parameters	Run 1	Run 2	Run 3	Average
Date	5/19/2009	5/19/2009	5/19/2009	
Test Time	08:50 – 11:58	12:35 - 15:16	16:36 - 18:57	
Temperature (°F)	1,444	1,534	1,580	1,519
Moisture (%)	12.3	11.0	11.0	11.4
O_2 (%)	9.5	9.5	9.9	9.7
CO_2 (%)	7.6	7.5	7.7	7.6
Sample volume (dscf)	72.328	76.461	67.262	72.017
Percent Isokinetic	99.1	97.9	98.7	98.6
Gas Flowrate – *Based on the average of the M5/M26A test trains.*				
acfm	208,414	230,081	205,468	214,655
dscfm	50,466	53,970	47,112	50,516
PM/PM_{10} (filterable)				
Concentration (gr/dscf)	0.0232	0.0166	0.0202	0.0200
Emission rate (lb/hour)	10.1	7.7	8.1	8.62
HCl				
Concentration (ppm)[a]	80.377	70.558	68.453	73.129
Emission rate (lb/hour)	23.07	21.66	18.34	21.03
SO_2				
Concentration (ppm)	457.13	381.82	433.24	424.06
Emission rate (lb/hour)	230.31	205.73	203.77	213.27
Visible Emissions				
Opacity (%)	9.3	5.8	0.3	5.13

[a] HCL was detected and estimated.

acfm = actual cubic feet per minute
CO_2 = Carbon Dioxide
SO_2 = Sulfur Dioxide
dscf = dry standard cubic feet
O_2 = Oxygen
PM = Particulate Matter
dscfm = dry standard cubic feet per minute
PM_{10} = Particulate matter less than 10 microns
HCl = Hydrogen Chloride
ppm = parts per million

The compliance tests for lead and mercury were performed simultaneously with the particulate matter, acid gases and SO_2 testing on May 19, 2009. The results are summarized in Table 2-2.

Table 2-2

Vent Stack #9 Lead & Mercury Test Results

Parameters	Run 1	Run 2	Run 3	Average
Date	5/19/2009	5/19/2009	5/19/2009	
Test Time	08:50 – 11:58	12:35 - 15:16	16:36 - 18:57	
Temperature (°F)	1,447	1,534	1,580	1,520
Moisture (%)	12.7	11.2	11.2	11.7
O_2 (%)	9.3	9.3	10.1	9.6
CO_2 (%)	7.8	7.6	7.7	7.7
Sample volume (dscf)	78.35	75.832	68.963	74.382
Percent Isokinetic	98.5	97.5	96.9	97.6
Gas Flowrate				
acfm	228,522	229,723	214,925	224,390
dscfm	54,957	53,786	49,168	52,637
Lead				
Concentration (gr/dscf)	0.00138	0.0008855	0.00082	0.001029
Emission rate (lb/hour)	0.12804	0.08308	0.07733	0.09615
Mercury[a]				
Concentration (ug/m^3)	8.635	8.102	8.822	8.5197
Emission rate (lb/hour)	0.00178	0.00163	0.00162	0.00168

[a] Based on the combined totals of particle bound, oxidized and elemental mercury.

acfm = actual cubic feet per minute
CO_2 = Carbon Dioxide
dscf = dry standard cubic feet
dscfm = dry standard cubic feet per minute
O_2 = Oxygen

The EPA Method 29 tests that were performed to determine the lead and mercury emissions also yielded emission rate information for other hazardous air pollutant (HAPs) metals. These HAP metals are reported for informational purposes only. The results are summarized in Table 2-3.

Table 2-3

Vent Stack #9 Information Test Results

Emission Unit		Pollutant	Measured Value (lb/hour)
Name	Number		
# 9 Vent Stack	P902	Mercury	0.00168
		Antimony	0.00431
		Arsenic	0.04012
		Barium	0.00955
		Beryllium	0.00041
		Cadmium	0.00165
		Chromium	0.00477
		Cobalt	0.00169
		Copper	0.06356
		Manganese	0.00591
		Nickel	0.01614
		Phosphorous	0.13971
		Selenium	0.01346
		Silver	0.00042
		Thallium	0.01054
		Zinc	0.19717

In comparison of the test results presented in Tables 2-1and 2-2 to the permit requirements listed in Table 1-1, the Vent Stack #9 is in compliance with the OEPA permit. As the Vent Stack #9 testing was used as representative for all of the vent stacks in Unit 2. All remaining Unit 2 vent stacks are considered to be in compliance with the OEPA permit requirements as well.

3.0 SAMPLING METHODOLOGY

The sampling methods used during the tests are summarized in Table 3-1.

Table 3-1

Test Method Summary

Emission Unit	Pollutant	Test Method	Comment
Vent Stack	Particulate	EPA Method 5	
	Acid Gases	EPA Method 26A	Combined with EPA M5 Train
	SO_2	EPA Method 6C	
	Lead and mercury	EPA Method 29	
	Traverse point layout	EPA Method 1	
	Gas flowrate	EPA Method 2	
	Gas molecular weight	EPA Method 3	
	Moisture	EPA Method 4	

SO_2 = Sulfur Dioxide
EPA = U.S. Environmental Protection Agency

3.1 Cyclonic Flow Verification Test

As part of the pre-test activities, measurements were made to determine if cyclonic flow conditions were present in the stack. Based on previous vent stack testing on Haverhill Unit 1, the presence of cyclonic flow was expected to present in the Unit 2 vent stacks. In order to determine the presence of cyclonic flow a cyclonic flow check was performed according to EPA Method 1 sampling procedures. The cyclonic flow measurements indicated that cyclonic flow was present in the stack, and the average yaw angle was 23.7 degrees. Since this exceeded the 20 degrees allowed by Method 1 procedures, an alternative approach to the Method 5/26A sampling was needed.

Based on the cyclonic flow testing that was performed during the compliance testing on Haverhill Unit 1, the same guidelines taken from the EPA Guideline Document EMC GD-008 for cyclonic flow alignment were used for the Unit 2 Vent Stack #9 compliance testing. The modified procedure involved the following:

- Measure the yaw angle at each traverse point as in Method 1.
- Rotate the probe to the average yaw angle so that the probe nozzle points into the gas flow.
- Sample at all points with the probe rotated to the average yaw angle.
- Calculate the percent isokinetic sampling rate based on these measurements.
- Calculate the stack velocity and volumetric flow rate using the cosine of the average yaw angle.

URS used the procedure as described above and calculated the stack gas velocity from the pre-run and compliance test run velocity traverses at the individual yaw angles. The results of these calculations are summarized in Table 3-1. The average difference for the three test runs was 3.82%. Based on the OEPA acceptance criteria for alternate flow measurement used on Haverhill Unit 1, the compliance test data would be validated if the pre-test stack gas velocity was within 10% of the stack gas velocity calculated from the compliance test runs conducted at the average yaw angle. The results of these calculations are summarized in Table 3-1. Since the average difference for the three test runs was 3.82%, the approach used for the Unit 2 Vent Stack #9 is valid.

Table 3-2

Comparison of Gas Velocities at Individual and Average Yaw Angles

	Run 1	Run 2	Run 3	Average
Average Vertical Stack Gas Velocity, ft/sec				
Pre-run Traverse at Individual Yaw Angles		54.22		54.22
Test Run Traverse at Average Yaw Angle	54.60	60.28	53.83	56.24
Absolute Difference of Velocities, % of Test Run Result	0.70	10.05	0.72	3.82

3.2 Test Methods

Each test method used for this compliance test program were based on standard methodology taken from the latest version of Title 40 of the Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A. These test methods were presented in the Intent to Test and Sampling Protocol submitted to OEPA prior to the compliance test. A detailed description of the sampling trains and methods used is provided below.

3.2.1 EPA Method 1 - EPA Reference Methods 1 and 2, Determination of Stack Gas Volumetric Flow Rate

U.S. Environmental Protection Agency (EPA) Methods 1 and 2 were used to determine the sampling traverse layout and stack gas volumetric flow rate at the sampling location. An integrated velocity traverse was conducted at discrete points during each test run for the vent stack at each traverse point. A calibrated S-type pitot tube and an incline manometer was used to measure the velocity pressure. A calibrated type "K" thermocouple was used to measure the stack gas temperature at each traverse point. Utilizing the measured stack gas molecular weight and the moisture content, the standard (Q_{std}) and actual volumetric flow rates were calculated in accordance with the formulas found in EPA Reference Method 2. The alternate methodology used to measure the velocity pressures was previously described in Section 3.1

3.2.2 EPA Reference Method 3, Determination of Stack Gas Molecular Weight

In accordance with EPA Reference Method 3A, the stack gas O_2 and CO_2 concentrations were determined for the vent stack gas. The O_2 and CO_2 content of the stack gas was determined using a Servomex 1400 O_2 and CO_2 gas analyzer. The resulting O_2 and CO_2 concentrations were used to calculate the molecular weight of the stack gas and to correct the DF emission rates to 7% O_2.

The gas sample was collected using the CEM sampling system described in Section 3.2.5.

3.2.3 EPA Reference Method 4, Determination of Stack Gas Moisture Content

The moisture content (%), B_{wo}, was determined for the vent stack gas in accordance with EPA Reference Method 4. The Method 4 sampling was incorporated with both the Method 5/26A and Method 29 isokinetic sampling trains.

3.2.4 EPA Method 5/26A – Determination of Particulate Matter & Hydrogen Chloride

The solid particulate matter (PM) testing was performed in accordance to EPA Method 5 (M5). The M5 sampling train was modified to also accommodate hydrogen chloride (HCl) sampling as described in EPA Method 26A. The PM/HCl sampling was performed by extracting a sample of the stack exhaust gas stream through an integrated quartz nozzle and probe liner encased in a stainless steel air-cooled sampling probe. The probe was attached to a heated glass filter holder containing a pre-weighed quartz-fiber filter. The probe and filter heater box were

maintained at a temperature of 248°F ± 25°F. After leaving the filter holder, the gas stream sample passed through a series of four glass impingers. The standard M5 sampling train was modified to accommodate HCl sampling by filling the first Smith-Greenburg impinger with 100 ml of 0.1N sulfuric acid. The second modified Smith-Greenburg impinger was also filled with 100 ml of 0.1N sulfuric acid. The third and fourth modified Smith-Greenburg impingers were filled with 0.1N sodium hydroxide. The fifth modified Smith-Greenburg impinger contained approximately 200 grams of indicating silica gel. The impingers were weighed prior to assembling the sampling train to permit gravimetric moisture determination. After exiting the impingers, the exhaust gas sample traveled through an umbilical cord to the control console and was then exhausted to atmosphere. The control console contained the sample pump, dry gas meter, calibrated orifice meter, thermocouple readouts and heat controls for the sampling train.

At the conclusion of each test run, the sample train was recovered by washing the sample probe and nozzle three times with acetone into a sample container. The filter was removed from the filter holder and placed into a Petri dish and sealed for transportation. The front half of the glass filter holder and connecting elbow were washed with acetone into the probe wash sample container. A sample of the acetone used in the sample recovery was collected and analyzed as a reagent blank. The impinger train was then disassembled and each impinger was weighed to determine the moisture gained during the sample run. The contents of the first two impingers were transferred into a sample container, along with the water rinsate of the impingers. The contents of impingers 3 and 4 were transferred to a separate sample container, along with the water rinsate of the impingers. The silica gel in impinger 5 was recovered for future reconditioning. At the conclusion of sampling, all the particulate samples were packaged and returned to the URS facility for subsequent analysis. The HCl samples were sent to an outside lab for analysis.

The particulate samples were analyzed by URS personnel. The analysis was performed by placing the filters into a desiccator for a minimum of 24 hours. The filters were then weighed to a constant weight. The acetone rinses were transferred to pre-weighed cups and allowed to dry in a laboratory hood at ambient temperature. The acetone cups were then transferred to a desiccator and allowed to dry for a minimum of 24 hours. The acetone cups were then weighed to a constant weight. The combined weights of the filter and probe wash were used to calculate

the mass emission rate of solid particulates. Figure 3-1 is a schematic of the M5/26A sample train.

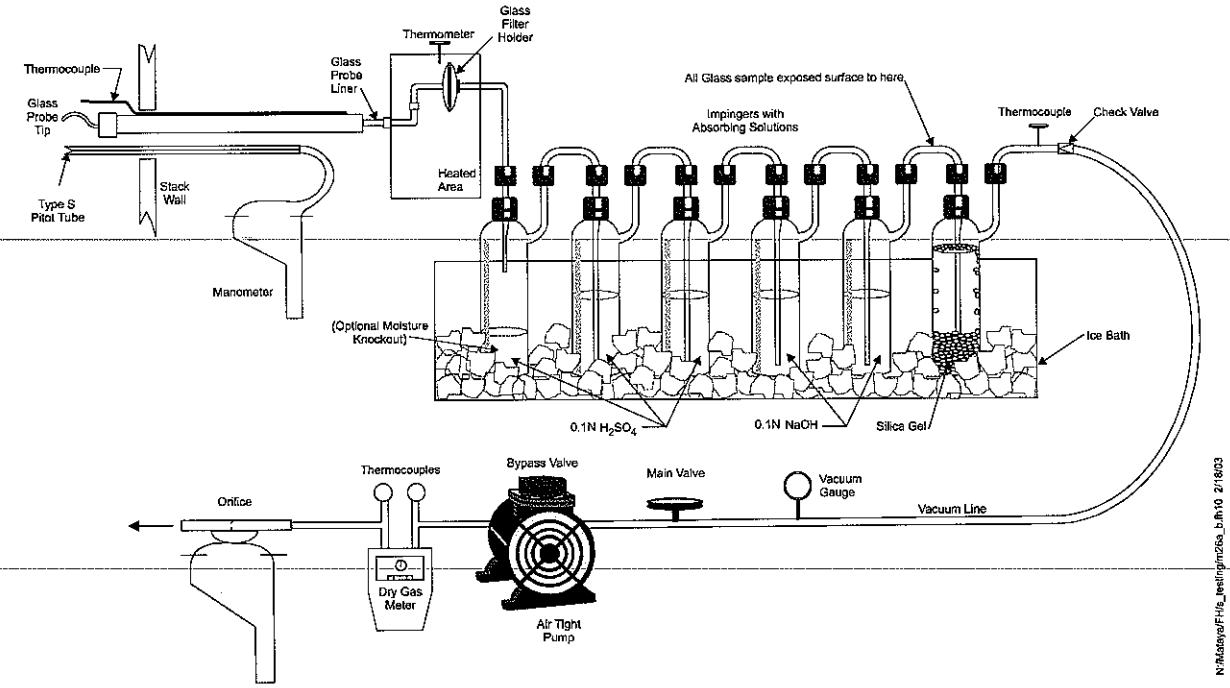


Figure 3-1. Schematic of EPA Method 5/26A Sample Train

3.2.5 EPA Method 6C – Sulfur Dioxide

The SO_2 concentrations were sampled using an API Model 100E ultraviolet fluorescence SO_2 gas analyzer. The SO_2 sampling conformed to procedures presented in EPA 40 CFR 60, Appendix A, Method 6C and Appendix B, Performance Specification 2. The concentration and mass emissions of SO_2 in the gas stream were reported in parts per million by volume (ppmv) on a dry basis, and in pounds per hour (lb/hr), respectively. The emission rate was calculated using the specific run-time average concentration in ppmv, the dry standard volumetric flow rate and the Ideal Gas Law.

The Access to the stack, for all gaseous sampling, was through a shared sample line. A hastelloy metal probe was used to extract the gas sample from the stack. A heated, 3/8 inch Teflon® line transported the sample from the point of extraction to the non-contact gas conditioning chiller system. The moisture was condensed and removed from the gas stream, while the pollutant passed through to the gaseous analyzers. The

analyzers were located in a temperature-controlled sampling trailer to minimize thermal affects on the calibration of the instruments.

Each reference method CEM was connected to an ESC datalogger for collection of data. One minute averages of each reference method CEM was recorded throughout the compliance test period. A copy of this raw data is provided in the Appendix of this report.

Prior to performing the SO_2 compliance test, the SO_2 analyzer was calibrated with a zero nitrogen gas along with a mid-level and high-level RATA class calibration gases. Section 4.2 describes the methodology used for CEM calibration. Figure 3-2 is a schematic of the CEM sampling system.

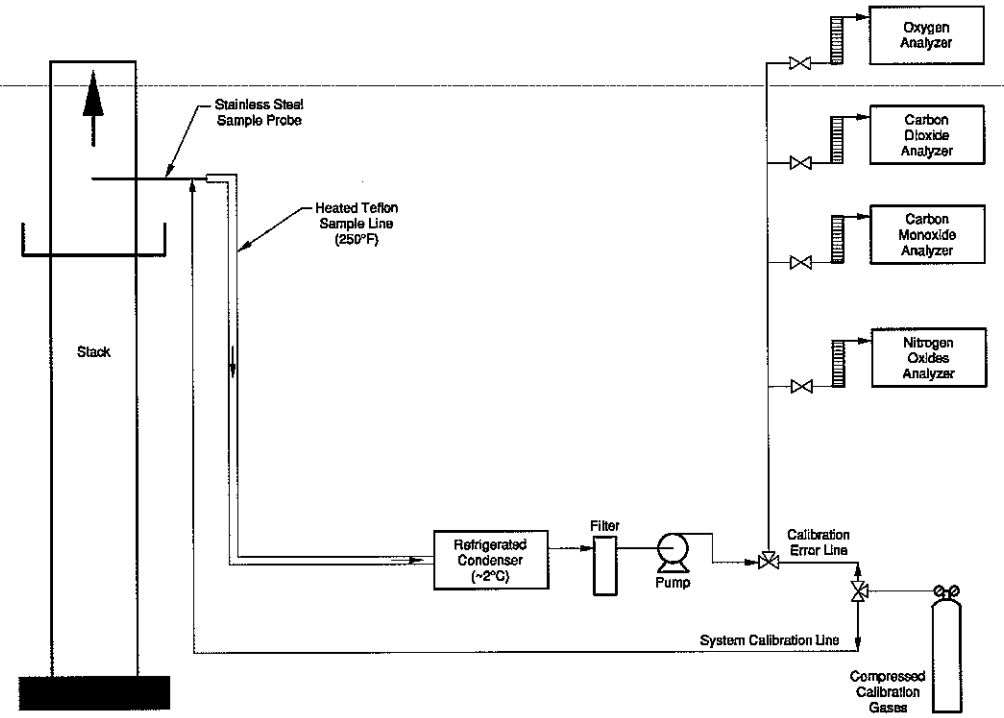


Figure 3-2. Schematic of Typical CEM Sampling System

(CEMs may vary)

3.2.6 EPA Method 29 – Lead & Mercury

The EPA Method 29 (M29) sampling train is based on the standard EPA Method 5 configuration with modifications to the sampling reagents placed in the impingers and the use of a glass nozzle. As with the M5 sampling, stack gas was isokinetically extracted from the stack

and pulled through a integrated quartz nozzle and probe liner encased in an air-cooled probe assembly connected to a heated glass filter assembly. The filter holder contained a quartz-fiber filter. The impinger train consisted of seven impingers. The first and second impingers each contained a 100 ml mixture of 5% HNO_3 and 10% H_2O_2. The fourth impinger was left empty as a buffer between the two different reagents used in the sample train. Impingers five and six each contained a 100 ml mixture of 4% $KMnO_4$ and 10% $H_2 SO_4$. Impinger seven contained 200 grams of indicating silica gel. The impinger section of the train was assembled in a dedicated clean area prior to being taken to the stack where the filter and probe were attached to the train. The remainder of the sampling train was identical in construction and operation to the M5 sampling train.

The gas stream velocity and temperature was monitored at each sampling point to insure that isokinetic sampling rates were maintained. As with the M5 train, leak checks were performed on the sampling trains at the beginning and end of each test run.

At the conclusion of each M29 test, the sample train was recovered by washing the nozzle/probe assembly and front half of the filter holder three times with 0.1N HNO_3 into a sample container. The impinger train was then disassembled and each impinger was weighed to determine the moisture gained during the sample run. The liquid contents of impingers one through three were transferred into a sample container along with the 0.1N nitric acid rinse. The contents of impingers four and five were transferred into a sample container. The impingers were then rinsed with 100 ml of fresh potassium permanganate solution. The rinse was then transferred to a separate sample container. The impingers were then rinsed with 100 ml of DI water. and added to the same sample container. In the event that residue was still present on the two impingers, a 25 ml rinse of 8N nitric acid was performed and collected into a separate sample container. The silica gel in the last impinger was recovered for subsequent reconditioning.

Samples of the filter, DI water, impinger solutions and rinse solutions were collected along with the actual test samples to serve as blanks for the tests. The blank samples were analyzed along wit the actual test samples to insure the integrity of the sample collection. Figure 3-3 is a schematic of the M29 sampling train.

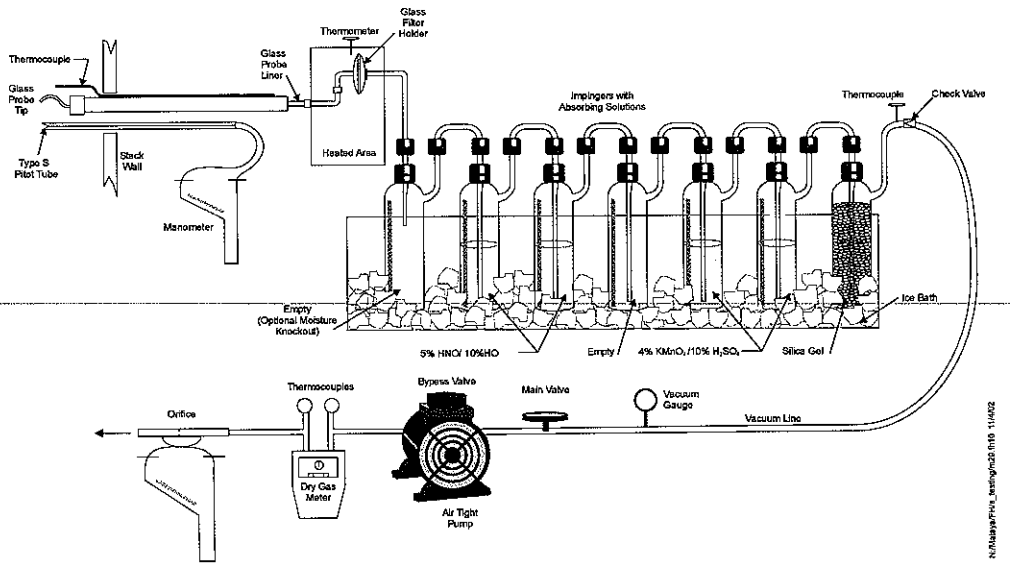


Figure 3-3. Schematic of EPA Method 29 Sampling Train

3.3 Sampling Exceptions

During the Vent Stack compliance testing three issues were encountered by the URS sampling team. Provided below is a detailed account of the issues and the exceptions taken to address the issue.

The first issue was concerning the sample train integrated probe liner and nozzle on the metals Run 2. During the change over from port 3 to port 4, the nozzle was accidently hit against the safety handrail while moving the test train around the sampling platform. The broken nozzle fell onto the stack sampling platform but was immediately recovered. When this occurred, all sampling activities were suspended and the OEPA representative on the stack observing the test run was informed and shown the broken nozzle. Because the nozzle is an integrated part of the sample probe liner, a new nozzle could not be attached without changing the entire probe liner/nozzle assembly. Since the test was 75% completed, it was agreed between the URS sample team and the OEPA representative that the test run could continue if the integrated sample probe liner/nozzle assembly were changed out. Due to the location of the break just inside the probe sheath, a leak check could not be performed before the probe liner/nozzle assembly was changed

out. After the probe liner/nozzle assembly was changed, a leak check was performed on the sample train to insure no other leak had occurred on the train. Since the probe liner and nozzle are manufactured as one single piece, and the only part replaced was the probe liner/nozzle assembly itself, and the fact that the leak check performed after the change out was successful, URS concludes that there would have been no reason to suspect a leak in the train prior to the change out. Once the change out and leak check were completed URS proceeded to complete the test run. At the conclusion of the sample test run, a final leak check was performed on the sample train and then the test train was recovered, including the broken probe liner and nozzle. URS believes there should be no bias to the test data of this test run due to this issue.

The second issue was concerning the temperature of the last impinger connector that monitors the sample gas temperature as it exits the sample train. According to EPA Method 5 sampling procedures, the exit temperature must remain below 68 °F. During the last two sampling points on test run 3, the last impinger temperature thermocouple of the EPA Method 29 metals train indicated that the exit gas temperature was above the 68 °F requirement, even though the entire sample train was completely covered with crushed ice. It was determined that the thermocouple reading was being interfered by the vent stack exhaust down washing onto the sample train, which caused the thermocouple to read high. This issue was shown to the OEPA representative and he concurred that the last impinger temperature was probably being biased by the vent stack exhaust, so URS believes that there should be no bias to the test data of this test run due to this issue.

The third issue encountered during the vent stack compliance tests was during the third test run. Approximately 40 minutes into the test run, the sample flow rate on the CEM system began to decline. The CEM operator attempted to increase the flow rate, but was unsuccessful because one of the two cooling chambers in the gas conditioner was beginning to freeze up and restrict the sample gas flow rate. At the 60 minute mark in the test run, the sample flow rate could no longer be maintained at a reasonable sample rate. Since the required minimum sampling time for a CEM test run is 60 minutes, and the test runs were being performed for a 120 minutes to coincide with the metals testing, it was decided to shorten the time period of CEM data collection to the first 60 minutes of run 3. The OEPA representative was informed of this situation and agreed that the CEM test run could be stopped at the 60 minute mark. The CEM

operator then proceeded to perform the final bias check on the CEM sample system to validate the data collected during the third test run. No issues were encountered during the final bias check. URS believes that there should be no bias to the CEM test data due to the reduced sampling time.

4.0 QUALITY ASSURANCE

The objective of URS's QA Program was to ensure the accuracy and precision, as well as reliability, of the data collected and generated for URS's clients and to meet the data quality objectives of regulatory or accrediting bodies. Management, administrative, statistical, investigative, preventative, and corrective techniques were employed to maximize the reliability of data.

During the compliance testing, a strict QA/QC program was adhered to. Before actual sampling on-site, all the sampling equipment was thoroughly checked to ensure that each component was clean and operable. Any damaged or faulty equipment was tagged and removed from service until it could be repaired. If any corrective actions were taken in response to these QC checks or in response to supervisor review of QC procedures, the corrective action taken was documented in a field QA/QC logbook.

Proper equipment calibration is essential in maintaining the desired data quality level. All calibrations of the equipment used in the stack sampling portion of the testing conformed to the guidelines outlined in the EPA quality assurance handbook, *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods* (EPA-600/4-77-027a). The following sections give a synopsis of the calibration procedures for the main components of the stack sampling systems.

4.1 Wet Method Test Equipment

The following sections describe the calibration procedures performed on the equipment used to perform the M5/26A and M29 sampling.

4.1.1 Dry Gas Meters/Orifice Meters

The dry gas meters and orifice meters in each control box to be used during the testing were calibrated before the test in order to ensure accurate measurements of the sample gas volumes. The dry gas meters and orifice meters are normally housed as a set inside each control

box and were calibrated as such. These sets of meters were calibrated against a secondary standard dry gas meter that is annually calibrated by Apex Instruments.

The dry gas meter/orifice meter sets were calibrated at predetermined nominal volume flow settings. For each of these flow rates, an accuracy ratio factor to the calibration standard (Y_i) was computed for the individual dry gas meters. A successful calibration for a particular dry gas meter would be achieved if each value of Y_i was within 2 percent of the average value of Y_i ($Y_i = Y \pm 0.02Y$).

In order to establish calibration for the orifice meter, a calibration coefficient ($\Delta H@_I$) was calculated for each flow rate. This coefficient is the orifice pressure differential (in inches H_2O) at a distinct orifice manometer setting that gives a flow of 0.75 ft^3/min of air at standard conditions. The desired tolerance for this coefficient is ±0.2 of the average value of the four values of $\Delta H@_I$ ($\Delta H@ \pm 0.2$). If any of the pre-test calibration coefficients for a particular meter violates the acceptance criteria, the meter in question would be adjusted and recalibrated.

4.1.2 Thermocouples and Thermocouple Readouts

All thermocouples used during the compliance test were calibrated to ensure accurate temperature measurements. All of the sensors utilized were type "K" thermocouples, which have a working range of approximately -300 °F to approximately 2,500 °F. These sensors were used in the measurement of stack gas temperature, filter box temperature, impinger outlet temperature and dry gas meter temperature. The thermocouples were calibrated against an NITS traceable mercury-in-glass thermometer at predetermined temperatures. In order to obtain the calibration data from each sensor, a single, recently calibrated thermocouple readout was used.

The thermocouple readouts used during the testing were calibrated using a thermocouple simulator. This calibration apparatus generates a voltage signal that mimics the signal an ideal "K" type thermocouple would exhibit at a particular temperature. The signal can be changed via a slide switch. The readouts were calibrated at ten different points from 200 °F through 2,000 °F, at increments of 200 °F.

4.1.3 Barometer

The field barometer used during the compliance test was an electronic barometer. This barometer was calibrated by comparing it to a standard mercury column barometer and adjusting it if any deviation existed between it and the standard. This exercise was performed both before and after the testing activities.

4.1.4 Analytical Balance

The field analytical balance was calibrated before the test with certified standard weights. The balance was adjusted for any deviation from the standard weights. In the field, periodic checks were made to insure data validity. This balance was used to measure the impinger weight changes due to moisture gain during the stack sampling (determination of stack moisture content).

The analytical balance used to weigh the M5 samples was calibrated before the samples were weighed, and periodically during the process, with a set of class 1 weights. The humidity of the desiccator and weighing room were recorded prior to weighing the samples along with the room temperature.

4.1.5 Pitot Tubes

The S-type pitot tubes used on each isokinetic sampling train were calibrated against a standard pitot tube using a wind tunnel, or by taking geometric measurements of the tube sizes and alignments. The basis for the calibration is described in 40 CFR, Part 60, Appendix A, Method 2.

4.2 CEMs

The reference method analyzers were calibrated with EPA-approved RATA Class calibration gases prior to the beginning of the test series, and after each compliance test run. The initial calibration error checks were performed at the beginning of the test run series in accordance with the specific reference method applicable to the analyzer. After the successful completion of the initial calibration error check, a system bias check was performed.

Zero, mid and high point calibration bias checks were performed prior to the beginning of the compliance test runs. The bias check is a comparison of instrument response to gas introduced into the analyzer with gases routed throughout the entire sampling system. The maximum allowable bias is 5% of the span. After the bias check was performed, the analyzers were not adjusted during the compliance tests, unless an analyzer failed the drift check. No analyzers failed the drift check.

The drift checks were performed on each analyzer by introducing the mid-range calibration gas and the zero nitrogen. The maximum allowable calibration drift is 3% of the span. Calibration drift was determined by comparing the before run and after run values. The test data values were corrected for bias and calibration drift. The following calculation, as cited in the reference method, was used to correct the measured concentrations for bias and instrument calibration drifts:

$$C_{gas} = (C_{anz} - C_o)\frac{C_{ma}}{(C_m - C_o)}$$

where:

C_{gas} = effluent gas concentration, dry basis, ppmv

C_{anz} = average gas concentration indicated by the gas analyzer, dry basis, ppmv

C_o = average of initial and final system calibration bias check responses for the zero gas, ppmv

C_m = average of initial and final system calibration bias check responses for the upscale calibration gas, ppmv

C_{ma} = actual concentration of the upscale calibration gas, ppmv.

Response time tests were performed in conjunction with the bias checks. The response time test was performed by measuring the time it took for each analyzer to reach 95% of the concentration of the high range calibration gas. The zero gas was then introduced into the sample system and the amount of time it took for the analyzer to reach a 95% reduction in scale reading was measured. The greater of these two readings was recorded as the response time for that analyzer.

Appendix A
PROCESS DATA

HNCC PUSHING REPORT **SEVERSTAL** **OPERATORS INITIALS** SD / DU

DATE: 05/19/09

OVEN	PREV TIME	PREV WEIGHT	DATE	CHG TIME	AM/PM CIRCLE	DATE	TONS GHG	OVEN INSP	DOOR/LINTEL DAMAGE	DOOR FIRE - PUSHER SIDE: DOOR OBS.	DOOR FIRE	Cor. Act. & Fire Out T.	PCM Pressure Readings: Pressure Reading	Fan Amp Reading	Corrective Action Required
101	932 am	45	5/17	7:53	AM/PM	5/19	45	Y // N	door // lintel	Y // N	Y // N				Y // N
105	941	45	5/17	8:01	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
109	950	45	5/17	8:10	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
113	959	45	5/17	8:19	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
117	1008	45	5/17	8:28	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
121	1017	45	5/17	8:37	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
125	1026	45	5/17	8:46	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
129	1036	45	5/17	8:56	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
133	1046	45	5/17	9:07	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
137	1056	45	5/17	9:19	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
141	1106	45	5/17	9:29	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
145	1117	45	5/17	9:40	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
149	1128	45	5/17	9:51	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
153	1139	45	5/17	10:01	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
157	1150	45	5/17	10:13	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
161	103	43	5/17	10:24	AM/PM	5/19	45	Y // N	door // lintel	Y // N	Y // N				Y // N
165	117	43	5/17	10:46	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
169	130	43	5/17	10:58	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
173	144	43	5/17	11:10	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
177	158	43	5/17	11:23	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
181	212	45	5/17	11:36	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
185	227	45	5/17	12:17	AM/PM	5/20		Y // N	door // lintel	Y // N	Y // N				Y // N
189	241	45	5/17	12:30	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
193	300	45	5/17	12:44	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
197	315	45	5/17	12:58	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N
													4.4	129	Y // N

Stack	Draft
1	
2	
3	
4	
5	

Charged Fire Ext.
Hydraulic Oil Spill
Windows Good Condition.
Doors Good Condition.

PCM	D/M	HOT CAR
YES-NO	YES-NO	YES-NO
YES-NO	YES-NO	YES-NO
YES-NO	YES-NO	YES-NO
YES-NO	YES-NO	YES-NO

Door fire correction step list.

1) Tighten door
2) Place K-Wool
3) Open uptake
4) Check blocks
5) Verify up take setting
6) Raise draft
7) Close SF 50%
8) Reduce door holes
9) Open EVS

PCM Pressure Readings

Must be in the required range of 3.0 to 12.0

If the reading isn't within the required range. Notify maintenance and the Turn Manager immediately. Write in the corrective actions taken t bring the pressure readings back into the EPA range.

Pressure Readings are to be recorded Once Per 8 Hour Shift / Every turn

Fan Amps are to be recorded Once Per 8 Hour Shift / Every Turn

Operator's / Maintenance Comments

Tons Charged:

HNCC PUSHING REPORT **MITTAL** **OPERATOR INITIALS** HS/TH

DATE: 05/18/09

OVEN	PREV TIME	PREV Weight	DATE	CHG TIME	AM/PM CIRCLE	DATE	TONS CHG	OVEN INSP	DOOR/LINTEL DAMAGE	DOOR FIRE - PUSHER SIDE: DOOR OBS.	DOOR FIRE	Cor. Act. & Fire Out T.	PCM Pressure Readings: Pressure Reading	Fan Amp Reading	Corrective Action Required	Operator's / Maintenance Comments
~~104~~	318 pm	45	5/16	5:02	AM/PM	4-19	43	Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~108~~	327	45	5/16	5:16	AM/PM		45	Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	Hot Car / from Hill leaning up
~~112~~	337	45	5/16	5:25	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~116~~	346	45	5/16	5:34	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)		4.2	130	Y // (N)	
~~120~~	438	45	5/16	5:44	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~124~~	516	45	5/16	5:53	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~128~~	526	45	5/16	6:03	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	Push Machine Stuck in travel
~~132~~	540	45	5/16	6:24	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~136~~	550	45	5/16	6:34	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~140~~	601	45	5/16	6:45	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~144~~	611	45	5/16	6:55	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~148~~	622	45	5/16	7:06	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~152~~	633	45	5/16	7:17	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~156~~	644	45	5/16	7:28	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~160~~	655	45	5/16	7:39	AM/PM			Y // N	door // lintel	(Y) // N	Y // (N)				Y // N	
~~164~~	843	45	5/16	8:56	AM/PM	5/16	45	Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~168~~	857	45	5/16	9:15	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	Delay for Equ testing
~~172~~	1232 am	45	5/17	9:27	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~176~~	1244	45	5/17	9:46	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~180~~	1257	45	5/17	9:59	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~184~~	110	45	5/17	10:13	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~188~~	124	45	5/17	10:34	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~192~~	138	45	5/17	10:48	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~196~~	151	45	5/17	11:06	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	
~~200~~	205	45	5/17	11:21	AM/PM			Y // N	door // lintel	(X) // N	Y // (X)				Y // N	

Stack	13-Feb			PCM	D/M	HOT CAR
1			Charged Fire Ext.	(YES-NO)	YES-NO	YES-NO
2			Hydraulic Oil Spill	(YES-NO)	YES-NO	YES-NO
3			Windows Good Condition.	(YES-NO)	YES-NO	YES-NO
4			Doors Good Condition.	(YES-NO)	YES-NO	YES-NO
5						

Door fire correction step list

1) Tighten door
2) Place K-Wool
3) Open uptake
4) Check blocks
5) Verify up take setting
6) Raise draft
7) Close SF 50%
8) Reduce door holes
9) Open EVS

PCM Pressure Readings

Must be in the required range of 3.0 to 12.0

If the reading isn't within the required range. Notify maintenance and the Turn Manager immediately. Write in the corrective actions taken t bring the pressure readings back into the EPA range.

Pressure Readings are to be recorded Once Per 8 Hour Shift / Every turn

Fan Amps are to be recorded Once Per 8 Hour Shift / Every Turn

Tons Charged:

HNCC PUSHING REPORT MITTAL OPERATOR INITIALS WC / DW / PD

DATE: 05/18/09

OVEN	PREV TIME	PREV WEIGHT	DATE	CHG TIME	AM/PM CIRCLE	DATE	TONS CHG	OVEN INSP	DOOR/LINTEL DAMAGE	DOOR FIRE - PUSHER SIDE: DOOR OBS.	DOOR FIRE	Cor. Act. & Fire Out T.	PCM Pressure Readings: Pressure Reading	Fan Amp Reading	Corrective Action Required	Operator's / Maintenance Comments
~~102~~	1226 am	45	5/16	2:15	AM/PM	5/18	45	Y // N	door // lintel	Y // N	Y // N		4.5	137	Y // N	
~~106~~	1240	45	5/16	2:37	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
110	338	45	5/16	4:31	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
114	349	45	5/16	5:01	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
118	358	45	5/16	5:10	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
122	409	45	5/16	5:20	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
126	418	45	5/16	5:29	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
130	428	45	5/16	5:39	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
134	439	45	5/16	5:48	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
138	448	45	5/16	5:59	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
142	501	45	5/16	6:09	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
146	512	45	5/16	6:20	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
150	523	45	5/16	6:31	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
154	535	45	5/16	6:42	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
158	548	45	5/16	6:53	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
162	616	45	5/16	4:17	AM/PM	5/18	45	Y // N	door // lintel	Y // N	Y // N				Y // N	
166	630	45	5/16	7:18	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
170	643	45	5/16	7:31	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
174	656	45	5/16	7:43	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
178	710	45	5/16	7:55	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
182	722	45	5/16	8:07	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
186	737	45	5/16	8:21	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
190	834	45	5/16	8:34	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
194	840	45	5/16	8:47	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	
198	850	45	5/16	9:20	AM/PM	"	"	Y // N	door // lintel	Y // N	Y // N				Y // N	

	Draft			PCM	D/M	HOT CAR
1			Charged Fire Ext.	YES-NO	YES-NO	YES-NO
2			Hydraulic Oil Spill	YES-NO	YES-NO	YES-NO
3			Windows Good Condition.	YES-NO	YES-NO	YES-NO
4			Doors Good Condition.	YES-NO	YES-NO	YES-NO
5						

Door fire correction step list

1) Tighten door
2) Place K-Wool
3) Open uptake
4) Check blocks
5) Verify up take setting
6) Raise draft
7) Close SF 50%
8) Reduce door holes
9) Open EVS

PCM Pressure Readings

Must be in the required range of 3.0 to 12.0

If the reading isn't within the required range. Notify maintenance and the Turn Manager immediately. Write in the corrective actions taken t bring the pressure readings back into the EPA range.

