



Results of the July 9 and 10, 2014 Mercury Research Tests Performed at the Northshore Mining Company Taconite Processing Facility Located in Silver Bay, Minnesota

Furnace 12 Hood Exhaust #1201	SV 111
Furnace 12 Waste Gas #1205	SV 114

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Prepared for
Northshore Mining Company
Silver Bay, Minnesota

Results of the July 9 and 10, 2014 Mercury Research Tests Performed
at the Northshore Mining Company Taconite Processing Facility
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Executive Summary

Barr Engineering Co. performed mercury research tests at the Northshore Mining Company facility located in Silver Bay, Minnesota. Simultaneous tests were performed on the Furnace 12 Hood Exhaust stack #1201 (SV 111) and Waste Gas stack #1205 (SV 114). The ASTM D-6784-16 Ontario Hydro Method was used to determine mercury emissions for research purposes. Stack vent identification numbers, emission unit identification numbers, and test results are presented in Table ES-1.

Table ES-1 Executive Summary Table

Mercury Test Parameter EPA Methods 1,2,3,4, and ASTM D-6784-16	Average Test Results	
	Furnace 12 Hood Exhaust	Furnace 12 Waste Gas
	#1201	#1205
Air Emissions Permit Group	GP 014	
Stack Vent Number	SV 111	SV 114
Emission Unit Number	EU 110	EU 114
Test Dates	July 9 and 10, 2014	
Total Mercury Concentration		
μg/dscf, with detection limit ¹	4.4 x 10 ⁻³	7.3 x 10 ⁻³
μg/dscf, without detection limit ²	3.9 x 10 ⁻³	6.8 x 10 ⁻³
lb/dscf, with detection limit ¹	9.7 x 10 ⁻¹²	1.6 x 10 ⁻¹¹
lb/dscf, without detection limit ²	8.6 x 10 ⁻¹²	1.5 x 10 ⁻¹¹
Total Mercury Emission Rate		
lb/hr, with detection limit ¹	3.3 x 10 ⁻⁵	5.2 x 10 ⁻⁵
lb/hr, without detection limit ²	2.9 x 10 ⁻⁵	4.8 x 10 ⁻⁵
Production Rate		
LTPH	237	

1. Results determined with application of analytical detection limit for each sample fraction, when applicable.
2. Detection limit not used. Results determined using quantifiable analytical estimates, when applicable.

1.0 Introduction

Barr Engineering Co. (Barr) performed mercury research tests at the Northshore Mining Company (Northshore) facility located in Silver Bay, Minnesota. Simultaneous tests were performed on the Furnace 12 Hood Exhaust stack #1201 (SV 111) and Waste Gas stack #1205 (SV 114). The ASTM D-6784-16 Ontario Hydro Method was used to determine mercury emissions for research purposes.

The testing was performed July 9 and 10, 2014 by Tom Kuchinski, David Herbst, and T.J. Webb of Barr. Jennifer Ramsdell of Northshore provided the coordination of the test team with facility operations. The stack testing was not witnessed by a representative of the MPCA. A list of project participants is provided in Appendix F.

Each test consisted of three 240-minute test runs to measure mercury emissions using the Ontario Hydro Method. Table 1-1 provides identification information for the sources tested.

The results of the testing were calculated in the following two ways:

1. When applicable, the full detection limit of the analytical method was applied to lab results for the various sample fractions.
2. When applicable, quantifiable estimated lab results were used for sample fractions that were otherwise below the detection limit of the analytical method.

Table 1-1 Emission Source Information

Source/Emissions Unit (Plant or process descriptor)	Emission Unit	Control Equipment	Stack Vent	Permit Group
Furnace 12 Hood Exhaust #1201	EU 110	CE 111	SV 111	GP 014
Furnace 12 Waste Gas #1205	EU 114	CE 114	SV 114	GP 014

2.0 Results

2.1 Furnace 12 Hood Exhaust #1201 (SV 111)

Results of the July 9 and 10, 2014 mercury research test are provided in Tables 1 and 3. Table 1 shows test results which are calculated using lab data that applies detection limits. Table 3 shows test results which are calculated using lab data that does not apply detection limits. The total mercury concentration was 4.4×10^{-3} µg/dscf when calculated using detection limits, and 3.9×10^{-3} µg/dscf when calculated without using detection limits.