Pressure Readings are to be recorded Once Per 8 Hour Shift / Every turn

Fan Amps are to be recorded Once Per 8 Hour Shift / Every Turn

Tons Charged:

HNCC PUSHING REPORT **SEVERSTAL** **OPERATORS INITIALS** TH | DT

DATE: 05/17/09

OVEN	PREV TIME	PREV WEIGHT	DATE	CHG TIME	AM/PM CIRCLE	DATE	TONS CHG	OVEN INSP	DOOR/LINTEL DAMAGE	DOOR FIRE - PUSHER SIDE: DOOR OBS.	DOOR FIRE	Cor. Act. & Fire Out T.	PCM Pressure Readings: Pressure Reading	Fan Amp Reading	Corrective Action Required	Operator's / Maintenance Comments
~~103~~ ✓	936 am	45	5/15	11:06	AM/PM	5/17	45	Y // N	door // lintel	Y // N	Y // N				Y // N	
~~107~~ ✓	945	45	5/15	11:15	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~111~~ ✓	954	45	5/15	11:24	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~115~~ ✓	1003	45	5/15	11:33	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~119~~ ✓	1013	45	5/15	11:42	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	Quench Car by nose
~~123~~	1024	45	5/15	1:28	AM/PM	5-18		Y // N	door // lintel	Y // N	Y // N		4.7	136	Y // N	
~~127~~	1036	45	5/15	1:37	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~131~~	1049	45	5/15	1:47	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~135~~	1059	45	5/15	1:58	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~139~~	1111	45	5/15	2:14	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	Q Car wouldn't from
	1124	45	5/15	2:24	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
	1136	45	5/15	2:35	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~151~~	1147	45	5/15	2:46	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~155~~	1200 pm	45	5/15	2:57	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~159~~	1211	45	5/15	3:08	AM/PM	↓	↓	Y // N	door // lintel	Y // N	Y // N				Y // N	
~~163~~	1255	45	5/15	3:31	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~167~~	108	45	5/15	3:49	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~171~~	124	45	5/15	3:56	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	Q-car - Lockin light
~~175~~	146	45	5/15	4:16	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~179~~	431	45	5/15	4:29	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~183~~	445	45	5/15	4:43	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~187~~	458	45	5/15	4:59	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	Hot Car ·
~~191~~	512	45	5/15	5:12	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~195~~	526	45	5/15	5:30	AM/PM			Y // N	door // lintel	Y // N	Y // N				Y // N	
~~199~~	540	45	5/15	5:46	AM/PM	↓	↓	Y // N	door // lintel	Y // N	Y // N				Y // N	

~~1~~			Charged Fire Ext.
2			Hydraulic Oil Spill
3			Windows Good Condition.
4			Doors Good Condition.
5			

PCM	D/M	HOT CAR
YES-NO	YES-NO	YES-NO
YES-NO	YES-NO	YES-NO
YES-NO	YES-NO	YES-NO
YES-NO	YES-NO	YES-NO

Door fire correction step list

1) Tighten door
2) Place K-Wool
3) Open uptake
4) Check blocks
5) Verify up take setting
6) Raise draft
7) Close SF 50%
8) Reduce door holes
9) Open EVS

PCM Pressure Readings

Must be in the required range of 3.0 to 12.0

If the reading isn't within the required range. Notify maintenance and the Turn Manager immediately. Write in the corrective actions taken t bring the pressure readings back into the EPA range.

Pressure Readings are to be recorded Once Per 8 Hour Shift / Every turn

Fan Amps are to be recorded Once Per 8 Hour Shift / Every Turn

Tons Charged:

Appendix B

VENT STACK TEST DATA

URS

SUMMARY OF RESULTS

Project Name:	Haverhill Compliance
Project Number:	39400492.520002
Site Location:	Vent Stack # 9
Test Location:	Outlet

Parameters	Run # 1	Run # 2	Run # 3	Avgerage
Run Times	0850-1159	1236-1515	1637-1859	
Date	5/19/2009	5/19/2009	5/19/2009	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	78.350	75.832	68.963	74.382
Moisture Content (% Vol.)	12.7	11.2	11.2	11.7
O2 (%)	9.3	9.3	10.1	9.6
CO2 (%)	7.8	7.6	7.7	7.7
Stack Gas Temperature (°F)	1447	1534	1580	1,520
Pitot Coef.	0.8400	0.8400	0.8400	0.8400
Stack Velocity (ft/min.)	3,592	3,611	3,378	3,527
Stack Velocity (ft/sec.)	59.87	60.18	56.31	58.79
Gas Flow Rate (ACFM)	228,522	229,723	214,925	224,390
Gas Flow Rate (SCFM)	62,967	60,557	55,370	59,631
Gas Flow Rate (DSCFM)	54,957	53,786	49,168	52,637
Percent Isokinetic	98.5	97.5	96.9	97.6
Total Metals Mass Rate (lb/hr)	0.79202	0.51904	0.50561	0.60556
Total Mercury Mass Rate (lb/hr)	0.00178	0.00163	0.00162	0.00168
Antimony Mass Rate (lb/hr)	0.00565	0.00365	0.00364	0.00431
Arsenic Mass Rate (lb/hr)	0.04964	0.03225	0.03848	0.04012
Barium Mass Rate (lb/hr)	0.00937	0.00966	0.00962	0.00955
Beryllium Mass Rate (lb/hr)	0.00047	0.00038	0.00036	0.00041
Cadmium Mass Rate (lb/hr)	0.00207	0.00150	0.00139	0.00165
Chromium Mass Rate (lb/hr)	0.00402	0.00645	0.00384	0.00477
Cobalt Mass Rate (lb/hr)	0.00189	0.00168	0.00151	0.00169
Copper Mass Rate (lb/hr)	0.07701	0.05897	0.05470	0.06356
Lead Mass Rate (lb/hr)	0.12804	0.08308	0.07733	0.09615
Manganese Mass Rate (lb/hr)	0.00278	0.00634	0.00861	0.00591
Nickel Mass Rate (lb/hr)	0.01624	0.01595	0.01623	0.01614
Phosphorous Mass Rate (lb/hr)	0.16033	0.12525	0.13354	0.13971
Selenium Mass Rate (lb/hr)	0.01642	0.01056	0.01340	0.01346
Silver Mass Rate (lb/hr)	0.00052	0.00043	0.00030	0.00042
Thallium Mass Rate (lb/hr)	0.01568	0.00896	0.00699	0.01054
Zinc Mass Rate (lb/hr)	0.30189	0.15393	0.13568	0.19717

STACK TEST CALCULATIONS

M5/M26A

Project:	Haverhill	Barom. Psr.:	29.8		Calculated
Project No:	39400493	Static Psr.:	-0.26	Ps:	29.781
Source:	Vent Stack # 9	Delta H @:	1.7667	As:	63.617
Run No.:	1	Gamma:	0.9634	An:	0.000767
Date:	5/19/2009	Pitot Coef.:	0.84		
Sample Volume:	82.175	Stack Dia.:	108	,in.	
Sample Time:	120	Nozzle Dia.:	0.375	,in.	
O2 Conc.:	9.33	H2O Gain:	242.6	,ml	
CO2 Conc.:	7.83	Part. Weight:		,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.33	0.574456	1.70	62	1426
2	0.41	0.640312	1.90	63	1472
3	0.40	0.632456	1.85	63	1474
4	0.34	0.583095	1.55	67	1392
5	0.28	0.52915	1.29	68	1367
6	0.21	0.458258	0.96	69	1265
7	0.35	0.591608	1.60	70	1400
8	0.32	0.565685	1.48	71	1563
9	0.33	0.574456	1.70	72	1573
10	0.27	0.519615	1.25	74	1537
11	0.25	0.5	1.15	75	1381
12	0.21	0.458258	0.96	75	1275
13	0.35	0.591608	1.60	75	1499
14	0.39	0.6245	1.80	76	1588
15	0.37	0.608276	1.70	76	1584
16	0.34	0.583095	1.55	77	1540
17	0.28	0.52915	1.30	78	1458
18	0.22	0.469042	0.97	78	1045
19	0.34	0.583095	1.55	78	1510
20	0.36	0.6	1.65	79	1578
21	0.33	0.574456	1.51	79	1564
22	0.30	0.547723	1.39	77	1529
23	0.25	0.5	1.15	75	1452
24	0.20	0.447214	0.92	76	1264
AVERAGE	0.3095833	0.553563	1.4366667	73.04167	1447.3333

Project: Haverhill
Project No: 39400493
Source: Vent Stack # 9
Run No.: 1

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (Vl0)(0.04707)

Vwstd = 11.42 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 78.350 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.13

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.6

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.1

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 3,592.1 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 228,521.87 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 62,966.72 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 54,956.94 DSCFM

Vsstd = Qstd/As

Vsstd = 863.87 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.99

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0000

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 0.00

STACK TEST CALCULATIONS

Metals

Project:	Haverhill	Barom. Psr.:	29.8		Calculated
Project No:	39400493	Static Psr.:	-0.26	Ps:	29.781
Source:	Vent Stack # 9	Delta H @:	1.7667	As:	63.617
Run No.:	2	Gamma:	0.9634	An:	0.000767
Date:	5/19/2009	Pitot Coef.:	0.84		
Sample Volume:	80.105	Stack Dia.:	108	,in.	
Sample Time:	120	Nozzle Dia.:	0.375	,in.	
O2 Conc.:	9.3	H2O Gain:	202.8	,ml	
CO2 Conc.:	7.6	Part. Weight:		,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.31	0.556776	1.42	70	1619
2	0.34	0.583095	1.55	71	1618
3	0.34	0.583095	1.55	72	1606
4	0.31	0.556776	1.42	73	1590
5	0.26	0.509902	1.20	74	1558
6	0.20	0.447214	0.92	75	1150
7	0.36	0.6	1.65	76	1591
8	0.39	0.6245	1.80	77	1615
9	0.39	0.6245	1.80	78	1610
10	0.32	0.565685	1.48	79	1611
11	0.26	0.509902	1.20	80	1580
12	0.24	0.489898	1.10	80	1330
13	0.32	0.565685	1.48	78	1602
14	0.36	0.6	1.65	79	1514
15	0.29	0.538516	1.35	80	1604
16	0.22	0.469042	1.00	80	1596
17	0.22	0.469042	1.00	80	1588
18	0.18	0.424264	0.83	80	1420
19	0.36	0.6	1.65	75	1584
20	0.36	0.6	1.65	76	1591
21	0.34	0.583095	1.55	77	1590
22	0.30	0.547723	1.39	77	1583
23	0.30	0.547723	1.39	78	1558
24	0.25	0.5	1.15	78	1100
AVERAGE	0.3008333	0.545685	1.3825	76.79167	1533.667

Project: Haverhill
Project No: 39400493
Source: Vent Stack # 9
Run No.: 2

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (Vl0)(0.04707)

Vwstd = 9.55 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 75.832 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.11

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.6

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.3

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 3,611.0 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 229,722.76 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 60,556.59 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 53,785.99 DSCFM

Vsstd = Qstd/As

Vsstd = 845.46 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.97

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0000

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 0.00

STACK TEST CALCULATIONS

M5/M8

Project:	Haverhill	Barom. Psr.:	29.8		Calculated
Project No:	39400493	Static Psr.:	-0.26	Ps:	29.781
Source:	/ent Stack # 9	Delta H @:	1.7732	As:	63.617
Run No.:	3	Gamma:	0.9906	An:	0.000767
Date:	5/19/2009	Pitot Coef.:	0.84		
Sample Volume:	71.928	Stack Dia.:	108	,in.	
Sample Time:	120	Nozzle Dia.:	0.375	,in.	
O2 Conc.:	10.05	H2O Gain:	184.8	,ml	
CO2 Conc.:	7.7	Part. Weight:		,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.32	0.565685	1.48	77	1600
2	0.36	0.6	1.65	77	1599
3	0.30	0.547723	1.38	78	1597
4	0.30	0.547723	1.38	79	1589
5	0.25	0.5	1.15	80	1547
6	0.22	0.469042	1.00	81	1530
7	0.24	0.489898	1.10	81	1591
8	0.25	0.5	1.15	82	1601
9	0.28	0.52915	1.30	83	1600
10	0.24	0.489898	1.10	84	1593
11	0.18	0.424264	0.83	85	1417
12	0.16	0.4	0.74	86	1508
13	0.30	0.547723	1.38	85	1594
14	0.34	0.583095	1.58	86	1587
15	0.28	0.52915	1.30	87	1582
16	0.32	0.565685	1.48	88	1574
17	0.26	0.509902	1.20	89	1539
18	0.24	0.489898	1.10	89	1560
19	0.26	0.509902	1.20	88	1611
20	0.25	0.5	1.15	89	1625
21	0.28	0.52915	1.30	89	1629
22	0.16	0.4	0.75	90	1622
23	0.18	0.424264	0.83	90	1617
24	0.22	0.469042	1.00	90	1607
AVERAGE	0.2579167	0.50505	1.1883333	84.70833	1579.958

Project: Haverhill
Project No: 39400493
Source: Vent Stack # 9
Run No.: 3

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 8.70 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 68.963 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.11

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.6

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.3

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 3,378.4 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 214,924.61 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 55,370.03 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 49,168.30 DSCFM

Vsstd = Qstd/As

Vsstd = 772.88 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.97

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0000

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 0.00

Project: Haverhill
Project No.: 39400493
Source: Vent Stack # 9
Test Date: 5/19/2009
Test I.D. M29

Parameters	Run # 1	Run # 2	Run # 3	Average
Sample Time	120	120	120	120
Vol. Sampled @ STP (ft3)	78.350	75.832	68.963	74.382
Moisture Content (% Vol.)	12.7	11.2	11.2	11.7
O2 (%)	9.3	9.3	10.1	9.6
CO2 (%)	7.8	7.6	7.7	7.7
Stack Gas Temperature (°F)	1447	1534	1580	1520
Stack Velocity (ft/min.)	3,592	3,611	3,378	3,527
Gas Flow Rate (ACFM)	228,522	229,723	214,925	224,390
Gas Flow Rate (SCFM)	62,967	60,557	55,370	59,631
Gas Flow Rate (DSCFM)	54,957	53,786	49,168	52,637
Percent Isokinetic	98.5	97.5	96.9	97.6

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520020
SOURCE:	Vent # 9	TEST DATE:	5/19/2009
TRAIN I.D.		TEST NO.:	1
COLLECTED BY:		CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	610.4	674.4	64.0
2	719.4	822.4	103.0
3	704.8	746.8	42.0
4	603.4	611.3	7.9
5	703.1	701	-2.1
6	739	744.7	5.7
7	886.9	909	22.1
TOTAL	4967	5209.6	242.6

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH			0
REAGENT BLANK			0
CORRECTED PROBE WASH *			0
FILTER # 1			0
FILTER # 2			0
IMPINGERS			0

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520020
SOURCE:	Vent # 9	TEST DATE:	5/19/2009
TRAIN I.D.		TEST NO.:	2
COLLECTED BY:		CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	595.8	723.5	127.7
2	736.6	794.6	58.0
3	704.0	704.6	0.6
4	604.7	605.3	0.6
5	707.5	703.3	-4.2
6	733.2	733.1	-0.1
7	900.2	920.4	20.2
TOTAL	4982.00	5184.8	202.8

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH			0
REAGENT BLANK			0
CORRECTED PROBE WASH *			0
FILTER # 1			0
FILTER # 2			0
IMPINGERS			0

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520020
SOURCE:	Vent # 9	TEST DATE:	5/19/2009
TRAIN I.D.		TEST NO.:	3
COLLECTED BY:		CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	613.4	715.4	102.0
2	724.7	777.3	52.6
3	703.7	713.5	9.8
4	608.3	610.5	2.2
5	706.6	704.5	-2.1
6	702.8	704	1.2
7	873.6	892.7	19.1
TOTAL	4933.1	5117.9	184.8

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH			0
REAGENT BLANK			0
CORRECTED PROBE WASH *			0
FILTER # 1			0
FILTER # 2			0
IMPINGERS			0

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS Multi-Metals Mass Emission Calculations

Project Name: Haverhill Vent Stack
Project No. 39400492.520002
Test Date: 5/19/2009

Test I.D.: **Main Stack - Run 1**

INPUT PARAMETERS

Vmstd: 78.350 Qstd: 54,957

Metal	Front Half ug	Back Half ug	Total ug	grams/sample	Mass Rate (lbs/hr)	Laboratory Reporting Limit
Antimony	60.9	N/D	60.9	0.0000609	0.0056504	6.0
Arsenic	269	266	535	0.0005350	0.0496384	1.0
Barium	101	N/D	101	0.0001010	0.0093710	20.0
Beryllium	5.1	N/D	5.1	0.0000051	0.0004732	0.5
Cadmium	22.3	N/D	22.3	0.0000223	0.0020690	1.0
Chromium	41.2	2.1	43.3	0.0000433	0.0040175	1.0
Cobalt	20.4	N/D	20.4	0.0000204	0.0018928	5.0
Copper	830	N/D	830	0.0008300	0.0770091	2.5
Lead	1380	N/D	1380	0.0013800	0.1280392	2.0
Manganese	26.3	3.7	30	0.0000300	0.0027835	1.5
Nickel	175	N/D	175	0.0001750	0.0162369	4.0
Phosphorous	1290	438	1728	0.0017280	0.1603274	30.0
Selenium	13	164	177	0.0001770	0.0164224	1.0
Silver	5.6	N/D	5.6	0.0000056	0.0005196	2.0
Thallium	169	N/D	169	0.0001690	0.0156802	5.0
Zinc	3240	13.8	3253.8	0.0032538	0.3018942	2.0
Total	7648.8	887.6	8536.4	0.0085364	0.792024546	

All analysis reported as estimated, but below reporting limit have been marked as N/D.

Metals Mass Rate (lb/hr)

Mmr= (Mn)(Qstd)(60)/(Vmstd)(453.6)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)

URS

Multi-Metals Mass Emission Calculations

Project Name: Haverhill Vent Stack
Project No. 39400492.520002
Test Date: 5/19/2009

Test I.D.: **Main Stack - Run 2**

INPUT PARAMETERS

Vmstd: 75.832 Qstd: 53,786

Metal	Front Half ug	Back Half ug	Total ug	grams/sample	Mass Rate (lbs/hr)	Laboratory Reporting Limit
Antimony	38.9	N/D	38.9	0.0000389	0.0036496	6.0
Arsenic	266	77.7	343.7	0.0003437	0.0322458	1.0
Barium	103	N/D	103	0.0001030	0.0096634	20.0
Beryllium	4.1	N/D	4.1	0.0000041	0.0003847	0.5
Cadmium	16	N/D	16	0.0000160	0.0015011	1.0
Chromium	66.3	2.4	68.7	0.0000687	0.0064454	1.0
Cobalt	17.9	N/D	17.9	0.0000179	0.0016794	5.0
Copper	626	2.5	628.5	0.0006285	0.0589655	2.5
Lead	884	1.5	885.5	0.0008855	0.0830772	2.0
Manganese	53.6	14	67.6	0.0000676	0.0063422	1.5
Nickel	170	N/D	170	0.0001700	0.0159493	4.0
Phosphorous	1120	215	1335	0.0013350	0.1252490	30.0
Selenium	22.8	89.8	112.6	0.0001126	0.0105641	1.0
Silver	4.6	N/D	4.6	0.0000046	0.0004316	2.0
Thallium	95.5	N/D	95.5	0.0000955	0.0089598	5.0
Zinc	1610	30.7	1640.7	0.0016407	0.1539296	2.0
Total	5098.7	433.6	5532.3	0.0055323	0.519037545	

All analysis reported as estimated, but below reporting limit have been marked as N/D.

Metals Mass Rate (lb/hr)

Mmr= (Mn)(Qstd)(60)/(Vmstd)(453.6)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)

URS Multi-Metals Mass Emission Calculations

Project Name: Haverhill Vent Stack
Project No. 39400492.520002
Test Date: 5/19/2009

Test I.D.: **Main Stack - Run 3**

INPUT PARAMETERS

Vmstd: 68.963 Qstd: 49,168

Metal	Front Half ug	Back Half ug	Total ug	grams/sample	Mass Rate (lbs/hr)	Laboratory Reporting Limit
Antimony	38.6	N/D	38.6	0.0000386	0.0036403	6.0
Arsenic	298	110	408	0.0004080	0.0384773	1.0
Barium	102	N/D	102	0.0001020	0.0096193	20.0
Beryllium	3.8	N/D	3.8	0.0000038	0.0003584	0.5
Cadmium	14.7	N/D	14.7	0.0000147	0.0013863	1.0
Chromium	23.5	17.2	40.7	0.0000407	0.0038383	1.0
Cobalt	16	N/D	16	0.0000160	0.0015089	5.0
Copper	580	N/D	580	0.0005800	0.0546982	2.5
Lead	820	N/D	820	0.0008200	0.0773319	2.0
Manganese	18.6	72.7	91.3	0.0000913	0.0086102	1.5
Nickel	162	10.1	172.1	0.0001721	0.0162303	4.0
Phosphorous	1240	176	1416	0.0014160	0.1335390	30.0
Selenium	22.1	120	142.1	0.0001421	0.0134010	1.0
Silver	3.2	N/D	3.2	0.0000032	0.0003018	2.0
Thallium	74.1	N/D	74.1	0.0000741	0.0069882	5.0
Zinc	1430	8.7	1438.7	0.0014387	0.1356797	2.0
Total	4846.6	514.7	5361.3	0.0053613	0.505609033	

All analysis reported as estimated, but below reporting limit have been marked as N/D.

Metals Mass Rate (lb/hr)

Mmr= (Mn)(Qstd)(60)/(Vmstd)(453.6)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)

URS

Mercury Mass Emission Calculations

Project Name: Haverhill Vent Stack Compliance
Project No.: 39400492
Test Date: 5/19/2009
Source: Vent Stack

INPUT PARAMETERS

RUN 1

Sample I.D.	Total ug	grams/sample	Vmstd (cu. ft.)	Concentration (ug/m^3)	Qstd (dscfm)	Mass Rate (lbs/hr)	Production Rate (Tons/Coal Charged)	Emission Rate (Tons/Coal Charged)
Probe Nozzel Rinse	N/D	N/D	78.350	N/D	54,957	N/D	45.00	N/D
Impingers 1-3	9.00	9.00E-06	78.350	4.056	54,957	0.000835	45.00	1.86E-05
Impinger 4	1.70	1.70E-06	78.350	0.766	54,957	0.000158	45.00	3.51E-06
mpinger 5&6 KMNO4	0.36	3.60E-07	78.350	0.162	54,957	0.000033	45.00	7.42E-07
Impinger 5&6 HCL	8.10	8.10E-06	78.350	3.650	54,957	0.000752	45.00	1.67E-05
Total	19.16	1.92E-05	78.350	8.635	54,957	0.001778	45.00	3.95E-05

RUN 2

Sample I.D.	Total ug	grams/sample	Vmstd (cu. ft.)	Concentration (ug/m^3)	Qstd (dscfm)	Mass Rate (lbs/hr)	Production Rate (Tons/Coal Charged)	Emission Rate (Tons/Coal Charged)
Probe Nozzel Rinse	N/D	N/D	75.832	N/D	53,786	N/D	45.00	N/D
Impingers 1-3	9.00	9.00E-06	75.832	4.191	53,786	0.000844	45.00	1.88E-05
Impinger 4	1.20	1.20E-06	75.832	0.559	53,786	0.000113	45.00	2.50E-06
mpinger 5&6 KMNO4	2.10	2.10E-06	75.832	0.978	53,786	0.000197	45.00	4.38E-06
Impinger 5&6 HCL	5.10	5.10E-06	75.832	2.375	53,786	0.000478	45.00	1.06E-05
Total	17.40	1.74E-05	75.832	8.102	53,786	0.001632	45.00	3.63E-05

RUN 3

Sample I.D.	Total ug	grams/sample	Vmstd (cu. ft.)	Concentration (ug/m^3)	Qstd (dscfm)	Mass Rate (lbs/hr)	Production Rate (Tons/Coal Charged)	Emission Rate (Tons/Coal Charged)
Probe Nozzel Rinse	N/D	N/D	68.963	N/D	49,168	N/D	45.00	N/D
Impingers 1-3	9.30	9.30E-06	68.963	4.762	49,168	0.000877	45.00	1.95E-05
Impinger 4	2.00	2.00E-06	68.963	1.024	49,168	0.000189	45.00	4.19E-06
mpinger 5&6 KMNO4	5.30	5.30E-06	68.963	2.714	49,168	0.000500	45.00	1.11E-05
Impinger 5&6 HCL	0.63	6.30E-07	68.963	0.323	49,168	0.000059	45.00	1.32E-06
Total	17.23	1.72E-05	68.963	8.822	49,168	0.001625	45.00	3.61E-05

Mass Rate (lb/hr)

MR= (Mn)(Qstd)(60)/(Vmstd)(453.6)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)

URS

STACK TEST DATA SHEET

Project:	Haverhill Vent Test	Barom. Psr.:	29.80
Project No:	39400492.520002	Static Psr.:	-0.26
Source:	Vent Stack # 9	Delta H @:	1.7667
Run No.:	1	Gamma:	0.9634
Date:	5/19/09	Pitot Coef.:	0.84 / AC6001
Filter No.:	n/a	Stack Dia.:	9.01 108"
Meter Box I.D.:	URS001	Stack Area:	
Sample Box No.:	n/a	Port Length:	4"
Probe Heater Setting:	250	Port Dia.:	4"
Personnel:	TG, DJ, GM, TB, RR	Probe Liner:	Quartz

Schematic of Stack

M-29

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	FILTER EXIT TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	08:50	0	0.33	1.7	824.050	62		236	241	1426	57	4.0
2		5	0.41	1.9	828.20	63		236	336	1492	57	4.0
3		10	0.40	1.85	831.70	63		231	387	1474	58	4.0
4		15	0.34	1.55	835.30	67		227	405	1372	61	3.5
5		20	0.28	1.29	838.50	68		227	396	1367	63	3.0
6		25	0.21	0.96	841.90	69		226	381	1365	62	2.0
		30			844.870					1400		
1		30	0.35	1.6	845.020	70		226	235	261	60	3.5
2		35	0.32	1.48	848.60	71		228	304	1563	57	3.5
3		40	0.33	1.7	851.50	72		231	337	1573	58	4.0
4		45	0.27	1.25	855.60	74		235	360	1537	60	3.5
5		50	0.25	1.15	858.70	75		233	359	1381	60	3.0
6		55	0.21	0.96	861.70	75		229	352	1275	62	2.5
		1.00			864.652							
1		1.00	0.35	1.6	864.850	75		229	239	1499	65	4.0
2		5	0.39	1.8	868.60	76		235	316	1588	58	4.5
3		10	0.37	1.7	872.20	76		231	366	1589	59	5.0
4		15	0.34	1.55	875.80	77		233	398	1540	61	4.0
5		20	0.28	1.30	879.50	78		236	390	1458	63	4.0
6		25	0.22	0.97	882.80	78		238	372	1095	63	3.0
		30			885.755							
1		30	0.34	1.55	885.827	78		229	254	1510	67	4.0
2		35	0.36	1.65	889.20	79		233	294	1578	60	4.0
3		40	0.33	1.51	892.90	79		237	346	1564	61	4.0
4		45	0.30	1.39	896.40	77		238	363	1529	63	4.0
5		50	0.25	1.15	899.80	75		234	349	1452	65	4.0
6		55	0.20	0.92	902.70	76		237	342	1264	66	3.5
	11:59	2.00			905.645							
AVERAGE												

LEAK CHECKS	
Pitot impact:	Good / Good
Pitot static:	Good / Good
Train initial:	0.0 @ 15" Hg
Train Final:	0.0 @ 8" Hg

NOZZLE MEASUREMENT	
I.D. No.:	IN-001
1	0.375
2	0.375
3	0.375
Avg.	

STACK GAS ANALYSIS				
		CO2	O2	CO
1		8.3	8.9	
2		7.6	9.6	
3		7.6	9.5	
Avg.				

NOTES: AQS - AC6-001

Operator Signature:

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520002
SOURCE:	Vent Stack # 9	TEST DATE:	5/19/09
TRAIN I.D.	M29-R1	TEST NO.:	1
COLLECTED BY:	TJB	CHKD BY:	TJB

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	610.4	674.4	
2	719.4	822.4	
3	704.8	746.8	
4	603.4	611.3	
5	~~606.0~~ 703.1	701.0	
6	739.0	744.7	
7	886.9	909.0	
TOTAL			

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH			
REAGENT BLANK			
CORRECTED PROBE WASH *			
FILTER # 1			
FILTER # 2			
IMPINGERS			

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

STACK TEST DATA SHEET

Project:	Haverhill Vent Test	Barom. Psr.:	29.8
Project No:	39400492.520002	Static Psr.:	-0.26
Source:	Vent Stack # 9	Delta H @:	1.7667
Run No.:	2	Gamma:	0.9634
Date:	5/19/09	Pitot Coef.:	0.84 / AC6-001
Filter No.:	N/a	Stack Dia.:	108"
Meter Box I.D.:	URS 001	Stack Area:	
Sample Box No.:		Port Length:	4.0"
Probe Heater Setting:	250	Port Dia.:	4.0"
Personnel:	TG, BJ, TB, GM, RR	Probe Liner:	Quartz

Schematic of Stack

M-29

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	FILTER EXIT TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	12:36	0	0.31	1.42	907.150	70	2	232	240	1619	68	3.0
2		5	0.34	1.55	910.70	71		236	288	1618	67	3.0
3		10	0.34	1.55	914.30	72		234	364	1606	65	3.0
4		15	0.31	1.42	917.40	73		234	384	1590	62	3.0
5		20	0.26	1.20	921.10	74		232	387	1558	57	3.0
6		25	0.20	0.92	924.40	75		232	369	1150	57	2.0
		30			926.975							
1		30	0.36	1.65	926.975	76		232	242	1591	67	3.0
2		35	0.39	1.80	930.50	77		230	328	1615	61	3.5
3		40	0.39	1.80	934.20	78		232	375	1610	61	4.0
4		45	0.32	1.48	938.30	79		240	402	1611	62	3.5
5		50	0.26	1.20	941.40	80		230	389	1580	61	3.0
6		55	0.24	1.1	944.50	80		232	377	1330	61	2.5
		1.00			947.975							
1		1.00	0.32	1.48	947.975	78		226	246	1602	64	3.0
2		5	0.36	1.65	951.90	79		233	323	1614	58	3.0
3		10	0.29	1.35	954.90	80		238	364	1604	58	3.0
4		15	0.22	1.0	958.80	80		231	369	1596	58	2.0
5		20	0.22	1.0	961.30	80		235	355	1588	58	2.0
6		25	0.18	0.83	964.10	80		238	338	1420	57	2.0
		30			966.660							
1	967.300	30	0.36	1.65	~~966.660~~ 967.300 TG	75		230	240	1584	62	3.0
2		35	0.36	1.65	971.00	76		226	256	1591	56	3.0
3		40	0.34	1.55	974.500	77		229	278	1590	56	3.5
4		45	0.30	1.39	978.30	77		233	337	~~1588~~	58	3.0
5		50	0.30	1.39	981.50	78		230	356	1558	58	3.0
6		55	0.25	1.15	984.90	78		223	366	1100	59	3.0
	15:15	2.00			987.895							
AVERAGE												

TG 1583

LEAK CHECKS	
Pitot impact:	good / good
Pitot static:	good / good
Train initial:	0.0 @ 15" Hg
Train Final:	0.0 @ 6" Hg

NOZZLE MEASUREMENT	
I.D. No.:	IN-001 / IN-003
1	0.375
2	0.375
3	0.375
Avg.	

STACK GAS ANALYSIS				
		CO2	O2	CO
1		7.6	9.3	
2				
3				
Avg.				

NOTES: Broken nozzel replaced prob liner / intergrated liner

Operator Signature: [signature]

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520002
SOURCE:	Vent Stack # 9	TEST DATE:	5/19/09
TRAIN I.D.	M29 - R2	TEST NO.:	2
COLLECTED BY:	TSB	CHKD BY:	TG

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	595.8	723.5	
2	736.6	794.6	
3	704.0	704.6	
4	604.7	605.3	
5	707.5	703.3	
6	733.2	733.1	
7	900.2	920.4	
TOTAL			

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH			
REAGENT BLANK			
CORRECTED PROBE WASH *			
FILTER # 1			
FILTER # 2			
IMPINGERS			

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

STACK TEST DATA SHEET

Project:	Haverhill Vent Test	Barom. Psr.:	29.8
Project No:	39400492.520002	Static Psr.:	-0.26
Source:	Vent Stack # 9	Delta H @:	1.7732
Run No.:	3	Gamma:	0.9906
Date:	5/19/09	Pitot Coef.:	0.84 / ACCOOL
Filter No.:	n/a	Stack Dia.:	108"
Meter Box I.D.:	URSG02	Stack Area:	
Sample Box No.:	n/a	Port Length:	4.0"
Probe Heater Setting:	250	Port Dia.:	4.0"
Personnel:	TG, TB, DS, GM, RR	Probe Liner:	Quartz

Schematic of Stack

M-29

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	FILTER EXIT TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	16:37	0	0.32	1.48	921.502	77		225	229	1600	59	3.0
2		5	0.36	1.65	925.10	77		233	291	1599	57	3.5
3		10	0.30	1.38	928.40	78		232	356	1597	58	3.5
4		15	0.30	1.38	931.80	79		232	352	1589	62	3.5
5		20	0.25	1.15	939.90	80		230	360	1547	64	3.0
6		25	0.22	1.0	937.80	81		234	357	1530	67	2.5
		30			940.585							
1		30	0.24	1.1	940.585	81		232	245	1591	68	2.5
2		35	0.25	1.15	943.40	82		237	311	1601	65	2.5
3		40	0.28	1.30	946.40	83		240	341	1600	65	3.0
4		45	0.24	1.1	949.50	84		239	350	1593	65	3.0
5		50	0.18	0.825	952.50	85		240	343	1417	64	2.0
6		55	0.16	0.74	955.10	86		238	325	1508	63	2.0
		1.00			957.285							
1		1.00	0.30	1.38	957.285	85		235	244	1594	68	3.5
2		5	0.34	1.58	960.40	86		233	333	1587	66	3.5
3		10	0.28	1.30	964.00	87		233	378	1582	66	3.5
4		15	0.32	1.48	967.20	88		235	384	1574	68	3.5
5		20	0.26	1.2	970.50	89		240	390	1539	68	3.0
6		25	0.24	1.1	973.90	89		237	368	1560	66	3.0
		30			976.615							
1		30	0.26	1.2	976.615	88		233	264	1611	68	3.0
2		35	0.25	1.15	979.80	89		237	325	1625	66	3.0
3		40	0.28	1.30	982.50	89		237	337	1629	66	3.0
4		45	0.16	0.75	985.80	90		240	338	1622	67	2.0
5		50	0.18	0.825	988.30	90		238	329	1617	70 *	2.0
6		55	0.22	1.0	990.80	90		237	308	1607	71*	3.0
	18:59	2.00			993.430							
AVERAGE												

LEAK CHECKS	
Pitot impact:	good / good
Pitot static:	Good / Good
Train initial:	0.0@ 15" Hg
Train Final:	0.0@ 7" Hg

NOZZLE MEASUREMENT	
I.D. No.:	IN-003
1	0.375
2	0.375
3	0.376
Avg.	

STACK GAS ANALYSIS				
		CO2	O2	CO
1		7.7	10.0	
2		7.7	10.1	
3				
Avg.				

Operator Signature:

NOTES: Different control Box heat controller on URSG01 going bad

*train exit temp high at last two points train in down wash from stack

URS

TEST LAB DATA SHEET

PROJECT: Haverhill Vent Test
SOURCE: Vent Stack # 9
TRAIN I.D. M29-3
COLLECTED BY: TSO

PROJECT NO.: 39400492.520002
TEST DATE: 5/19/09
TEST NO.: 3
CHKD BY: TJS

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	613.4	715.4	
2	724.7	777.3	
3	703.7	713.5	
4	608.3	610.5	
5	706.6	704.5	
6	702.8	704.0	
7	873.6	892.7	
TOTAL			

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH			
REAGENT BLANK			
CORRECTED PROBE WASH *			
FILTER # 1			
FILTER # 2			
IMPINGERS			

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

SUMMARY OF RESULTS

Project Name:	Haverhill Compliance
Project Number:	39400492.520002
Site Location:	Vent Stack # 9
Test Location:	Outlet

Parameters	Run # 1	Run # 2	Run # 3	Average
Run Times	0850-1158	1235-1516	1636-1857	
Date	5/19/2009	5/19/2009	5/19/2009	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	72.328	76.461	67.262	72.017
Moisture Content (% Vol.)	12.3	11.0	11.0	11.4
O2 (%)	9.5	9.5	9.9	9.7
CO2 (%)	7.6	7.5	7.7	7.6
Stack Gas Temperature (°F)	1444	1534	1580	1,519
Pitot Coef.	0.8400	0.8400	0.8400	0.8400
Stack Velocity (ft/min.)	3,276	3,617	3,230	3,374
Stack Velocity (ft/sec.)	54.60	60.28	53.83	56.24
Gas Flow Rate (ACFM)	208,414	230,081	205,468	214,655
Gas Flow Rate (SCFM)	57,534	60,651	52,945	57,043
Gas Flow Rate (DSCFM)	50,466	53,970	47,112	50,516
Percent Isokinetic	99.1	97.9	98.7	98.6
Particulate Conc. (Grains/DSCF)	0.0232	0.0166	0.0202	0.0200
Particulate Conc. (MG/DSCM)	53.2	37.9	46.1	45.740
Particulate Mass Rate (lbs/hour)	10.1	7.7	8.1	8.620
HCL Mass Rate (lbs/hour)	23.07	21.66	18.34	21.03
SO2 Conc. (ppm)	457.13	381.82	433.24	424.06
SO2 Mass Rate (lbs/hour)	230.31	205.73	203.77	213.27

STACK TEST CALCULATIONS

Project:	Haverhill	Barom. Psr.:	29.8		Calculated
Project No:	39400492	Static Psr.:	-0.26	Ps:	29.781
Source:	Vent Stack # 9	Delta H @:	1.8143	As:	63.617
Run No.:	1	Gamma:	0.9498	An:	0.000767
Date:	5/19/2009	Pitot Coef.:	0.84		
Sample Volume:	76.98	Stack Dia.:	108	,in.	
Sample Time:	120	Nozzle Dia.:	0.375	,in.	
O2 Conc.:	9.54	H2O Gain:	215.2	,ml	
CO2 Conc.:	7.64	Part. Weight:	0.1089	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.21	0.458258	1.15	62	1426
2	0.10	0.316228	0.48	63	1473
3	0.10	0.316228	0.48	63	1474
4	0.15	0.387298	0.73	64	1372
5	0.20	0.447214	0.95	65	1367
6	0.20	0.447214	0.95	66	1265
7	0.25	0.5	1.20	70	1400
8	0.30	0.547723	1.42	71	1563
9	0.34	0.583095	1.62	72	1574
10	0.29	0.538516	1.40	73	1514
11	0.20	0.447214	0.96	75	1341
12	0.15	0.387298	0.73	76	1270
13	0.30	0.547723	1.42	76	1499
14	0.37	0.608276	1.78	77	1588
15	0.37	0.608276	1.78	78	1584
16	0.30	0.547723	1.42	78	1540
17	0.32	0.565685	1.55	79	1458
18	0.27	0.519615	1.30	79	1045
19	0.42	0.648074	2.00	77	1510
20	0.38	0.616441	1.82	78	1578
21	0.35	0.591608	1.70	78	1564
22	0.30	0.547723	1.42	78	1529
23	0.26	0.509902	1.25	78	1452
24	0.20	0.447214	0.95	78	1264
AVERAGE	0.26375	0.505606	1.26875	73.08333	1443.75

Project: Haverhill
Project No: 39400492
Source: Vent Stack # 9
Run No.: 1

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 10.13 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 72.328 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.12

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.6

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.2

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 3,276.1 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 208,414.04 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 57,534.32 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 50,466.50 DSCFM

Vsstd = Qstd/As

Vsstd = 793.28 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.99

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0232

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 10.05

STACK TEST CALCULATIONS

Project:	Haverhill	Barom. Psr.:	29.8		Calculated
Project No:	39400492	Static Psr.:	-0.26	Ps:	29.781
Source:	Vent Stack # 9	Delta H @:	1.8143	As:	63.617
Run No.:	2	Gamma:	0.9498	An:	0.000767
Date:	5/19/2009	Pitot Coef.:	0.84		
Sample Volume:	82.463	Stack Dia.:	108	,in.	
Sample Time:	120	Nozzle Dia.:	0.375	,in.	
O2 Conc.:	9.52	H2O Gain:	201.1	,ml	
CO2 Conc.:	7.5	Part. Weight:	0.0821	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.40	0.632456	1.92	73	1619
2	0.34	0.583095	1.65	75	1618
3	0.30	0.547723	1.45	75	1606
4	0.30	0.547723	1.45	77	1590
5	0.28	0.52915	1.35	78	1558
6	0.20	0.447214	0.96	79	1150
7	0.35	0.591608	1.70	79	1591
8	0.34	0.583095	1.65	80	1615
9	0.39	0.6245	1.90	81	1510
10	0.34	0.583095	1.65	82	1611
11	0.26	0.509902	1.25	82	1580
12	0.23	0.479583	1.10	81	1330
13	0.36	0.6	1.72	82	1602
14	0.36	0.6	1.72	83	1614
15	0.34	0.583095	1.65	83	1604
16	0.34	0.583095	1.65	84	1596
17	0.28	0.52915	1.35	84	1588
18	0.20	0.447214	0.96	84	1420
19	0.36	0.6	1.72	80	1584
20	0.34	0.583095	1.65	81	1591
21	0.30	0.547723	1.45	81	1590
22	0.25	0.5	1.20	82	1583
23	0.25	0.5	1.20	82	1558
24	0.15	0.387298	0.73	82	1100
AVERAGE	0.3025	0.546659	1.459375	80.41667	1533.667

Project: Haverhill
Project No: 39400492
Source: Vent Stack # 9
Run No.: 2

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 9.47 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 76.461 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.11

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.6

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.3

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 3,616.7 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 230,081.43 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 60,651.13 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 53,969.72 DSCFM

Vsstd = Qstd/As

Vsstd = 848.35 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.98

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0166

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 7.67

STACK TEST CALCULATIONS

M5/M8

Project:	Haverhill	Barom. Psr.:	29.8		Calculated
Project No:	39400492	Static Psr.:	-0.26	Ps:	29.781
Source:	/ent Stack # 9	Delta H @:	1.8143	As:	63.617
Run No.:	3	Gamma:	0.9498	An:	0.000767
Date:	5/19/2009	Pitot Coef.:	0.84		
Sample Volume:	73.126	Stack Dia.:	108	,in.	
Sample Time:	120	Nozzle Dia.:	0.375	,in.	
O2 Conc.:	9.91	H2O Gain:	176.9	,ml	
CO2 Conc.:	7.74	Part. Weight:	0.0879	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.30	0.547723	1.42	79	1600
2	0.26	0.509902	1.25	79	1599
3	0.24	0.489898	1.15	80	1597
4	0.26	0.509902	1.25	80	1589
5	0.16	0.4	0.78	81	1547
6	0.18	0.424264	0.86	82	1530
7	0.30	0.547723	1.42	82	1591
8	0.30	0.547723	1.42	83	1601
9	0.25	0.5	1.20	83	1600
10	0.21	0.458258	1.00	84	1583
11	0.13	0.360555	0.63	85	1417
12	0.16	0.4	0.78	85	1508
13	0.34	0.583095	1.65	84	1594
14	0.31	0.556776	1.50	85	1587
15	0.30	0.547723	1.42	85	1582
16	0.25	0.5	1.20	87	1574
17	0.23	0.479583	1.10	87	1539
18	0.16	0.4	0.78	88	1560
19	0.24	0.489898	1.15	86	1611
20	0.26	0.509902	1.25	87	1625
21	0.24	0.489898	1.15	88	1629
22	0.21	0.458258	1.00	88	1622
23	0.21	0.458258	1.00	88	1617
24	0.18	0.424264	0.86	88	1607
AVERAGE	0.2366667	0.483067	1.1333333	84.33333	1579.542

Project: Haverhill
Project No: 39400492
Source: Vent Stack # 9
Run No.: 3

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 8.33 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 67.262 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.11

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.6

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.4

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 3,229.8 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 205,468.22 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 52,944.64 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 47,112.34 DSCFM

Vsstd = Qstd/As

Vsstd = 740.56 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.99

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0202

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 8.14

Project: Haverhill
Project No.: 39400492
Source: Vent Stack # 9
Test Date: 5/19/2009
Test I.D. M5 / HCl

Parameters	Run # 1	Run # 2	Run # 3	Average
Sample Time	120	120	120	120
Vol. Sampled @ STP (ft3)	72.328	76.461	67.262	72.017
Moisture Content (% Vol.)	12.3	11.0	11.0	11.4
O2 (%)	9.5	9.5	9.9	9.7
CO2 (%)	7.6	7.5	7.7	7.6
Stack Gas Temperature (°F)	1444	1534	1580	1519
Stack Velocity (ft/min.)	3,276	3,617	3,230	3,374
Gas Flow Rate (ACFM)	208,414	230,081	205,468	214,655
Gas Flow Rate (SCFM)	57,534	60,651	52,945	57,043
Gas Flow Rate (DSCFM)	50,466	53,970	47,112	50,516
Percent Isokinetic	99.1	97.9	98.7	98.6
Particulate Conc. (Grains/DSCF)	0.0232	0.0166	0.0202	0.0200
Particulate Conc. (MG/DSCM)	53.1634	37.9135	46.1435	45.7401
Particulate Mass Rate (pounds/hr)	10.05	7.67	8.14	8.62

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520020
SOURCE:	Vent # 9	TEST DATE:	5/19/2009
TRAIN I.D.		TEST NO.:	1
COLLECTED BY:		CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	669.2	768.7	99.5
2	698.8	772.0	73.2
3	725.1	743.8	18.7
4	707.8	709.9	2.1
5	726	727.6	1.6
6	896.9	917	20.1
7			0
TOTAL	4423.8	4639.0	215.2

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	16.6301	16.6451	0.015
REAGENT BLANK	17.0249	17.025	0.0001
CORRECTED PROBE WASH *			0.0149
FILTER # 1	0.2664	0.3604	0.094
FILTER # 2			0
IMPINGERS			0

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.1089
PARTICULATE COLLECTED (including impinger catch)	

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520020
SOURCE:	Vent # 9	TEST DATE:	5/19/2009
TRAIN I.D.		TEST NO.:	2
COLLECTED BY:		CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	672.7	811.0	138.3
2	712.4	751.0	38.6
3	732.6	736.2	3.6
4	712.1	711.9	-0.2
5	729.7	731.7	2.0
6	896.8	915.6	18.8
7			0.0
TOTAL	4456.30	4657.4	201.1

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	17.1869	17.1942	0.0073
REAGENT BLANK	17.0249	17.025	0.0001
CORRECTED PROBE WASH *			0.0072
FILTER # 1	0.2588	0.3337	0.0749
FILTER # 2			0
IMPINGERS			0

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0821
PARTICULATE COLLECTED (including impinger catch)	

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520020
SOURCE:	Vent # 9	TEST DATE:	5/19/2009
TRAIN I.D.		TEST NO.:	3
COLLECTED BY:		CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	664.9	788.5	123.6
2	683.8	713.6	29.8
3	714.0	718.8	4.8
4	698.0	699.8	1.8
5	709.3	710	0.7
6	909.7	925.9	16.2
7			0.0
TOTAL	4379.7	4556.6	176.9

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	16.6429	16.6651	0.0222
REAGENT BLANK	17.0249	17.025	0.0001
CORRECTED PROBE WASH *			0.0221
FILTER # 1	0.3419	0.4077	0.0658
FILTER # 2			0
IMPINGERS			0

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0879
PARTICULATE COLLECTED (including impinger catch)	

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

HCl Mass Emission Calculations

Project Name: Haverhill Vent Stack Compliance
Project No. 39400492
Test Date: 5/19/2009

Test I.D.: **Main Stack**

INPUT PARAMETERS

Run No.	Total ug	grams/sample	Vmstd (cu. ft.)	Qstd (dscfm)	Mass Rate (lbs/hr)	Estimated Concentration[1] (ppm)
1	250,000	0.250000	72.328	50,466	23.0737	80.377
2	232,000	0.232000	76.461	53,970	21.6610	70.558
3	198,000	0.198000	67.262	47,112	18.3447	68.453

[1] Below detection limit

Mass Rate (lb/hr)

MR= (Mn)(Qstd)(60)/(Vmstd)(453.6)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)

HCl constant= 9.481E-08

URS

CALC. NO. _____

CALCULATION SHEET

SIGNATURE _____ DATE _____ CHECKED _____ DATE 5/18/09

PROJECT HHNC Heat Stack #9 JOB NO. _____

SUBJECT Cyclonic Flow Check SHEET 1 OF 1 SHEETS

Traverse Point		ΔP	Temp	Angle
A	1	0.35	1314	1
	2	0.32	1304	0
	3	0.35	1304	22
	4	0.29	1318	30
	5	0.24	1265	28
	6	0.19	1130	15
B	1	0.39	1308	22
	2	0.37	1312	28
	3	0.29	1308	29
	4	0.29	1288	28
	5	0.26	1219	28
	6	0.22	1111	28
C	1	0.24	1300	20
	2	0.37	1312	24
	3	0.28	1317	11
	4	0.31	1285	21
	5	0.23	1120	21
	6	0.15	1109	20
D	1	0.40	1314	26
	2	0.38	1311	32
	3	0.33	1315	33
	4	0.26	1316	34
	5	0.22	1326	32
	6	0.15	1235	35

Pre Run 1

Stack Area 63.6172

Traverse Points	Null Angle	Cosine of angle	ΔP	Stack T	Vs	Qa	Qa*Cos()
A-1	1.0	0.99985	0.35	1314	3,666	233,244	233,209
A-2	0.0	1.00000	0.32	1304	3,496	222,395	222,395
A-3	22.0	0.92718	0.35	1304	3,656	232,586	215,650
A-4	30.0	0.86603	0.29	1318	3,341	212,552	184,075
A-5	28.0	0.88295	0.24	1265	2,994	190,458	168,165
A-6	15.0	0.96593	0.19	1130	2,557	162,695	157,152
B-1	22.0	0.92718	0.39	1308	3,864	245,795	227,897
B-2	28.0	0.88295	0.37	1312	3,768	239,681	211,625
B-3	29.0	0.87462	0.29	1308	3,332	211,953	185,379
B-4	28.0	0.88295	0.29	1288	3,313	210,751	186,082
B-5	28.0	0.88295	0.26	1219	3,074	195,574	172,682
B-6	28.0	0.88295	0.22	1111	2,735	174,020	153,651
C-1	20.0	0.93969	0.24	1300	3,024	192,381	180,779
C-2	24.0	0.91355	0.37	1312	3,768	239,681	218,959
C-3	11.0	0.98163	0.28	1317	3,282	208,796	204,960
C-4	21.0	0.93358	0.31	1285	3,422	217,710	203,250
C-5	21.0	0.93358	0.23	1120	2,805	178,440	166,588
C-6	20.0	0.93969	0.15	1109	2,257	143,601	134,941
D-1	26.0	0.89879	0.40	1314	3,920	249,349	224,113
D-2	32.0	0.84805	0.38	1311	3,817	242,829	205,931
D-3	33.0	0.83867	0.33	1315	3,561	226,546	189,997
D-4	34.0	0.82904	0.26	1316	3,162	201,145	166,756
D-5	32.0	0.84805	0.22	1326	2,917	185,546	157,352
D-6	35.0	0.81915	0.15	1235	2,346	149,256	122,263
				1268		206,958	187,244
	23.7						

Run 1

Traverse Points	Method 2 Null Angle	Cosine of angle	ΔP	√ΔP	Vertical √ΔP	Average Null Angle	Method 5/26A Cosine of angle	ΔP	√ΔP	Vertical √ΔP	
A-1	1.0	0.99985	0.35	0.5916	0.5915	24.96	0.9066	0.21	0.4583	0.4155	
A-2	0.0	1.00000	0.32	0.5657	0.5657	24.96	0.9066	0.10	0.3162	0.2867	
A-3	22.0	0.92718	0.35	0.5916	0.5485	24.96	0.9066	0.10	0.3162	0.2867	
A-4	30.0	0.86603	0.29	0.5385	0.4664	24.96	0.9066	0.15	0.3873	0.3511	
A-5	28.0	0.88295	0.24	0.4899	0.4326	24.96	0.9066	0.20	0.4472	0.4054	
A-6	15.0	0.96593	0.19	0.4359	0.4210	24.96	0.9066	0.20	0.4472	0.4054	
B-1	22.0	0.92718	0.39	0.6245	0.5790	24.96	0.9066	0.25	0.5000	0.4533	
B-2	28.0	0.88295	0.37	0.6083	0.5371	24.96	0.9066	0.30	0.5477	0.4966	
B-3	29.0	0.87462	0.29	0.5385	0.4710	24.96	0.9066	0.34	0.5831	0.5286	
B-4	28.0	0.88295	0.29	0.5385	0.4755	24.96	0.9066	0.29	0.5385	0.4882	
B-5	28.0	0.88295	0.26	0.5099	0.4502	24.96	0.9066	0.20	0.4472	0.4054	
B-6	28.0	0.88295	0.22	0.4690	0.4141	24.96	0.9066	0.15	0.3873	0.3511	
C-1	20.0	0.93969	0.24	0.4899	0.4604	24.96	0.9066	0.30	0.5477	0.4966	
C-2	24.0	0.91355	0.37	0.6083	0.5557	24.96	0.9066	0.37	0.6083	0.5515	
C-3	11.0	0.98163	0.28	0.5292	0.5194	24.96	0.9066	0.37	0.6083	0.5515	
C-4	21.0	0.93358	0.31	0.5568	0.5198	24.96	0.9066	0.30	0.5477	0.4966	
C-5	21.0	0.93358	0.23	0.4796	0.4477	24.96	0.9066	0.32	0.5657	0.5129	
C-6	20.0	0.93969	0.15	0.3873	0.3639	24.96	0.9066	0.27	0.5196	0.4711	
D-1	26.0	0.89879	0.40	0.6325	0.5684	24.96	0.9066	0.42	0.6481	0.5875	
D-2	32.0	0.84805	0.38	0.6164	0.5228	24.96	0.9066	0.38	0.6164	0.5589	
D-3	33.0	0.83867	0.33	0.5745	0.4818	24.96	0.9066	0.35	0.5916	0.5364	
D-4	34.0	0.82904	0.26	0.5099	0.4227	24.96	0.9066	0.30	0.5477	0.4966	
D-5	32.0	0.84805	0.22	0.4690	0.3978	24.96	0.9066	0.26	0.5099	0.4623	
D-6	35.0	0.81915	0.15	0.3873	0.3173	24.96	0.9066	0.20	0.4472	0.4054	
					0.4804					0.4584	-4.6%

Run 2

Traverse Points	Method 2 Null Angle	Cosine of angle	ΔP	√ΔP	Vertical √ΔP	Average Null Angle	Method 5/26A Cosine of angle	ΔP	√ΔP	Vertical √ΔP	
A-1	1.0	0.99985	0.35	0.5916	0.5915	24.96	0.9066	0.40	0.6325	0.5734	
A-2	0.0	1.00000	0.32	0.5657	0.5657	24.96	0.9066	0.34	0.5831	0.5286	
A-3	22.0	0.92718	0.35	0.5916	0.5485	24.96	0.9066	0.30	0.5477	0.4966	
A-4	30.0	0.86603	0.29	0.5385	0.4664	24.96	0.9066	0.30	0.5477	0.4966	
A-5	28.0	0.88295	0.24	0.4899	0.4326	24.96	0.9066	0.28	0.5292	0.4797	
A-6	15.0	0.96593	0.19	0.4359	0.4210	24.96	0.9066	0.20	0.4472	0.4054	
B-1	22.0	0.92718	0.39	0.6245	0.5790	24.96	0.9066	0.35	0.5916	0.5364	
B-2	28.0	0.88295	0.37	0.6083	0.5371	24.96	0.9066	0.34	0.5831	0.5286	
B-3	29.0	0.87462	0.29	0.5385	0.4710	24.96	0.9066	0.39	0.6245	0.5662	
B-4	28.0	0.88295	0.29	0.5385	0.4755	24.96	0.9066	0.34	0.5831	0.5286	
B-5	28.0	0.88295	0.26	0.5099	0.4502	24.96	0.9066	0.26	0.5099	0.4623	
B-6	28.0	0.88295	0.22	0.4690	0.4141	24.96	0.9066	0.23	0.4796	0.4348	
C-1	20.0	0.93969	0.24	0.4899	0.4604	24.96	0.9066	0.36	0.6000	0.5440	
C-2	24.0	0.91355	0.37	0.6083	0.5557	24.96	0.9066	0.36	0.6000	0.5440	
C-3	11.0	0.98163	0.28	0.5292	0.5194	24.96	0.9066	0.34	0.5831	0.5286	
C-4	21.0	0.93358	0.31	0.5568	0.5198	24.96	0.9066	0.34	0.5831	0.5286	
C-5	21.0	0.93358	0.23	0.4796	0.4477	24.96	0.9066	0.28	0.5292	0.4797	
C-6	20.0	0.93969	0.15	0.3873	0.3639	24.96	0.9066	0.20	0.4472	0.4054	
D-1	26.0	0.89879	0.40	0.6325	0.5684	24.96	0.9066	0.36	0.6000	0.5440	
D-2	32.0	0.84805	0.38	0.6164	0.5228	24.96	0.9066	0.34	0.5831	0.5286	
D-3	33.0	0.83867	0.33	0.5745	0.4818	24.96	0.9066	0.30	0.5477	0.4966	
D-4	34.0	0.82904	0.26	0.5099	0.4227	24.96	0.9066	0.25	0.5000	0.4533	
D-5	32.0	0.84805	0.22	0.4690	0.3978	24.96	0.9066	0.25	0.5000	0.4533	
D-6	35.0	0.81915	0.15	0.3873	0.3173	24.96	0.9066	0.15	0.3873	0.3511	
					0.4804					0.4956	3.2%

Run 3

	Method 2						Method 5/26A				
Traverse Points	Null Angle	Cosine of angle	ΔP	√ΔP	Vertical √ΔP	Average Null Angle	Cosine of angle	ΔP	√ΔP	Vertical √ΔP	
A-1	1.0	0.99985	0.35	0.5916	0.5915	24.96	0.9066	0.30	0.5477	0.4966	
A-2	0.0	1.00000	0.32	0.5657	0.5657	24.96	0.9066	0.26	0.5099	0.4623	
A-3	22.0	0.92718	0.35	0.5916	0.5485	24.96	0.9066	0.24	0.4899	0.4441	
A-4	30.0	0.86603	0.29	0.5385	0.4664	24.96	0.9066	0.26	0.5099	0.4623	
A-5	28.0	0.88295	0.24	0.4899	0.4326	24.96	0.9066	0.16	0.4000	0.3626	
A-6	15.0	0.96593	0.19	0.4359	0.4210	24.96	0.9066	0.18	0.4243	0.3846	
B-1	22.0	0.92718	0.39	0.6245	0.5790	24.96	0.9066	0.30	0.5477	0.4966	
B-2	28.0	0.88295	0.37	0.6083	0.5371	24.96	0.9066	0.30	0.5477	0.4966	
B-3	29.0	0.87462	0.29	0.5385	0.4710	24.96	0.9066	0.25	0.5000	0.4533	
B-4	28.0	0.88295	0.29	0.5385	0.4755	24.96	0.9066	0.21	0.4583	0.4155	
B-5	28.0	0.88295	0.26	0.5099	0.4502	24.96	0.9066	0.13	0.3606	0.3269	
B-6	28.0	0.88295	0.22	0.4690	0.4141	24.96	0.9066	0.16	0.4000	0.3626	
C-1	20.0	0.93969	0.24	0.4899	0.4604	24.96	0.9066	0.34	0.5831	0.5286	
C-2	24.0	0.91355	0.37	0.6083	0.5557	24.96	0.9066	0.31	0.5568	0.5048	
C-3	11.0	0.98163	0.28	0.5292	0.5194	24.96	0.9066	0.30	0.5477	0.4966	
C-4	21.0	0.93358	0.31	0.5568	0.5198	24.96	0.9066	0.25	0.5000	0.4533	
C-5	21.0	0.93358	0.23	0.4796	0.4477	24.96	0.9066	0.23	0.4796	0.4348	
C-6	20.0	0.93969	0.15	0.3873	0.3639	24.96	0.9066	0.16	0.4000	0.3626	
D-1	26.0	0.89879	0.40	0.6325	0.5684	24.96	0.9066	0.24	0.4899	0.4441	
D-2	32.0	0.84805	0.38	0.6164	0.5228	24.96	0.9066	0.26	0.5099	0.4623	
D-3	33.0	0.83867	0.33	0.5745	0.4818	24.96	0.9066	0.24	0.4899	0.4441	
D-4	34.0	0.82904	0.26	0.5099	0.4227	24.96	0.9066	0.21	0.4583	0.4155	
D-5	32.0	0.84805	0.22	0.4690	0.3978	24.96	0.9066	0.21	0.4583	0.4155	
D-6	35.0	0.81915	0.15	0.3873	0.3173	24.96	0.9066	0.18	0.4243	0.3846	
					0.4804					0.4379	-8.8%

URS

STACK TEST DATA SHEET

Project:	Haverhill Vent Test	Barom. Psr.:	29.80
Project No:	39400492.520002	Static Psr.:	~0.26
Source:	Vent Stack # 9	Delta H @:	1.8143
Run No.:	1	Gamma:	0.9498
Date:	5/19/09	Pitot Coef.:	0.84 / AC6002
Filter No.:	GF-147	Stack Dia.:	9.0'
Meter Box I.D.:	D	Stack Area:	
Sample Box No.:	N/A	Port Length:	4.0"
Probe Heater Setting:	250	Port Dia.:	4.0"
Personnel:	TG, DS, GM, RR	Probe Liner:	Quartz

Schematic of Stack

M-5 / HCl

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	FILTER EXIT TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	08:50	0	0.21	1.15	623,200	62		254	227	1426	53	2.0
2		5	0.10	0.48	627.60	63		259	227	1473	49	1.0
3		10	0.10	0.48	629.00	63		259	232	1474	49	1.0
4		15	0.15	0.725	631.10	64		261	241	1372	48	1.0
5		20	0.20	0.95	633.00	65		260	246	1367	49	2.0
6		25	0.20	0.95	635.70	66		247	273	1265	49	2.0
		30			638.880							
1		30	0.26	1.2 0.95	641.065	70		235	252	1400	64	3.0
2		35	0.30	1.42	644.10	71		241	293	1563	58	3.0
3		40	0.34	1.62	647.50	72		243	335	1574	57	4.0
4		45	0.29	1.40	651.00	73		241	380	1514	59	4.0
5		50	0.20	0.96	654.10	75		240	390	1341	62	3.0
6		55	0.15	0.725	657.50	76		238	374	1270	62	3.0
		1.00			660.205							
1		1.00	0.30	1.42	660.450	76		240	250	1499	66	3.5
2		5	0.37	1.78	664.30	77		240	312	1588	60	5.0
3		10	0.37	1.78	667.20	78		240	355	1584	55	6.0
4		15	0.30	1.42	671.10	78		239	394	1540	56	5.0
5		20	0.32	1.55	674.70	79		240	400	1458	58	5.0
6		25	0.27	1.3	678.50	79		239	391	1045	59	5.0
		30			682.000							
1		30	0.42	2.0	682.122	77		242	262	1510	60	6.0
2		35	0.38	1.82	686.00	78		241	338	1578	49	7.0
3		40	0.35	1.70	689.80	78		231	383	1564	47	7.0
4		45	0.30	1.42	693.70	78		230	402	1529	49	6.5
5		50	0.26	1.25	697.30	78		230	398	1452	50	6.0
6		55	0.20	0.95	700.80	78		231	383	1264	50	5.0
	11:58	2.00			703,900							
AVERAGE												

LEAK CHECKS	
Pitot impact:	good / good
Pitot static:	good / good
Train initial:	0.0 @ 15" Hg
Train Final:	0.0 @ 10" Hg

NOZZLE MEASUREMENT	
I.D. No.:	IN-002
1	0.375
2	0.376
3	0.375
Avg.	

STACK GAS ANALYSIS				
		CO_2	O_2	CO
1		8.3	8.9	
2		7.6	9.6	
3		7.6	9.5	
Avg.				

NOTES: 624.835 – 626.00 high vac problem last impinger connection frozen / jarred impinger during move leak checked

Operator Signature:

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520002
SOURCE:	Vent Stack # 9	TEST DATE:	5/19/09
TRAIN I.D.	M5/26A - R1	TEST NO.:	1
COLLECTED BY:	TG BJGM, RR	CHKD BY:	TG

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	669.2	768.7	
2	698.8	772.0	
3	725.1	743.8	
4	707.8	709.9	
5	726.0	727.6	
6	896.9	917.0	
7			
TOTAL			

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	16.6301	16.6451	
REAGENT BLANK	17.0249	17.0250	
CORRECTED PROBE WASH *			
FILTER # 1 GF-147	0.2664	0.3604	
FILTER # 2			
IMPINGERS			

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

STACK TEST DATA SHEET

Project:	Haverhill Vent Test	Barom. Psr.:	29.80
Project No:	39400492.520002	Static Psr.:	-0.26
Source:	Vent Stack # 9	Delta H @:	1.8143
Run No.:	2	Gamma:	0.9498
Date:	5/19/09	Pitot Coef.:	0.84 | AC6CO2
Filter No.:	GF-168	Stack Dia.:	108"
Meter Box I.D.:	V	Stack Area:	
Sample Box No.:	n/a	Port Length:	4.0"
Probe Heater Setting:	250	Port Dia.:	4.0"
Personnel:	TG, BJ, GM, RR, TB	Probe Liner:	Quartz

Schematic of Stack

M5/HCl

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	FILTER EXIT TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	12:35	0	0.40	1.92	704.300	73	2	226	230	1619	67	4.0
2		5	0.34	1.65	707.80	75		231	238	1618	55	4.0
3		10	0.30	1.45	711.80	75		230	307	1606	52	3.5
4		15	0.30	1.45	715.20	77		231	341	1590	52	3.5
5		20	0.28	1.35	718.60	78		230	349	1558	52	3.0
6		25	0.20	0.96	722.30	79		231	336	1150	52	2.5
		30			725.145							
1		30	0.35	1.70	725.145	79		231	230	1591	59	4.0
2		35	0.34	1.65	728.80	80		230	290	1615	52	4.0
3		40	0.39	1.90	732.20	81		226	327	1610	52	5.0
4		45	0.34	1.65	736.30	82		231	363	1611	54	5.0
5		50	0.26	1.25	740.20	82		230	371	1580	57	3.0
6		55	0.23	1.1	743.20	81		231	347	1330	58	3.0
		1.00			746.362							
1		1.00	0.36	1.72	746.362	82		232	240	1602	60	5.0
2		5	0.36	1.72	750.10	83		231	307	1614	55	5.0
3		10	0.34	1.65	753.30	83		230	344	1604	56	5.0
4		15	0.34	1.65	757.20	84		229	356	1596	58	5.0
5		20	0.28	1.35	760.50	84		232	364	1588	58	5.0
6		25	0.20	0.96	764.10	84		231	356	1420	59	4.0
		30			767.210							
1		30	0.36	1.72	767.350	80		229	261	1584	66	6.0
2		35	0.34	1.65	771.30	81		232	271	1591	59	7.0
3		40	0.30	1.45	774.20	81		232	319	1590	61	10.0
4		45	0.25	1.2	778.20	82		238	346	1583	63	10.0
5		50	0.25	1.2	781.10	82		233	342	1558	67	10.0
6		55	0.15	0.725	784.80	82		230	335	1100	61	8.0
	15:16	2.00			786.763							
AVERAGE												

LEAK CHECKS	
Pitot impact:	good / good
Pitot static:	good / good
Train initial:	0.00 @ 15" Hg
Train Final:	0.00 @ 12" Hg

NOZZLE MEASUREMENT	
I.D. No.:	IN-002
1	0.375
2	0.376
3	0.375
Avg.	

STACK GAS ANALYSIS				
		CO2	O2	CO
1		9.6	9.3	
2				
3				
Avg.				

NOTES:

Operator Signature: Todd Dyer

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520002
SOURCE:	Vent Stack # 9	TEST DATE:	5/19/09
TRAIN I.D.	M5/26A-R2	TEST NO.:	2
COLLECTED BY:	TG, BS, GM, RR	CHKD BY:	TG

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	672.7	811.0	
2	712.4	751.0	
3	732.6	736.2	
4	712.1	711.9	
5	729.7	731.7	
6	896.8	915.6	
7			
TOTAL			

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	17.1869	17.1942	
REAGENT BLANK	17.0249	17.0250	
CORRECTED PROBE WASH *			
FILTER # 1 GF-168	0.2588	0.3337	
FILTER # 2			
IMPINGERS			

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

STACK TEST DATA SHEET

Project:	Haverhill Vent Test	Barom. Psr.:	29.80
Project No:	39400492.520002	Static Psr.:	-0.26
Source:	Vent Stack # 9	Delta H @:	1.8143
Run No.:	3	Gamma:	0.9498
Date:	5/19/09	Pitot Coef.:	0.84 / AC6002
Filter No.:	GP-183	Stack Dia.:	108"
Meter Box I.D.:	V	Stack Area:	
Sample Box No.:	N/A	Port Length:	4.0"
Probe Heater Setting:	250	Port Dia.:	4"
Personnel:	TG, TD, DS, GM, RR	Probe Liner:	Quartz

Schematic of Stack

M5- HCL

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	FILTER EXIT TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	16:36	0	0.30	1.42	787.150	79	232	232	268	1600	57	2.0
2		5	0.26	1.25	790.500	79		229	288	1599	54	2.0
3		10	0.24	1.15	793.70	80		231	335	1597	52	2.0
4		15	0.26	1.25	796.80	80		233	350	1589	53	2.0
5		20	0.16	0.775	800.00	81		233	349	1547	54	1.0
6		25	0.18	0.86	802.60	82		234	335	1530	55	1.0
		30			805.195							
1		30	0.30	1.42	805.195	82		231	241	1591	57	3.0
2		35	0.30	1.42	808.40	83		230	322	1601	51	3.0
3		40	0.25	1.20	811.80	83		233	357	1600	51	3.0
4		45	0.21	1.0	815.10	84		231	377	1593	51	2.5
5		50	0.13	0.625	818.10	85		230	374	1417	52	1.5
6		55	0.16	0.775	820.50	85		231	343	1508	52	
		1.00			822.865							
1		1.00	0.34	1.65	822.865	84		230	238	1594	60	4.0
2		5	0.31	1.5	826.30	85		232	336	1587	54	4.0
3		10	0.30	1.42	830.10	85		231	371	1582	55	4.0
4		15	0.25	1.20	833.30	97		230	379	1574	57	3.5
5		20	0.23	1.1	836.50	87		230	366	1539	57	3.5
6		25	0.16	0.775	839.90	88		230	344	1560	58	2.0
		30			842.275					1644		
1		30	0.24	1.15	842.275	86		239	274	1611	65	3.0
2		35	0.26	1.25	845.40	87		233	321	1625	56	3.5
3		40	0.24	1.15	848.50	88		235	354	1629	55	3.5
4		45	0.21	1.0	851.80	88		230	374	1622	55	3.5
5		50	0.21	1.0	854.30	88		229	373	1617	57	3.5
6		55	0.18	0.86	857.70	88		231	361	1607	57	3.0
	18:57	2.00			860.276							
AVERAGE												

LEAK CHECKS	
Pitot impact:	good / good
Pitot static:	good / good
Train initial:	0.00 @ 15" Hg
Train Final:	0.00 @ 7" Hg

NOZZLE MEASUREMENT	
I.D. No.:	JU-002
1	0.375
2	0.376
3	0.375
Avg.	

STACK GAS ANALYSIS				
		CO2	O2	CO
1		7.7	10.0	
2		7.7	10.1	
3				
Avg.				

NOTES:

Operator Signature: Todd Ayp

URS

TEST LAB DATA SHEET

PROJECT:	Haverhill Vent Test	PROJECT NO.:	39400492.520002
SOURCE:	Vent Stack # 9	TEST DATE:	5/19/09
TRAIN I.D.	M5/26A - R3	TEST NO.:	3
COLLECTED BY:	TG, BJ, TB on RR	CHKD BY:	TF

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	664.9	788.5	
2	683.8	713.6	
3	714.0	718.8	
4	698.0	699.8	
5	709.3	710.6	
6	909.7	925.9	
7			
TOTAL			

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	16.6429	16.6651	
REAGENT BLANK	17.0249	17.0250	
CORRECTED PROBE WASH *			
FILTER # 1 GF-183	0.3419	0.4077	
FILTER # 2			
IMPINGERS			

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

QA PROBE WASH (as required)

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g

COMMENTS:

URS

CALC. NO. _____

CALCULATION SHEET

SIGNATURE M. Mowery DATE 6-8-09 CHECKED _____ DATE _____

PROJECT Haverhill Unit 2 Vent Stack JOB NO. _____

SUBJECT Compliance Test SHEET _____ OF _____ SHEETS

Filters

Run		I.W.	6/1/09 msm F.W	6/8/09 msm F.W.
1	GF-147	0.2664	0.3606	0.3604
2	GF-168	0.2588	0.3337	0.3339
3	GF-183	0.3419	0.4077	0.4077

Probe Wash

	I.W.	F.W.	F.W.
VT-1	16.6301	16.6452	16.6451
VT-2	17.1869	17.1948	17.1942
VT-3	16.6429	16.6651	16.6652
Blank	17.0249	17.0251	17.0250

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	7:13	0.00	0.00	-0.42
5/19/2009	7:14	7.04	9.05	-0.37
5/19/2009	7:15	19.09	21.04	0.55
5/19/2009	7:16	19.01	20.98	-0.26
5/19/2009	7:17	18.91	20.66	0.22
5/19/2009	7:18	12.92	10.29	0.98
5/19/2009	7:19	12.60	10.04	1.11
5/19/2009	7:20	12.60	10.04	1.01
5/19/2009	7:21	12.60	10.04	0.24
5/19/2009	7:22	-999.00	-999.00	-999.00
5/19/2009	7:23	-999.00	-999.00	-999.00
5/19/2009	7:24	0.52	20.00	-0.36
5/19/2009	7:25	0.09	20.30	-0.34
5/19/2009	7:26	-999.00	-999.00	-999.00
5/19/2009	7:27	0.06	20.30	-0.35
5/19/2009	7:28	0.05	20.30	-0.35
5/19/2009	7:29	-0.05	19.83	-4.76
5/19/2009	7:30	0.05	20.30	-0.35
5/19/2009	7:31	3.19	17.32	-0.34
5/19/2009	7:32	12.59	9.91	-0.35
5/19/2009	7:33	12.61	9.90	-0.22
5/19/2009	7:34	12.62	9.94	0.48
5/19/2009	7:35	2.54	1.78	359.38
5/19/2009	7:36	0.00	0.04	459.99
5/19/2009	7:37	0.00	0.02	451.29
5/19/2009	7:38	0.00	0.01	515.72
5/19/2009	7:39	0.00	0.00	993.74
5/19/2009	7:40	0.00	0.00	999.48
5/19/2009	7:41	0.00	12.06	461.12
5/19/2009	7:42	1.86	17.44	9.57
5/19/2009	7:43	10.20	11.84	9.07
5/19/2009	7:44	11.46	10.82	0.21
5/19/2009	7:45	12.54	9.94	0.74
5/19/2009	7:46	12.47	9.72	3.12
5/19/2009	7:47	0.84	0.28	400.78
5/19/2009	7:48	0.02	0.00	442.11
5/19/2009	7:49	0.02	0.00	449.94
5/19/2009	7:50	0.01	3.09	402.79
5/19/2009	7:51	0.01	20.48	16.26
5/19/2009	7:52	0.09	20.35	3.83
5/19/2009	7:53	6.36	11.61	363.06
5/19/2009	7:54	6.79	11.29	388.53
5/19/2009	7:55	6.79	11.21	383.96
5/19/2009	7:56	6.80	11.22	383.65
5/19/2009	7:57	6.77	11.19	381.64
5/19/2009	7:58	6.78	11.16	383.68
5/19/2009	7:59	6.80	11.17	390.02
5/19/2009	8:00	6.80	11.17	385.59
5/19/2009	8:01	6.80	11.11	384.94
5/19/2009	8:02	6.83	11.12	385.92

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	8:03	6.84	11.14	388.44
5/19/2009	8:04	6.84	11.10	390.21
5/19/2009	8:05	6.84	11.14	392.65
5/19/2009	8:06	6.83	11.18	393.19
5/19/2009	8:07	6.81	11.21	393.79
5/19/2009	8:08	6.77	11.10	394.49
5/19/2009	8:09	6.82	11.15	405.32
5/19/2009	8:10	6.80	11.21	401.51
5/19/2009	8:11	6.79	11.20	396.47
5/19/2009	8:12	6.80	11.10	396.80
5/19/2009	8:13	6.83	11.15	399.88
5/19/2009	8:14	6.81	11.16	397.63
5/19/2009	8:15	6.79	11.16	397.09
5/19/2009	8:16	6.80	11.12	396.67
5/19/2009	8:17	6.82	11.14	398.11
5/19/2009	8:18	6.83	11.10	399.77
5/19/2009	8:19	6.83	11.18	399.79
5/19/2009	8:20	6.80	11.12	396.49
5/19/2009	8:21	6.82	11.13	398.30
5/19/2009	8:22	6.81	11.14	397.63
5/19/2009	8:23	6.80	11.09	396.05
5/19/2009	8:24	6.82	11.13	395.97
5/19/2009	8:25	6.79	11.07	393.10
5/19/2009	8:26	6.79	11.10	393.78
5/19/2009	8:27	6.78	11.07	392.92
5/19/2009	8:28	6.79	11.11	393.58
5/19/2009	8:29	6.78	11.05	396.32
5/19/2009	8:30	6.83	11.08	402.61
5/19/2009	8:31	6.81	11.13	399.17
5/19/2009	8:32	6.79	11.13	394.55
5/19/2009	8:33	6.78	11.12	393.45
5/19/2009	8:34	6.78	11.15	390.43
5/19/2009	8:35	6.78	11.13	389.36
5/19/2009	8:36	6.81	11.17	390.39
5/19/2009	8:37	6.78	11.20	388.81
5/19/2009	8:38	6.77	11.15	387.60
5/19/2009	8:39	6.79	11.22	389.87
5/19/2009	8:40	6.78	11.18	388.92
5/19/2009	8:41	2.32	17.82	188.11
5/19/2009	8:42	4.13	14.62	199.24
5/19/2009	8:43	6.78	11.22	372.96
5/19/2009	8:44	6.82	11.11	377.81
5/19/2009	8:45	6.87	11.06	383.49
5/19/2009	8:46	6.88	11.10	387.59
5/19/2009	8:47	6.87	11.09	388.71
5/19/2009	8:48	6.88	11.02	390.09
5/19/2009	8:49	6.92	11.00	393.92
5/19/2009	8:50	6.94	11.10	393.54
5/19/2009	8:51	6.88	11.11	390.05
5/19/2009	8:52	6.87	11.13	390.33

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	8:53	6.86	11.18	387.98
5/19/2009	8:54	6.86	11.14	387.06
5/19/2009	8:55	6.72	11.45	387.69
5/19/2009	8:56	6.63	11.44	381.77
5/19/2009	8:57	6.65	11.43	382.15
5/19/2009	8:58	6.71	11.19	380.01
5/19/2009	8:59	6.88	10.91	388.78
5/19/2009	9:00	7.05	10.61	401.38
5/19/2009	9:01	7.30	10.25	419.90
5/19/2009	9:02	7.62	9.90	444.20
5/19/2009	9:03	7.63	10.11	454.08
5/19/2009	9:04	7.39	10.32	433.46
5/19/2009	9:05	7.40	10.32	431.67
5/19/2009	9:06	7.38	10.32	430.94
5/19/2009	9:07	7.40	10.27	433.47
5/19/2009	9:08	7.41	10.34	436.58
5/19/2009	9:09	7.38	10.44	434.78
5/19/2009	9:10	7.33	10.46	428.78
5/19/2009	9:11	7.28	10.57	425.77
5/19/2009	9:12	7.25	10.45	421.91
5/19/2009	9:13	7.32	10.48	428.47
5/19/2009	9:14	7.24	10.78	429.20
5/19/2009	9:15	7.05	10.86	422.27
5/19/2009	9:16	7.04	10.81	416.44
5/19/2009	9:17	7.28	10.43	421.40
5/19/2009	9:18	7.40	10.49	434.16
5/19/2009	9:19	7.32	10.35	433.21
5/19/2009	9:20	7.48	10.03	444.51
5/19/2009	9:21	7.90	9.56	477.77
5/19/2009	9:22	7.89	9.82	477.78
5/19/2009	9:23	7.71	9.85	460.57
5/19/2009	9:24	7.72	9.87	461.44
5/19/2009	9:25	7.72	9.82	462.83
5/19/2009	9:26	7.62	10.16	465.18
5/19/2009	9:27	7.36	10.45	456.69
5/19/2009	9:28	7.30	10.45	444.74
5/19/2009	9:29	7.40	10.16	439.36
5/19/2009	9:30	7.53	10.05	446.64
5/19/2009	9:31	7.59	9.70	453.43
5/19/2009	9:32	7.86	9.30	475.42
5/19/2009	9:33	8.24	8.92	518.10
5/19/2009	9:34	8.28	8.92	526.05
5/19/2009	9:35	8.18	8.92	513.45
5/19/2009	9:36	8.14	8.73	508.66
5/19/2009	9:37	8.14	8.88	503.24
5/19/2009	9:38	7.99	8.96	485.94
5/19/2009	9:39	7.94	8.93	482.04
5/19/2009	9:40	7.94	8.99	480.82
5/19/2009	9:41	7.92	9.16	481.87
5/19/2009	9:42	7.87	9.09	475.34

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	9:43	7.84	9.15	471.88
5/19/2009	9:44	7.81	9.25	471.52
5/19/2009	9:45	7.43	9.81	465.03
5/19/2009	9:46	7.38	9.87	453.53
5/19/2009	9:47	7.34	9.91	449.39
5/19/2009	9:48	7.45	9.59	445.36
5/19/2009	9:49	7.59	9.31	456.73
5/19/2009	9:50	7.69	9.06	470.39
5/19/2009	9:51	7.95	8.63	488.13
5/19/2009	9:52	8.34	8.20	516.67
5/19/2009	9:53	8.37	8.25	524.87
5/19/2009	9:54	8.03	8.66	508.97
5/19/2009	9:55	8.03	8.70	501.82
5/19/2009	9:56	8.02	8.73	500.54
5/19/2009	9:57	7.99	8.69	499.24
5/19/2009	9:58	7.95	8.95	500.72
5/19/2009	9:59	7.81	9.00	491.57
5/19/2009	10:00	7.75	9.11	487.80
5/19/2009	10:01	7.74	9.01	480.86
5/19/2009	10:02	7.78	8.98	481.89
5/19/2009	10:03	7.82	8.78	483.01
5/19/2009	10:04	7.93	8.69	491.15
5/19/2009	10:05	8.00	8.73	495.47
5/19/2009	10:06	8.00	8.75	494.19
5/19/2009	10:07	7.92	8.75	491.55
5/19/2009	10:08	7.97	8.80	491.85
5/19/2009	10:09	7.97	8.83	493.19
5/19/2009	10:10	7.95	8.85	493.64
5/19/2009	10:11	7.95	8.92	492.07
5/19/2009	10:12	7.90	8.88	490.00
5/19/2009	10:13	8.03	8.50	493.83
5/19/2009	10:14	8.15	8.56	508.06
5/19/2009	10:15	8.12	8.60	507.84
5/19/2009	10:16	8.09	8.61	506.82
5/19/2009	10:17	8.08	8.75	505.59
5/19/2009	10:18	8.02	8.70	500.64
5/19/2009	10:19	8.05	8.79	503.44
5/19/2009	10:20	8.00	8.85	499.54
5/19/2009	10:21	7.96	9.03	495.70
5/19/2009	10:22	7.88	9.03	491.76
5/19/2009	10:23	7.86	9.05	487.14
5/19/2009	10:24	7.86	9.04	487.17
5/19/2009	10:25	7.88	9.04	489.78
5/19/2009	10:26	7.88	9.08	490.96
5/19/2009	10:27	7.84	9.15	489.26
5/19/2009	10:28	7.80	9.27	485.65
5/19/2009	10:29	7.73	9.20	479.67
5/19/2009	10:30	7.78	9.23	482.36
5/19/2009	10:31	7.79	9.22	484.48
5/19/2009	10:32	7.80	9.27	483.69