During test Run 3, a 42-minute delay in the testing was noted due to a production issue with the furnace. No other delays or difficulties with the testing were noted.

2.2 Furnace 12 Waste Gas #1205 (SV 114)

Results of the July 9 and 10, 2014 mercury research test are provided in Tables 2 and 4. Table 2 shows test results which are calculated using lab data that applies detection limits. Table 4 shows test results which are calculated using lab data that does not apply detection limits. The total mercury concentration was 7.3×10^{-3} µg/dscf when calculated using detection limits, and 6.8×10^{-3} µg/dscf when calculated without using detection limits.

During test Run 3, a 42-minute delay in the testing was noted due to a production issue with the furnace. No other delays or difficulties with the testing were noted.

3.0 Process Description

Furnace 12 (EU110 & EU114)

Northshore's Furnace 12 is a straight grate furnace manufactured by Arthur G. McKee Company. The furnace has four major operating zones referred to as the drying zone, preheat zone, firing zone and the cooling/recoup zone.

Unfired green balls comprised of iron concentrate and a composite binder composed of bentonite and organic binder (starch) enter the furnace at the drying zone. The green balls are then dried using heat recouped from the furnace. The air from the drying zone is referred to as the Hood Exhaust (EU 110).

The dried pellets enter the firing zone where they are heated sufficiently to start an exothermic reaction caused by conversion of the magnetite to hematite. Natural gas fired burners are located in the firing zone to provide the necessary heat. The Waste Gas is exhausted from the firing zone (EU 114).

Once the exothermic reaction is started, the pellets enter the cooling/recoup zone where the exothermic reaction of the pellets is completed and the reacted pellets are cooled before being discharged from the grate. The hot exhaust from this zone is recouped for furnace operation and the excess enters the Hood Exhaust (EU 110).

The Furnace 12 Hood Exhaust and Waste Gas air streams are directed to wet wall electrostatic precipitators (WWESP) for emissions control. The furnace utilizes three parallel WWESPs for the Hood Exhaust and two parallel WWESPs for the Waste Gas.

Operating parameters of the Furnace 12 Hood Exhaust and Waste Gas WWESP stacks were recorded once every minute for the duration of each test run. The taconite production rate for Furnace Line 12 during the testing averaged 237 LTPH. Other parametric monitoring information for the tests is located in Appendix E.

4.0 Stack Testing Procedures and Methods

The testing was performed from ports meeting U.S. EPA Method 1 criteria. The U.S. EPA Method 1 criteria data are listed in Table 4-1. Sample port locations and traverse point details are provided in Figures 1-2.

Table 4-1 U.S. EPA Method 1 Criteria

Source/Emissions Unit (Plant or process descriptor)	Distance to Downstream Disturbances from Sample Site (In Diameters)	Distance to Upstream Disturbances from Sample Site (In Diameters)	Number of Ports	Number of Points	Average Absolute Yaw Angle
Furnace 12 Hood Exhaust Stack #1201	1.3	2.9	2	24	7.4 ¹
Furnace 12 Waste Gas Stack #1205	1.3	2.9	2	24	5.9 ¹

1. Cyclonic flow data provided comes from previous tests performed at the sources

Volumetric airflow determinations were performed in accordance with U.S. EPA Method 2 using an S type pitot tube. Airflows were determined in conjunction with the Ontario Hydro tests.

Oxygen and carbon dioxide concentrations were estimated using EPA Method 3A data from previous tests on these sources.

Stack gas moisture content was determined by the performance of U.S. EPA Method 4, in conjunction with the Ontario Hydro tests. The volume of moisture collected during test Run 1 was used to estimate moisture content for test Runs 2 and 3 for both sources.

Mercury concentrations and emission rates were determined in accordance with ASTM D6784-16 Ontario Hydro. The sample runs were 240-minutes in duration. All glassware and reagent preparation was conducted in accordance with the standard, and were completed by Barr. Potassium permanganate sample reagents were prepared on-site daily. For each test, the samples were recovered in the controlled environment of Barr's mobile laboratory. The samples were analyzed by Element One of Wilmington, North Carolina. Element One's certified laboratory report and complete sample chain of custody is located in Appendix C. Element One's summary of quantifiable estimated results that do not have a detection limit applied are provided in the last page of Appendix C.