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	10:33	7.75	9.23	480.91
5/19/2009	10:34	7.80	9.19	483.32
5/19/2009	10:35	4.64	13.98	316.53
5/19/2009	10:36	7.71	9.39	480.27
5/19/2009	10:37	7.73	9.43	493.91
5/19/2009	10:38	7.67	9.52	468.27
5/19/2009	10:39	7.64	9.43	465.82
5/19/2009	10:40	7.68	9.41	468.16
5/19/2009	10:41	7.69	9.42	470.92
5/19/2009	10:42	7.69	9.41	475.48
5/19/2009	10:43	7.68	9.40	476.54
5/19/2009	10:44	7.68	9.38	472.56
5/19/2009	10:45	7.68	9.39	468.37
5/19/2009	10:46	7.66	9.41	466.62
5/19/2009	10:47	7.64	9.47	464.62
5/19/2009	10:48	7.59	9.48	462.67
5/19/2009	10:49	7.59	9.47	462.23
5/19/2009	10:50	7.61	9.47	466.32
5/19/2009	10:51	7.61	9.38	455.41
5/19/2009	10:52	7.67	9.37	457.62
5/19/2009	10:53	7.67	9.43	463.67
5/19/2009	10:54	7.61	9.65	462.95
5/19/2009	10:55	7.52	9.48	452.80
5/19/2009	10:56	7.63	9.51	460.26
5/19/2009	10:57	7.60	9.43	458.52
5/19/2009	10:58	7.64	9.48	458.10
5/19/2009	10:59	7.61	9.56	461.35
5/19/2009	11:00	7.56	9.47	458.38
5/19/2009	11:01	7.58	9.47	454.92
5/19/2009	11:02	7.47	9.73	459.93
5/19/2009	11:03	6.18	11.52	429.27
5/19/2009	11:04	7.61	9.50	486.37
5/19/2009	11:05	7.61	9.44	467.16
5/19/2009	11:06	7.63	9.63	464.88
5/19/2009	11:07	7.55	9.51	456.81
5/19/2009	11:08	7.59	9.53	466.06
5/19/2009	11:09	7.60	9.54	468.48
5/19/2009	11:10	7.58	9.64	463.02
5/19/2009	11:11	7.51	9.68	454.86
5/19/2009	11:12	7.47	9.77	447.45
5/19/2009	11:13	7.42	9.74	443.23
5/19/2009	11:14	7.46	9.69	445.52
5/19/2009	11:15	7.50	9.58	440.82
5/19/2009	11:16	7.54	9.54	442.92
5/19/2009	11:17	7.55	9.65	448.60
5/19/2009	11:18	7.48	9.71	453.10
5/19/2009	11:19	7.45	9.68	444.27
5/19/2009	11:20	7.47	9.77	441.64
5/19/2009	11:21	7.42	9.82	436.12
5/19/2009	11:22	7.38	9.85	434.37

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	11:23	7.37	9.78	431.74
5/19/2009	11:24	7.41	9.69	432.85
5/19/2009	11:25	7.50	9.60	436.99
5/19/2009	11:26	7.55	9.54	440.67
5/19/2009	11:27	7.61	9.57	444.72
5/19/2009	11:28	7.56	9.68	438.39
5/19/2009	11:29	7.49	9.55	432.70
5/19/2009	11:30	7.59	9.51	437.10
5/19/2009	11:31	7.60	9.50	440.11
5/19/2009	11:32	7.78	9.08	444.87
5/19/2009	11:33	7.91	9.01	459.41
5/19/2009	11:34	7.93	9.14	460.34
5/19/2009	11:35	7.87	9.11	457.66
5/19/2009	11:36	7.92	9.05	452.02
5/19/2009	11:37	7.92	9.06	455.42
5/19/2009	11:38	7.91	9.04	460.92
5/19/2009	11:39	7.93	8.99	460.23
5/19/2009	11:40	7.95	9.02	462.04
5/19/2009	11:41	7.93	9.11	462.94
5/19/2009	11:42	7.88	9.10	458.00
5/19/2009	11:43	7.87	9.15	455.01
5/19/2009	11:44	7.86	9.03	454.48
5/19/2009	11:45	7.94	9.05	460.24
5/19/2009	11:46	7.94	9.05	463.54
5/19/2009	11:47	7.93	9.11	460.70
5/19/2009	11:48	7.88	9.19	456.79
5/19/2009	11:49	7.85	9.22	456.14
5/19/2009	11:50	7.86	9.21	457.47
5/19/2009	11:51	7.86	9.34	459.74
5/19/2009	11:52	7.80	9.26	453.41
5/19/2009	11:53	7.86	9.23	461.07
5/19/2009	11:54	7.89	9.23	461.88
5/19/2009	11:55	7.89	9.31	460.89
5/19/2009	11:56	7.88	9.40	459.52
5/19/2009	11:57	7.84	9.36	454.29
5/19/2009	11:58	7.86	9.32	454.38
5/19/2009	11:59	7.88	9.34	457.52
5/19/2009	12:00	7.87	9.38	457.00
5/19/2009	12:01	7.85	9.39	454.26
5/19/2009	12:02	7.86	9.42	450.44
5/19/2009	12:03	7.84	9.51	447.92
5/19/2009	12:04	7.80	9.37	445.37
5/19/2009	12:05	7.88	9.41	452.96
5/19/2009	12:06	7.84	9.50	449.75
5/19/2009	12:07	7.79	9.52	448.67
5/19/2009	12:08	7.78	9.56	453.04
5/19/2009	12:09	7.74	9.63	437.69
5/19/2009	12:10	7.70	9.55	426.47
		7.65	9.54	459.76

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	12:11	10.29	10.08	224.11
5/19/2009	12:12	12.45	10.10	32.29
5/19/2009	12:13	12.46	10.09	24.86
5/19/2009	12:14	8.60	6.78	19.21
5/19/2009	12:15	0.08	0.42	13.75
5/19/2009	12:16	0.05	0.41	11.26
5/19/2009	12:17	0.04	0.40	9.29
5/19/2009	12:18	0.03	0.41	8.07
5/19/2009	12:19	0.02	0.43	7.31
5/19/2009	12:20	0.02	0.42	6.66
5/19/2009	12:21	0.01	0.43	5.94
5/19/2009	12:22	0.21	0.56	9.35
5/19/2009	12:23	0.23	0.50	321.91
5/19/2009	12:24	0.02	0.48	394.21
5/19/2009	12:25	0.01	0.49	430.70
5/19/2009	12:26	0.01	0.51	454.80
5/19/2009	12:27	1.68	2.57	442.12
5/19/2009	12:28	7.56	9.32	409.64
5/19/2009	12:29	7.62	9.24	404.00
5/19/2009	12:30	7.62	9.08	399.26
5/19/2009	12:31	7.70	9.19	407.73
5/19/2009	12:32	7.62	9.11	396.87
5/19/2009	12:33	7.65	9.05	399.15
5/19/2009	12:34	7.66	9.13	403.92
5/19/2009	12:35	7.64	9.20	400.91
5/19/2009	12:36	7.61	9.14	396.08
5/19/2009	12:37	7.64	9.25	397.48
5/19/2009	12:38	7.59	9.13	397.51
5/19/2009	12:39	7.65	9.08	406.62
5/19/2009	12:40	7.69	8.96	411.00
5/19/2009	12:41	7.73	9.19	412.48
5/19/2009	12:42	7.62	9.16	403.85
5/19/2009	12:43	7.66	9.06	402.58
5/19/2009	12:44	7.69	9.18	414.88
5/19/2009	12:45	7.63	9.27	433.19
5/19/2009	12:46	7.57	9.27	410.10
5/19/2009	12:47	7.57	9.31	413.27
5/19/2009	12:48	7.55	9.31	411.99
5/19/2009	12:49	7.58	9.24	409.60
5/19/2009	12:50	7.65	9.13	414.59
5/19/2009	12:51	7.72	9.21	412.98
5/19/2009	12:52	7.58	9.51	392.42
5/19/2009	12:53	7.48	9.35	384.81
5/19/2009	12:54	7.58	9.39	395.93
5/19/2009	12:55	7.56	9.40	397.28
5/19/2009	12:56	7.55	9.38	399.92

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	12:57	7.55	9.47	398.48
5/19/2009	12:58	7.52	9.32	388.37
5/19/2009	12:59	7.58	9.22	398.32
5/19/2009	13:00	7.59	9.26	398.42
5/19/2009	13:01	7.56	9.29	396.77
5/19/2009	13:02	7.51	9.34	403.00
5/19/2009	13:03	7.64	9.11	402.58
5/19/2009	13:04	7.61	9.40	408.15
5/19/2009	13:05	7.51	9.28	395.13
5/19/2009	13:06	7.58	9.20	399.55
5/19/2009	13:07	7.62	9.25	404.23
5/19/2009	13:08	7.60	9.28	404.69
5/19/2009	13:09	7.61	9.36	401.42
5/19/2009	13:10	7.61	9.09	397.00
5/19/2009	13:11	7.73	9.15	408.69
5/19/2009	13:12	7.71	9.32	403.70
5/19/2009	13:13	7.60	9.50	400.61
5/19/2009	13:14	7.04	10.35	389.90
5/19/2009	13:15	6.42	10.87	332.61
5/19/2009	13:16	7.51	9.40	411.11
5/19/2009	13:17	7.53	9.38	416.26
5/19/2009	13:18	7.53	9.44	419.66
5/19/2009	13:19	7.51	9.38	416.12
5/19/2009	13:20	7.55	9.56	412.48
5/19/2009	13:21	7.44	9.58	403.07
5/19/2009	13:22	7.45	9.48	398.57
5/19/2009	13:23	7.52	9.50	402.59
5/19/2009	13:24	7.49	9.46	403.62
5/19/2009	13:25	7.52	9.42	400.99
5/19/2009	13:26	7.57	9.42	401.81
5/19/2009	13:27	7.55	9.46	396.58
5/19/2009	13:28	7.53	9.43	396.62
5/19/2009	13:29	7.56	9.38	393.57
5/19/2009	13:30	7.57	9.41	398.51
5/19/2009	13:31	7.57	9.33	402.65
5/19/2009	13:32	7.61	9.32	405.69
5/19/2009	13:33	7.58	9.54	406.18
5/19/2009	13:34	7.46	9.58	387.08
5/19/2009	13:35	7.43	9.65	378.54
5/19/2009	13:36	7.38	9.65	384.62
5/19/2009	13:37	7.38	9.69	375.09
5/19/2009	13:38	7.35	9.72	377.18
5/19/2009	13:39	7.33	9.69	374.63
5/19/2009	13:40	7.36	9.62	374.15
5/19/2009	13:41	7.40	9.63	378.93
5/19/2009	13:42	7.44	9.50	380.88
5/19/2009	13:43	7.50	9.64	385.36
5/19/2009	13:44	7.40	9.63	378.74
5/19/2009	13:45	7.39	9.68	374.80
5/19/2009	13:46	7.35	9.78	370.50

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	13:47	7.31	9.80	367.02
5/19/2009	13:48	7.32	9.73	357.04
5/19/2009	13:49	7.33	9.80	363.16
5/19/2009	13:50	7.27	9.81	362.75
5/19/2009	13:51	7.32	9.76	360.37
5/19/2009	13:52	7.37	9.79	362.40
		7.52	9.42	395.89
5/19/2009	13:53	7.38	9.90	361.85
5/19/2009	13:54	7.31	9.79	357.01
5/19/2009	13:55	7.39	9.71	350.30
5/19/2009	13:56	7.43	9.61	343.35
5/19/2009	13:57	7.47	9.60	352.52
5/19/2009	13:58	7.45	9.71	355.32
5/19/2009	13:59	7.35	9.89	346.90
5/19/2009	14:00	7.23	9.81	335.29
5/19/2009	14:01	7.28	9.79	334.51
5/19/2009	14:02	7.27	9.83	328.82
5/19/2009	14:03	7.25	9.90	325.87
5/19/2009	14:04	7.22	9.86	319.21
5/19/2009	14:05	7.10	10.24	314.02
5/19/2009	14:06	0.46	20.59	27.59
5/19/2009	14:07	0.13	20.45	10.37
5/19/2009	14:08	0.13	20.50	9.52
5/19/2009	14:09	0.12	20.52	8.79
5/19/2009	14:10	3.00	16.23	126.02
5/19/2009	14:11	7.53	10.14	392.53
5/19/2009	14:12	7.53	10.13	413.14
5/19/2009	14:13	7.56	10.14	418.40
5/19/2009	14:14	7.56	10.24	423.62
5/19/2009	14:15	7.50	10.19	419.11
5/19/2009	14:16	7.53	10.25	422.68
5/19/2009	14:17	7.50	10.27	420.95
5/19/2009	14:18	7.47	10.31	419.05
5/19/2009	14:19	7.44	10.20	415.06
5/19/2009	14:20	2.02	18.23	207.09
5/19/2009	14:21	3.43	15.21	438.34
5/19/2009	14:22	7.53	9.66	723.49
5/19/2009	14:23	7.54	9.88	416.17
5/19/2009	14:24	7.52	10.08	397.40
5/19/2009	14:25	7.48	10.03	394.06
5/19/2009	14:26	7.51	10.00	396.42
5/19/2009	14:27	7.51	9.97	396.00
5/19/2009	14:28	7.47	10.08	390.99
5/19/2009	14:29	7.42	10.05	387.15
5/19/2009	14:30	7.41	10.02	384.51

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	14:31	7.42	9.96	384.95
5/19/2009	14:32	7.50	9.86	389.82
5/19/2009	14:33	7.54	9.80	394.55
5/19/2009	14:34	7.54	9.88	396.44
5/19/2009	14:35	7.47	9.82	392.13
5/19/2009	14:36	7.46	9.90	389.80
5/19/2009	14:37	7.43	9.73	387.67
5/19/2009	14:38	7.48	9.54	390.60
5/19/2009	14:39	7.46	9.64	389.24
5/19/2009	14:40	7.38	9.64	382.80
5/19/2009	14:41	7.37	9.69	378.81
5/19/2009	14:42	7.37	9.66	382.61
5/19/2009	14:43	7.35	9.63	379.19
5/19/2009	14:44	7.37	9.62	380.08
5/19/2009	14:45	7.40	9.61	382.17
5/19/2009	14:46	7.40	9.50	377.26
5/19/2009	14:47	7.44	9.59	386.21
5/19/2009	14:48	7.42	9.53	381.24
5/19/2009	14:49	7.46	9.40	382.00
5/19/2009	14:50	7.54	9.45	387.66
5/19/2009	14:51	7.52	9.39	385.08
5/19/2009	14:52	7.53	9.56	387.54
5/19/2009	14:53	7.45	9.72	378.93
5/19/2009	14:54	7.39	9.68	372.40
5/19/2009	14:55	7.41	9.65	374.27
5/19/2009	14:56	7.43	9.52	375.94
5/19/2009	14:57	7.52	9.42	383.15
5/19/2009	14:58	7.57	9.45	383.76
5/19/2009	14:59	7.57	9.50	380.40
5/19/2009	15:00	7.55	9.54	378.64
5/19/2009	15:01	7.53	9.56	376.08
5/19/2009	15:02	7.50	9.62	372.36
5/19/2009	15:03	7.47	9.52	362.25
5/19/2009	15:04	7.55	9.47	372.33
5/19/2009	15:05	7.57	9.50	376.90
5/19/2009	15:06	7.56	9.46	375.66
5/19/2009	15:07	7.55	9.65	374.60
5/19/2009	15:08	7.45	9.58	364.53
5/19/2009	15:09	7.48	9.60	364.21
5/19/2009	15:10	7.46	9.70	356.77
5/19/2009	15:11	7.41	9.64	348.99
5/19/2009	15:12	7.44	9.58	351.73
5/19/2009	15:13	7.49	9.50	355.09
5/19/2009	15:14	7.53	9.50	356.10
5/19/2009	15:15	7.54	9.54	352.44
5/19/2009	15:16	7.51	9.60	341.32
5/19/2009	15:17	7.48	9.62	336.07
5/19/2009	15:18	7.45	9.60	343.80
5/19/2009	15:19	7.46	9.59	346.44
5/19/2009	15:20	7.49	9.65	357.47

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	15:21	7.43	9.71	367.65
5/19/2009	15:22	7.39	9.68	356.25
5/19/2009	15:23	7.41	9.58	356.67
5/19/2009	15:24	7.48	9.63	362.12
5/19/2009	15:25	7.44	9.53	360.39
5/19/2009	15:26	7.51	9.52	366.91
5/19/2009	15:27	7.52	9.55	366.29
5/19/2009	15:28	7.51	9.55	361.06
5/19/2009	15:29	7.48	9.65	357.23
		7.47	9.65	380.02
5/19/2009	15:30	4.04	5.46	309.75
5/19/2009	15:31	0.07	0.32	98.35
5/19/2009	15:32	0.05	0.29	57.14
5/19/2009	15:33	0.04	0.29	49.58
5/19/2009	15:34	0.03	0.29	39.06
5/19/2009	15:35	0.03	0.29	32.40
5/19/2009	15:36	0.03	0.29	27.58
5/19/2009	15:37	0.02	0.29	23.51
5/19/2009	15:38	0.02	0.29	21.09
5/19/2009	15:39	0.02	0.29	19.21
5/19/2009	15:40	4.48	4.02	17.90
5/19/2009	15:41	12.19	9.55	16.25
5/19/2009	15:42	12.24	9.59	15.57
5/19/2009	15:43	12.26	9.58	14.85
5/19/2009	15:44	12.28	9.57	14.12
5/19/2009	15:45	12.29	9.57	13.62
5/19/2009	15:46	12.30	9.58	12.87
5/19/2009	15:47	8.32	6.28	31.55
5/19/2009	15:48	0.16	0.34	279.80
5/19/2009	15:49	0.10	0.32	349.54
5/19/2009	15:50	0.08	0.32	366.40
5/19/2009	15:51	0.06	0.31	378.77
5/19/2009	15:52	0.05	0.30	393.71
5/19/2009	15:53	0.04	0.31	401.41
5/19/2009	15:54	0.03	0.32	406.45
5/19/2009	15:55	0.03	6.96	317.69
5/19/2009	15:56	0.03	9.58	149.33
5/19/2009	15:57	0.05	19.81	22.01
5/19/2009	15:58	0.09	20.47	5.34
5/19/2009	15:59	0.09	20.49	5.29
5/19/2009	16:00	0.09	20.50	5.05
5/19/2009	16:01	0.27	20.18	5.48
5/19/2009	16:02	0.56	21.44	8.19
5/19/2009	16:03	0.10	21.83	6.56
5/19/2009	16:04	0.10	21.84	4.70
5/19/2009	16:05	0.10	21.78	4.16
5/19/2009	16:06	0.10	21.83	3.79
5/19/2009	16:07	0.10	21.83	3.48

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	16:08	0.10	19.19	2.57
5/19/2009	16:09	0.07	21.00	4.27
5/19/2009	16:10	0.04	20.62	5.01
5/19/2009	16:11	0.04	20.24	5.72
5/19/2009	16:12	0.04	20.82	6.09
5/19/2009	16:13	0.04	20.93	4.06
5/19/2009	16:14	0.04	20.71	3.83
5/19/2009	16:15	0.04	20.98	3.91
5/19/2009	16:16	0.04	20.71	4.12
5/19/2009	16:17	0.04	20.81	3.65
5/19/2009	16:18	0.04	20.93	3.95
5/19/2009	16:19	0.04	21.17	3.73
5/19/2009	16:20	0.10	21.21	3.64
5/19/2009	16:21	0.06	21.22	3.11
5/19/2009	16:22	0.19	20.39	2.93
5/19/2009	16:23	0.08	20.87	9.58
5/19/2009	16:24	0.04	20.93	11.23
5/19/2009	16:25	0.04	20.93	7.25
5/19/2009	16:26	0.04	3.58	5.80
5/19/2009	16:27	0.02	0.54	5.30
5/19/2009	16:28	2.20	2.59	3.62
5/19/2009	16:29	12.45	10.08	3.38
5/19/2009	16:30	12.54	10.08	3.00
5/19/2009	16:31	3.46	2.83	278.60
5/19/2009	16:32	0.04	0.55	427.68
5/19/2009	16:33	0.03	3.56	408.77
5/19/2009	16:34	0.03	20.78	25.74
5/19/2009	16:35	1.77	18.07	100.67
5/19/2009	16:36	7.82	9.77	440.36
5/19/2009	16:37	7.75	9.92	438.02
5/19/2009	16:38	7.72	9.90	434.84
5/19/2009	16:39	7.72	9.84	437.95
5/19/2009	16:40	7.76	9.87	442.04
5/19/2009	16:41	7.75	9.94	441.54
5/19/2009	16:42	7.72	10.00	436.53
5/19/2009	16:43	7.69	10.02	436.39
5/19/2009	16:44	7.69	10.00	434.37
5/19/2009	16:45	7.71	10.00	435.34
5/19/2009	16:46	7.73	9.97	438.39
5/19/2009	16:47	7.73	9.97	440.76
5/19/2009	16:48	7.75	9.86	442.85
5/19/2009	16:49	7.83	9.89	447.58
5/19/2009	16:50	7.80	9.90	445.62
5/19/2009	16:51	7.78	9.92	445.48
5/19/2009	16:52	7.79	9.88	444.87
5/19/2009	16:53	7.80	9.91	445.98
5/19/2009	16:54	7.73	9.94	438.53

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	16:55	7.72	9.85	436.16
5/19/2009	16:56	7.79	9.77	442.12
5/19/2009	16:57	7.84	9.81	448.23
5/19/2009	16:58	7.82	9.92	449.33
5/19/2009	16:59	7.75	9.94	441.94
5/19/2009	17:00	7.74	9.93	440.13
5/19/2009	17:01	7.75	9.96	440.16
5/19/2009	17:02	7.74	9.92	440.22
5/19/2009	17:03	7.76	9.87	441.70
5/19/2009	17:04	7.79	9.93	443.24
5/19/2009	17:05	7.77	9.94	441.34
5/19/2009	17:06	7.77	9.93	442.53
5/19/2009	17:07	7.77	9.98	442.55
5/19/2009	17:08	7.74	10.00	438.36
5/19/2009	17:09	7.73	9.93	436.89
5/19/2009	17:10	7.78	9.89	442.18
5/19/2009	17:11	7.80	9.91	441.63
5/19/2009	17:12	7.80	9.96	441.49
5/19/2009	17:13	7.76	9.99	438.23
5/19/2009	17:14	7.73	9.99	435.82
5/19/2009	17:15	7.73	10.01	435.37
5/19/2009	17:16	7.72	10.03	435.81
5/19/2009	17:17	7.71	9.96	434.43
5/19/2009	17:18	7.75	9.95	435.59
5/19/2009	17:19	7.75	9.92	436.02
5/19/2009	17:20	7.76	9.95	437.41
5/19/2009	17:21	7.72	10.11	433.85
5/19/2009	17:22	7.63	10.03	428.19
5/19/2009	17:23	7.66	9.95	425.87
5/19/2009	17:24	7.70	9.96	429.88
5/19/2009	17:25	7.68	9.97	427.95
5/19/2009	17:26	7.68	9.93	425.23
5/19/2009	17:27	7.67	9.90	424.81
5/19/2009	17:28	7.72	9.72	427.89
5/19/2009	17:29	7.77	9.95	430.45
5/19/2009	17:30	7.69	9.97	431.03
5/19/2009	17:31	7.74	9.83	437.66
5/19/2009	17:32	7.80	9.79	440.26
5/19/2009	17:33	7.79	9.94	440.61
5/19/2009	17:34	7.67	9.95	428.50
5/19/2009	17:35	7.69	9.92	428.81
5/19/2009	17:36	7.70	9.85	429.40
5/19/2009	17:37	7.71	9.80	429.85
5/19/2009	17:38	7.73	9.74	430.62
5/19/2009	17:39	7.73	9.74	430.88
5/19/2009	17:40	7.70	9.64	425.80
5/19/2009	17:41	7.74	9.63	427.22
		7.74	9.91	436.93

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	17:42	7.71	9.44	426.43
5/19/2009	17:43	5.34	13.05	363.49
5/19/2009	17:44	6.48	10.86	472.86
5/19/2009	17:45	7.69	9.64	497.52
5/19/2009	17:46	1.61	2.04	197.77
5/19/2009	17:47	0.04	0.41	43.36
5/19/2009	17:48	0.41	0.86	34.22
5/19/2009	17:49	11.85	9.94	5.59
5/19/2009	17:50	12.36	10.09	3.48
5/19/2009	17:51	8.09	6.38	23.56
5/19/2009	17:52	0.09	0.42	348.83
5/19/2009	17:53	0.06	0.41	397.39
5/19/2009	17:54	0.05	0.41	403.59
5/19/2009	17:55	0.03	0.40	416.51
5/19/2009	17:56	1.91	2.93	393.81
5/19/2009	17:57	7.57	9.64	351.29
5/19/2009	17:58	7.61	9.58	381.43
5/19/2009	17:59	7.57	9.61	385.67
5/19/2009	18:00	7.53	9.66	396.31
5/19/2009	18:01	7.47	9.60	393.42
5/19/2009	18:02	7.50	9.55	392.87
5/19/2009	18:03	7.57	9.45	404.02
5/19/2009	18:04	7.62	9.45	409.65
5/19/2009	18:05	7.60	9.43	418.75
5/19/2009	18:06	7.63	9.49	410.90
5/19/2009	18:07	7.63	9.52	415.72
5/19/2009	18:08	7.60	9.61	413.86
5/19/2009	18:09	7.57	9.59	407.87
5/19/2009	18:10	7.58	9.52	407.28
5/19/2009	18:11	7.61	9.43	410.04
5/19/2009	18:12	7.72	9.26	419.30
5/19/2009	18:13	7.83	9.17	429.07
5/19/2009	18:14	7.94	9.07	444.97
5/19/2009	18:15	8.00	9.04	443.08
5/19/2009	18:16	6.99	10.77	392.75
5/19/2009	18:17	0.19	20.18	82.92
5/19/2009	18:18	0.10	20.21	44.61
5/19/2009	18:19	0.08	20.23	36.68
5/19/2009	18:20	0.07	20.25	29.31
5/19/2009	18:21	0.07	20.25	25.18
5/19/2009	18:22	0.06	20.25	22.12
5/19/2009	18:23	0.06	20.24	20.20
5/19/2009	18:24	0.06	20.27	18.19
5/19/2009	18:25	0.06	20.26	17.74
5/19/2009	18:26	0.06	20.27	16.11
5/19/2009	18:27	0.05	20.27	15.29
5/19/2009	18:28	0.05	20.26	14.52
5/19/2009	18:29	0.05	20.27	13.90
5/19/2009	18:30	0.05	20.27	13.02
5/19/2009	18:31	0.05	20.28	12.48

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	18:32	0.05	20.28	12.36
5/19/2009	18:33	0.05	20.28	12.07
5/19/2009	18:34	0.05	20.29	11.62
5/19/2009	18:35	0.05	20.29	11.69
5/19/2009	18:36	0.05	20.29	11.32
5/19/2009	18:37	0.05	20.28	11.12
5/19/2009	18:38	0.05	20.29	11.20
5/19/2009	18:39	0.05	20.29	11.30
5/19/2009	18:40	0.05	20.29	10.73
5/19/2009	18:41	0.05	20.29	9.94
5/19/2009	18:42	0.05	20.30	9.23
5/19/2009	18:43	0.05	20.30	8.69
5/19/2009	18:44	0.05	20.29	8.37
5/19/2009	18:45	0.05	20.30	8.57
5/19/2009	18:46	0.05	20.31	8.31
5/19/2009	18:47	0.05	20.31	8.45
5/19/2009	18:48	0.05	20.31	7.96
5/19/2009	18:49	0.05	20.31	8.02
5/19/2009	18:50	0.05	20.30	8.08
5/19/2009	18:51	0.05	20.30	8.19
5/19/2009	18:52	0.05	20.30	7.83
5/19/2009	18:53	0.05	20.30	8.33
5/19/2009	18:54	0.05	20.30	7.95
5/19/2009	18:55	0.05	20.30	8.24
5/19/2009	18:56	0.05	20.31	8.30
5/19/2009	18:57	0.05	20.30	8.34
5/19/2009	18:58	0.05	20.31	9.00
5/19/2009	18:59	0.05	20.33	8.74
5/19/2009	19:00	0.05	20.33	8.61
5/19/2009	19:01	0.05	20.32	8.65
5/19/2009	19:02	0.05	20.32	8.44
5/19/2009	19:03	0.05	20.33	8.25
5/19/2009	19:04	0.05	20.31	8.19
5/19/2009	19:05	0.05	20.30	7.45
5/19/2009	19:06	0.05	20.30	7.96
5/19/2009	19:07	0.05	20.30	7.71
5/19/2009	19:08	0.05	20.32	7.02
5/19/2009	19:09	0.05	20.33	7.15
5/19/2009	19:10	0.05	20.34	6.70
5/19/2009	19:11	0.05	20.35	6.36
5/19/2009	19:12	0.05	20.32	6.18
5/19/2009	19:13	0.05	20.32	6.08
5/19/2009	19:14	0.05	20.33	6.13
5/19/2009	19:15	0.05	20.32	6.12
5/19/2009	19:16	0.05	20.32	5.87
5/19/2009	19:17	0.05	20.32	5.73
5/19/2009	19:18	0.04	20.33	5.98
5/19/2009	19:19	0.05	20.33	6.21
5/19/2009	19:20	0.05	20.33	5.52
5/19/2009	19:21	0.05	20.33	5.36

Haverhill # 9 Vent Stack Raw Data

Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)
5/19/2009	19:22	0.04	20.33	5.22
5/19/2009	19:23	0.05	20.34	4.95
5/19/2009	19:24	0.05	20.33	5.11
5/19/2009	19:25	0.04	20.31	5.30
5/19/2009	19:26	0.05	20.31	5.18
5/19/2009	19:27	0.05	20.31	4.67
5/19/2009	19:28	0.04	20.32	4.65
5/19/2009	19:29	0.05	20.33	5.44
5/19/2009	19:30	0.05	20.34	4.83
5/19/2009	19:31	0.04	20.34	4.00
5/19/2009	19:32	0.04	20.33	4.56
5/19/2009	19:33	0.04	20.33	4.98
5/19/2009	19:34	0.04	20.33	4.34

Haverhill # 9 Vent Stack Emissions Data

Run # 1

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	8:50	6.94	11.10	393.54	6.93	10.88	390.19	50,466	196.59
5/19/2009	8:51	6.88	11.11	390.05	6.87	10.89	386.70	50,466	194.83
5/19/2009	8:52	6.87	11.13	390.33	6.86	10.91	386.98	50,466	194.97
5/19/2009	8:53	6.86	11.18	387.98	6.85	10.96	384.63	50,466	193.78
5/19/2009	8:54	6.86	11.14	387.06	6.85	10.92	383.71	50,466	193.32
5/19/2009	8:55	6.72	11.45	387.69	6.71	11.23	384.34	50,466	193.64
5/19/2009	8:56	6.63	11.44	381.77	6.62	11.22	378.42	50,466	190.66
5/19/2009	8:57	6.65	11.43	382.15	6.64	11.21	378.80	50,466	190.85
5/19/2009	8:58	6.71	11.19	380.01	6.70	10.97	376.66	50,466	189.77
5/19/2009	8:59	6.88	10.91	388.78	6.87	10.69	385.43	50,466	194.19
5/19/2009	9:00	7.05	10.61	401.38	7.04	10.39	398.03	50,466	200.54
5/19/2009	9:01	7.30	10.25	419.90	7.29	10.03	416.55	50,466	209.87
5/19/2009	9:02	7.62	9.90	444.20	7.61	9.68	440.85	50,466	222.11
5/19/2009	9:03	7.63	10.11	454.08	7.62	9.89	450.73	50,466	227.09
5/19/2009	9:04	7.39	10.32	433.46	7.38	10.10	430.11	50,466	216.70
5/19/2009	9:05	7.40	10.32	431.67	7.39	10.10	428.32	50,466	215.80
5/19/2009	9:06	7.38	10.32	430.94	7.37	10.10	427.59	50,466	215.43
5/19/2009	9:07	7.40	10.27	433.47	7.39	10.05	430.12	50,466	216.70
5/19/2009	9:08	7.41	10.34	436.58	7.40	10.12	433.23	50,466	218.27
5/19/2009	9:09	7.38	10.44	434.78	7.37	10.22	431.43	50,466	217.36
5/19/2009	9:10	7.33	10.46	428.78	7.32	10.24	425.43	50,466	214.34
5/19/2009	9:11	7.28	10.57	425.77	7.27	10.35	422.42	50,466	212.82
5/19/2009	9:12	7.25	10.45	421.91	7.24	10.23	418.56	50,466	210.88
5/19/2009	9:13	7.32	10.48	428.47	7.31	10.26	425.12	50,466	214.18
5/19/2009	9:14	7.24	10.78	429.20	7.23	10.56	425.85	50,466	214.55
5/19/2009	9:15	7.05	10.86	422.27	7.04	10.64	418.92	50,466	211.06
5/19/2009	9:16	7.04	10.81	416.44	7.03	10.59	413.09	50,466	208.12
5/19/2009	9:17	7.28	10.43	421.40	7.27	10.21	418.05	50,466	210.62
5/19/2009	9:18	7.40	10.49	434.16	7.39	10.27	430.81	50,466	217.05
5/19/2009	9:19	7.32	10.35	433.21	7.31	10.13	429.86	50,466	216.57
5/19/2009	9:20	7.48	10.03	444.51	7.47	9.81	441.16	50,466	222.27
5/19/2009	9:21	7.90	9.56	477.77	7.89	9.34	474.42	50,466	239.02
5/19/2009	9:22	7.89	9.82	477.78	7.88	9.60	474.43	50,466	239.03
5/19/2009	9:23	7.71	9.85	460.57	7.70	9.63	457.22	50,466	230.36
5/19/2009	9:24	7.72	9.87	461.44	7.71	9.65	458.09	50,466	230.80
5/19/2009	9:25	7.72	9.82	462.83	7.71	9.60	459.48	50,466	231.50
5/19/2009	9:26	7.62	10.16	465.18	7.61	9.94	461.83	50,466	232.68
5/19/2009	9:27	7.36	10.45	456.69	7.35	10.23	453.34	50,466	228.40
5/19/2009	9:28	7.30	10.45	444.74	7.29	10.23	441.39	50,466	222.38
5/19/2009	9:29	7.40	10.16	439.36	7.39	9.94	436.01	50,466	219.67
5/19/2009	9:30	7.53	10.05	446.64	7.52	9.83	443.29	50,466	223.34
5/19/2009	9:31	7.59	9.70	453.43	7.58	9.48	450.08	50,466	226.76
5/19/2009	9:32	7.86	9.30	475.42	7.85	9.08	472.07	50,466	237.84
5/19/2009	9:33	8.24	8.92	518.10	8.23	8.70	514.75	50,466	259.34
5/19/2009	9:34	8.28	8.92	526.05	8.27	8.70	522.70	50,466	263.35
5/19/2009	9:35	8.18	8.92	513.45	8.17	8.70	510.10	50,466	257.00

Haverhill # 9 Vent Stack Emissions Data

Run # 1

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	9:36	8.14	8.73	508.66	8.13	8.51	505.31	50,466	254.59
5/19/2009	9:37	8.14	8.88	503.24	8.13	8.66	499.89	50,466	251.86
5/19/2009	9:38	7.99	8.96	485.94	7.98	8.74	482.59	50,466	243.14
5/19/2009	9:39	7.94	8.93	482.04	7.93	8.71	478.69	50,466	241.17
5/19/2009	9:40	7.94	8.99	480.82	7.93	8.77	477.47	50,466	240.56
5/19/2009	9:41	7.92	9.16	481.87	7.91	8.94	478.52	50,466	241.09
5/19/2009	9:42	7.87	9.09	475.34	7.86	8.87	471.99	50,466	237.80
5/19/2009	9:43	7.84	9.15	471.88	7.83	8.93	468.53	50,466	236.06
5/19/2009	9:44	7.81	9.25	471.52	7.80	9.03	468.17	50,466	235.87
5/19/2009	9:45	7.43	9.81	465.03	7.42	9.59	461.68	50,466	232.60
5/19/2009	9:46	7.38	9.87	453.53	7.37	9.65	450.18	50,466	226.81
5/19/2009	9:47	7.34	9.91	449.39	7.33	9.69	446.04	50,466	224.72
5/19/2009	9:48	7.45	9.59	445.36	7.44	9.37	442.01	50,466	222.69
5/19/2009	9:49	7.59	9.31	456.73	7.58	9.09	453.38	50,466	228.42
5/19/2009	9:50	7.69	9.06	470.39	7.68	8.84	467.04	50,466	235.31
5/19/2009	9:51	7.95	8.63	488.13	7.94	8.41	484.78	50,466	244.24
5/19/2009	9:52	8.34	8.20	516.67	8.33	7.98	513.32	50,466	258.62
5/19/2009	9:53	8.37	8.25	524.87	8.36	8.03	521.52	50,466	262.75
5/19/2009	9:54	8.03	8.66	508.97	8.02	8.44	505.62	50,466	254.74
5/19/2009	9:55	8.03	8.70	501.82	8.02	8.48	498.47	50,466	251.14
5/19/2009	9:56	8.02	8.73	500.54	8.01	8.51	497.19	50,466	250.50
5/19/2009	9:57	7.99	8.69	499.24	7.98	8.47	495.89	50,466	249.84
5/19/2009	9:58	7.95	8.95	500.72	7.94	8.73	497.37	50,466	250.59
5/19/2009	9:59	7.81	9.00	491.57	7.80	8.78	488.22	50,466	245.98
5/19/2009	10:00	7.75	9.11	487.80	7.74	8.89	484.45	50,466	244.08
5/19/2009	10:01	7.74	9.01	480.86	7.73	8.79	477.51	50,466	240.58
5/19/2009	10:02	7.78	8.98	481.89	7.77	8.76	478.54	50,466	241.10
5/19/2009	10:03	7.82	8.78	483.01	7.81	8.56	479.66	50,466	241.66
5/19/2009	10:04	7.93	8.69	491.15	7.92	8.47	487.80	50,466	245.76
5/19/2009	10:05	8.00	8.73	495.47	7.99	8.51	492.12	50,466	247.94
5/19/2009	10:06	8.00	8.75	494.19	7.99	8.53	490.84	50,466	247.30
5/19/2009	10:07	7.92	8.75	491.55	7.91	8.53	488.20	50,466	245.97
5/19/2009	10:08	7.97	8.80	491.85	7.96	8.58	488.50	50,466	246.12
5/19/2009	10:09	7.97	8.83	493.19	7.96	8.61	489.84	50,466	246.79
5/19/2009	10:10	7.95	8.85	493.64	7.94	8.63	490.29	50,466	247.02
5/19/2009	10:11	7.95	8.92	492.07	7.94	8.70	488.72	50,466	246.23
5/19/2009	10:12	7.90	8.88	490.00	7.89	8.66	486.65	50,466	245.19
5/19/2009	10:13	8.03	8.50	493.83	8.02	8.28	490.48	50,466	247.11
5/19/2009	10:14	8.15	8.56	508.06	8.14	8.34	504.71	50,466	254.28
5/19/2009	10:15	8.12	8.60	507.84	8.11	8.38	504.49	50,466	254.17
5/19/2009	10:16	8.09	8.61	506.82	8.08	8.39	503.47	50,466	253.66
5/19/2009	10:17	8.08	8.75	505.59	8.07	8.53	502.24	50,466	253.04
5/19/2009	10:18	8.02	8.70	500.64	8.01	8.48	497.29	50,466	250.55
5/19/2009	10:19	8.05	8.79	503.44	8.04	8.57	500.09	50,466	251.96
5/19/2009	10:20	8.00	8.85	499.54	7.99	8.63	496.19	50,466	249.99
5/19/2009	10:21	7.96	9.03	495.70	7.95	8.81	492.35	50,466	248.06

Haverhill # 9 Vent Stack Emissions Data

Run # 1

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	10:22	7.88	9.03	491.76	7.77	8.81	488.41	50,466	246.07
5/19/2009	10:23	7.86	9.05	487.14	7.75	8.83	483.79	50,466	243.74
5/19/2009	10:24	7.86	9.04	487.17	7.75	8.82	483.82	50,466	243.76
5/19/2009	10:25	7.88	9.04	489.78	7.77	8.82	486.43	50,466	245.07
5/19/2009	10:26	7.88	9.08	490.96	7.77	8.86	487.61	50,466	245.67
5/19/2009	10:27	7.84	9.15	489.26	7.73	8.93	485.91	50,466	244.81
5/19/2009	10:28	7.80	9.27	485.65	7.69	9.05	482.30	50,466	242.99
5/19/2009	10:29	7.73	9.20	479.67	7.62	8.98	476.32	50,466	239.98
5/19/2009	10:30	7.78	9.23	482.36	7.67	9.01	479.01	50,466	241.34
5/19/2009	10:31	7.79	9.22	484.48	7.68	9.00	481.13	50,466	242.40
5/19/2009	10:32	7.80	9.27	483.69	7.69	9.05	480.34	50,466	242.01
5/19/2009	10:33	7.75	9.23	480.91	7.64	9.01	477.56	50,466	240.61
5/19/2009	10:34	7.80	9.19	483.32	7.69	8.97	479.97	50,466	241.82
5/19/2009	10:35	4.64	13.98	316.53	4.53	13.76	313.18	50,466	157.79
5/19/2009	10:36	7.71	9.39	480.27	7.60	9.17	476.92	50,466	240.28
5/19/2009	10:37	7.73	9.43	493.91	7.62	9.21	490.56	50,466	247.16
5/19/2009	10:38	7.67	9.52	468.27	7.56	9.30	464.92	50,466	234.24
5/19/2009	10:39	7.64	9.43	465.82	7.53	9.21	462.47	50,466	233.00
5/19/2009	10:40	7.68	9.41	468.16	7.57	9.19	464.81	50,466	234.18
5/19/2009	10:41	7.69	9.42	470.92	7.58	9.20	467.57	50,466	235.57
5/19/2009	10:42	7.69	9.41	475.48	7.58	9.19	472.13	50,466	237.87
5/19/2009	10:43	7.68	9.40	476.54	7.57	9.18	473.19	50,466	238.40
5/19/2009	10:44	7.68	9.38	472.56	7.57	9.16	469.21	50,466	236.40
5/19/2009	10:45	7.68	9.39	468.37	7.57	9.17	465.02	50,466	234.29
5/19/2009	10:46	7.66	9.41	466.62	7.55	9.19	463.27	50,466	233.41
5/19/2009	10:47	7.64	9.47	464.62	7.53	9.25	461.27	50,466	232.40
5/19/2009	10:48	7.59	9.48	462.67	7.48	9.26	459.32	50,466	231.42
5/19/2009	10:49	7.59	9.47	462.23	7.48	9.25	458.88	50,466	231.19
5/19/2009	10:50	7.61	9.47	466.32	7.50	9.25	462.97	50,466	233.25
5/19/2009	10:51	7.61	9.38	455.41	7.50	9.16	452.06	50,466	227.76
5/19/2009	10:52	7.67	9.37	457.62	7.56	9.15	454.27	50,466	228.87
5/19/2009	10:53	7.67	9.43	463.67	7.56	9.21	460.32	50,466	231.92
5/19/2009	10:54	7.61	9.65	462.95	7.50	9.43	459.60	50,466	231.56
5/19/2009	10:55	7.52	9.48	452.80	7.41	9.26	449.45	50,466	226.44
5/19/2009	10:56	7.63	9.51	460.26	7.52	9.29	456.91	50,466	230.20
5/19/2009	10:57	7.60	9.43	458.52	7.49	9.21	455.17	50,466	229.32
5/19/2009	10:58	7.64	9.48	458.10	7.53	9.26	454.75	50,466	229.11
5/19/2009	10:59	7.61	9.56	461.35	7.50	9.34	458.00	50,466	230.75
5/19/2009	11:00	7.56	9.47	458.38	7.45	9.25	455.03	50,466	229.25
5/19/2009	11:01	7.58	9.47	454.92	7.47	9.25	451.57	50,466	227.51
5/19/2009	11:02	7.47	9.73	459.93	7.36	9.51	456.58	50,466	230.04
5/19/2009	11:03	6.18	11.52	429.27	6.07	11.30	425.92	50,466	214.59
5/19/2009	11:04	7.61	9.50	486.37	7.50	9.28	483.02	50,466	243.36
5/19/2009	11:05	7.61	9.44	467.16	7.50	9.22	463.81	50,466	233.68
5/19/2009	11:06	7.63	9.63	464.88	7.52	9.41	461.53	50,466	232.53
5/19/2009	11:07	7.55	9.51	456.81	7.44	9.29	453.46	50,466	228.46

Haverhill # 9 Vent Stack Emissions Data

Run # 1

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	11:08	7.59	9.53	466.06	7.48	9.31	462.71	50,466	233.12
5/19/2009	11:09	7.60	9.54	468.48	7.49	9.32	465.13	50,466	234.34
5/19/2009	11:10	7.58	9.64	463.02	7.47	9.42	459.67	50,466	231.59
5/19/2009	11:11	7.51	9.68	454.86	7.40	9.46	451.51	50,466	227.48
5/19/2009	11:12	7.47	9.77	447.45	7.36	9.55	444.10	50,466	223.75
5/19/2009	11:13	7.42	9.74	443.23	7.31	9.52	439.88	50,466	221.62
5/19/2009	11:14	7.46	9.69	445.52	7.35	9.47	442.17	50,466	222.77
5/19/2009	11:15	7.50	9.58	440.82	7.39	9.36	437.47	50,466	220.41
5/19/2009	11:16	7.54	9.54	442.92	7.43	9.32	439.57	50,466	221.46
5/19/2009	11:17	7.55	9.65	448.60	7.44	9.43	445.25	50,466	224.33
5/19/2009	11:18	7.48	9.71	453.10	7.37	9.49	449.75	50,466	226.59
5/19/2009	11:19	7.45	9.68	444.27	7.34	9.46	440.92	50,466	222.15
5/19/2009	11:20	7.47	9.77	441.64	7.36	9.55	438.29	50,466	220.82
5/19/2009	11:21	7.42	9.82	436.12	7.31	9.60	432.77	50,466	218.04
5/19/2009	11:22	7.38	9.85	434.37	7.27	9.63	431.02	50,466	217.16
5/19/2009	11:23	7.37	9.78	431.74	7.26	9.56	428.39	50,466	215.83
5/19/2009	11:24	7.41	9.69	432.85	7.30	9.47	429.50	50,466	216.39
5/19/2009	11:25	7.50	9.60	436.99	7.39	9.38	433.64	50,466	218.48
5/19/2009	11:26	7.55	9.54	440.67	7.44	9.32	437.32	50,466	220.33
5/19/2009	11:27	7.61	9.57	444.72	7.50	9.35	441.37	50,466	222.37
5/19/2009	11:28	7.56	9.68	438.39	7.45	9.46	435.04	50,466	219.18
5/19/2009	11:29	7.49	9.55	432.70	7.38	9.33	429.35	50,466	216.32
5/19/2009	11:30	7.59	9.51	437.10	7.48	9.29	433.75	50,466	218.53
5/19/2009	11:31	7.60	9.50	440.11	7.49	9.28	436.76	50,466	220.05
5/19/2009	11:32	7.78	9.08	444.87	7.67	8.86	441.52	50,466	222.45
5/19/2009	11:33	7.91	9.01	459.41	7.80	8.79	456.06	50,466	229.77
5/19/2009	11:34	7.93	9.14	460.34	7.82	8.92	456.99	50,466	230.24
5/19/2009	11:35	7.87	9.11	457.66	7.76	8.89	454.31	50,466	228.89
5/19/2009	11:36	7.92	9.05	452.02	7.81	8.83	448.67	50,466	226.05
5/19/2009	11:37	7.92	9.06	455.42	7.81	8.84	452.07	50,466	227.76
5/19/2009	11:38	7.91	9.04	460.92	7.80	8.82	457.57	50,466	230.53
5/19/2009	11:39	7.93	8.99	460.23	7.82	8.77	456.88	50,466	230.19
5/19/2009	11:40	7.95	9.02	462.04	7.84	8.80	458.69	50,466	231.10
5/19/2009	11:41	7.93	9.11	462.94	7.82	8.89	459.59	50,466	231.55
5/19/2009	11:42	7.88	9.10	458.00	7.77	8.88	454.65	50,466	229.06
5/19/2009	11:43	7.87	9.15	455.01	7.76	8.93	451.66	50,466	227.56
5/19/2009	11:44	7.86	9.03	454.48	7.75	8.81	451.13	50,466	227.29
5/19/2009	11:45	7.94	9.05	460.24	7.83	8.83	456.89	50,466	230.19
5/19/2009	11:46	7.94	9.05	463.54	7.83	8.83	460.19	50,466	231.85
5/19/2009	11:47	7.93	9.11	460.70	7.82	8.89	457.35	50,466	230.42
5/19/2009	11:48	7.88	9.19	456.79	7.77	8.97	453.44	50,466	228.45
5/19/2009	11:49	7.85	9.22	456.14	7.74	9.00	452.79	50,466	228.13
5/19/2009	11:50	7.86	9.21	457.47	7.75	8.99	454.12	50,466	228.80
5/19/2009	11:51	7.86	9.34	459.74	7.75	9.12	456.39	50,466	229.94
5/19/2009	11:52	7.80	9.26	453.41	7.69	9.04	450.06	50,466	226.75
5/19/2009	11:53	7.86	9.23	461.07	7.75	9.01	457.72	50,466	230.61

Haverhill # 9 Vent Stack Emissions Data

Run # 1

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	11:54	7.89	9.23	461.88	7.78	9.01	458.53	50,466	231.02
5/19/2009	11:55	7.89	9.31	460.89	7.78	9.09	457.54	50,466	230.52
5/19/2009	11:56	7.88	9.40	459.52	7.77	9.18	456.17	50,466	229.83
5/19/2009	11:57	7.84	9.36	454.29	7.73	9.14	450.94	50,466	227.19
5/19/2009	11:58	7.86	9.32	454.38	7.75	9.10	451.03	50,466	227.24
Averages		**7.64**	**9.54**	**460.48**	**7.54**	**9.32**	**457.13**	**50,466**	**230.31**

CEM CALIBRATIONS

PROJECT NAME	Haverhill Vent Stack Compliance
PROJECT NUMBER	39400492.52
DATE	May 19, 2009
RUN NUMBER	R1
START TIME	8:50 AM
STOP TIME	11:58 AM

ANALYZER	SPAN
CO	
CO_2	25
O_2	25
NO_x	
SO_2	1000
THC	

		SYSTEM CALIBRATION ERROR			SYSTEM BIAS CHECK								
					PRETEST		POST TEST						
	GAS CYLINDER NUMBER	CAL. GAS VALUE (% or PPM)	ANALYZER RESPONSE (% or PPM)	CAL ERROR (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	DRIFT (% SPAN)	IS CAL ERROR CHECK OK? (YES/NO)	IS PRETEST BIAS OK? (YES/NO)	IS POSTEST BIAS OK? (YES/NO)	IS SYSTEM DRIFT OK? (YES/NO)
CO_2 zero	n/a	0.00	0.00	0.00%	0.02	-0.08%	0.01	-0.04%	0.04%	YES	YES	YES	YES
CO_2 mid	CC2603	12.43	12.62	-0.76%	12.54	0.32%	12.46	0.64%	0.32%	YES	YES	YES	YES
CO_2 hi	CC144573	18.97	19.01	-0.16%						YES			
O_2 zero	n/a	0.00	0.00	0.00%	0.00	0.00%	0.43	-1.72%	-1.72%	YES	YES	YES	YES
O_2 mid	CC2603	9.98	9.94	0.16%	9.94	0.00%	10.10	-0.64%	-0.64%	YES	YES	YES	YES
O_2 hi	CC144573	20.95	20.98	-0.12%						YES			
SO_2 zero	n/a	0.00	0.48	-0.05%	0.74	-0.03%	5.94	-0.55%	-0.52%	YES	YES	YES	YES
SO_2 mid	ALM017179	451.00	451.29	-0.03%	449.94	0.14%	454.80	-0.35%	-0.49%	YES	YES	YES	YES
SO_2 hi	CC155593	1000.00	999.48	0.05%						YES			

Correction factors

	Average Concentration during Test Period	Zero offset	Bias Correction Factor
CO_2	Avg. Conc -	0.015	0.995594714
O_2	Avg. Conc -	0.215	1.017848037
SO_2	Avg. Conc -	3.34	1.004387235

Example Calculations

Calibration error = ((cal. gas value - analyzer resp) / analyzer span) * 100: allowable error ± 2 % as per CFR 40 Part 60 Method 6C Section 4.1 , allowable error ± 5 % for THC as per CFR 40 Part 60 Method 25A Section 8.4

System Bias = ((analyzer resp - system resp) / analyzer span) * 100: allowable error ± 5 % as per CFR 40 part 60 Method 6C Section 4.2

Drift = ((pretest sys resp - post test sys resp) / analyzer span) * 100: allowable error ± 3 % as per CFR 40 part 60 Method 6C Section 4.3 & 4.4 allowable error ± 2 % as per CFR 40 Part 60 Method 20 Section 3.5 (for NOx only)

Correction Factor = (Avg. Conc. - Zero Offset) * Bias Correction Factor

Sys Bias (pre and post) must be performed on each run: To determine Drift.
Use zero gas and either mid or hi cal gas, choose cal gas closest to measured stack concentration.

Drift must be performed every hour on THC

Calibration Error is performed only at start, unless allowable error parameters are exceeded.

Haverhill # 9 Vent Stack Emissions Data

Run # 2

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	12:28	7.56	9.32	409.64	7.55	8.82	404.83	53,970	218.12
5/19/2009	12:29	7.62	9.24	404.00	7.61	8.74	399.19	53,970	215.08
5/19/2009	12:30	7.62	9.08	399.26	7.61	8.58	394.45	53,970	212.53
5/19/2009	12:31	7.70	9.19	407.73	7.69	8.69	402.92	53,970	217.09
5/19/2009	12:32	7.62	9.11	396.87	7.61	8.61	392.06	53,970	211.24
5/19/2009	12:33	7.65	9.05	399.15	7.64	8.55	394.34	53,970	212.47
5/19/2009	12:34	7.66	9.13	403.92	7.65	8.63	399.11	53,970	215.04
5/19/2009	12:35	7.64	9.20	400.91	7.63	8.70	396.10	53,970	213.42
5/19/2009	12:36	7.61	9.14	396.08	7.60	8.64	391.27	53,970	210.81
5/19/2009	12:37	7.64	9.25	397.48	7.63	8.75	392.67	53,970	211.57
5/19/2009	12:38	7.59	9.13	397.51	7.58	8.63	392.70	53,970	211.59
5/19/2009	12:39	7.65	9.08	406.62	7.64	8.58	401.81	53,970	216.49
5/19/2009	12:40	7.69	8.96	411.00	7.68	8.46	406.19	53,970	218.85
5/19/2009	12:41	7.73	9.19	412.48	7.72	8.69	407.67	53,970	219.65
5/19/2009	12:42	7.62	9.16	403.85	7.61	8.66	399.04	53,970	215.00
5/19/2009	12:43	7.66	9.06	402.58	7.65	8.56	397.77	53,970	214.32
5/19/2009	12:44	7.69	9.18	414.88	7.68	8.68	410.07	53,970	220.94
5/19/2009	12:45	7.63	9.27	433.19	7.62	8.77	428.38	53,970	230.81
5/19/2009	12:46	7.57	9.27	410.10	7.56	8.77	405.29	53,970	218.37
5/19/2009	12:47	7.57	9.31	413.27	7.56	8.81	408.46	53,970	220.08
5/19/2009	12:48	7.55	9.31	411.99	7.54	8.81	407.18	53,970	219.39
5/19/2009	12:49	7.58	9.24	409.60	7.57	8.74	404.79	53,970	218.10
5/19/2009	12:50	7.65	9.13	414.59	7.64	8.63	409.78	53,970	220.79
5/19/2009	12:51	7.72	9.21	412.98	7.71	8.71	408.17	53,970	219.92
5/19/2009	12:52	7.58	9.51	392.42	7.57	9.01	387.61	53,970	208.84
5/19/2009	12:53	7.48	9.35	384.81	7.47	8.85	380.00	53,970	204.74
5/19/2009	12:54	7.58	9.39	395.93	7.57	8.89	391.12	53,970	210.73
5/19/2009	12:55	7.56	9.40	397.28	7.55	8.90	392.47	53,970	211.46
5/19/2009	12:56	7.55	9.38	399.92	7.54	8.88	395.11	53,970	212.88
5/19/2009	12:57	7.55	9.47	398.48	7.54	8.97	393.67	53,970	212.11
5/19/2009	12:58	7.52	9.32	388.37	7.51	8.82	383.56	53,970	206.66
5/19/2009	12:59	7.58	9.22	398.32	7.57	8.72	393.51	53,970	212.02
5/19/2009	13:00	7.59	9.26	398.42	7.58	8.76	393.61	53,970	212.08
5/19/2009	13:01	7.56	9.29	396.77	7.55	8.79	391.96	53,970	211.19
5/19/2009	13:02	7.51	9.34	403.00	7.50	8.84	398.19	53,970	214.54
5/19/2009	13:03	7.64	9.11	402.58	7.63	8.61	397.77	53,970	214.32
5/19/2009	13:04	7.61	9.40	408.15	7.60	8.90	403.34	53,970	217.32
5/19/2009	13:05	7.51	9.28	395.13	7.50	8.78	390.32	53,970	210.30
5/19/2009	13:06	7.58	9.20	399.55	7.57	8.70	394.74	53,970	212.68
5/19/2009	13:07	7.62	9.25	404.23	7.61	8.75	399.42	53,970	215.21
5/19/2009	13:08	7.60	9.28	404.69	7.59	8.78	399.88	53,970	215.45
5/19/2009	13:09	7.61	9.36	401.42	7.60	8.86	396.61	53,970	213.69
5/19/2009	13:10	7.61	9.09	397.00	7.60	8.59	392.19	53,970	211.31
5/19/2009	13:11	7.73	9.15	408.69	7.72	8.65	403.88	53,970	217.61
5/19/2009	13:12	7.71	9.32	403.70	7.70	8.82	398.89	53,970	214.92
5/19/2009	13:13	7.60	9.50	400.61	7.59	9.00	395.80	53,970	213.26

Haverhill # 9 Vent Stack Emissions Data

Run # 2

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	13:14	7.04	10.35	389.90	7.03	9.85	385.09	53,970	207.48
5/19/2009	13:15	6.42	10.87	332.61	6.41	10.37	327.80	53,970	176.62
5/19/2009	13:16	7.51	9.40	411.11	7.50	8.90	406.30	53,970	218.91
5/19/2009	13:17	7.53	9.38	416.26	7.52	8.88	411.45	53,970	221.69
5/19/2009	13:18	7.53	9.44	419.66	7.52	8.94	414.85	53,970	223.52
5/19/2009	13:19	7.51	9.38	416.12	7.50	8.88	411.31	53,970	221.61
5/19/2009	13:20	7.55	9.56	412.48	7.54	9.06	407.67	53,970	219.65
5/19/2009	13:21	7.44	9.58	403.07	7.43	9.08	398.26	53,970	214.58
5/19/2009	13:22	7.45	9.48	398.57	7.44	8.98	393.76	53,970	212.16
5/19/2009	13:23	7.52	9.50	402.59	7.51	9.00	397.78	53,970	214.32
5/19/2009	13:24	7.49	9.46	403.62	7.48	8.96	398.81	53,970	214.88
5/19/2009	13:25	7.52	9.42	400.99	7.51	8.92	396.18	53,970	213.46
5/19/2009	13:26	7.57	9.42	401.81	7.56	8.92	397.00	53,970	213.90
5/19/2009	13:27	7.55	9.46	396.58	7.54	8.96	391.77	53,970	211.08
5/19/2009	13:28	7.53	9.43	396.62	7.52	8.93	391.81	53,970	211.11
5/19/2009	13:29	7.56	9.38	393.57	7.55	8.88	388.76	53,970	209.46
5/19/2009	13:30	7.57	9.41	398.51	7.56	8.91	393.70	53,970	212.12
5/19/2009	13:31	7.57	9.33	402.65	7.56	8.83	397.84	53,970	214.35
5/19/2009	13:32	7.61	9.32	405.69	7.60	8.82	400.88	53,970	215.99
5/19/2009	13:33	7.58	9.54	406.18	7.57	9.04	401.37	53,970	216.26
5/19/2009	13:34	7.46	9.58	387.08	7.45	9.08	382.27	53,970	205.97
5/19/2009	13:35	7.43	9.65	378.54	7.42	9.15	373.73	53,970	201.36
5/19/2009	13:36	7.38	9.65	384.62	7.37	9.15	379.81	53,970	204.64
5/19/2009	13:37	7.38	9.69	375.09	7.37	9.19	370.28	53,970	199.51
5/19/2009	13:38	7.35	9.72	377.18	7.34	9.22	372.37	53,970	200.63
5/19/2009	13:39	7.33	9.69	374.63	7.32	9.19	369.82	53,970	199.26
5/19/2009	13:40	7.36	9.62	374.15	7.35	9.12	369.34	53,970	199.00
5/19/2009	13:41	7.40	9.63	378.93	7.39	9.13	374.12	53,970	201.57
5/19/2009	13:42	7.44	9.50	380.88	7.43	9.00	376.07	53,970	202.62
5/19/2009	13:43	7.50	9.64	385.36	7.49	9.14	380.55	53,970	205.04
5/19/2009	13:44	7.40	9.63	378.74	7.39	9.13	373.93	53,970	201.47
5/19/2009	13:45	7.39	9.68	374.80	7.38	9.18	369.99	53,970	199.35
5/19/2009	13:46	7.35	9.78	370.50	7.34	9.28	365.69	53,970	197.03
5/19/2009	13:47	7.31	9.80	367.02	7.30	9.30	362.21	53,970	195.16
5/19/2009	13:48	7.32	9.73	357.04	7.31	9.23	352.23	53,970	189.78
5/19/2009	13:49	7.33	9.80	363.16	7.32	9.30	358.35	53,970	193.08
5/19/2009	13:50	7.27	9.81	362.75	7.26	9.31	357.94	53,970	192.86
5/19/2009	13:51	7.32	9.76	360.37	7.31	9.26	355.56	53,970	191.57
5/19/2009	13:52	7.37	9.79	362.40	7.36	9.29	357.59	53,970	192.67
5/19/2009	14:23	7.54	9.88	416.17	7.53	9.38	411.36	53,970	221.64
5/19/2009	14:24	7.52	10.08	397.40	7.51	9.58	392.59	53,970	211.53
5/19/2009	14:25	7.48	10.03	394.06	7.47	9.53	389.25	53,970	209.73
5/19/2009	14:26	7.51	10.00	396.42	7.50	9.50	391.61	53,970	211.00
5/19/2009	14:27	7.51	9.97	396.00	7.50	9.47	391.19	53,970	210.77
5/19/2009	14:28	7.47	10.08	390.99	7.46	9.58	386.18	53,970	208.07
5/19/2009	14:29	7.42	10.05	387.15	7.41	9.55	382.34	53,970	206.00

Haverhill # 9 Vent Stack Emissions Data

Run # 2

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	14:30	7.41	10.02	384.51	7.40	9.52	379.70	53,970	204.58
5/19/2009	14:31	7.42	9.96	384.95	7.41	9.46	380.14	53,970	204.82
5/19/2009	14:32	7.50	9.86	389.82	7.49	9.36	385.01	53,970	207.44
5/19/2009	14:33	7.54	9.80	394.55	7.53	9.30	389.74	53,970	209.99
5/19/2009	14:34	7.54	9.88	396.44	7.53	9.38	391.63	53,970	211.01
5/19/2009	14:35	7.47	9.82	392.13	7.46	9.32	387.32	53,970	208.69
5/19/2009	14:36	7.46	9.90	389.80	7.45	9.40	384.99	53,970	207.43
5/19/2009	14:37	7.43	9.73	387.67	7.42	9.23	382.86	53,970	206.28
5/19/2009	14:38	7.48	9.54	390.60	7.47	9.04	385.79	53,970	207.86
5/19/2009	14:39	7.46	9.64	389.24	7.45	9.14	384.43	53,970	207.13
5/19/2009	14:40	7.38	9.64	382.80	7.37	9.14	377.99	53,970	203.66
5/19/2009	14:41	7.37	9.69	378.81	7.36	9.19	374.00	53,970	201.51
5/19/2009	14:42	7.37	9.66	382.61	7.36	9.16	377.80	53,970	203.56
5/19/2009	14:43	7.35	9.63	379.19	7.34	9.13	374.38	53,970	201.71
5/19/2009	14:44	7.37	9.62	380.08	7.36	9.12	375.27	53,970	202.19
5/19/2009	14:45	7.40	9.61	382.17	7.39	9.11	377.36	53,970	203.32
5/19/2009	14:46	7.40	9.50	377.26	7.39	9.00	372.45	53,970	200.67
5/19/2009	14:47	7.44	9.59	386.21	7.43	9.09	381.40	53,970	205.50
5/19/2009	14:48	7.42	9.53	381.24	7.41	9.03	376.43	53,970	202.82
5/19/2009	14:49	7.46	9.40	382.00	7.45	8.90	377.19	53,970	203.23
5/19/2009	14:50	7.54	9.45	387.66	7.53	8.95	382.85	53,970	206.28
5/19/2009	14:51	7.52	9.39	385.08	7.51	8.89	380.27	53,970	204.89
5/19/2009	14:52	7.53	9.56	387.54	7.52	9.06	382.73	53,970	206.21
5/19/2009	14:53	7.45	9.72	378.93	7.44	9.22	374.12	53,970	201.57
5/19/2009	14:54	7.39	9.68	372.40	7.38	9.18	367.59	53,970	198.06
5/19/2009	14:55	7.41	9.65	374.27	7.40	9.15	369.46	53,970	199.06
5/19/2009	14:56	7.43	9.52	375.94	7.42	9.02	371.13	53,970	199.96
5/19/2009	14:57	7.52	9.42	383.15	7.51	8.92	378.34	53,970	203.85
5/19/2009	14:58	7.57	9.45	383.76	7.56	8.95	378.95	53,970	204.18
5/19/2009	14:59	7.57	9.50	380.40	7.56	9.00	375.59	53,970	202.37
5/19/2009	15:00	7.55	9.54	378.64	7.54	9.04	373.83	53,970	201.42
5/19/2009	15:01	7.53	9.56	376.08	7.52	9.06	371.27	53,970	200.04
5/19/2009	15:02	7.50	9.62	372.36	7.49	9.12	367.55	53,970	198.03
5/19/2009	15:03	7.47	9.52	362.25	7.46	9.02	357.44	53,970	192.59
5/19/2009	15:04	7.55	9.47	372.33	7.54	8.97	367.52	53,970	198.02
5/19/2009	15:05	7.57	9.50	376.90	7.56	9.00	372.09	53,970	200.48
5/19/2009	15:06	7.56	9.46	375.66	7.55	8.96	370.85	53,970	199.81
5/19/2009	15:07	7.55	9.65	374.60	7.54	9.15	369.79	53,970	199.24
5/19/2009	15:08	7.45	9.58	364.53	7.44	9.08	359.72	53,970	193.82
5/19/2009	15:09	7.48	9.60	364.21	7.47	9.10	359.40	53,970	193.64
5/19/2009	15:10	7.46	9.70	356.77	7.45	9.20	351.96	53,970	189.63
5/19/2009	15:11	7.41	9.64	348.99	7.40	9.14	344.18	53,970	185.44
5/19/2009	15:12	7.44	9.58	351.73	7.43	9.08	346.92	53,970	186.92
5/19/2009	15:13	7.49	9.50	355.09	7.48	9.00	350.28	53,970	188.73
5/19/2009	15:14	7.53	9.50	356.10	7.52	9.00	351.29	53,970	189.27
5/19/2009	15:15	7.54	9.54	352.44	7.53	9.04	347.63	53,970	187.30

Haverhill # 9 Vent Stack Emissions Data

Run # 2

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	15:16	7.51	9.60	341.32	7.50	9.10	336.51	53,970	181.31
5/19/2009	15:17	7.48	9.62	336.07	7.47	9.12	331.26	53,970	178.48
5/19/2009	15:18	7.45	9.60	343.80	7.44	9.10	338.99	53,970	182.65
5/19/2009	15:19	7.46	9.59	346.44	7.45	9.09	341.63	53,970	184.07
5/19/2009	15:20	7.49	9.65	357.47	7.48	9.15	352.66	53,970	190.01
5/19/2009	15:21	7.43	9.71	367.65	7.42	9.21	362.84	53,970	195.50
5/19/2009	15:22	7.39	9.68	356.25	7.38	9.18	351.44	53,970	189.35
5/19/2009	15:23	7.41	9.58	356.67	7.40	9.08	351.86	53,970	189.58
5/19/2009	15:24	7.48	9.63	362.12	7.47	9.13	357.31	53,970	192.52
5/19/2009	15:25	7.44	9.53	360.39	7.43	9.03	355.58	53,970	191.58
5/19/2009	15:26	7.51	9.52	366.91	7.50	9.02	362.10	53,970	195.10
5/19/2009	15:27	7.52	9.55	366.29	7.51	9.05	361.48	53,970	194.76
5/19/2009	15:28	7.51	9.55	361.06	7.50	9.05	356.25	53,970	191.95
5/19/2009	15:29	7.48	9.65	357.23	7.47	9.15	352.42	53,970	189.88
Averages		**7.50**	**9.52**	**386.64**	**7.48**	**9.02**	**381.82**	**53,970**	**205.73**

CEM CALIBRATIONS

PROJECT NAME	Haverhill Vent Stack Compliance
PROJECT NUMBER	39400492.52
DATE	May 19, 2009
RUN NUMBER	R2
START TIME	12:28 PM
STOP TIME	3:29 PM

ANALYZER SPAN	
CO	
CO_2	25
O_2	25
NO_x	
SO_2	1000
THC	

		SYSTEM CALIBRATION ERROR			SYSTEM BIAS CHECK					IS CAL ERROR CHECK OK? (YES/NO)	IS PRETEST BIAS OK? (YES/NO)	IS POSTEST BIAS OK? (YES/NO)	IS SYSTEM DRIFT OK? (YES/NO)
					PRETEST		POST TEST						
	GAS CYLINDER NUMBER	CAL. GAS VALUE (% or PPM)	ANALYZER RESPONSE (% or PPM)	CAL ERROR (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	DRIFT (% SPAN)				
CO_2 zero	n/a	0.00	0.00	0.00%	0.01	-0.04%	0.02	-0.08%	-0.04%	YES	YES	YES	YES
CO_2 mid	CC2603	12.43	12.62	-0.76%	12.46	0.64%	12.45	0.68%	0.04%	YES	YES	YES	YES
CO_2 hi	CC144573	18.97	19.01	-0.16%						YES			
O_2 zero	n/a	0.00	0.00	0.00%	0.43	-1.72%	0.54	-2.16%	-0.44%	YES	YES	YES	YES
O_2 mid	CC2603	9.98	9.94	0.16%	10.10	-0.64%	10.08	-0.56%	0.08%	YES	YES	YES	YES
O_2 hi	CC144573	20.95	20.98	-0.12%						YES			
SO_2 zero	n/a	0.00	0.48	-0.05%	5.94	-0.55%	3.38	-0.29%	0.26%	YES	YES	YES	YES
SO_2 mid	ALM017179	451.00	451.29	-0.03%	454.80	-0.35%	427.68	2.36%	2.71%	YES	YES	YES	YES
SO_2 hi	CC155593	1000.00	999.48	0.05%						YES			

Correction factors

	Average Concentration during Test Period	Zero offset	Bias Correction Factor
CO_2	Avg. Conc -	0.015	0.999196141
O_2	Avg. Conc -	0.485	1.039042166
SO_2	Avg. Conc -	4.66	1.033029456

Example Calculations

Calibration error = ((cal. gas value - analyzer resp) / analyzer span) * 100: allowable error ± 2 % as per CFR 40 Part 60 Method 6C Section 4.1 , allowable error ± 5 % for THC as per CFR 40 Part 60 Method 25A Section 8.4

System Bias = ((analyzer resp - system resp) / analyzer span) * 100: allowable error ± 5 % as per CFR 40 part 60 Method 6C Section 4.2

Drift = ((pretest sys resp - post test sys resp) / analyzer span) * 100: allowable error ± 3 % as per CFR 40 part 60 Method 6C Section 4.3 & 4.4 allowable error ± 2 % as per CFR 40 Part 60 Method 20 Section 3.5 (for NOx only)

Correction Factor = (Avg. Conc. - Zero Offset) * Bias Correction Factor

Sys Bias (pre and post) must be performed on each run: To determine Drift.
Use zero gas and either mid or hi cal gas, choose cal gas closest to measured stack concentration.

Drift must be performed every hour on THC

Calibration Error is performed only at start, unless allowable error parameters are exceeded.

Haverhill # 9 Vent Stack Emissions Data

Run # 3

		Raw Data			Corrected Data				Mass Rate
Date	Hour	CO2 (%)	O2 (%)	SO2 (ppm)	CO2 (%)	O2 (%)	SO2 (ppm)	Flow (dscfm)	SO2 (lb/hr)
5/19/2009	16:37	7.75	9.92	438.02	7.72	9.43	434.33	47,112	204.28
5/19/2009	16:38	7.72	9.90	434.84	7.69	9.41	431.15	47,112	202.79
5/19/2009	16:39	7.72	9.84	437.95	7.69	9.35	434.26	47,112	204.25
5/19/2009	16:40	7.76	9.87	442.04	7.73	9.38	438.35	47,112	206.17
5/19/2009	16:41	7.75	9.94	441.54	7.72	9.45	437.85	47,112	205.94
5/19/2009	16:42	7.72	10.00	436.53	7.69	9.51	432.84	47,112	203.58
5/19/2009	16:43	7.69	10.02	436.39	7.66	9.53	432.70	47,112	203.51
5/19/2009	16:44	7.69	10.00	434.37	7.66	9.51	430.68	47,112	202.56
5/19/2009	16:45	7.71	10.00	435.34	7.68	9.51	431.65	47,112	203.02
5/19/2009	16:46	7.73	9.97	438.39	7.70	9.48	434.70	47,112	204.46
5/19/2009	16:47	7.73	9.97	440.76	7.70	9.48	437.07	47,112	205.57
5/19/2009	16:48	7.75	9.86	442.85	7.72	9.37	439.16	47,112	206.55
5/19/2009	16:49	7.83	9.89	447.58	7.80	9.40	443.89	47,112	208.78
5/19/2009	16:50	7.80	9.90	445.62	7.77	9.41	441.93	47,112	207.86
5/19/2009	16:51	7.78	9.92	445.48	7.75	9.43	441.79	47,112	207.79
5/19/2009	16:52	7.79	9.88	444.87	7.76	9.39	441.18	47,112	207.50
5/19/2009	16:53	7.80	9.91	445.98	7.77	9.42	442.29	47,112	208.02
5/19/2009	16:54	7.73	9.94	438.53	7.70	9.45	434.84	47,112	204.52
5/19/2009	16:55	7.72	9.85	436.16	7.69	9.36	432.47	47,112	203.41
5/19/2009	16:56	7.79	9.77	442.12	7.76	9.28	438.43	47,112	206.21
5/19/2009	16:57	7.84	9.81	448.23	7.81	9.32	444.54	47,112	209.08
5/19/2009	16:58	7.82	9.92	449.33	7.79	9.43	445.64	47,112	209.60
5/19/2009	16:59	7.75	9.94	441.94	7.72	9.45	438.25	47,112	206.12
5/19/2009	17:00	7.74	9.93	440.13	7.71	9.44	436.44	47,112	205.27
5/19/2009	17:01	7.75	9.96	440.16	7.72	9.47	436.47	47,112	205.29
5/19/2009	17:02	7.74	9.92	440.22	7.71	9.43	436.53	47,112	205.32
5/19/2009	17:03	7.76	9.87	441.70	7.73	9.38	438.01	47,112	206.01
5/19/2009	17:04	7.79	9.93	443.24	7.76	9.44	439.55	47,112	206.74
5/19/2009	17:05	7.77	9.94	441.34	7.74	9.45	437.65	47,112	205.84
5/19/2009	17:06	7.77	9.93	442.53	7.74	9.44	438.84	47,112	206.40
5/19/2009	17:07	7.77	9.98	442.55	7.74	9.49	438.86	47,112	206.41
5/19/2009	17:08	7.74	10.00	438.36	7.71	9.51	434.67	47,112	204.44
5/19/2009	17:09	7.73	9.93	436.89	7.70	9.44	433.20	47,112	203.75
5/19/2009	17:10	7.78	9.89	442.18	7.75	9.40	438.49	47,112	206.24
5/19/2009	17:11	7.80	9.91	441.63	7.77	9.42	437.94	47,112	205.98
5/19/2009	17:12	7.80	9.96	441.49	7.77	9.47	437.80	47,112	205.91
5/19/2009	17:13	7.76	9.99	438.23	7.73	9.50	434.54	47,112	204.38
5/19/2009	17:14	7.73	9.99	435.82	7.70	9.50	432.13	47,112	203.25
5/19/2009	17:15	7.73	10.01	435.37	7.70	9.52	431.68	47,112	203.03
5/19/2009	17:16	7.72	10.03	435.81	7.69	9.54	432.12	47,112	203.24
5/19/2009	17:17	7.71	9.96	434.43	7.68	9.47	430.74	47,112	202.59
5/19/2009	17:18	7.75	9.95	435.59	7.72	9.46	431.90	47,112	203.14
5/19/2009	17:19	7.75	9.92	436.02	7.72	9.43	432.33	47,112	203.34
5/19/2009	17:20	7.76	9.95	437.41	7.73	9.46	433.72	47,112	203.99
5/19/2009	17:21	7.72	10.11	433.85	7.69	9.62	430.16	47,112	202.32
5/19/2009	17:22	7.63	10.03	428.19	7.60	9.54	424.50	47,112	199.66

Haverhill # 9 Vent Stack Emissions Data

Run # 3

Date	Hour	Raw Data CO2 (%)	Raw Data O2 (%)	Raw Data SO2 (ppm)	Corrected Data CO2 (%)	Corrected Data O2 (%)	Corrected Data SO2 (ppm)	Flow (dscfm)	Mass Rate SO2 (lb/hr)
5/19/2009	17:23	7.66	9.95	425.87	7.63	9.46	422.18	47,112	198.57
5/19/2009	17:24	7.70	9.96	429.88	7.67	9.47	426.19	47,112	200.45
5/19/2009	17:25	7.68	9.97	427.95	7.65	9.48	424.26	47,112	199.54
5/19/2009	17:26	7.68	9.93	425.23	7.65	9.44	421.54	47,112	198.27
5/19/2009	17:27	7.67	9.90	424.81	7.64	9.41	421.12	47,112	198.07
5/19/2009	17:28	7.72	9.72	427.89	7.69	9.23	424.20	47,112	199.52
5/19/2009	17:29	7.77	9.95	430.45	7.74	9.46	426.76	47,112	200.72
5/19/2009	17:30	7.69	9.97	431.03	7.66	9.48	427.34	47,112	200.99
5/19/2009	17:31	7.74	9.83	437.66	7.71	9.34	433.97	47,112	204.11
5/19/2009	17:32	7.80	9.79	440.26	7.77	9.30	436.57	47,112	205.33
5/19/2009	17:33	7.79	9.94	440.61	7.76	9.45	436.92	47,112	205.50
5/19/2009	17:34	7.67	9.95	428.50	7.64	9.46	424.81	47,112	199.80
5/19/2009	17:35	7.69	9.92	428.81	7.66	9.43	425.12	47,112	199.95
5/19/2009	17:36	7.70	9.85	429.40	7.67	9.36	425.71	47,112	200.23
5/19/2009	17:37	7.71	9.80	429.85	7.68	9.31	426.16	47,112	200.44
5/19/2009	17:38	7.73	9.74	430.62	7.70	9.25	426.93	47,112	200.80
5/19/2009	17:39	7.73	9.74	430.88	7.70	9.25	427.19	47,112	200.92
5/19/2009	17:40	7.70	9.64	425.80	7.67	9.15	422.11	47,112	198.53
5/19/2009	17:41	7.74	9.63	427.22	7.71	9.14	423.53	47,112	199.20
Averages		**7.74**	**9.91**	**436.93**	**7.71**	**9.42**	**433.24**	**47,112**	**203.77**

CEM CALIBRATIONS

PROJECT NAME	Haverhill Vent Stack Compliance
PROJECT NUMBER	39400492.52
DATE	May 19, 2009
RUN NUMBER	R3
START TIME	4:37 PM
STOP TIME	5:41 PM

ANALYZER	SPAN
CO	
CO_2	25
O_2	25
NO_x	
SO_2	1000
THC	

		SYSTEM CALIBRATION ERROR			SYSTEM BIAS CHECK								
					PRETEST		POST TEST						
	GAS CYLINDER NUMBER	CAL. GAS VALUE (% or PPM)	ANALYZER RESPONSE (% or PPM)	CAL ERROR (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	DRIFT (% SPAN)	IS CAL ERROR CHECK OK? (YES/NO)	IS PRETEST BIAS OK? (YES/NO)	IS POSTEST BIAS OK? (YES/NO)	IS SYSTEM DRIFT OK? (YES/NO)
CO_2 zero	n/a	0.00	0.00	0.00%	0.02	-0.08%	0.04	-0.16%	-0.08%	YES	YES	YES	YES
CO_2 mid	CC2603	12.43	12.62	-0.76%	12.45	0.68%	12.36	1.04%	0.36%	YES	YES	YES	YES
CO_2 hi	CC144573	18.97	19.01	-0.16%						YES			
O_2 zero	n/a	0.00	0.00	0.00%	0.54	-2.16%	0.41	-1.64%	0.52%	YES	YES	YES	YES
O_2 mid	CC2603	9.98	9.94	0.16%	10.08	-0.56%	10.09	-0.60%	-0.04%	YES	YES	YES	YES
O_2 hi	CC144573	20.95	20.98	-0.12%						YES			
SO_2 zero	n/a	0.00	0.48	-0.05%	3.38	-0.29%	3.48	-0.30%	-0.01%	YES	YES	YES	YES
SO_2 mid	ALM017179	451.00	451.29	-0.03%	427.68	2.36%	416.51	3.48%	1.12%	YES	YES	YES	YES
SO_2 hi	CC155593	1000.00	999.48	0.05%						YES			

Correction factors

	Average Concentration during Test Period	Zero offset	Bias Correction Factor
CO_2	Avg. Conc -	0.03	1.004444
O_2	Avg. Conc -	0.475	1.038502
SO_2	Avg. Conc -	3.43	1.077234

Example Calculations

Calibration error = ((cal. gas value - analyzer resp) / analyzer span) * 100: allowable error ± 2 % as per CFR 40 Part 60 Method 6C Section 4.1 , allowable error ± 5 % for THC as per CFR 40 Part 60 Method 25A Section 8.4

System Bias = ((analyzer resp - system resp) / analyzer span) * 100: allowable error ± 5 % as per CFR 40 part 60 Method 6C Section 4.2

Drift = ((pretest sys resp - post test sys resp) / analyzer span) * 100: allowable error ± 3 % as per CFR 40 part 60 Method 6C Section 4.3 & 4.4 allowable error ± 2 % as per CFR 40 Part 60 Method 20 Section 3.5 (for NOx only)

Correction Factor = (Avg. Conc. - Zero Offset) * Bias Correction Factor

Sys Bias (pre and post) must be performed on each run: To determine Drift.
Use zero gas and either mid or hi cal gas, choose cal gas closest to measured stack concentration.