The test methods referenced above are found in 40 CFR Part 60, Appendix A; and ASTM.

Tables

TABLE 1

ONTARIO HYDRO METHOD MERCURY EMISSIONS TEST RESULTS

Furnace 12 Hood Exhaust #1201 (SV 111)
Research Testing on 7/9/2014 & 7/10/14

Parameter	Run 1	Run 2	Run 3	Average
Test Date	7/9/2014	7/10/2014	7/10/2014	---
Test Period	1312 - 1719	753 - 1159	1249 - 1735	---
Test Duration, min.	240	240	240	240
Avg. Stack Temperature, deg.F	124	124	123	124
Avg. Moisture Content, %V/V	11.0	10.9	10.9	10.9
Mercury Sample Loading, ug				
Particle Bound	< 0.015	< 0.015	< 0.015	< 0.015
Oxidized	< 0.11	< 0.10	< 0.11	< 0.11
Elemental	0.668	0.523	0.617	0.603
Total	0.793	0.638	0.742	0.724
Air Flow Rate				
ACFM	70,800	71,300	70,900	71,000
SCFM	62,500	63,200	63,000	62,900
DSCFM	55,600	56,300	56,100	56,000
Sample Volume				
ACF	178.37	175.70	177.29	177.12
DSCF	163.45	165.30	164.83	164.52
Isokinetic Variation, %				
	98.6	98.5	98.5	98.6
Mercury Concentration, µg/dscf				
Particle Bound	< 9.2E-05	< 9.1E-05	< 9.1E-05	< 9.1E-05
Oxidized	< 6.7E-04	< 6.0E-04	< 6.7E-04	< 6.5E-04
Elemental	4.1E-03	3.2E-03	3.7E-03	3.7E-03
Total	4.9E-03	3.9E-03	4.5E-03	4.4E-03
Mercury Concentration, lb/dscf				
Particle Bound	< 2.0E-13	< 2.0E-13	< 2.0E-13	< 2.0E-13
Oxidized	< 1.5E-12	< 1.3E-12	< 1.5E-12	< 1.4E-12
Elemental	9.0E-12	7.0E-12	8.2E-12	8.1E-12
Total	1.1E-11	8.5E-12	9.9E-12	9.7E-12
Mercury Emission Rate, lb/hr				
Particle Bound	< 6.8E-07	< 6.8E-07	< 6.8E-07	< 6.8E-07
Oxidized	< 5.0E-06	< 4.5E-06	< 5.0E-06	< 4.8E-06
Elemental	3.0E-05	2.4E-05	2.8E-05	2.7E-05
Total	3.6E-05	2.9E-05	3.3E-05	3.3E-05
Process Data				
Fired Pellet Production Rate, LTPH	238	239	235	237
Secondary Voltage, kV	24	24	24	24
Primary Amperage, amps	19	19	19	19
Water Flow Rate, gpm	163	163	163	163

Note: The "<" sign indicates the mass is below method detection limits. All calculations use the detection limit for concentration and emissions determinations.