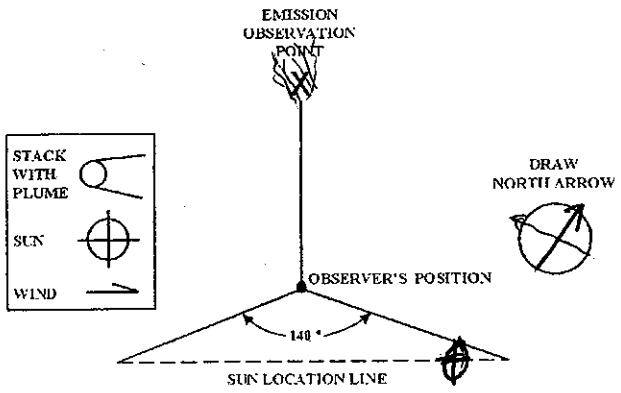
Drift must be performed every hour on THC

Calibration Error is performed only at start, unless allowable error parameters are exceeded.

VISIBLE EMISSION OBSERVATION FORM

Company Name: Haverhill North Coke Company		
Location: 2246 Gallia Pike		
City: Franklin Furnace	State: OH	Zip:
Process Equipment: Coke Oven Vent Stack	Operating Mode: Normal Prod.	
Control Equipment: N/A	Operating Mode: N/A	
Describe Emission Point: Circular Stack of vent off coke ovens		
Height of Emission Point: 60'	Height Relative to Observer: Start 60' End 60'	
Distance to Emission Point: Start 150' End 150'	Direction to Emission Point: Start NW End NW	
Vertical Angle to Observation Pt.: Start 35° End 35°	Direction to Observation Point: Start SE End SE	
Describe Emissions: Start white dust/smoke occasional black End Same		
Emission Color: Start white/black End white/black	If Water Droplet Plume (Circle): Attached Detached (N/A)	
Point In The Plume At Which Opacity Was Determined: Start 10' End 20'		
Describe Plume Background: Start Blue Sky End Blue Sky		
Background Color: Start Blue End Blue	Sky Condition: Start Mostly Clear End Mostly Clear	
Wind Speed: Start Gentle 5 End Gentle 5	Wind Direction: Start to W/SW End to W/SW	
Ambient Temp: Start 60° End 60°	Wet Bulb Temp: N/A	RH Percent: N/A

SOURCE LAYOUT SKETCH



Observation Date	Start Time	End Time
5/19/09	0852	0921

Min \ Sec	0	15	30	45	Comments
1	10	10	10	10	
2	10	5	5	5	
3	5	5	10	5	
4	5	5	5	5	
5	5	5	5	10	
6	5	5	5	5	
7	5	5	5	10	
8	15	15	20	10	
9	5	5	5	5	
10	10	10	15	10	
11	10	10	10	5	
12	10	10	15	10	
13	10	5	10	10	
14	10	10	5	10	
15	10	10	15	15	
16	5	5	5	5	
17	10	5	5	5	
18	5	5	5	5	
19	5	5	5	10	
20	10	10	5	10	
21	5	10	10	5	
22	5	5	5	10	
23	10	10	10	15	
24	15	20	20	20	
25	15	10	15	10	
26	10	10	10	10	
27	10	10	25	15	
28	10	5	15	10	
29	10	10	15	20	
30	15	20	25	10	

Observer's Name (Print): Thomas Brado	
Observer's Signature: TB	Date: 5/19/09
Organization: URS Corp.	
Certified by: Carl Koontz Assoc.	Date: 4/6/09

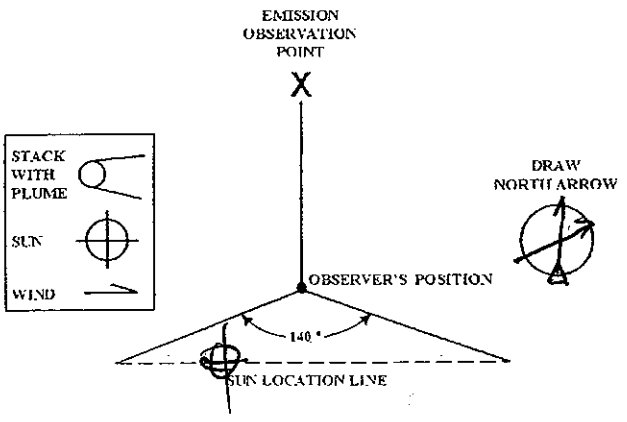
Additional Information

Continue on reverse side

VISIBLE EMISSION OBSERVATION FORM

Company Name: Haverhill North Coke Company			
Location: 2446 Gallia Pike			
City: Franklin Furnace	State: OH	Zip:	
Process Equipment: Coke oven Vent Stack 9		Operating Mode: Normal	
Control Equipment: N/A		Operating Mode: ~~Normal~~ N/A	
Describe Emission Point: Circular stack off coke ovens			
Height of Emission Point: 60'	Height Relative to Observer: Start 60' End 60'		
Distance to Emission Point: Start 150' End 150'	Direction to Emission Point: Start N End N		
Vertical Angle to Observation Pt.: Start -35° End -35°	Direction to Observation Point: Start S End S		
Describe Emissions: Start whitish smoke/dust End whitish smoke/dust			
Emission Color: Start white End white	If Water Droplet Plume (Circle): Attached Detached (N/A)		
Point In The Plume At Which Opacity Was Determined: Start 20' End 20'			
Describe Plume Background: Start Blue clear sky End Blue clear sky			
Background Color: Start Blue End Blue	Sky Condition: Start Clear End Clear		
Wind Speed: Start 5mph End 5mph	Wind Direction: Start from SW End from SW		
Ambient Temp: Start 84° End 84°	Wet Bulb Temp: N/A	RH Percent: N/A	

SOURCE LAYOUT SKETCH



Observation Date: 5/19/09	Start Time: 1415	End Time: 1444

Min \ Sec	0	15	30	45	Comments
1	5	5	5	5	
2	5	5	5	5	
3	10	10	10	5	
4	10	5	10	5	
5	5	10	5	10	
6	5	5	5	5	
7	10	5	5	5	
8	5	5	5	5	
9	10	5	5	5	
10	5	5	5	5	
11	5	5	5	5	
12	5	5	10	5	
13	5	5	5	5	
14	5	10	10	5	
15	10	5	5	5	
16	10	5	5	5	
17	5	5	5	5	
18	5	5	5	5	
19	5	5	5	5	
20	5	10	5	5	
21	5	5	5	5	
22	5	5	5	5	
23	5	5	5	10	
24	5	5	5	5	
25	5	5	5	5	
26	5	10	5	10	
27	5	5	5	5	
28	5	5	5	5	
29	10	5	5	10	
30	5	5	5	5	

Observer's Name (Print): Thomas Brado	
Observer's Signature: JHB	Date: 5/19/09
Organization: URS Corp.	
Certified by: Carl Koontz Assoc.	Date: 4/6/09

Additional Information

Continue on reverse side

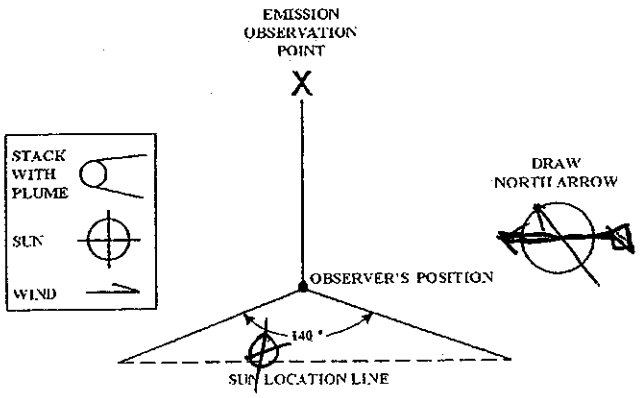
VISIBLE EMISSION OBSERVATION FORM

Company Name HNCC			
Location 9446 Gallia Pike			
City Franklin Furnace	**State** OH	**Zip**	
Process Equipment Coke Oven Vent Stack 9		**Operating Mode** Normal	
Control Equipment N/A		**Operating Mode** N/A	
Describe Emission Point Circular Stack off coke ovens			
Height of Emission Point 60'		**Height Relative to Observer** Start 60' End 60'	
Distance to Emission Point Start 200' End 200'		**Direction to Emission Point** Start E End E	
Vertical Angle to Observation Pt. Start ~25° End ~25°		**Direction to Observation Point** Start W End W	
Describe Emissions Start None V.Sible End Whitish Smoke/Dust			
Emission Color Start N/A End White		**If Water Droplet Plume (Circle)** Attached Detached (N/A)	
Point In The Plume At Which Opacity Was Determined Start 10' End 10'			
Describe Plume Background Start Clear Sky End Clear Sky			
Background Color Start Blue End Blue		**Sky Condition** Start Clear End Clear	
Wind Speed Start Gentle ~5 End Gentle ~5		**Wind Direction** Start from SW End from SE	
Ambient Temp Start 85° End 82°	**Wet Bulb Temp** N/A	**RH Percent** N/A	

Observation Date 5/19/09	Start Time 1803	End Time 1832

Sec / Min	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	5	0	
3	0	0	0	0	
4	0	0	5	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	5	0	0	0	
9	0	0	0	0	
10	0	5	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	6	0	
18	0	0	5	0	
19	0	0	0	0	
20	0	0	6	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	5	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

SOURCE LAYOUT SKETCH



Observer's Name (Print) Thomas Brado	
Observer's Signature	**Date** 5/19/09
Organization URS Corp.	
Certified by Carl Koontz Assoc.	**Date** 4/6/09

Additional Information

Continue on reverse side

Visible Emission Observation Form

Company Name			Observation Date	Start Time		End Time	
Haverhill North Coke Company			5/19/2009	8:52		9:21	
Location			Interval	0	15	30	45
2446 Gallia Pike			1	10	10	10	10
City	**State**	**Zip**	2	10	5	5	5
Franklin Furnace	Ohio	45629	3	5	5	10	5
Process Equipment		**Operating Mode**	4	5	5	5	5
# 9 Vent Stack (Coke Oven Vent Stack)		Normal Production	5	5	5	5	10
Control Equipment		**Operating Mode**	6	5	5	5	5
n/a		n/a	7	5	5	5	10
Describe Emission Point			8	15	15	20	10
Circular Stack off Coke Ovens			9	5	5	5	5
Height of Emission Point	**Height Relative to Observer**		10	10	10	15	10
60'	Start 60' End 60'		11	10	10	10	5
Distance to Emission Point	**Direction to Emission Point**		12	10	10	15	10
Start 150' End 150'	Start NW End NW		13	10	5	10	10
Vertical Angle to Observation Point	**Direction to Observation Point**		14	10	10	5	10
Start 35° End 35°	Start SE End SE		15	10	10	15	15
Describe Emissions			16	5	5	5	5
Start White Dust/ Smoke Occasional Black	End White Dust/ Smoke Occasional Black		17	10	5	5	5
Emission Color	**If Water Droplet Plume (Shaded)**		18	5	5	5	5
Start white/black End white/black	n/a Attached Detached		19	5	5	5	10
Point In The Plume At Which Opacity Was Determined			20	10	10	5	10
Start 10' End 20'			21	5	10	10	5
Describe Plume Background			22	5	5	5	10
Start Blue Sky	End Blue Sky		23	10	10	10	15
Background Color	**Sky Condition**		24	15	20	20	20
Start Blue End Blue	Start Mostly Clear End Mostly Clear		25	15	10	15	10
Wind Speed (mph)	**Wind Direction (from)**		26	10	10	10	10
Start 5-10 End 5-10	Start w/sw End w/sw		27	10	10	25	15
Ambient Temp	**Wet Blub Temp**	**RH Percent**	28	10	5	15	10
Start 60° End 60°	n/a	n/a	29	10	10	15	20
			30	15	20	25	10

Test Results:

Maximum 6 Minute Rolling Avg:	13.3 %	Minimum Opacity:	5.0 %
Average Opacity:	9.3 %	# of Readings >20%:	2
Maximum Opacity:	25.0 %	Number of Readings:	120

Visible Emission Observation Form

Company Name		
Haverhill North Coke Company		
Location		
2446 Gallia Pike		
City	**State**	**Zip**
Franklin Furnace	Ohio	45629
Process Equipment	**Operating Mode**	
# 9 Vent Stack (Coke Oven Vent Stack)	Normal Production	
Control Equipment	**Operating Mode**	
n/a	n/a	

Describe Emission Point

Circular Stack off Coke Ovens

Height of Emission Point	**Height Relative to Observer**
60'	**Start** 60' **End** 60'
Distance to Emission Point	**Direction to Emission Point**
Start 150' **End** 150'	**Start** N **End** N
Vertical Angle to Observation Point	**Direction to Observation Point**
Start 35° **End** 35°	**Start** S **End** S

Describe Emissions

Start Whiteish Smoke/ Dust	**End** Whiteish Smoke/ Dust
Emission Color	**If Water Droplet Plume (Shaded)**
Start White **End** White	n/a Attached Detached
Point In The Plume At Which Opacity Was Determined	
Start 20'	**End** 20'

Describe Plume Background

Start Blue Clear Sky	**End** Blue Clear Sky
Background Color	**Sky Condition**
Start Blue **End** Blue	**Start** Clear **End** Clear
Wind Speed (mph)	**Wind Direction (from)**
Start 5 **End** 5	**Start** SW **End** SW

Ambient Temp	**Wet Blub Temp**	**RH Percent**
Start 84° **End** 84°	n/a	n/a

Observation Date	Start Time		End Time	
5/19/2009	14:15		14:44	
Interval	0	15	30	45
1	5	5	5	5
2	5	5	5	5
3	10	10	10	5
4	10	5	10	5
5	5	10	5	10
6	5	5	5	5
7	10	5	5	5
8	5	5	5	5
9	10	5	5	5
10	5	5	5	5
11	5	5	5	5
12	5	5	10	5
13	5	5	5	5
14	5	10	10	5
15	10	5	5	5
16	10	5	5	5
17	5	5	5	5
18	5	5	5	5
19	5	5	5	5
20	5	10	5	5
21	5	5	5	5
22	5	5	5	5
23	5	5	5	10
24	5	5	5	5
25	5	5	5	5
26	5	10	5	10
27	5	5	5	5
28	5	5	5	5
29	10	5	5	10
30	5	5	5	5

Test Results:

Maximum 6 Minute Rolling Avg:	6.7 %	Minimum Opacity:	5.0 %
Average Opacity:	5.8 %	# of Readings >20%:	0
Maximum Opacity:	10.0 %	Number of Readings:	120

Visible Emission Observation Form

Company Name		
Haverhill North Coke Company		
Location		
2446 Gallia Pike		
City	**State**	**Zip**
Franklin Furnace	Ohio	45629
Process Equipment	**Operating Mode**	
# 9 Vent Stack (Coke Oven Vent Stack)	Normal Production	
Control Equipment	**Operating Mode**	
None	n/a	

Describe Emission Point

Circular Stack off Coke Ovens

Height of Emission Point	**Height Relative to Observer**
60'	**Start** 60' **End** 60'
Distance to Emission Point	**Direction to Emission Point**
Start 200' **End** 200'	**Start** E **End** E
Vertical Angle to Observation Point	**Direction to Observation Point**
Start 25° **End** 25°	**Start** W **End** W

Describe Emissions

Start None Visible	**End** Whiteish Smoke/Dust
Emission Color	**If Water Droplet Plume (Shaded)**
Start n/a **End** white	n/a Attached Detached
Point In The Plume At Which Opacity Was Determined	
Start 10'	**End** 10'

Describe Plume Background

Start Clear Sky	**End** Clear Sky
Background Color	**Sky Condition**
Start Blue **End** Blue	**Start** Clear **End** Clear
Wind Speed (mph)	**Wind Direction (from)**
Start Gentle **End** Gentle	**Start** SW **End** SE

Ambient Temp	**Wet Blub Temp**	**RH Percent**
Start 85° **End** 82°	n/a	n/a

Observation Date	**Start Time**		**End Time**	
5/19/2009	18:03		18:32	
Interval	0	15	30	45
1	0	0	0	0
2	0	0	5	0
3	0	0	0	0
4	0	0	5	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	5	0	0	0
9	0	0	0	0
10	0	5	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	5	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	5
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0

Test Results:

Maximum 6 Minute Rolling Avg:	0.4 %	Minimum Opacity:	0.0 %
Average Opacity:	0.3 %	# of Readings >20%:	0
Maximum Opacity:	5.0 %	Number of Readings:	120

CARL KOONTZ ASSOCIATES

of Nashville, Tennessee

This is to acknowledge that

THOMAS BRADO

successfully participated in Visible Emissions training on APR 0 6 2009

and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.

Carl Koontz

Instructor

Appendix C
LABORATORY REPORTS

Original Chain of Custody Documentation

URS

Chain of Custody Record

H9E 221301

Page 1 of 2

M29 Train Samples

Project	HNCC Vent 9
Site	Franklin Furnace
Project Number	39400492
Prepared by	T. Brado

Sample	Sample Matrix	Date/Time	Target Compounds: Metals			Blank	Analyze - EPA Method 29 Ty	Shipping Container Number	Comments
M29-R1-PNR-0.1n Nitric	0.1n Nitric Acid	5/19/2009 1215	x				x	1	
M29-R1-Imp1-3-Condensate	Nitric Peroxide	5/19/2009 1215	x				x	1	
M29-R1-Imp4-Condensate	0.1n Nitric Acid	5/19/2009 1215	x				x	1	
M29-R1-Imp5+6-KMnO4	KMnO4 + H2SO4	5/19/2009 1215	x				x	1	
M29-R1-Imp5+6-HCL	HCL	5/19/2009 1215	x				x	1	
M29-R2-PNR-0.1n Nitric	0.1n Nitric Acid	5/19/09 1530	x				x	1	
M29-R2-Imp1-3-Condensate	Nitric Peroxide	5/19/09 1530	x				x	1	
M29-R2-Imp4-Condensate	0.1n Nitric Acid	5/19/09 1530	x				x	1	
M29-R2-Imp5+6-KMn04	KMnO4 + H2SO4	5/19/09 1530	x				x	1	
M29-R2-Imp5+6-HCL	HCL	5/19/09 1530	x				x	1	
M29-R3-PNR-0.1n Nitric	0.1n Nitric Acid	5/19/09 1930	x				x	1	
M29-R3-Imp1-3-Condensate	Nitric Peroxide	5/19/09 1930	x				x	1	

Remarks: See Test Plan for Analyte List

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
T. Brado	5/22/09	1300	Ryan Henry	5/22/09	1300			
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Laboratory by	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

REC. AT AMBIENT
NO CUSTODY SEAL
1 COOLER RH 5/22/09
HAND DELIVERED

URS

Chain of Custody Record

H4E-220301

M29 Train Samples

Project	HNCC Vent 9
Site	Franklin Furnace
Project Number	39400492
Prepared by	T. Brado

Sample	Sample Matrix	Date/Time	Target Compounds: Metals			Blank	Analyze - EPA Method 29 Type	Shipping Container Number	Comments
M29-R3-Imp4-Condensate	0.1n Nitric Acid	5/19/09 1930	x				x	1	
M29-R3-Imp5+6-KMnO4	KMnO4 + H2SO4	5/19/09 1930	x				x	1	
M29-R3-Imp5+6-HCL	HCL	5/19/09 1930	x				x	1	
M29-Blank-0.1n Nitric	0.1n Nitric Acid	5/19/09 1700	x			x	x	1	
M29-Blank-Nitric Peroxide	Nitric Peroxide	5/19/09 1700	x			x	x	1	
M29-Blank-KMnO4 + H2SO4	KMnO4 + H2SO4	5/19/09 1700	x			x	x	1	
M29-R1-QZ-12	Filter	5/19/09 1215	x				x	1	
M29-R2-QZ-13	Filter	5/19/09 1530	x				x	1	
M29-R3-QZ-14	Filter	5/19/09 1930	x				x	1	
			x				x	1	
			x				x	1	
			x				x	1	

Remarks: See Test Plan for Analyte List

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
T. Brado	5/22/09	1300	Lynn Henry	5/22/09	1300			
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Laboratory by	Date	Time	Airbill No.	Opened by	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

URS Corporation

Client Sample ID: M29-R1-PNR-0.1N NITRIC/FILTER

TOTAL Metals

Lot-Sample #...: H9E220301-001 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149322						
Aluminum	1470	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 8.7	LDLCR1AA
Antimony	60.9	6.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 0.85	LDLCR1AC
Arsenic	269	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 0.35	LDLCR1AD
Barium	101	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 0.35	LDLCR1AE
Beryllium	5.1	0.50 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 0.16	LDLCR1AF
Cadmium	22.3	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 1.0	LDLCR1AG
Calcium	3270 J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 3.3	LDLCR1AH
Chromium	41.2	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 0.31	LDLCR1AJ
Cobalt	20.4	5.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 0.50	LDLCR1AK
Copper	830	2.5 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 0.59	LDLCR1AL
Iron	4680	10.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 5.0	LDLCR1AM
Lead	1380	2.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 2.0	LDLCR1AN
Magnesium	200 B,J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:44	06/01-06/03/09 MDL.....: 3.6	LDLCR1AP

(Continued on next page)

URS Corporation

Client Sample ID: M29-R1-PNR-0.1N NITRIC/FILTER

TOTAL Metals

Lot-Sample #...: H9E220301-001 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	26.3	1.5	ug	SW846 6010B	06/01-06/03/09	LDLCR1AQ
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.15	
Molybdenum	52.9	4.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1AR
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.63	
Nickel	175	4.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1AT
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.44	
Phosphorus	1290	30.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1AU
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 1.9	
Selenium	13.0	1.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1AV
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.35	
Silver	5.6	2.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1AW
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.95	
Strontium	47.1	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1AX
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.50	
Thallium	169	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1A0
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 5.0	
Tin	90.8	10.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1A1
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 1.0	
Titanium	118	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1A2
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.50	
Vanadium	32.9	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1A3
		Dilution Factor: 1		Analysis Time..: 12:44	MDL.....: 0.50	
Zinc	3240 J	20.0	ug	SW846 6010B	06/01-06/03/09	LDLCR1A4
		Dilution Factor: 10		Analysis Time..: 15:57	MDL.....: 2.3	
Prep Batch #...: 9153077						
Mercury	ND	0.20	ug	SW846 7470A	06/03/09	LDLCR1A5
		Dilution Factor: 1		Analysis Time..: 15:01	MDL.....: 0.060	

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: M29-R1-IMP1-3-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-002 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149323						
Aluminum	73.5	20.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AA
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 9.6	
Antimony	ND	6.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AC
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.85	
Arsenic	266	1.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AD
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.33	
Barium	1.4 B	20.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AE
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.30	
Beryllium	ND	0.50	ug	SW846 6010B	06/01-06/03/09	LDLCV1AF
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.16	
Cadmium	0.13 B	0.50	ug	SW846 6010B	06/01-06/03/09	LDLCV1AG
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.063	
Calcium	451 B,J	500	ug	SW846 6010B	06/01-06/03/09	LDLCV1AH
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 2.9	
Chromium	2.1	1.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AJ
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.31	
Cobalt	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AK
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.50	
Copper	1.8 B	2.5	ug	SW846 6010B	06/01-06/03/09	LDLCV1AL
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.59	
Iron	89.6 J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AM
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 5.0	
Lead	0.46 B	1.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AN
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.35	
Magnesium	27.3 B,J	500	ug	SW846 6010B	06/01-06/03/09	LDLCV1AP
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 2.2	

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URS Corporation

Client Sample ID: M29-R1-IMP1-3-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-002 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	3.7 J	1.5	ug	SW846 6010B	06/01-06/03/09	LDLCV1AQ
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.15	
Molybdenum	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AR
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.65	
Nickel	1.6 B	4.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AT
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.40	
Phosphorus	438 J	30.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AU
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 1.9	
Selenium	164	1.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AV
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.43	
Silver	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AW
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.95	
Strontium	1.1 B	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1AX
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.50	
Thallium	ND	3.5	ug	SW846 6010B	06/01-06/03/09	LDLCV1A0
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.85	
Tin	22.0 J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1A1
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 1.0	
Titanium	2.2 B	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1A2
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.50	
Vanadium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1A3
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.50	
Zinc	13.8	2.0	ug	SW846 6010B	06/01-06/03/09	LDLCV1A4
		Dilution Factor: 1		Analysis Time..: 12:07	MDL.....: 0.45	
Prep Batch #...: 9153078						
Mercury	9.0	0.40	ug	SW846 7470A	06/03/09	LDLCV1A5
		Dilution Factor: 2		Analysis Time..: 15:22	MDL.....: 0.12	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: M29-R1-IMP4-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-003 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153078						
Mercury	1.7	0.060	ug	SW846 7470A	06/03/09	LDLCW1AA
		Dilution Factor: 0.3		Analysis Time...: 15:34	MDL.....: 0.018	

URS Corporation

Client Sample ID: M29-R1-IMP5+6-KMNO4

TOTAL Metals

Lot-Sample #...: H9E220301-004 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153080						
Mercury	0.36	0.17	ug	SW846 7470A	06/03/09	LDLCX1AA

Dilution Factor: 0.83 Analysis Time..: 15:52 MDL.....: 0.050

URS Corporation

Client Sample ID: M29-R1-IMP5+6-HCL

TOTAL Metals

Lot-Sample #...: H9E220301-005 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153080						
Mercury	8.1	0.28	ug	SW846 7470A	06/03/09	LDLC01AA
		Dilution Factor: 1.38		Analysis Time..: 16:08	MDL.....: 0.083	

URS Corporation

Client Sample ID: M29-R2-PNR-0.1N NITRIC/FILTER

TOTAL Metals

Lot-Sample #...: H9E220301-006 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149322						
Aluminum	1950	20.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AH
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 8.7	
Antimony	38.9	6.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AJ
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.85	
Arsenic	266	1.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AK
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.35	
Barium	103	20.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AL
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.35	
Beryllium	4.1	0.50	ug	SW846 6010B	06/01-06/03/09	LDLC31AM
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.16	
Cadmium	16.0	1.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AN
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 1.0	
Calcium	1570 J	500	ug	SW846 6010B	06/01-06/03/09	LDLC31AP
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 3.3	
Chromium	66.3	1.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AQ
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.31	
Cobalt	17.9	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AR
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.50	
Copper	626	2.5	ug	SW846 6010B	06/01-06/03/09	LDLC31AT
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.59	
Iron	6250	10.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AU
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 5.0	
Lead	884	2.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AV
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 2.0	
Magnesium	149 B,J	500	ug	SW846 6010B	06/01-06/03/09	LDLC31AW
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 3.6	

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URS Corporation

Client Sample ID: M29-R2-PNR-0.1N NITRIC/FILTER

TOTAL Metals

Lot-Sample #...: H9E220301-006 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	53.6	1.5	ug	SW846 6010B	06/01-06/03/09	LDLC31AX
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.15	
Molybdenum	57.8	4.0	ug	SW846 6010B	06/01-06/03/09	LDLC31A0
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.63	
Nickel	170	4.0	ug	SW846 6010B	06/01-06/03/09	LDLC31A1
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.44	
Phosphorus	1120	30.0	ug	SW846 6010B	06/01-06/03/09	LDLC31A2
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 1.9	
Selenium	22.8	1.0	ug	SW846 6010B	06/01-06/03/09	LDLC31A3
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.35	
Silver	4.6	2.0	ug	SW846 6010B	06/01-06/03/09	LDLC31A4
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.95	
Strontium	32.2	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC31A5
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.50	
Thallium	95.5	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AA
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 5.0	
Tin	54.9	10.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AC
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 1.0	
Titanium	110	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AD
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.50	
Vanadium	26.3	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AE
		Dilution Factor: 1		Analysis Time..: 12:56	MDL.....: 0.50	
Zinc	1610 J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLC31AF
		Dilution Factor: 5		Analysis Time..: 16:09	MDL.....: 1.2	
Prep Batch #...: 9153077						
Mercury	ND	0.20	ug	SW846 7470A	06/03/09	LDLC31AG
		Dilution Factor: 1		Analysis Time..: 15:04	MDL.....: 0.060	

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: M29-R2-IMP1-3-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-007 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149323						
Aluminum	86.4	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 9.6	LDLC51AH
Antimony	ND	6.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.85	LDLC51AJ
Arsenic	77.7	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.33	LDLC51AK
Barium	3.3 B	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.30	LDLC51AL
Beryllium	ND	0.50 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.16	LDLC51AM
Cadmium	0.11 B	0.50 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.063	LDLC51AN
Calcium	534 J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 2.9	LDLC51AP
Chromium	2.4	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.31	LDLC51AQ
Cobalt	1.6 B	5.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.50	LDLC51AR
Copper	2.5	2.5 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.59	LDLC51AT
Iron	462 J	10.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 5.0	LDLC51AU
Lead	1.5	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 0.35	LDLC51AV
Magnesium	45.2 B,J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:19	06/01-06/03/09 MDL.....: 2.2	LDLC51AW

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URS Corporation

Client Sample ID: M29-R2-IMP1-3-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-007 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	14.0 J	1.5	ug	SW846 6010B	06/01-06/03/09	LDLC51AX
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.15	
Molybdenum	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LDLC51A0
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.65	
Nickel	2.2 B	4.0	ug	SW846 6010B	06/01-06/03/09	LDLC51A1
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.40	
Phosphorus	215 J	30.0	ug	SW846 6010B	06/01-06/03/09	LDLC51A2
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 1.9	
Selenium	89.8	1.0	ug	SW846 6010B	06/01-06/03/09	LDLC51A3
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.43	
Silver	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LDLC51A4
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.95	
Strontium	3.4 B	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC51A5
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.50	
Thallium	ND	3.5	ug	SW846 6010B	06/01-06/03/09	LDLC51AA
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.85	
Tin	27.0 J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLC51AC
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 1.0	
Titanium	2.5 B	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC51AD
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.50	
Vanadium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLC51AE
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.50	
Zinc	30.7	2.0	ug	SW846 6010B	06/01-06/03/09	LDLC51AF
		Dilution Factor: 1		Analysis Time..: 12:19	MDL.....: 0.45	
Prep Batch #...: 9153078						
Mercury	9.0	0.40	ug	SW846 7470A	06/03/09	LDLC51AG
		Dilution Factor: 2		Analysis Time..: 15:24	MDL.....: 0.12	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: M29-R2-IMP4-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-008 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153078						
Mercury	1.2	0.14	ug	SW846 7470A	06/03/09	LDLC71AA
		Dilution Factor: 0.7		Analysis Time..: 15:37	MDL.....: 0.042	

URS Corporation

Client Sample ID: M29-R2-IMP5+6-KMNO4

TOTAL Metals

Lot-Sample #...: H9E220301-009 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153080						
Mercury	2.1	0.17	ug	SW846 7470A	06/03/09	LDLC81AA
		Dilution Factor: 0.84		Analysis Time..: 15:54	MDL.....: 0.050	

URS Corporation

Client Sample ID: M29-R2-IMP5+6-HCL

TOTAL Metals

Lot-Sample #...: H9E220301-010 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153080						
Mercury	5.1	0.27	ug	SW846 7470A	06/03/09	LDLC91AA
		Dilution Factor: 1.35		Analysis Time..: 16:10	MDL.....: 0.081	

URS Corporation

Client Sample ID: M29-R3-PNR-0.1N NITRIC/FILTER

TOTAL Metals

Lot-Sample #...: H9E220301-011 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149322						
Aluminum	1700	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 8.7	LDLDA1AH
Antimony	38.6	6.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 0.85	LDLDA1AJ
Arsenic	298	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 0.35	LDLDA1AK
Barium	102	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 0.35	LDLDA1AL
Beryllium	3.8	0.50 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 0.16	LDLDA1AM
Cadmium	14.7	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 1.0	LDLDA1AN
Calcium	681 J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 3.3	LDLDA1AP
Chromium	23.5	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 0.31	LDLDA1AQ
Cobalt	16.0	5.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 0.50	LDLDA1AR
Copper	580	2.5 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 0.59	LDLDA1AT
Iron	4470	10.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 5.0	LDLDA1AU
Lead	820	2.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 2.0	LDLDA1AV
Magnesium	150 B,J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:21	06/01-06/03/09 MDL.....: 3.6	LDLDA1AW

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URS Corporation

Client Sample ID: M29-R3-PNR-0.1N NITRIC/FILTER

TOTAL Metals

Lot-Sample #...: H9E220301-011 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	18.6	1.5	ug	SW846 6010B	06/01-06/03/09	LDLDA1AX
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.15	
Molybdenum	58.7	4.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1A0
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.63	
Nickel	162	4.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1A1
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.44	
Phosphorus	1240	30.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1A2
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 1.9	
Selenium	22.1	1.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1A3
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.35	
Silver	3.2	2.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1A4
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.95	
Strontium	43.1	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1A5
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.50	
Thallium	74.1	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1AA
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 5.0	
Tin	53.6	10.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1AC
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 1.0	
Titanium	146	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1AD
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.50	
Vanadium	22.2	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1AE
		Dilution Factor: 1		Analysis Time..: 13:21	MDL.....: 0.50	
Zinc	1430 J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLDA1AF
		Dilution Factor: 5		Analysis Time..: 16:15	MDL.....: 1.2	
Prep Batch #...: 9153077						
Mercury	ND	0.20	ug	SW846 7470A	06/03/09	LDLDA1AG
		Dilution Factor: 1		Analysis Time..: 15:09	MDL.....: 0.060	

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: M29-R3-IMP1-3-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-012 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149323						
Aluminum	64.8	20.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AH
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 9.6	
Antimony	ND	6.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AJ
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.85	
Arsenic	110	1.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AK
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.33	
Barium	1.2 B	20.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AL
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.30	
Beryllium	ND	0.50	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AM
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.16	
Cadmium	0.10 B	0.50	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AN
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.063	
Calcium	443 B,J	500	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AP
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 2.9	
Chromium	17.2	1.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AQ
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.31	
Cobalt	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AR
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.50	
Copper	2.0 B	2.5	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AT
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.59	
Iron	106 J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AU
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 5.0	
Lead	0.56 B	1.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AV
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.35	
Magnesium	24.8 B,J	500	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AW
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 2.2	

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URS Corporation

Client Sample ID: M29-R3-IMP1-3-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-012 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	72.7 J	1.5	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AX
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.15	
Molybdenum	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1A0
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.65	
Nickel	10.1	4.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1A1
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.40	
Phosphorus	176 J	30.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1A2
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 1.9	
Selenium	120	1.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1A3
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.43	
Silver	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1A4
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.95	
Strontium	1.0 B	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1A5
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.50	
Thallium	ND	3.5	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AA
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.85	
Tin	15.0 J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AC
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 1.0	
Titanium	1.8 B	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AD
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.50	
Vanadium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AE
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.50	
Zinc	8.7	2.0	ug	SW846 6010B	06/01-06/03/09	LDLDJ1AF
		Dilution Factor: 1		Analysis Time..: 12:25	MDL.....: 0.45	
Prep Batch #...: 9153078						
Mercury	9.3	0.40	ug	SW846 7470A	06/03/09	LDLDJ1AG
		Dilution Factor: 2		Analysis Time..: 15:30	MDL.....: 0.12	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: M29-R3-IMP4-CONDENSATE

TOTAL Metals

Lot-Sample #...: H9E220301-013 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153078						
Mercury	2.0	0.14	ug	SW846 7470A	06/03/09	LDLDM1AA
		Dilution Factor: 0.7		Analysis Time..: 15:47	MDL.....: 0.042	

URS Corporation

Client Sample ID: M29-R3-IMP5+6-KMNO4

TOTAL Metals

Lot-Sample #...: H9E220301-014 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153080						
Mercury	5.3	0.13	ug	SW846 7470A	06/03/09	LDLDQ1AA
		Dilution Factor: 0.63		Analysis Time..: 15:59	MDL.....: 0.038	

URS Corporation

Client Sample ID: M29-R3-IMP5+6-HCL

TOTAL Metals

Lot-Sample #...: H9E220301-015 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153080						
Mercury	0.63	0.28	ug	SW846 7470A	06/03/09	LDLDV1AA
		Dilution Factor: 1.38		Analysis Time..: 16:15	MDL.....: 0.083	

URS Corporation

Client Sample ID: M29-BLANK-0.1N NITRIC

TOTAL Metals

Lot-Sample #...: H9E220301-016 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149322						
Aluminum	ND	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 8.7	LDLD01AH
Antimony	ND	6.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 0.85	LDLD01AJ
Arsenic	ND	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 0.35	LDLD01AK
Barium	ND	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 0.35	LDLD01AL
Beryllium	ND	0.50 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 0.16	LDLD01AM
Cadmium	ND	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 1.0	LDLD01AN
Calcium	**54.0 B,J**	**500** Dilution Factor: 1	ug	**SW846 6010B** Analysis Time..: 13:27	**06/01-06/03/09** MDL.....: 3.3	LDLD01AP
Chromium	ND	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 0.31	LDLD01AQ
Cobalt	ND	5.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 0.50	LDLD01AR
Copper	ND	2.5 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 0.59	LDLD01AT
Iron	ND	10.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 5.0	LDLD01AU
Lead	ND	2.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 13:27	06/01-06/03/09 MDL.....: 2.0	LDLD01AV
Magnesium	**11.5 B,J**	**500** Dilution Factor: 1	ug	**SW846 6010B** Analysis Time..: 13:27	**06/01-06/03/09** MDL.....: 3.6	LDLD01AW

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URS Corporation

Client Sample ID: M29-BLANK-0.1N NITRIC

TOTAL Metals

Lot-Sample #...: H9E220301-016 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	**0.18 B**	1.5	ug	SW846 6010B	06/01-06/03/09	LDLD01AX
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.15	
Molybdenum	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LDLD01A0
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.63	
Nickel	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LDLD01A1
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.44	
Phosphorus	ND	30.0	ug	SW846 6010B	06/01-06/03/09	LDLD01A2
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 1.9	
Selenium	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LDLD01A3
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.35	
Silver	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LDLD01A4
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.95	
Strontium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLD01A5
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.50	
Thallium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLD01AA
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 5.0	
Tin	ND	10.0	ug	SW846 6010B	06/01-06/03/09	LDLD01AC
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 1.0	
Titanium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLD01AD
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.50	
Vanadium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLD01AE
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.50	
Zinc	**0.60 B,J**	**2.0**	ug	**SW846 6010B**	**06/01-06/03/09**	**LDLD01AF**
		Dilution Factor: 1		Analysis Time..: 13:27	MDL.....: 0.23	
Prep Batch #...: 9153077						
Mercury	0.088 B,J	0.20	ug	SW846 7470A	06/03/09	LDLD01AG
		Dilution Factor: 1		Analysis Time..: 15:12	MDL.....: 0.060	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: M29-BLANK-NITRIC PEROXIDE

TOTAL Metals

Lot-Sample #...: H9E220301-017 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9149323						
Aluminum	ND	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 9.6	LDLD71AH
Antimony	ND	6.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.85	LDLD71AJ
Arsenic	ND	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.33	LDLD71AK
Barium	ND	20.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.30	LDLD71AL
Beryllium	ND	0.50 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.16	LDLD71AM
Cadmium	ND	0.50 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.063	LDLD71AN
Calcium	59.4 B,J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 2.9	LDLD71AP
Chromium	ND	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.31	LDLD71AQ
Cobalt	ND	5.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.50	LDLD71AR
Copper	ND	2.5 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.59	LDLD71AT
Iron	ND	10.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 5.0	LDLD71AU
Lead	ND	1.0 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 0.35	LDLD71AV
Magnesium	12.4 B,J	500 Dilution Factor: 1	ug	SW846 6010B Analysis Time..: 12:32	06/01-06/03/09 MDL.....: 2.2	LDLD71AW