TABLE 2

ONTARIO HYDRO METHOD MERCURY EMISSIONS TEST RESULTS

Furnace 12 Waste Gas #1205 (SV 114)
Research Testing on 7/9/2014 & 7/10/14

Parameter	Run 1	Run 2	Run 3	Average
Test Date	7/9/2014	7/10/2014	7/10/2014	---
Test Period	1312 - 1719	753 - 1159	1248 - 1735	---
Test Duration, min.	240	240	240	240
Avg. Stack Temperature, deg.F	139	139	139	139
Avg. Moisture Content, %V/V	19.4	19.4	18.7	19.2
Mercury Sample Loading, ug				
Particle Bound	0.025	0.027	< 0.020	0.024
Oxidized	< 0.13	< 0.14	< 0.13	< 0.13
Elemental	1.00	0.947	1.04	0.998
Total	1.16	1.11	1.19	1.15
Air Flow Rate				
ACFM	75,300	76,100	80,100	77,200
SCFM	64,900	65,800	69,200	66,600
DSCFM	52,300	53,000	56,300	53,900
Sample Volume				
ACF	166.50	159.23	175.70	167.14
DSCF	154.87	151.56	165.79	157.41
Isokinetic Variation, %				
	99.4	96.0	98.9	98.1
Mercury Concentration, µg/dscf				
Particle Bound	1.6E-04	1.8E-04	< 1.2E-04	1.5E-04
Oxidized	< 8.4E-04	< 9.2E-04	< 7.8E-04	< 8.5E-04
Elemental	6.5E-03	6.2E-03	6.3E-03	6.3E-03
Total	7.5E-03	7.4E-03	7.2E-03	7.3E-03
Mercury Concentration, lb/dscf				
Particle Bound	3.5E-13	3.9E-13	< 2.7E-13	3.4E-13
Oxidized	< 1.9E-12	< 2.0E-12	< 1.7E-12	< 1.9E-12
Elemental	1.4E-11	1.4E-11	1.4E-11	1.4E-11
Total	1.6E-11	1.6E-11	1.6E-11	1.6E-11
Mercury Emission Rate, lb/hr				
Particle Bound	1.1E-06	1.2E-06	< 9.0E-07	1.1E-06
Oxidized	< 5.8E-06	< 6.5E-06	< 5.8E-06	< 6.0E-06
Elemental	4.5E-05	4.4E-05	4.7E-05	4.5E-05
Total	5.2E-05	5.2E-05	5.4E-05	5.2E-05
Process Data				
Fired Pellet Production Rate, LTPH	238	239	235	237
Secondary Voltage, kV	12	12	12	12
Primary Amperage, amps	6	7	7	7
Water Flow Rate, gpm	160	160	160	160

Note: The "<" sign indicates the mass is below method detection limits. All calculations use the detection limit for concentration and emissions determinations.

TABLE 3
NO DETECTION LIMIT
ONTARIO HYDRO METHOD MERCURY EMISSIONS TEST RESULTS

Furnace 12 Hood Exhaust #1201 (SV 111)
Research Testing on 7/9/2014 & 7/10/14

Parameter	Run 1	Run 2	Run 3	Average
Test Date	7/9/2014	7/10/2014	7/10/2014	---
Test Period	1312 - 1719	753 - 1159	1249 - 1735	---
Test Duration, min.	240	240	240	240
Avg. Stack Temperature, deg.F	124	124	123	124
Avg. Moisture Content, %V/V	11.0	10.9	10.9	10.9
Mercury Sample Loading, ug				
Particle Bound	0.006	0.008	0.006	0.006
Oxidized	0.037	0.045	0.037	0.039
Elemental	0.666	0.516	0.610	0.597
Total	0.708	0.568	0.652	0.642
Air Flow Rate				
ACFM	70,800	71,300	70,900	71,000
SCFM	62,500	63,200	63,000	62,900
DSCFM	55,600	56,300	56,100	56,000
Sample Volume				
ACF	178.37	175.70	177.29	177.12
DSCF	163.45	165.30	164.83	164.52
Isokinetic Variation, %				
	98.6	98.5	98.5	98.6
Mercury Concentration, ug/dscf				
Particle Bound	3.4E-05	4.5E-05	3.3E-05	3.7E-05
Oxidized	2.2E-04	2.7E-04	2.2E-04	2.4E-04
Elemental	4.1E-03	3.1E-03	3.7E-03	3.6E-03
Total	4.3E-03	3.4E-03	4.0E-03	3.9E-03
Mercury Concentration, lb/dscf				
Particle Bound	7.4E-14	1.0E-13	7.4E-14	8.3E-14
Oxidized	4.9E-13	5.9E-13	4.9E-13	5.2E-13
Elemental	9.0E-12	6.9E-12	8.2E-12	8.0E-12
Total	9.5E-12	7.6E-12	8.7E-12	8.6E-12
Mercury Emission Rate, lb/hr				
Particle Bound	2.5E-07	3.4E-07	2.5E-07	2.8E-07
Oxidized	1.6E-06	2.0E-06	1.6E-06	1.8E-06
Elemental	3.0E-05	2.3E-05	2.7E-05	2.7E-05
Total	3.2E-05	2.6E-05	2.9E-05	2.9E-05
Process Data				
Fired Pellet Production Rate, LTPH	238	239	235	237
Secondary Voltage, kV	24	24	24	24
Primary Amperage, amps	19	19	19	19
Water Flow Rate, gpm	163	163	163	163

Note: The Detection Limit was removed for this data set. These Results should be used for informational purposes only.