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URS Corporation

Client Sample ID: M29-BLANK-NITRIC PEROXIDE

TOTAL Metals

Lot-Sample #...: H9E220301-017 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Manganese	0.42 B,J	1.5	ug	SW846 6010B	06/01-06/03/09	LDLD71AX
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.15	
Molybdenum	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LDLD71A0
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.65	
Nickel	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LDLD71A1
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.40	
Phosphorus	7.7 B,J	30.0	ug	SW846 6010B	06/01-06/03/09	LDLD71A2
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 1.9	
Selenium	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LDLD71A3
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.43	
Silver	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LDLD71A4
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.95	
Strontium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLD71A5
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.50	
Thallium	ND	3.5	ug	SW846 6010B	06/01-06/03/09	LDLD71AA
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.85	
Tin	9.2 B,J	10.0	ug	SW846 6010B	06/01-06/03/09	LDLD71AC
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 1.0	
Titanium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLD71AD
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.50	
Vanadium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LDLD71AE
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.50	
Zinc	0.77 B	2.0	ug	SW846 6010B	06/01-06/03/09	LDLD71AF
		Dilution Factor: 1		Analysis Time..: 12:32	MDL.....: 0.45	
Prep Batch #...: 9153078						
Mercury	0.12 B	0.40	ug	SW846 7470A	06/03/09	LDLD71AG
		Dilution Factor: 2		Analysis Time..: 15:33	MDL.....: 0.12	

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: M29-BLANK-KMNO4+H2SO4

TOTAL Metals

Lot-Sample #...: H9E220301-018 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9153080						
Mercury	ND	0.030	ug	SW846 7470A	06/03/09	LDLD81AA
		Dilution Factor: 0.15		Analysis Time..: 16:01	MDL.....: 0.0090	

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H9E220301 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H9E290000-322 Prep Batch #...: 9149322						
Aluminum	ND	20.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AA
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Antimony	ND	6.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AC
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Arsenic	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AD
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Barium	ND	20.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AE
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Beryllium	ND	0.50	ug	SW846 6010B	06/01-06/03/09	LD1CP1AF
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Cadmium	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AG
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Calcium	32.1 B	500	ug	SW846 6010B	06/01-06/03/09	LD1CP1AH
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Chromium	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AJ
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Cobalt	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AK
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Copper	ND	2.5	ug	SW846 6010B	06/01-06/03/09	LD1CP1AL
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Iron	ND	10.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AM
		Dilution Factor: 1				
		Analysis Time..: 11:18				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H9E220301 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Lead	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AN
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Magnesium	10 B	500	ug	SW846 6010B	06/01-06/03/09	LD1CP1AP
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Manganese	ND	1.5	ug	SW846 6010B	06/01-06/03/09	LD1CP1AQ
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Molybdenum	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AR
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Nickel	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AT
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Phosphorus	ND	30.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AU
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Selenium	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AV
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Silver	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AW
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Strontium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1AX
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Thallium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1A0
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Tin	ND	10.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1A1
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Titanium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1A2
		Dilution Factor: 1				
		Analysis Time..: 11:18				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H9E220301 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Vanadium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1A3
		Dilution Factor: 1				
		Analysis Time..: 11:18				
Zinc	0.36 B	2.0	ug	SW846 6010B	06/01-06/03/09	LD1CP1A4
		Dilution Factor: 1				
		Analysis Time..: 11:18				

MB Lot-Sample #: H9E290000-323 Prep Batch #...: 9149323

Aluminum	ND	20.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AA
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Antimony	ND	6.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AC
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Arsenic	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AD
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Barium	ND	20.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AE
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Beryllium	ND	0.50	ug	SW846 6010B	06/01-06/03/09	LD1CW1AF
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Cadmium	ND	0.50	ug	SW846 6010B	06/01-06/03/09	LD1CW1AG
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Calcium	42.8 B	500	ug	SW846 6010B	06/01-06/03/09	LD1CW1AH
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Chromium	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AJ
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Cobalt	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AK
		Dilution Factor: 1				
		Analysis Time..: 10:59				

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METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H9E220301 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Copper	ND	2.5	ug	SW846 6010B	06/01-06/03/09	LD1CW1AL
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Iron	7.9 B	10.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AM
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Lead	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AN
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Magnesium	13.3 B	500	ug	SW846 6010B	06/01-06/03/09	LD1CW1AP
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Manganese	0.28 B	1.5	ug	SW846 6010B	06/01-06/03/09	LD1CW1AQ
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Molybdenum	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AR
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Nickel	ND	4.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AT
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Phosphorus	14.0 B	30.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AU
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Selenium	ND	1.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AV
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Silver	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AW
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Strontium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1AX
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Thallium	ND	3.5	ug	SW846 6010B	06/01-06/03/09	LD1CW1A0
		Dilution Factor: 1				
		Analysis Time..: 10:59				

(Continued on next page)

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H9E220301 Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Tin	25.8	10.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1A1
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Titanium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1A2
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Vanadium	ND	5.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1A3
		Dilution Factor: 1				
		Analysis Time..: 10:59				
Zinc	ND	2.0	ug	SW846 6010B	06/01-06/03/09	LD1CW1A4
		Dilution Factor: 1				
		Analysis Time..: 10:59				
MB Lot-Sample #: H9F020000-077 Prep Batch #...: 9153077						
Mercury	0.082 B	0.20	ug	SW846 7470A	06/03/09	LD5T01AA
		Dilution Factor: 1				
		Analysis Time..: 14:56				
MB Lot-Sample #: H9F020000-078 Prep Batch #...: 9153078						
Mercury	ND	0.40	ug	SW846 7470A	06/03/09	LD5T31AA
		Dilution Factor: 2				
		Analysis Time..: 15:13				
Mercury	ND	0.20	ug	SW846 7470A	06/03/09	LD5T31AD
		Dilution Factor: 1				
		Analysis Time..: 15:13				
MB Lot-Sample #: H9F020000-080 Prep Batch #...: 9153080						
Mercury	ND	0.050	ug	SW846 7470A	06/03/09	LD5T61AA
		Dilution Factor: 0.25				
		Analysis Time..: 15:48				
Mercury	ND	0.020	ug	SW846 7470A	06/03/09	LD5T61AD
		Dilution Factor: 0.1				
		Analysis Time..: 15:48				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

B Estimated result. Result is less than RL.

Original Chain of Custody Documentation

HGE: 220311

URS

Chain of Custody Record

M26a Train Samples

Project	HNCC Vent 9
Site	Franklin Furnace
Project Number	39400492
Prepared by	T. Brado

Sample	Sample Matrix	Date/Time	Target Compounds: HCL, Halides, Halogens, Clorides			Blank	Analyze - EPA Method 26a T	Shipping Container Number	Comments
M5/26a-R1-Imp1-3	0.1n H2SO4	5/19/2009 1215	x				x	1	
M5/26a-R1-Imp4+5	0.1n NaOH	5/19/2009 1215	x				x	1	
M5/26a-R2-Imp1-3	0.1n H2SO4	5/19/2009 1530	x				x	1	
M5/26a-R2-Imp4+5	0.1n NaOH	5/19/2009 1530	x				x	1	
M5/26a-R3-Imp1-3	0.1n H2SO4	5/19/2009 1930	x				x	1	
M5/26a-R3-Imp4+5	0.1n NaOH	5/19/09 1930	x				x	1	
M5/26a-Blank-0.1n H2SO4	0.1n H2SO4	5/19/09 1700	x				x	1	
M5/26a-Blank-0.1n NaOH	0.1n NaOH	5/19/09 1700	x				x	1	
M5/26a-Blank-D.I. Water	D.I. H20	5/19/09 1700	x				x	1	

HCL

Remarks: See Test Plan for Analyte List

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
T. Brado	5/22/09	1300	Ryan Henry	5/22/09	1300			
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Laboratory by	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

REC. AT AMBIENT
NO CUSTODY SEAL
1 COOLER RH 5/22/09
HAND DELIVERED

SAMPLE SUMMARY

H9E220311

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
LDLHM	001	M5/26A-R1-IMP1-3	05/19/09	12:15
LDLHX	002	M5/26A-R1-IMP4+5	05/19/09	12:15
LDLH3	003	M5/26A-R2-IMP1-3	05/19/09	15:30
LDLH6	004	M5/26A-R2-IMP4+5	05/19/09	15:30
LDLH8	005	M5/26A-R3-IMP1-3	05/19/09	19:30
LDLJA	006	M5/26A-R3-IMP4+5	05/19/09	19:30
LDLJJ	007	M5/26A-BLANK-0.1N H2SO4	05/19/09	17:00
LDLJT	008	M5/26A-BLANK-0.1N NAOH	05/19/09	17:00
LDLJ1	009	M5/26A-BLANK-D.I.WATER	05/19/09	17:00

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

URS Corporation

Client Sample ID: M5/26A-R1-IMP1-3

General Chemistry

Lot-Sample #...: H9E220311-001 Work Order #...: LDLHM Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride	250000	27800	ug	KNOX 0050/26A Mod	06/03/09	9155121

Dilution Factor: 277675.8 MDL.....: 11700

URS Corporation

Client Sample ID: M5/26A-R1-IMP4+5

General Chemistry

Lot-Sample #...: H9E220311-002 **Work Order #...:** LDLHX **Matrix.....:** AIR
Date Sampled...: 05/19/09 **Date Received..:** 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine	2720	230	ug	KNOX 0050/26A Mod	06/02/09	9153423

Dilution Factor: 2300 MDL.....: 96.6

URS Corporation

Client Sample ID: M5/26A-R2-IMP1-3

General Chemistry

Lot-Sample #...: H9E220311-003 Work Order #...: LDLH3 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride	232000	26700	ug	KNOX 0050/26A Mod	06/03/09	9155121

Dilution Factor: 267391.5 MDL.....: 11200

URS Corporation

Client Sample ID: M5/26A-R2-IMP4+5

General Chemistry

Lot-Sample #...: H9E220311-004 Work Order #...: LDLH6 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine	5590	650	ug	KNOX 0050/26A Mod	06/02/09	9153423

Dilution Factor: 6500 MDL.....: 273

URS Corporation

Client Sample ID: M5/26A-R3-IMP1-3

General Chemistry

Lot-Sample #...: H9E220311-005 Work Order #...: LDLH8 Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride	198000	23700	ug	KNOX 0050/26A Mod	06/03/09	9155121

Dilution Factor: 236538.7 MDL.....: 9930

URS Corporation

Client Sample ID: M5/26A-R3-IMP4+5

General Chemistry

Lot-Sample #...: H9E220311-006 Work Order #...: LDLJA Matrix.....: AIR
Date Sampled...: 05/19/09 Date Received..: 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine	4880	520	ug	KNOX 0050/26A Mod	06/02/09	9153423

Dilution Factor: 5200 MDL.....: 218

URS Corporation

Client Sample ID: M5/26A-BLANK-0.1N H2SO4

General Chemistry

Lot-Sample #...: H9E220311-007 **Work Order #...:** LDLJJ **Matrix.....:** AIR
Date Sampled...: 05/19/09 **Date Received..:** 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride	ND	103	ug	KNOX 0050/26A Mod	06/03/09	9155121

Dilution Factor: 1028.43 MDL.....: 43.2

URS Corporation

Client Sample ID: M5/26A-BLANK-0.1N NAOH

General Chemistry

Lot-Sample #...: H9E220311-008 **Work Order #...:** LDLJT **Matrix.....:** AIR
Date Sampled...: 05/19/09 **Date Received..:** 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine	ND	100	ug	KNOX 0050/26A Mod	06/02/09	9153423

Dilution Factor: 1000 MDL.....: 42.0

URS Corporation

Client Sample ID: M5/26A-BLANK-D.I.WATER

General Chemistry

Lot-Sample #...: H9E220311-009 **Work Order #...:** LDLJ1 **Matrix.....:** AIR
Date Sampled...: 05/19/09 **Date Received..:** 05/22/09

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Hydrogen chloride	ND	103	ug	KNOX 0050/26A Mod	06/03/09	9155121

Dilution Factor: 1028.43 MDL.....: 43.2

METHOD BLANK REPORT

General Chemistry

Client Lot #...: H9E220311 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine		Work Order #: LD97L1AA		MB Lot-Sample #:	H9F020000-423	
	ND	10.0	ug	KNOX 0050/26A Mod	06/02/09	9153423
		Dilution Factor: 100				
Hydrogen chloride		Work Order #: LD97M1AA		MB Lot-Sample #:	H9F040000-121	
	ND	10.3	ug	KNOX 0050/26A Mod	06/03/09	9155121
		Dilution Factor: 102.8				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: H9E220311 **Matrix.....:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine		WO#:LD97L1AC-LCS/LD97L1AD-LCSD LCS Lot-Sample#: H9F020000-423					
	95	(90 - 110)			KNOX 0050/26A Mod	06/02/09	9153423
	95	(90 - 110)	0.02	(0-20)	KNOX 0050/26A Mod	06/02/09	9153423
		Dilution Factor: 100					
Hydrogen chloride		WO#:LD97M1AC-LCS/LD97M1AD-LCSD LCS Lot-Sample#: H9F040000-121					
	94	(90 - 110)			KNOX 0050/26A Mod	06/03/09	9155121
	94	(90 - 110)	0.0	(0-20)	KNOX 0050/26A Mod	06/03/09	9155121
		Dilution Factor: 102.8					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: H9E220311 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine		WO#:LD97L1AC-LCS/LD97L1AD-LCSD				LCS Lot-Sample#: H9F020000-423		
	75.0	71.6	ug	95		KNOX 0050/26A Mod	06/02/09	9153423
	75.0	71.6	ug	95	0.02	KNOX 0050/26A Mod	06/02/09	9153423
		Dilution Factor: 100						
Hydrogen chloride		WO#:LD97M1AC-LCS/LD97M1AD-LCSD				LCS Lot-Sample#: H9F040000-121		
	77.1	72.7	ug	94		KNOX 0050/26A Mod	06/03/09	9155121
	77.1	72.7	ug	94	0.0	KNOX 0050/26A Mod	06/03/09	9155121
		Dilution Factor: 102.8						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: H9E220311 **Matrix.....:** AIR
Date Sampled...: 05/19/09 **Date Received..:** 05/22/09

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine		WO#: LDLH61AC-MS/LDLH61AD-MSD MS Lot-Sample #: H9E220311-004					
	82	(75 - 125)			KNOX 0050/26A Mod	06/02/09	9153423
	94	(75 - 125)	2.3	(0-20)	KNOX 0050/26A Mod	06/02/09	9153423
		Dilution Factor: 6500					
Hydrogen chloride		WO#: LDLH31AC-MS/LDLH31AD-MSD MS Lot-Sample #: H9E220311-003					
	93	(75 - 125)			KNOX 0050/26A Mod	06/03/09	9155121
	84	(75 - 125)	1.7	(0-20)	KNOX 0050/26A Mod	06/03/09	9155121
		Dilution Factor: 26739					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: H9E220311 **Matrix.....:** AIR
Date Sampled...: 05/19/09 **Date Received..:** 05/22/09

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Chlorine			WO#: LDLH61AC-MS/LDLH61AD-MSD				MS Lot-Sample #: H9E220311-004		
	5590	1300	6660	ug	82		KNOX 0050/26A	06/02/09	9153423
	5590	1300	6810	ug	94	2.3	KNOX 0050/26A	06/02/09	9153423
			Dilution Factor: 6500						
Hydrogen chloride			WO#: LDLH31AC-MS/LDLH31AD-MSD				MS Lot-Sample #: H9E220311-003		
	232000	53500	282000	ug	93		KNOX 0050/26A	06/03/09	9155121
	232000	53500	277000	ug	84	1.7	KNOX 0050/26A	06/03/09	9155121
			Dilution Factor: 26739						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Appendix D

CALIBRATION INFORMATION

URS

CALC. NO. _____

CALCULATION SHEET

SIGNATURE _____ DATE 5/19/09 CHECKED _____ DATE 5/19/09

PROJECT _____ JOB NO. _____

SUBJECT Haverhill vent Stack SHEET 1 OF 2 SHEETS

Direct cals

	Time	CO2	O2	SO2
Zero	07:13	0.0	0.0	
O2/CO2	07:16	19.01	20.98	
O2/CO2	07:34	12.62	9.94	0.48
SO2	07:37			451.29
SO2	07:40			999.48

System cal

	Time	CO2	O2	SO2
~~Zero~~				
O2/CO2	07:45	12.54	9.94	0.74
SO2	07:49	0.02	0.0	449.94

Bias check R1

	Time	CO2	O2	SO2
O2/CO2	12:13	12:46	10.10	
SO2	12:26			454.80
Zero	12:21	0.01	0.43	5.94

Sample pump off line 13:54 – 14:11

Bias check

>	Time	CO2	O2	SO2
Zero		0.02	0.29	
O2/CO2		12.29	9.57	13.62
SO2				

Cem gas conditioner stopped up – bypassed secondary side and checked bias

	Time	CO2	O2	SO2
Zero	16:27	0.02	0.54	5.80
O2/CO2	16:29	12.45	10.08	3.38
SO2	16:32			427.68

URS

CALC. NO. _____

CALCULATION SHEET

SIGNATURE _____ DATE 5/19/09 CHECKED _____ DATE 5/19/09

PROJECT _____ JOB NO. _____

SUBJECT Haverhill Vent Stack SHEET 2 OF 2 SHEETS

Calgass

		CO2	O2	SO2
17:46	zero			
17:47	Zero	0.04	0.41	
17:50	O2/CO2	12.36	16.09	3.48
17:55				416.51

17:58 on line

18:16 off line sample condition freezing up

URS

RESPONSE TIME TEST

Date of Test: May 19, 2009

Facility / Location Haverhill Vent Stack

Analyzer Type: O_2

Span Gas Concentration: 20.95

Analyzer Span Setting: 25

UPSCALE RESPONSE			
	Start	95% Response	Time (sec)
1	0.0	19.9	31.94
2	0.0	19.9	31.54
3	0.0	19.9	31.68
Average Upscale Response			31.72

DOWNSCALE RESPONSE			
	Start	95% Response	Time (sec)
1	19.9	1.0	31.63
2	19.9	1.0	31.87
3	19.9	1.0	31.41
Average Downscale Response			31.64

UPSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable zero to stack gas.

DOWNSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable high-level cal to stack gas.

RESPONSE TIME = The longer of the two mean times.

URS

RESPONSE TIME TEST

Date of Test: May 19, 2009

Facility / Location Haverhill Vent Stack

Analyzer Type: CO_2

Span Gas Concentration: 18.97

Analyzer Span Setting: 25

UPSCALE RESPONSE			
	Start	95% Response	Time (sec)
1	0.0	18.0	31.94
2	0.0	18.0	31.54
3	0.0	18.0	31.68
Average Upscale Response			31.72

DOWNSCALE RESPONSE			
	Start	95% Response	Time (sec)
1	18.0	0.9	31.63
2	18.0	0.9	31.87
3	18.0	0.9	31.41
Average Downscale Response			31.64

UPSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable zero to stack gas.

DOWNSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable high-level cal to stack gas.

RESPONSE TIME = The longer of the two mean times.

URS

RESPONSE TIME TEST

Date of Test: May 19, 2009

Facility / Location Haverhill Vent Stack

Analyzer Type: SO_2

Span Gas Concentration: 998

Analyzer Span Setting: 1000

UPSCALE RESPONSE			
	Start	95% Response	Time (sec)
1	0.0	948.1	47.76
2	0.0	948.1	48.57
3	0.0	948.1	48.23
Average Upscale Response			48.19

DOWNSCALE RESPONSE			
	Start	95% Response	Time (sec)
1	948.1	49.9	48.12
2	948.1	49.9	48.07
3	948.1	49.9	49.02
Average Downscale Response			48.40

UPSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable zero to stack gas.

DOWNSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable high-level cal to stack gas.

RESPONSE TIME = The longer of the two mean times.

AIR LIQUIDE | Air Liquide America Specialty Gases LLC | SCOTT™

RATA CLASS

Dual-Analyzed Calibration Standard

6141 EASTON ROAD, BLDG 1, PLUMSTEADVILLE, PA 18949-0310 Phone: 800-331-4953 Fax: 215-766-7226

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
6141 EASTON ROAD, BLDG 1
PLUMSTEADVILLE, PA 18949-0310

P.O. No.: ALAS-47490
Project No.: 01-02472-002

Customer

AIR LIQUIDE AMERICA L.P

1001 ALVIN WEINBERG DRIVE
OAK RIDGE TN 37830-8012

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC155593 **Certification Date:** 11Apr2009 **Exp. Date:** 10Apr2012
Cylinder Pressure*:** 2010 PSIG **Batch No:** 01-91016

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
SULFUR DIOXIDE *	998	PPM	+/- 1%	Direct NIST and NMi
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Prot

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1662	15May2010	KAL003173	975.0 PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//000928781	02Apr2009	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

SULFUR DIOXIDE *

First Triad Analysis

Date: 04Apr2009 Response Unit:PPM

Z1=-0.34000	R1=975.4073	T1=998.7147
R2=975.9840	Z2=0.27212	T2=999.5731
Z3=0.85990	T3=999.6768	R3=976.9236

Avg. Concentration: 998.2 PPM

Second Triad Analysis

Date: 11Apr2009 Response Unit: PPM

Z1=-0.23441	R1=974.3050	T1=998.0539
R2=974.6436	Z2=0.17148	T2=998.2387
Z3=0.33616	T3=998.5874	R3=975.1186

Avg. Concentration: 998.6 PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4

r=9.99999E-1

Constants:	A=0.00000E+0
B=1.00004E+0	C=4.00000E-6
D=0.00000E+0	E=0.00000E+0

APPROVED BY: James M. Lunger

AIR LIQUIDE Air Liquide America Specialty Gases LLC | Scott™

RATA CLASS

Dual-Analyzed Calibration Standard

500 WEAVER PARK RD, LONGMONT, CO 80501 Phone: 888-253-1635 Fax: 303-772-7673

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
500 WEAVER PARK RD
LONGMONT, CO 80501

P.O. No.: ALAS-47490
Project No.: 08-75571-001

Customer

AIR LIQUIDE AMERICA L.P

1001 ALVIN WEINBERG DRIVE
OAK RIDGE TN 37830-8012

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM017179 **Certification Date:** 19Feb2009 **Exp. Date:** 19Feb2011
Cylinder Pressure*:** 2000 PSIG **Prev Certification Date:** 09Oct2007

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
SULFUR DIOXIDE *	451	PPM	+/- 1%	Direct NIST and NMi
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Prot

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1661	05Jun2012	KAL004415	501.3 PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//1602651	11Feb2009	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

SULFUR DIOXIDE *

First Triad Analysis

Date: 09Oct2007 Response Unit:PPM

Z1=0.00000	R1=508.8380	T1=453.3856
R2=509.0606	Z2=0.09308	T2=454.0219
Z3=0.11151	T3=454.2509	R3=509.0898

Avg. Concentration: 451.6 PPM

Second Triad Analysis

Date: 19Feb2009 Response Unit: PPM

Z1=-0.32464	R1=503.5780	T1=452.4061
R2=503.9299	Z2=-0.27055	T2=452.8616
Z3=-0.20779	T3=452.9942	R3=503.9357

Avg. Concentration: 450.5 PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99995E-1

Constants:	A=0.00000E+0
B=9.95063E-1	C=3.00000E-6
D=0.00000E+0	E=0.00000E+0

APPROVED BY: JW
Jon Witzak

Airgas

Airgas Specialty Gases
12722 S. Wentworth Avenue
Chicago, IL 60628
1-773-785-3000
FAX: 1-773-785-1928
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI60E15A1968	Reference Number:	54-124119942-2
Cylinder Number:	CC144573	Cylinder Volume:	159 Cu.Ft.
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
Analysis Date:	Dec 28, 2007	Valve Outlet:	590

Expiration Date: Dec 28, 2010

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON DIOXIDE	18.00 %	18.07 %	G1	+/- 1% NIST Traceable
OXYGEN	21.00 %	20.95 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	60608	CC206134	22.51% OXYGEN/NITROGEN	May 01, 2010
NTRM	101705	SG9169340BAL	17.89% CARBON DIOXIDE/	May 01, 2010

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA 510	NDIR	Dec 03, 2007
CAI-110	Paramagnetic	Dec 03, 2007

Triad Data Available Upon Request

Notes:

QA Approval

Airgas

Airgas Specialty Gases
12722 S. Wentworth Avenue
Chicago, IL 60628
1-773-785-3000
FAX: 1-773-785-1928
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI77E15A01N3	Reference Number:	54-124154172-1
Cylinder Number:	CC2603	Cylinder Volume:	153 Cu.Ft.
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
Analysis Date:	Oct 09, 2008	Valve Outlet:	590

Expiration Date: Oct 09, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Results of Method	Total Relative Uncertainty
OXYGEN	10.00 %	9.980 %	G1	1% NIST Traceable
CARBON DIOXIDE	12.50 %	12.43 %	G1	1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM/CO2	080806	SG9161059BAL	15.862% CARBON DIOXIDE/	May 01, 2010
NTRM/O2	82658	SG9168304BAL	16.04% OXYGEN/	Jan 01, 2010

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA 510	NDIR	Oct 08, 2008
(P-1) CAI-110	Paramagnetic	Oct 08, 2008

Triad Data Available Upon Request

Notes:

B. Galvan

QA Approval

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	V	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	68
CALIBRATION STANDARD ID:	361815	AMBIENT PRESSURE (In Hg):	30.09
DATE CALIBRATED:	5/13/2009	Secondary Standard Correction Factor	0.9941

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3)	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Vd
0.5	5	4.971	5.228
1.0	5	4.971	5.251
2.0	10	9.941	10.578
3.0	10	9.941	10.665
4.0	10	9.941	10.691

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
68.0	71.0
69.0	74.0
70.0	78.0
70.0	82.0
71.0	85.0

CALCULATIONS

Time (min)	Gamma (Y)	Delta H@
13.06	0.9550	1.9093
9.10	0.9532	1.8505
12.56	0.9493	1.7561
10.26	0.9463	1.7448
9.06	0.9451	1.8109
	Avg Y	Avg Delta H@
	0.9498	1.8143
	0.9298	1.6143
Tolerances	0.9698	2.0143

Y - Ratio of Accuracy of Wet Test Meter Tolerance = +/- 0.02

Delta H@ - Orifice Pressure Differential that Yields 0.75 CFM

Is Unit Within Calibration Tolerances? YES

Calibrator: _____ Date: 5-13-09

Approved by: _____ Date: 5-15-09

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	V	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	74
CALIBRATION STANDARD ID:	361815	AMBIENT PRESSURE (in Hg):	30.04
DATE CALIBRATED:	6/3/2009	Secondary Standard Correction Factor	0.9941

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3)	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Vd
0.5	6	5.965	6.321
1.0	5	4.971	5.294
2.0	10	9.941	10.622
3.0	11	10.935	11.680
4.0	10	9.941	10.631

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
74.0	82.0
75.0	83.0
75.0	86.0
75.0	89.0
76.0	91.0

CALCULATIONS

Time (min)	Gamma (Y)	Delta H@
15.50	0.9566	1.8746
9.16	0.9506	1.8644
13.06	0.9505	1.9095
11.25	0.9537	1.7469
9.01	0.9519	1.8080
	Avg Y	Avg Delta H@
	0.9527	1.8407
	0.9327	1.6407
Tolerances	0.9727	2.0407

Y - Ratio of Accuracy of Wet Test Meter Tolerance = +/- 0.02

Delta H@ - Orifice Pressure Differential that Yields 0.75 CFM

Is Unit Within Calibration Tolerances? YES

Calibrator: _____ Date: 6-3-09

Approved by: _____ Date: 6/4/09

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	URS 001	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	68
CALIBRATION STANDARD ID:	361815	AMBIENT PRESSURE (In Hg):	30.09
DATE CALIBRATED:	5/13/2009	Secondary Standard Correction Factor	0.9941

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3)	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Vd
0.5	5	4.971	5.102
1.0	5	4.971	5.146
2.0	10	9.941	10.431
3.0	10	9.941	10.498
4.0	10	9.941	10.557

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
64.0	65.0
64.0	67.0
64.0	71.0
64.0	74.0
64.0	76.0

CALCULATIONS

Time (min)	Gamma (Y)	Delta H@
12.52	0.9749	1.7479
9.05	0.9691	1.8196
12.55	0.9611	1.7365
10.30	0.9580	1.7446
9.04	0.9539	1.7851
	Avg Y	Avg Delta H@
	0.9634	1.7667
	0.9434	1.5667
Tolerances	0.9834	1.9667

Y - Ratio of Accuracy of Wet Test Meter Tolerance = +/- 0.02

Delta H@ - Orifice Pressure Differential that Yields 0.75 CFM

Is Unit Within Calibration Tolerances? YES

Calibrator: R D Raymond Date: 5-13-09

Approved by: Michael Mowry Date: 5-15-09

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	URS 001	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	73
CALIBRATION STANDARD ID:	361815	AMBIENT PRESSURE (In Hg):	30.09
DATE CALIBRATED:	7/15/2009	Secondary Standard Correction Factor	0.9941

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3)	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Vd
0.5	5	4.971	5.118
1.0	5	4.971	5.171
2.0	10	9.941	10.439
3.0	10	9.941	10.495
4.0	10	9.941	10.538

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
75.0	79.0
75.0	80.0
75.0	83.0
75.0	85.0
75.0	86.0

CALCULATIONS

Time (min)	Gamma (Y)	Delta H@
13.08	0.9772	1.9371
9.07	0.9678	1.8594
12.39	0.9618	1.7253
10.20	0.9579	1.7475
9.01	0.9534	1.8147
	Avg Y	Avg Delta H@
	0.9636	1.8168
	0.9436	1.6168
Tolerances	0.9836	2.0168

Y - Ratio of Accuracy of Wet Test Meter Tolerance = +/- 0.02

Delta H@ - Orifice Pressure Differential that Yields 0.75 CFM

Is Unit Within Calibration Tolerances? YES

Calibrator: _____ Date: 7-15-09

Approved by: _____ Date: 7/16/09

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	URS 002	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	68
CALIBRATION STANDARD ID:	361815	AMBIENT PRESSURE (In Hg):	30.1
DATE CALIBRATED:	5/15/2009	Secondary Standard Correction Factor	0.9941

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3)	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Vd
0.5	5	4.971	4.970
1.0	5	4.971	5.048
2.0	10	9.941	10.195
3.0	10	9.941	10.257
4.0	10	9.941	10.313

TEMPERATURE

Calibrator Temperature (F) Tw		Average DGM (F) Td
63.0		68.0
64.0		70.0
64.0		74.0
65.0		76.0
65.0		79.0

CALCULATIONS

Time (min)	Gamma (Y)	Delta H@
12.55	1.0084	1.7391
8.57	0.9935	1.6220
13.05	0.9889	1.8664
10.56	0.9823	1.8333
9.1	0.9801	1.8051
	Avg Y	Avg Delta H@
	0.9906	1.7732
	0.9706	1.5732
Tolerances	1.0106	1.9732

Y - Ratio of Accuracy of Wet Test Meter Tolerance = +/- 0.02

Delta H@ - Orifice Pressure Differential that Yields 0.75 CFM

Is Unit Within Calibration Tolerances? YES

Calibrator: _____ Date: 5-15-09

Approved by: _____ Date: 5-15-09

THERMOCOUPLE READOUT CALIBRATION DATA FORM
(FOR K-TYPE THERMOCOUPLES)

Control Box / Thermocouple Readout Number:	URS 002		Calibrated By:	R. Raymond
Ambient Temperature:	70	°F	Date:	6/15/2009
Omega Engineering Calibrator	Model No.	22 TC	Serial #'s	174470

Primary Standards Directly Traceable t National Institute of Standards and Technology (NIST)

Reference[a] Source Temperature, (°F)	Test Thermometer Temperature, (°F)	Temperature Difference, %
0	0	0.00
200	200	0.00
400	397	0.35
600	600	0.00
1000	1001	0.07
1200	1200	0.00

Are all the Thermocouple Readout calibration points within calibration standard of <= to 1.5 %? **Yes**

$$\frac{(\text{Ref. Temp., oF} + 460) - (\text{Test Therm. Temp., oF} + 460)}{\text{Ref. Temp., oF} + 460} * 100 <= 1.5\ \%$$

Calibrator Signature: _____ Date: 6/15/2009

Approval Signature: _____ Date: 6/17/09

THERMOCOUPLE READOUT CALIBRATION DATA FORM
(FOR K-TYPE THERMOCOUPLES)

Control Box / Thermocouple Readout Number:	URS 001		Calibrated By:	R. Raymond
Ambient Temperature:	72	°F	Date:	6/15/2009
Omega Engineering Calibrator	Model No.	22 TC	Serial #'s	174470

Primary Standards Directly Traceable t National Institute of Standards and Technology (NIST)

Reference[a] Source Temperature, (°F)	Test Thermometer Temperature, (°F)	Temperature Difference, %
0	0	0.00
200	201	0.15
400	397	0.35
600	600	0.00
1000	1001	0.07
1200	1199	0.06

Are all the Thermocouple Readout calibration points within calibration standard of <= to 1.5 %? **Yes**

$$\frac{(\text{Ref. Temp., oF} + 460) - (\text{Test Therm. Temp., oF} + 460)}{\text{Ref. Temp., oF} + 460} * 100 <= 1.5\ \%$$

Calibrator Signature: _____ Date: 6/15/2009

Approval Signature: _____ Date: 6/17/09

THERMOCOUPLE READOUT CALIBRATION DATA FORM
(FOR K-TYPE THERMOCOUPLES)

Control Box / Thermocouple Readout Number: V

Calibrated By: R. Raymond

Ambient Temperature: 70 °F

Date: 6/12/2009

Omega Engineering Calibrator Model No. 22 TC

Serial #'s 174470

Primary Standards Directly Traceable t National Institute of Standards and Technology (NIST)

Reference[a] Source Temperature, (°F)	Test Thermometer Temperature, (°F)	Temperature Difference, %
0	1	0.22
200	200	0.00
400	399	0.12
600	600	0.00
1000	999	0.07
1200	1199	0.06

Are all the Thermocouple Readout calibration points within calibration standard of <= to 1.5 %? Yes

$$\frac{(\text{Ref. Temp., oF} + 460) - (\text{Test Therm. Temp., oF} + 460)}{\text{Ref. Temp., oF} + 460} * 100 <= 1.5\ \%$$

Calibrator Signature: _____ Date: 6/12/2009

Approval Signature: _____ Date: 6/17/09

URS TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? x yes _____ no

Pitot tube openings damaged? _____ yes (explain below) x no

a_1 = 0 ° (<10°), a_2 = 1 ° (<10°) z = A sin γ = 0.000 (in.); (<0.125 in.)

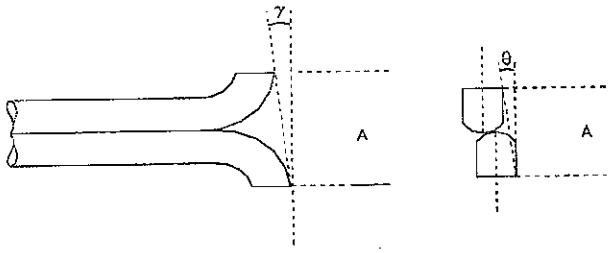
b_1 = 0 ° (<5°), b_2 = 0 ° (<5°) w = A sin θ = 0.000 (in.); (<0.03125 in.)

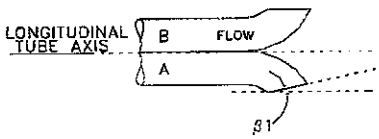
γ = 0 °, θ = 0 °, A = 0.979 (in.) P_A = 0.36 (in.), P_B = 0.36 (in.), D_t = 0.911

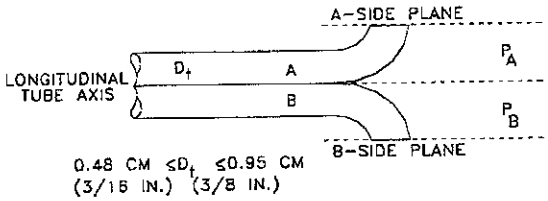
Comments: _____

Does the calibration meet Method 2 construction requirements for use at 0.84 coefficient? **Yes**

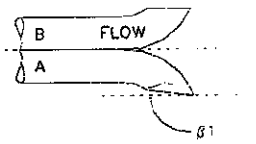
Pitot Tube No.: AQS AC6 002 Date: 6/22/2009 Name: R. Raymond

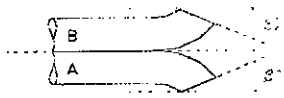


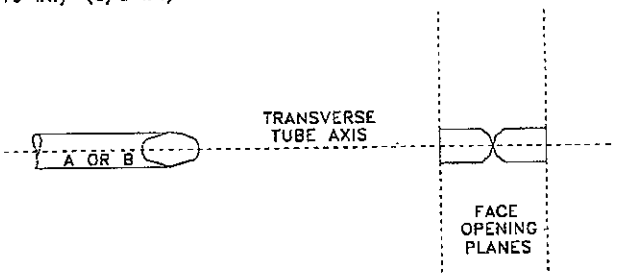


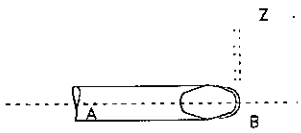


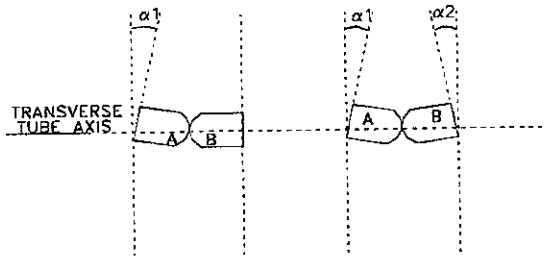
NOTE:
1.05 D_t<P_t <1.50 D
P_A = P_B

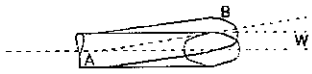












URS TYPE S PITOT TUBE INSPECTION DATA FORM

Pitot tube assembly level? x yes _____ no

Pitot tube openings damaged? _____ yes (explain below) x no

a_1 = 1 ° (<10°), a_2 = 0 ° (<10°) z = A sin γ = 0.000 (in.); (<0.125 in.)

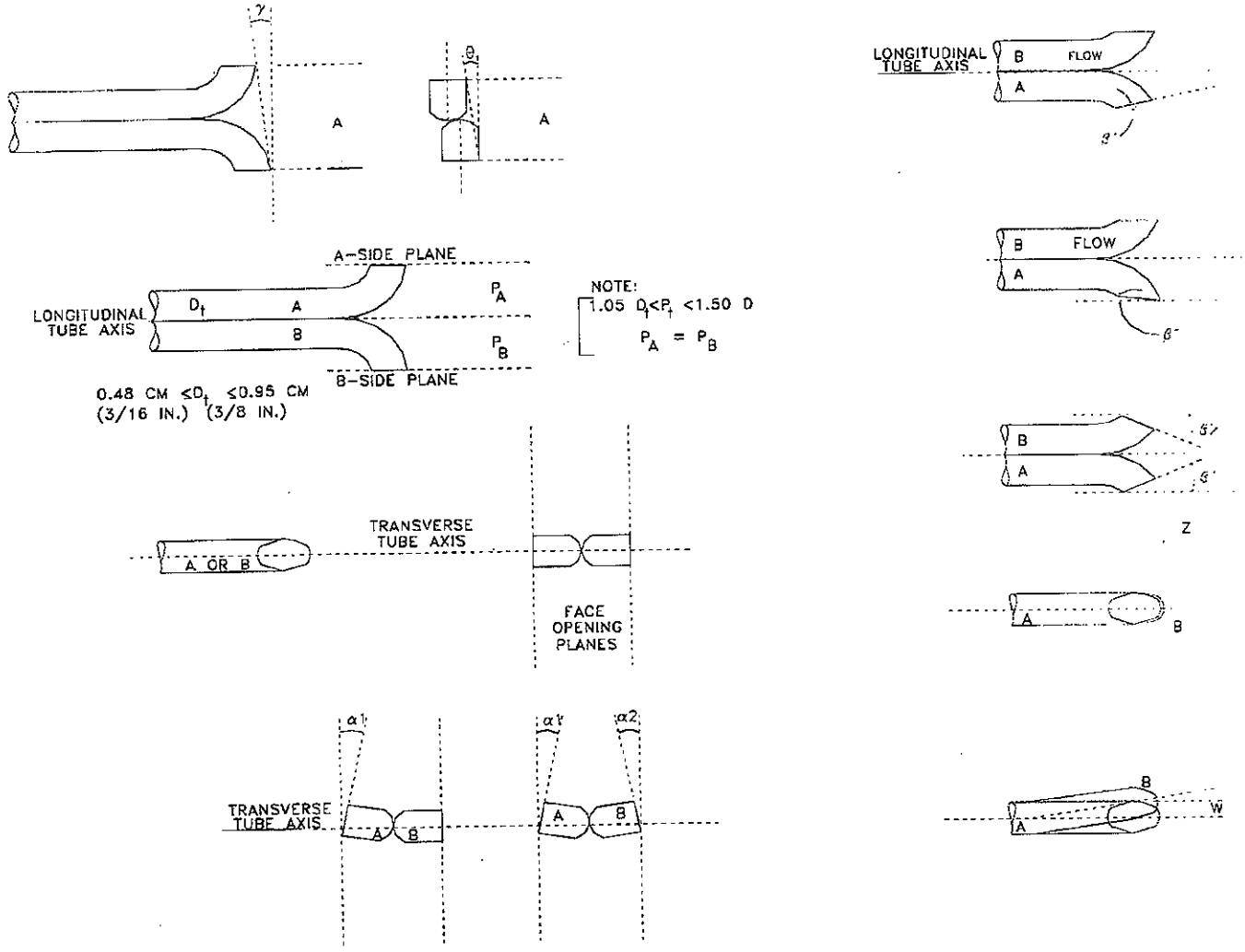
b_1 = 1 ° (<5°), b_2 = 0 ° (<5°) w = A sin θ = 0.017 (in.); (<0.03125 in.)