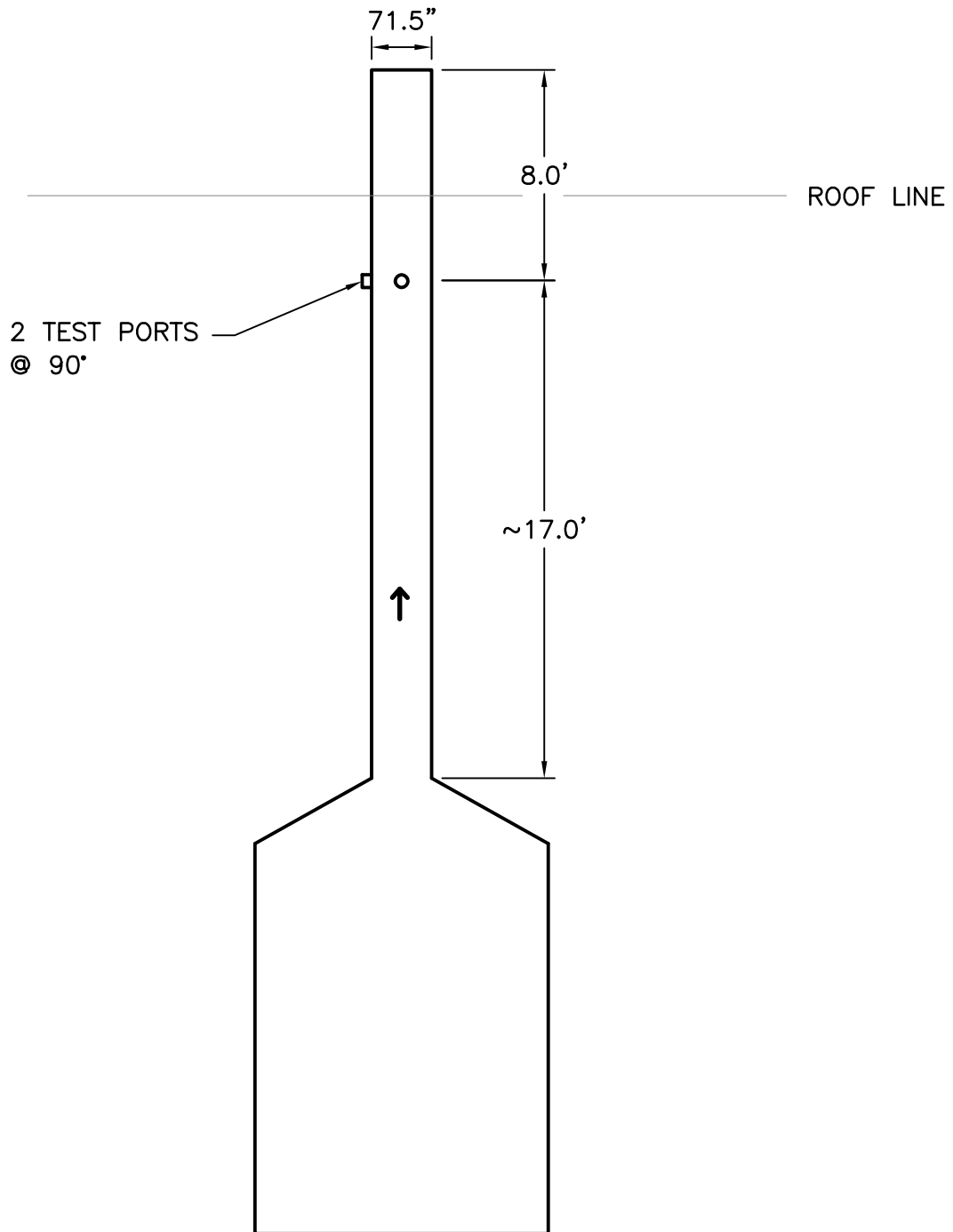
TABLE 4
NO DETECTION LIMIT
ONTARIO HYDRO METHOD MERCURY EMISSIONS TEST RESULTS

Furnace 12 Waste Gas #1205 (SV 114)
Research Testing on 7/9/2014 & 7/10/14

Parameter	Run 1	Run 2	Run 3	Average
Test Date	7/9/2014	7/10/2014	7/10/2014	---
Test Period	1312 - 1719	753 - 1159	1248 - 1735	---
Test Duration, min.	240	240	240	240
Avg. Stack Temperature, deg.F	139	139	139	139
Avg. Moisture Content, %V/V	19.4	19.4	18.7	19.2
Mercury Sample Loading, ug				
Particle Bound	0.021	0.024	0.015	0.020
Oxidized	0.057	0.059	0.050	0.055
Elemental	0.997	0.940	1.04	0.990
Total	1.07	1.02	1.10	1.07
Air Flow Rate				
ACFM	75,300	76,100	80,100	77,200
SCFM	64,900	65,800	69,200	66,600
DSCFM	52,300	53,000	56,300	53,900
Sample Volume				
ACF	166.50	159.23	175.70	167.14
DSCF	154.87	151.56	165.79	157.41
Isokinetic Variation, %				
	99.4	96.0	98.9	98.1
Mercury Concentration, µg/dscf				
Particle Bound	1.3E-04	1.6E-04	8.7E-05	1.3E-04
Oxidized	3.7E-04	3.9E-04	3.0E-04	3.5E-04
Elemental	6.4E-03	6.2E-03	6.2E-03	6.3E-03
Total	6.9E-03	6.7E-03	6.6E-03	6.8E-03
Mercury Concentration, lb/dscf				
Particle Bound	2.9E-13	3.5E-13	1.9E-13	2.8E-13
Oxidized	8.1E-13	8.5E-13	6.6E-13	7.7E-13
Elemental	1.4E-11	1.4E-11	1.4E-11	1.4E-11
Total	1.5E-11	1.5E-11	1.5E-11	1.5E-11
Mercury Emission Rate, lb/hr				
Particle Bound	9.2E-07	1.1E-06	6.5E-07	8.9E-07
Oxidized	2.5E-06	2.7E-06	2.2E-06	2.5E-06
Elemental	4.5E-05	4.3E-05	4.6E-05	4.5E-05
Total	4.8E-05	4.7E-05	4.9E-05	4.8E-05
Process Data				
Fired Pellet Production Rate, LTPH	238	239	235	237
Secondary Voltage, kV	12	12	12	12
Primary Amperage, amps	6	7	7	7
Water Flow Rate, gpm	160	160	160	160

Note: The Detection Limit was removed for this data set. These Results should be used for informational purposes only.