γ = 0 °, θ = 1 °, A = 0.979 (in.) P_A = 0.34 (in.), P_B = 0.36 (in.), D_t = 0.958

Comments: _____

Does the calibration meet Method 2 construction requirements for use at 0.84 coefficient? **Yes**

Pitot Tube No.: AQS AC6 001 Date: 6/22/2009 Name: R. Raymond



URS

Stack Temperature Sensor Calibration Spreadsheet
Primary Standard: NIST Traceable Thermometer
Enclosures Denote Input Data

Thermocouple ID:	Flex TC 001	Calibrated By:	R. Raymond
Calibration Standard:	PRIMARY	Thermocouple Readout Number	SR 1/ 0201004
Calibration Standard ID:	15059408	Thermocouple Readout Correlation:	1.00000
Date Calibrated:	3/31/2009	Ambient Temperature (F):	67

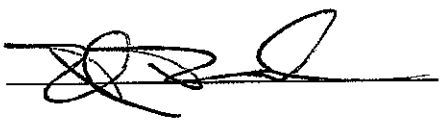
Reference Point Number	Source (Specify) See Note 1	Reference Thermometer Temperature F	Reference Thermometer Temperature C
1	Ice Bath	42.0	5.6
2	Ambient	68.0	20.0
3	Hot Sand	394.0	201.1

Thermocouple Potentiometer Temperature F	Corrected Potentiometer Temperature F	Corrected Potentiometer Temperature C	Temperature % Difference See Note 2
46.0	46.0	7.8	0.8
70.0	70.0	21.1	0.4
402.0	402.0	205.6	0.9

Does thermocouple Meet Specifications?

YES at 46 F
YES at 70 F
YES at 402 F

Calibrator Signature:



Note 1 - Type of calibration system used
Note 2 - $\frac{[(\text{ref temp, C} + 273) - (\text{test thermometer temp, C} + 273)]100}{\text{ref temp, C} + 273} < 1.5\%$

URS

Stack Temperature Sensor Calibration Spreadsheet
Primary Standard: NIST Traceable Thermometer
Enclosures Denote Input Data

Thermocouple ID:	AQS AC6 001	Calibrated By:	R. Raymond
Calibration Standard:	PRIMARY	Thermocouple Readout Number	SR1/0201004
Calibration Standard ID:	15059408	Thermocouple Readout Correlation:	1.00000
Date Calibrated:	3/31/2009	Ambient Temperature (F):	67

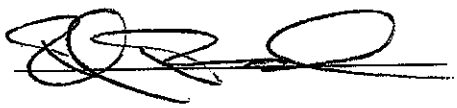
Reference Point Number	Source (Specify) See Note 1	Reference Thermometer Temperature F	Reference Thermometer Temperature C
1	Ice Bath	40.0	4.4
2	Ambient	68.0	20.0
3	Hot Sand	427.0	219.4

Thermocouple Potentiometer Temperature F	Corrected Potentiometer Temperature F	Corrected Potentiometer Temperature C	Temperature % Difference See Note 2
40.0	40.0	4.4	0.0
69.0	69.0	20.6	0.2
420.0	420.0	215.6	0.8

Does thermocouple Meet Specifications?

YES at 40 F
YES at 69 F
YES at 420 F

Calibrator Signature:



Note 1 - Type of calibration system used
Note 2 - $\frac{[(\text{ref temp, C} + 273) - (\text{test thermometer temp, C} + 273)]}{\text{ref temp, C} + 273} 100 < 1.5\%$

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	URS 002	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69
CALIBRATION STANDARD ID:	361815	AMBIENT PRESSURE (In Hg):	29.82
DATE CALIBRATED:	7/17/2009	Secondary Standard Correction Factor	0.9941

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3)	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Vd
0.5	5	4.971	4.996
1.0	6	5.965	6.042
2.0	10	9.941	10.144
3.0	10	9.941	10.232
4.0	10	9.941	10.255

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
70.0	74.0
70.0	76.0
70.0	80.0
70.0	83.0
70.0	86.0

CALCULATIONS

Time (min)	Gamma (Y)	Delta H@
12.57	1.0012	1.7881
10.51	0.9959	1.7297
12.56	0.9936	1.7655
10.23	0.9881	1.7471
9.01	0.9889	1.7970
	Avg Y	**Avg Delta H@**
	0.9935	**1.7655**
	0.9735	1.5655
Tolerances	1.0135	1.9655

Y - Ratio of Accuracy of Wet Test Meter Tolerance = +/- 0.02

Delta H@ - Orifice Pressure Differential that Yields 0.75 CFM

Is Unit Within Calibration Tolerances? **YES**

Calibrator: Robert Raymond Date: 7/17/2009

Approved by: Ted Ayr Date: 7/20/09

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	URS 002	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69
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	0.9735	1.5655
Tolerances	1.0135	1.9655

Y - Ratio of Accuracy of Wet Test Meter Tolerance = +/- 0.02

Delta H@ - Orifice Pressure Differential that Yields 0.75 CFM

Is Unit Within Calibration Tolerances? YES

Calibrator: Robert Raymond Date: 7/17/2009

Approved by: Date: 7/20/09

Appendix E

INTENT TO TEST NOTIFICATION

URS

April 20, 2009

Ms. Cindy Charles, Director
Ohio Environmental Protection Agency
Portsmouth Local Air Agency
605 Washington Street, Third Floor
Portsmouth, Ohio 45662

Haverhill North Coke Company
Intent to Test Notification – Emission Unit P902 – Vent Stack
Facility ID: 077300018
Test Date Notification

Dear Ms. Charles:

In accordance with the Permit to Install No. 07-00511, Emission Unit P902, Testing Requirements, Haverhill North Coke Company (HNCC) wishes to submit the attached "Intent to Test" notification.

The proposed test date is May 19-20, 2009. If there are any process upsets at the plant or scheduling conflicts with your office, the test will be rescheduled for time that is convenient to all parties. Please be aware that these test dates have been chosen to coordinate with the outage of the heat recovery steam generator (HRSG) unit #9. If testing is delayed, the testing could be performed on Unit #10 at a later date.

Please note that the enclosed ITTN request that the required mercury testing be performed together with the lead testing using EPA Method 29 sampling procedures.

As soon as we receive your approval on the test date, we will proceed to prepare for the test project. If you have any questions regarding the ITTN, please contact me at (865) 220-8109, or by email at michael_mowery@urscorp.com.

Sincerely,

Michael Mowery
Source Testing Manager

cc C. Sharp-Sun Coke, J. Carson-URS

URS Corporation
1093 Commerce Park Dr. Suite 100
Oak Ridge, TN 37830
Tel: 865.483.9870
Fax: 865.483.9061
www.urscorp.com

Intent to Test Notification
Haverhill North Coke Company

April 20, 2009

Prepared for:

Haverhill North Coke Company
2446 Gallia Pike
Franklin Furnace, Ohio 45629

INTENT TO TEST NOTIFICATION
HAVERHILL NORTH COKE COMPANY

Prepared for:

Haverhill North Coke Company
2446 Gallia Pike
Franklin Furnace, Ohio 45629

Prepared by:

URS Corporation
1093 Commerce Park Drive, Suite 100
Oak Ridge, Tennessee 37830

April 20, 2009

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APPENDIX

A Schematic of Vent Stack

B Schematics of Proposed Test Trains

C Example Data Sheets

D Example Calculations

ACRONYMS

CEMS	Continuous Emissions Monitoring System
EPA	Environmental Protection Agency
HAP	Hazardous Air Pollutant
HNCC	Haverhill North Coke Company
HRSG	Heat Recovery Steam Generator
MACT	Maximum Achievable Control Technology
OEPA	Ohio Environmental Protection Agency
SO_2	Sulfur Dioxide
VE	Visible Emission

1.0 INTRODUCTION

Haverhill North Coke Company (HNCC) utilizes Sun Coke's Thompson heat recovery type of oven to manufacture metallurgical coke. In coke production from both heat recovery and byproduct ovens, the volatile fraction of the coal is driven off in a reducing atmosphere. Coke is essentially the remaining carbon and ash. With byproduct ovens, the volatiles and combustion products are collected downstream of the oven chamber and refined in a chemical plant to produce coke oven gas and other products such as tar, ammonia, and light oils. In heat recovery ovens, all the coal volatiles are oxidized.

Heat recovery steam generators (HRSGs) recover heat from the oven waste gases. The cooled gases pass through a lime spray dryer/baghouse system prior to being exhausted from the main stack. The oven pushing/charging machine travels on rails between ovens during the production cycle. A traveling hood/baghouse system controls emissions from coal charging that escape the ovens. On the opposite side of the ovens from the pushing/charging machine, coke is pushed into a flat push hot car that travels on rails from the oven to the quench tower. A multicyclone captures and controls emissions from pushing the coke into the car and during travel to the quench tower. A baghouse controls particulate emissions from the coke screening and crushing facilities in the coke processing area.

There are currently 200 ovens at HNCC that operate on a 48-hour coking cycle. The operating schedule is arranged such that that half the ovens are charged each day. For example, the 100 even-numbered ovens are charged one day and the 100 odd-numbered ovens are charged the next. The 50 ovens that are charged daily are currently performed over three eight-hour shifts.

The second 100 ovens at HNCC (P902) were started-up in 2008. Initial compliance tests for P902 are required by the January 2008 final permit to install modification. The sources listed in the permit that require compliance testing include the main waste gas stack, charging machine baghouse stack, pushing hot car multiclone stack, fugitive charging emissions, fugitive pushing emissions, and bypass vent stack.

The compliance testing on the main waste gas stack, charging machine baghouse stack and pushing hot car multiclone stack were completed during the period of April 6-17, 2009. The Intent to Test Notification sent to OEPA did not include the HRSG bypass vent stack testing because it was scheduled to be completed during the first scheduled by-pass of a heat recovery steam generator. Therefore, the HRSG bypass vent stack required a separate Intent to Test Notification, which is now being provided.

2.0 TESTING

Since emissions from the ovens are essentially continuous, testing on the HRSG vent stack can be performed anytime. However, since the oven exhaust gases are used to heat the HRSG, the HRSG vent is only opened when the HRSG boiler is not in operation, or down for maintenance. The HRSG #9 is currently scheduled for outage during the week of May 17, 2009. The HRSG #9 vent stack has been chosen to be the representative stack for the HRSG vent stack compliance testing. The compliance testing will be performed during the outage week.

2.1 Test Requirements and Technical Approach

According to P902 Operating Permit, Section V. Testing Requirements, subsection b, item vi, the testing requirements for the HRSG bypass vent stack include; particulate emissions (PE), sulfur dioxide (SO_2), opacity visible emissions (VE), lead (Pb), hydrogen chloride (HCl) and mercury (Hg).

The proposed test methods to provide the required data previously listed are shown below in Table 2-1. Each proposed test is based on current Environmental Protection Agency (EPA) reference test methods.

Table 2-1

Test Requirements

Emission Unit	Pollutant	Test Method	Comment
HRSG vent stack - P902	Particulate	EPA Method 5	
	HCl	EPA Method 26A	Combined with Method 5 test train
	lead and mercury	EPA Method 29	Replaces ASTM D6784-02 for Hg.
	Sulfur dioxide	EPA Method 6C	
	Traverse point layout	EPA Method 1	
	Gas flow rate	EPA Method 2	As part of Method 5 and 29 testing
	Gas molecular weight	EPA Method 3A	
	Moisture	EPA Method 4	As part of Method 5 and 29 testing
	VE	EPA Method 9	

During construction of the Unit 2 HRSG vent stacks, for unknown reasons, the access platforms located at the top of the vent stacks were constructed approximately four feet higher on the stack than what were constructed on the Unit 1 HRSG vent stacks. Due to the extremely close proximity now to the exit of the stack, the space on the access platform is reduced due to the

stack vent cover actuation arms being directly above the handrail of the access platform. Because of these concerns over the limited space for sampling trains and exhaust gas exposure to sampling team members, URS is requesting that the alternate EPA test method 29 listed in the operating permit for metal hazardous air pollutants (HAPs) be used to collect the mercury samples.

Also, since the vent stacks are only open during HRSG maintenance or during a malfunction (to protect downstream equipment), the mercury emissions would be minimal, so the total mercury reported by Method 29 should be acceptable for determining emissions during these times.

The lead and mercury testing will be performed together in the EPA Method 29 sampling, which will also include the HAP metals. A separate ASTM D6784-02 (Ontario Hydro Method or OHM) sampling train will not be used to measure mercury. If the OHM train is used to collect mercury, a separate Method 12 train would be required because the lead sampling cannot be combined with the particulate/HCl sampling train. Using the OHM train would cause a total of 3 sampling trains to be used to complete a test run on the HRSG vent stack, instead of the proposed 2 sampling trains. Reducing the number of test trains per test run to two sampling trains, will free up available space on the sampling platform. It will also decrease the number of sampling personnel needed on the sampling platform. Reducing the number of personnel on the sampling platform will allow URS to rotate sampling personnel on the stack during a test run, which reduce anticipated heat stress caused by the close proximity to the stack outlet.

The mercury collected in the EPA Method 29 sampling train will be analyzed and reported as "total mercury", which should satisfy the mercury emission measurement of the operating permit.

The Method 5/12 and Method 29 sampling trains will be operated for a total run time of 2 hours. The SO_2, O_2 and CO_2 CEMs will be operated. The average gas flow rate of the 2 isokinetic sampling trains will be used to calculate the SO_2 mass emission rate.

2.2 Description of Sampling Trains

EPA Method 5/26A –

The particulate and HCl sampling will be performed using a combined EPA Method 5 and EPA Method 26A sampling train. The train will consist of an integrated quartz nozzle and probe liner fitted into an air-cooled sampling probe. The probe will be connected to a heated glass filter holder containing a pre-weighed 3" quartz filter. The outlet of the filter holder will be connected to a series of ball-joint impingers. The first two impingers will contain 0.1 N sulfuric acid followed by two impingers containing 0.1 N sodium hydroxide connected to a final silica gel impinger. The sampling train will be connected, by means of an umbilical cord, to the control console. The control console contains the dry gas meter, sampling pump, heat controllers and incline manometer.

The sampling probe will be fitted with an S-type pitot for measure gas flow, and a K-type thermocouple for measuring the gas stream temperature. Prior to performing the compliance test, a cyclonic flow verification traverse will be performed. In the event that significant cyclonic flow exists, the following procedures will be used during the compliance test:

- Measure the yaw angle at each traverse point as in Method 1.
- Rotate the sample probe to the average yaw angle so that the nozzle points into the gas flow.
- Sample at all points with the nozzle rotated to the average yaw angle.
- Set the sample rate based on the Method 2 velocity head measurement taken at the average yaw angle.
- Calculate the percent isokinetic sampling rate based on these measurements.
- Calculate the stack velocity and volumetric flow rate using the cosine of the average yaw angle.

The Method 5/26A will be operated to collect a minimum of 30 dscf over a 2-hour period. At the conclusion of the sample run, the impinger train will be moved to the sample recovery trailer. The impingers will be weighed to determine the moisture gained during the test run. The contents of the impingers with then be collected as per EPA Method 26A procedures. To avoid possible breakage of the probe liner, the probe will be washed and recovered on the stack as per EPA Method 5 procedures.

EPA Method 29 –

The lead and mercury sampling will be performed using an EPA Method 29 sampling train. The train will consist of an integrated quartz nozzle and probe liner fitted into an air-cooled sampling probe. The probe will be connected to a heated glass filter holder containing a pre-weighed 3" quartz filter. The outlet of the filter holder will be connected to a series of ball-joint impingers. the first two impingers will contain a 5% HNO_3/10%H_2O_2 mixture. The third impinger is empty, and the fourth and fifth impingers will contain a mixture of 4% $KMnO_4$/10%H_2SO_4. The sixth impinger will contain silica gel. The remainder of the sampling train is identical to the previously described Method 5 train.

The Method 29 train will be operated identically to the Method 5 train, except the total sample volume collected will be at least 60 dscf to assure adequate detection limits of lead and mercury. At the conclusion of the sample run, the Method 29 sample train will be removed from the stack to the sample recovery trailer for subsequent recovery per Method 29 procedures. The sample probe will be washed on the stack to avoid potential breakage of the probe liner.

SO_2/O_2/CO_2 –

During each test run URS will operate CEMs for SO_2 according to EPA Method 6C sampling procedures along with O_2 and CO_2, as per EPA Method 3C. The CEM monitors will be calibrated before and after each test run using EPA Protocol gases. The gases will be measured continuously and an electronic datalogger will record 1-minute averages for the test runs.

The CEM sampling will be performed by placing a steel sample probe in the stack to withdraw a continuous gas sample. The gas sample will be transported through a heated Teflon sample line to the test trailer. At the trailer the sample line will be connected to a electric gas chiller that will remove any moisture in the gas stream. Exiting the gas chiller, the dried sample gas will be split to each CEM for subsequent analysis.

Visible Emissions -

Visible emissions (VE) will be read on the exit of the vent stack during each of the three sample test runs. A certified VE reader will read the VEs for a 30-minute period according to EPA Method 9 sampling procedures. The VE readings taken every 15 seconds will be recorded on a data form by the VE reader. At the conclusion of a 30-minute test reading the data will be averaged to determine the average VE reading for the corresponding compliance test run.

Copies of all test data sheets, lab recovery data and VE readings will be provided in the final compliance report.

3.0 TEST SCHEDULE

Three test runs will be performed on the vent stack for compliance. Each test run will include all of the test parameters listed in Table 2-1. One of the test runs will be performed during production activities for the coke ovens serviced by the vent stack being tested. A tentative test schedule is presented in Table 3-1 assuming the afternoon production cycle starts at 1600 hours on the day of testing.

Table 3-1

Test Schedule

Source	Run Number	Test Period	Comment
HRSG Vent Stack – P901	1	0800–1030	Mid-cycle
HRSG Vent Stack – P901	2	1200–1430	Late-cycle
HRSG Vent Stack – P901	3	1600–1830	Production

Assumes production cycle starts at 1600 hours. Test periods will be adjusted as necessary to accommodate a different production cycle start time.

URS will travel to HNCC site on Monday May 18, 2009 and set up the test equipment. All three test runs will then be performed on Tuesday May 19th. In the event that testing is delayed, Wednesday May 20th will be reserved as a contingency day to complete the testing.

4.0 TEST REPORT

The permit requires submission of the test report within 30 days of conducting the test. However, the metals laboratory analyses are complex and will not be available for up to 5 weeks after testing. Therefore, it will not be possible to submit the test report on this schedule. It is proposed that the report be submitted within 21 days after the laboratory analyses are completed.

At the completion of the test project a final engineering report will be issued to HNNC for subsequent submittal to OEPA. Provided below is a general description of what will be contained in the report.

- A summary of the test results,
- A description of the technical approach used including EPA reference methods,
- QA/QC procedures,
- All permit-required plant process data,
- All raw data sheets,
- Production data for the process during the compliance tests,
- All calibration data, and
- Formulas used to calculate mass emission rates

5.0 INTENT TO TEST FORMS

The Ohio EPA Intent to Test Forms are attached.

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

Agency use only	
Date Received	
Assigned	

Facility Premise No. 0773000182

Emissions Unit PTI No. P902

SCC Number NA

Proposed Test Date May 19-20, 2009

Proposed Start Time 08:00, or as process requires

A. Facility Contact Information:

Name Haverhill North Coke Company

Address 2446 Gallia Pike, Franklin Furnace, OH 45692

Contact Person Kris Kinder

Telephone (O) (740) 355-9808 (Cell) (740) 291-7201

E-mail kkkinder@sunocoinc.com

Testing Firm Information:

Name URS Corporation

Address 1093 Commerce Park Dr., Ste. 100, Oak Ridge, TN 37830

Contact Person Michael Mowery

Telephone (O) (865) 220-8109 (Cell) (865) 310-0439

E-mail michael_mowery@urscorp.com

B. Test Location Information:

Name Unit 2

Contact Person Kris Kinder

Address

Telephone (O) (Cell)

C. Test Plan and Emissions Unit Information Table: List the applicable information under each respective column heading.

Emission Unit # / Description	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method(s)	Number of Sampling Points	Total Time for Sample Run	Number of Sampling Runs
P902 Vent Stack #9	N/A	N/A	Particulate, acid gases, mercury, lead, VE	EPA Method 5/26A, Method 29, Method 9	24	120 minutes	3

Are *any* modifications, or alternatives as spelled out within the test methods, being proposed? Yes ☒ No ☐ If "no", then no modifications or alternatives, however minor, will be accepted. If yes, list each test method and section being modified, and attach a detailed modification description and justification: Perform mercury testing by EPA Method 29 instead of ASTM D6784-02.

Source is testing to comply with (check all that apply): State PTI ☒ State PTO ☐ Title V ☐ NSPS ☐ MACT ☐ BIF ☐ Title IV ☐ Other (explain)

D. What is the maximum rated capacity or throughput of the emissions unit given in its permit-to-install or permit-to-operate? 48 tons of coal per oven

Has the facility scheduled production or throughput so that the emissions unit can be operated at the maximum capacity given in its permit-to-install or permit-to-operate during the test? Yes ☒ No ☐ If no, attach explanation.

Specify how the operating rate will be demonstrated during testing: The coal is weighed before each oven is charged.

Sampling Location(s): Inlet ☐ Outlet ☒ Simultaneous ☐ Will Cyclonic flow check(s) be conducted? Yes ☒ No ☐

Fuel Sampling: Coal - Proximate ☐ Ultimate ☐ Other ☐ If other, specify: N/A

Emission rate to be calculated using: F-Factor ☐ Ultimate Coal Analysis ☐ Other ☐ If other, specify: N/A

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes ☐ No ☒

If yes, briefly describe:

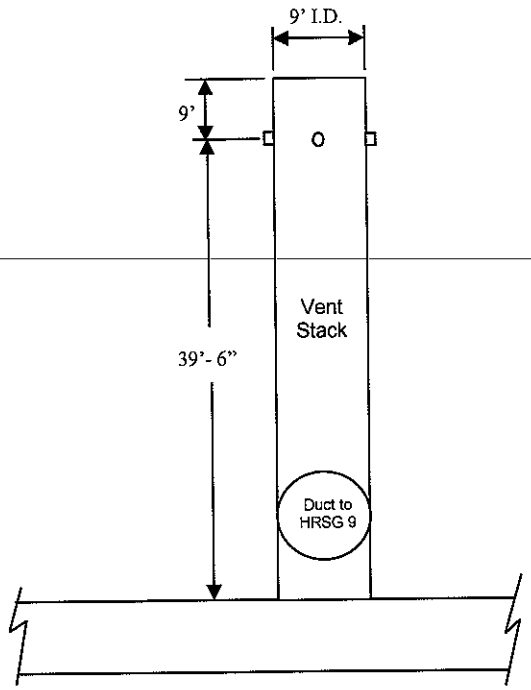
(Note: Some maintenance, such as installing new filter bags in a baghouse, or replacing the activated carbon in an adsorber, may disqualify the emissions unit from a performance test until a sufficient amount of time has elapsed to ensure a test which will be representative of normal operations.)

Appendix A
Schematic of Vent Stack

24 Sample Points Required
4 ports with 6 points each

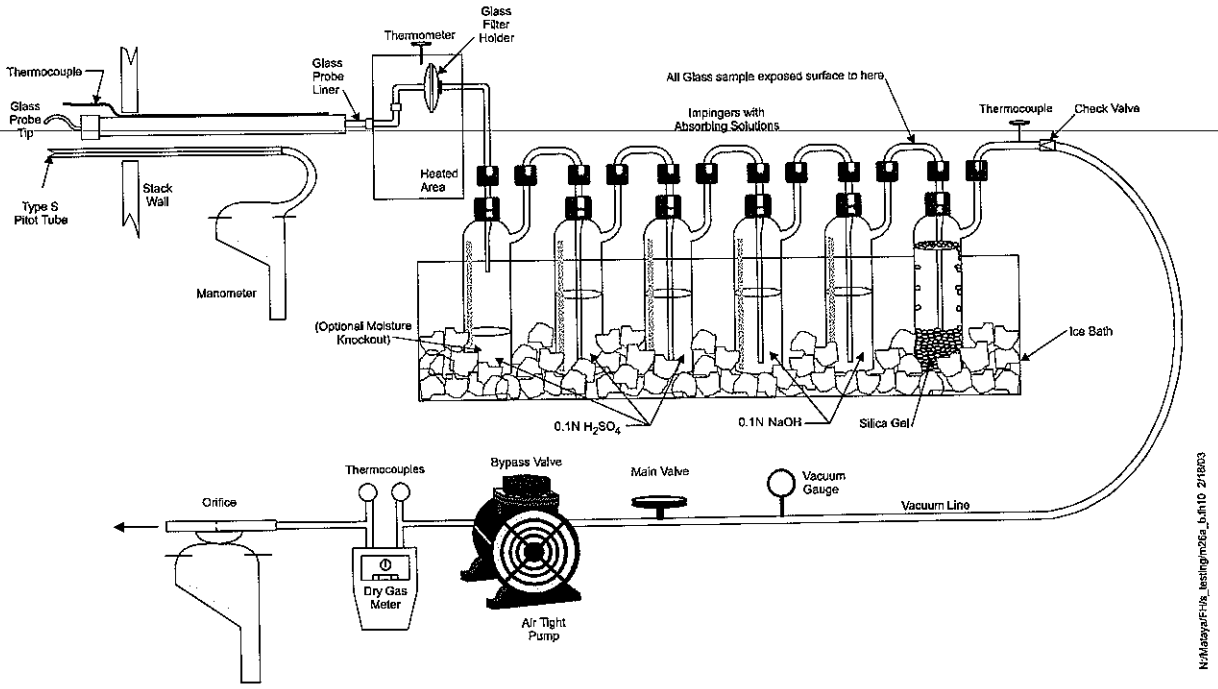
Traverse Layout

Point	Distance (from wall)
1	2.27
2	7.24
3	12.74
4	19.12
5	27.00
6	38.45

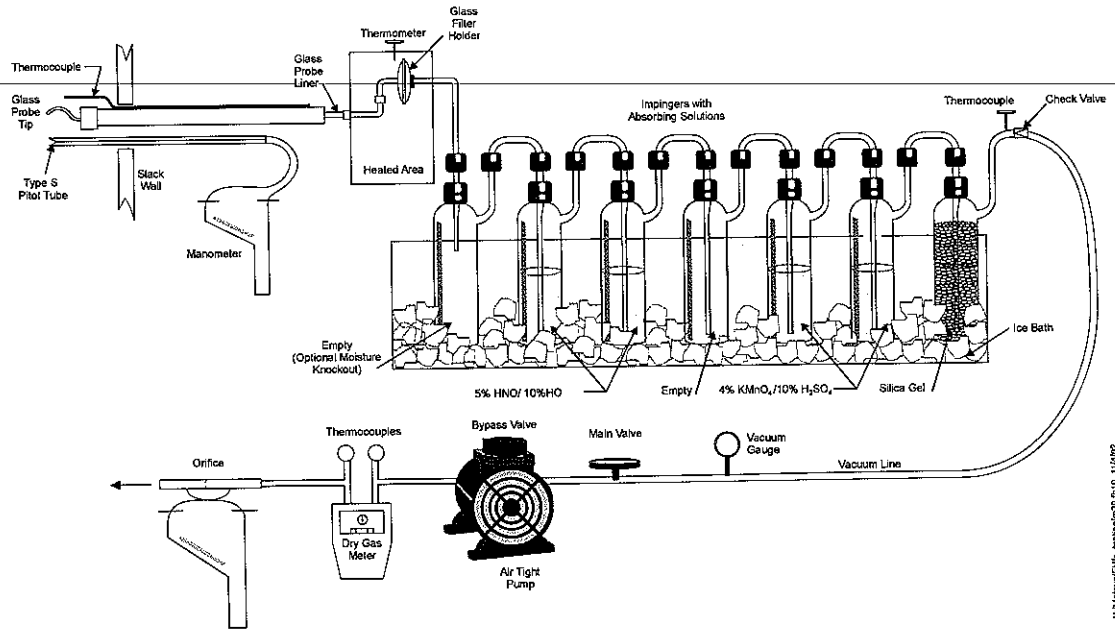


Schematic of Vent Stack

APPENDIX B
Schematic of Sample Trains



EPA Method 5/26A Test Train



EPA Method 29 Test Train (with mercury)

Appendix C
Example Data Sheets

URS

STACK TEST DATA SHEET

Method used: _____

Project: _____
Project No: _____
Source: _____
Run No.: _____
Date: _____
Operator: _____

Barom. Psr.: _____
Static Psr.: _____
Meter Box I.D.: _____
Delta H @: _____
Gamma: _____
Pitot Coef.: _____

Stack Dia.: _____
Stack Area: _____
Port Length: _____
Port Dia.: _____
Probe Liner: _____
Filter No.: _____

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P	SAMPLE DELTA H	GAS SAMPLE VOLUME	DGM TEMP.	STACK TEMP.	PROBE TEMP.	FILTER BOX TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
AVERAGE											

LEAK CHECKS	
Pitot impact:	
Pitot static:	
Train initial:	
Train Final:	

NOZZLE MEASUREMENT	
I.D. No.:	
1	
2	
3	
Avg.	

STACK GAS ANALYSIS			
	CO2	O2	
1			
2			
3			
Avg.			

NOTES: _____

URS

TEST LAB DATA SHEET

PROJECT: _____ JOB NO.: _____

SOURCE: _____ DATE: _____

TRAIN I.D.: _____ TEST NO.: RUN - 1

COLLECTED BY: _____ CHKD. BY: _____

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1			
2			
3			
4			
5			
6			
7			
TOTAL			

URS

CEM RESPONSE TIME TEST

Date of Test:

Analyzer Type:

S/N:

Span Gas Concentration:

Analyzer Span Setting:

UPSCALE RESPONSE			
	Start	**95% Response**	**Time**
1			
2			
3			
Average Upscale Response			

DOWNSCALE RESPONSE			
	Start	**95% Response**	**Time**
1			
2			
3			
Average Downscale Response			

UPSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable zero to stack gas.

DOWNSCALE RESPONSE = Time required to reach 95% of stable reading shifting from stable high-level cal to stack gas or stable gas to zero.

RESPONSE TIME = The longer of the two mean times.

CEM CALIBRATIONS

PROJECT NAME	
PROJECT NUMBER	
DATE	
RUN NUMBER	
START TIME	
STOP TIME	

ANALYZER SPAN	
CO	500
CO_2	25%
O_2	25%
NO_x	500
SO_2	100
THC	

		CALIBRATION ERROR			SYSTEM BIAS CHECK									
					PRETEST		POST TEST			IS CAL ERROR	IS PRETEST	IS POSTEST	IS SYSTEM
	GAS CYLINDER NUMBER	CAL. GAS VALUE (% or PPM)	ANALYZER RESPONSE (% or PPM)	CAL ERROR (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	SYSTEM RESP.	SYS. BIAS (% SPAN)	DRIFT (% SPAN)	CHECK OK? (YES/NO)	BIAS OK? (YES/NO)	BIAS OK? (YES/NO)	DRIFT OK? (YES/NO)
CO zero				0.00		0.00		0.00	0.00	YES	YES	YES	YES
CO low				0.00									
CO mid				0.00		0.00		0.00	0.00	YES	YES	YES	YES
CO hi				0.00									
CO_2 zero				0.00		0.00		0.00	0.00	YES	YES	YES	YES
CO_2 low				0.00									
CO_2 mid				0.00		0.00		0.00	0.00	YES	YES	YES	YES
CO_2 hi				0.00									
O_2 zero				0.00		0.00		0.00	0.00	YES	YES	YES	YES
O_2 low				0.00									
O_2 mid				0.00		0.00		0.00	0.00	YES	YES	YES	YES
O_2 hi				0.00									
NO_x zero				0.00		0.00		0.00	0.00	YES	YES	YES	YES
NO_x low				0.00									
NO_x mid				0.00		0.00		0.00	0.00	YES	YES	YES	YES
NO_x hi				0.00									
SO_2 zero				0.00		0.00		0.00	0.00	YES	YES	YES	YES
SO_2 low				0.00									
SO_2 mid				0.00		0.00		0.00	0.00	YES	YES	YES	YES
SO_2 hi				0.00									

Correction factors

CO	Avg. Conc -	0	*	#DIV/0!
CO_2	Avg. Conc -	0	*	#DIV/0!
O_2	Avg. Conc -	0	*	#DIV/0!
NO_x	Avg. Conc -	0.00	*	#DIV/0!
SO,	Avg. Conc -	0.00	*	#DIV/0!

Calibration error = ((cal. gas value - analyzer resp) / analyzer span) * 100: allowable error ± 2 % , ± 5 % for THC

System Bias = ((analyzer resp - system resp) / analyzer span) * 100: allowable error ± 5 %

Drift = ((pretest sys resp - post test sys resp) / analyzer span) * 100: allowable error ± 3 %

Sys Bias (pre and post) must be performed on each run: To determine Drift.
Use zero gas and either mid or hi cal gas, choose cal gas closest to measured stack concentration.

Drift must be performed every hour on THC

Calibration Error is performed only at start, unless allowable error parameters are exceeded.

URS

PARTICULATE TEST LAB DATA SHEET

PROJECT: _____ JOB NO.: _____
SOURCE: _____ DATE: _____
TRAIN I.D.: _____ TEST NO.: _____
COLLECTED BY: _____ CHKD. BY: _____

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1			
2			
3			
4			
TOTAL			

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
Probe Wash			
Corrected Probe Wash*			
Filter			
202 Back Half Extraction			
Corrected 202 Extraction**			

*subtract reagent blank from probe wash
**subtract reagent blank from back half extraction

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)
PARTICULATE COLLECTED (including impinger catch)

ACETONE BLANK

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g

METHYLENE CHLORIDE BLANK

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g

URS

VELOCITY TRAVERSE DATA SHEET

Project Name: _____
Project No.: _____
Date: _____

Test No.: _____
Location: _____
Personnel: _____

Traverse Point	Velocity Pressure	Stack Temperature
Average		

Stack Dimensions: _____

Stack Area, As: _____ FT^2

Barometric Pressure, Pbar: _____ in. Hg

Static Pressure, Pst: _____ in. H_2O

Stack Pressure, Ps: (Pst / 13.6) + Pb = _____ in. Hg

Stack Temperature, Ts: _____ °F

Molecular Weight of Stack Gas, Ms: _____ Note: (21% O_2 = 28.1 Ms)

Pitot Tube Coefficient, Cp: _____

Stack Velocity, Vs: 174 * Cp * Sq. Rt. of Delta p * Sq. Rt. of ((29.92 / Ps) * (28.96 / Ms) * (Ts + 460))= _____ ft/min.

Gas Volume Flow (ACFM), V: Vs * As = _____ ft^3/min.

Gas Volume Flow (SCFM), Vstd: V * (528/(Ts + 460) * (Ps / 29.92) = _____ SCFM

Pitot Tube Type: _____ I.D. No.: _____
Manometer Type: _____ I.D. No.: _____
Thermometer Type: _____ I.D. No.: _____

Appendix D
Example Calculations

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STACK TEST CALCULATIONS

Project:	Client	Barom. Psr.:	27.88		Calculated
Project No:	1	Static Psr.:	-0.2	Ps:	27.865
Source:	Kiln #2	Delta H @:	1.67	As:	77.887
Run No.:	1	Gamma:	1.004	An:	0.000398
Date:	5/4/2006	Pitot Coef.:	0.84		
Sample Volume:	39.35	Stack Dia.:	119.5	,in.	
Sample Time:	60	Nozzle Dia.:	0.27	,in.	
O2 Conc.:	13	H2O Gain:	22.4	,ml	
CO2 Conc.:	8	Part. Weight:	0.0041	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE		STACK TEMP.
	Actual	Sq. Root		Inlet	Outlet	
1	0.42	0.648074	1.5	91		321
2	0.35	0.591608	1.2	91		319
3	0.4	0.632456	1.4	93		322
4	0.4	0.632456	1.4	93		313
5	0.35	0.591608	1.2	95		313
6	0.3	0.547723	1.1	96		317
7	0.35	0.591608	1.2	97		330
8	0.28	0.52915	1	97		344
9	0.28	0.52915	1	97		350
10	0.3	0.547723	1.1	97		363
11	0.28	0.52915	1	99		356
12	0.32	0.565685	1.15	99		355
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
AVERAGE	0.3358333	0.578033	1.1875	95.41667		333.5833

Project: Client
Project No: 1
Source: Kiln #2
Run No.: 1

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (Vl0)(0.04707)

Vwstd = 1.05 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 35.092 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.03

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.8

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 29.5

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 2,444.7 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 190,411.54 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 117,987.69 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 114,546.07 DSCFM

Vsstd = Qstd/As

Vsstd = 1470.68 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 1.00

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0018

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.77

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VELOCITY TRAVERSE CALCULATION SHEET

Note: Manual input only data marked in RED
Client:
Project Number:
Source:
Date:
Velocity Test #:

INPUT PARAMETERS

Barometric Pressure (Pb), in.Hg.	0.00	in, Hg
Avg. Percent CO2	0.0	%
Avg. Percent O2	0.0	%
Avg. Percent CO	0.0	%
Avg. Percent N2	100.0	%
Average Square Root of Delta P	0.0000	in. H_2O
Average Stack Temperature, (T_s)	#DIV/0!	(^oF)
Static Pressure	0.00	in. H_2O
Stack Diameter	0.00	inches
Pressure in the stack, (P_s)	0.00	in Hg
Stack area, (A_s)	0.00	ft^2
Pitot Tube Coeffiecent , (C_p)	0.00	
Average Percent Moisture, (B_{wo})	0.00%	

Point No.	Delta P	Sq. Root Delta P	Stack Temp (F)
1		0.0000	
2		0.0000	
3		0.0000	
4		0.0000	
5		0.0000	
6		0.0000	
7		0.0000	
8		0.0000	
9		0.0000	
10		0.0000	
11		0.0000	
12		0.0000	
13		0.0000	
14		0.0000	
15		0.0000	
16		0.0000	
17			
16			
19			
20			
21			
22			
23			
24			
Average	**#DIV/0!**	**0.0000**	**#DIV/0!**

VELOCITY CALCULATIONS

Molecular Weight of the Dry Gas Stream
Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)
Md = (0.44)*(0.00) + (0.32)*(0.00) + (0.28)*(100.00)
Md = 28.00 lb/lbmol

Molecular Weight of Stack Gas
Ms = (Md)(1-Bwo) + 18(Bwo)
Ms = (28.00) * (1-0.000) + (18) * (0.000)
Ms = 28.00 lb/lbmol

Velocity of Stack Gas
$Vs = 85.49*60*Cp*(\Delta P)^{0.5}\ [(Ts+460)/Ps/Ms]^{0.5}$
#VALUE!
#VALUE! ft/min

Total Flow of Stack Gas
Qa = As X Vs
#VALUE!
#VALUE! CFM

Qs = Qa X 528/Ts X Ps/29.92
#VALUE!
#VALUE! SCFM

Qstd = Qs(1 - Bwo)
#VALUE!
#VALUE! DSCFM

Vsstd = Qstd/As
#VALUE!
#VALUE! ft/min

Velocity Test #: 0
VELOCITY TRAVERSE RESULTS

Stack Gas Temperature (F)	#DIV/0!	Stack Velocity (ft/min)	#DIV/0!
Moisture Content (% Vol)	0.00%	Gas Flow Rate (ACFM)	#DIV/0!
CO2 Percent	0.0	Gas Flow Rate (@ wet STP)	#DIV/0!
O2 Percent	0.0	Gas Flow Rate (DSCFM)	#DIV/0!

URS

Gaseous Mass Emission Calculations

Project Name:
Project No.:
Test Date:

INPUT PARAMETERS

Test I.D.	NOx Conc. (ppm)	CO Conc. (ppm)	SO_2 Conc. (ppm)	O_2 Conc. (%)	CO_2 Conc. (%)	THC (ppm)	Flow Rate (dscfm)	NOx Mass Rate (lb/hr)	CO Mass Rate (lb/hr)	SO_2 Mass Rate (lb/hr)	O_2 Mass Rate (lb/hr)	CO_2 Mass Rat (lb/hr)	THC Mass Rate (lb/hr)
1	0.00	0.00	0.00	0.00	0.00	0.00	0	0.000	0.000	0.000	0.000	0.000	0.000

Mass Rate (lb/hr)

MR= (ppm)(mw constant)(Qstd(60)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
mw constant for NOx - 1.1949×10^{-7}
mw constant for CO - 7.2753×10^{-8}
mw constant for SO2 - 1.6639×10^{-7}
mw constant for O2 - 8.3114×10^{-8}
mw constant for CO2 - 1.1431×10^{-7}
mw constant for THC (as propane) - 1.1453×10^{-7}