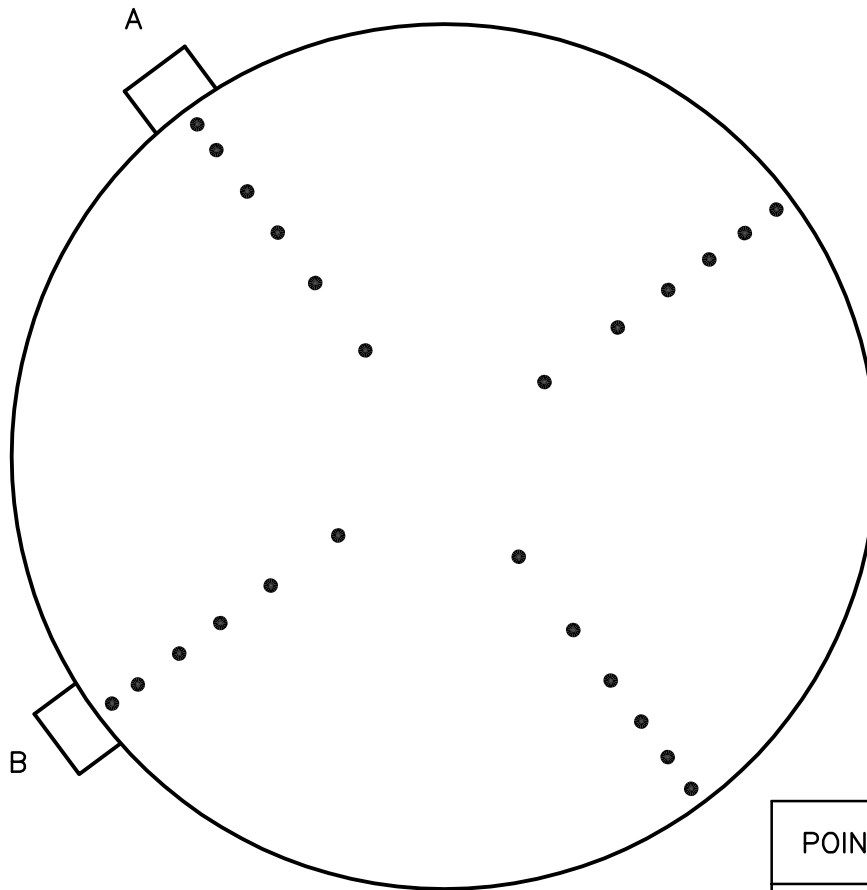
Figures



TEST PORT LOCATIONS
NORTHSHORE MINING COMPANY
SILVER BAY, MINNESOTA
FURNACE 12 HOOD EXHAUST (SV111, SV112, SV113) &
WASTE GAS STACKS (SV114, SV115)

NOT TO SCALE

FIGURE 1



NO. OF TEST PORTS	2
PORT DIAMETER	4"
NO. OF TRAVERSE POINTS	24
DUCT DIAMETER	71.5"

POINT	INSERTION DEPTH IN "
1	1.52
2	4.79
3	8.45
4	12.67
5	17.88
6	25.43
7	46.07
8	53.63
9	58.83
10	63.05
11	66.71
12	69.98

TRAVERSE POINT LOCATIONS
 NORTHSORE MINING COMPANY
 SILVER BAY, MINNESOTA
 FURNACE 12 HOOD EXHAUST (SV111, SV112, SV113) &
 WASTE GAS STACKS (SV114, SV115)

NOT TO SCALE

FIGURE 2

Appendices

Appendix A

Report Calculations and Nomenclature

Determination of Volumetric Air Flow Rate, Gas Composition, and Moisture Content

EPA Methods 2, 3, 4 and Ontario Hydro Method ASTM D6784-02

Furnace 12 Hood Exhaust #1201 (SV 111)

Research Testing on 7/9/2014 & 7/10/2014

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	7/9/2014	7/10/2014	7/10/2014
Test Period	-	-	1312 - 1719	753 - 1159	1249 - 1735
Number of Sample Ports	-	-	2	2	2
Number of Traverse Points	-	-	24	24	24
Duct Dimensions (diameter or Length x Width)	D, L X W	inches	71.50	71.50	71.50
Barometric Pressure	Pbar	in. Hg	29.21	29.35	29.35
Stack Static Pressure	Pg	in. H ₂ O	-0.19	-0.19	-0.19
Average Stack Temperature	Tsf	degrees F	124	124	123
Actual Dry Gas Meter Volume	Vm	cubic feet	178.37	175.70	177.29
Dry Gas Meter Calibration Factor	Y	-	0.9914	0.9914	0.9914
Average Orifice Meter Pressure Drop	DH	in H ₂ O	1.68	1.68	1.68
Average Meter Temperature	Tmf	degrees F	100	88	94
Pitot Tube Coefficient	Cp	-	0.84	0.84	0.84
Average Square Root of Velocity Head	(DP) ^{0.5}	-	0.693	0.700	0.697
Volume of Water Vapor Condensed in Impingers	Vwc	ml	402	402	402
Mass of Water Vapor Collected in Desiccant	Vwsg	g	26	26	26
Orsat Results, Dry Basis					
Oxygen	%O ₂	%v/v	19.4	19.4	19.4
Carbon Dioxide	%CO ₂	%v/v	0.40	0.40	0.40
Nitrogen + Carbon Monoxide	%N ₂ + %CO	%v/v	80.2	80.2	80.2
Nozzle Diameter	Dn	inches	0.252	0.252	0.252
Run Time	theta	minutes	240	240	240
Calculated Data	Symbol	Units	Run 1	Run 2	Run 3
Average Absolute Stack Temperature Tsr = Tsf + 460	Tsr	degrees R	584	584	583
Stack Pressure Ps = Pbar + Pg / 13.6	Ps	in. Hg	29.20	29.34	29.34
Duct Area A = 3.14 x D ² / (4 x 144) or A = L x W / 144	A	Sq. ft	27.883	27.883	27.883
Meter Volume at Standard Conditions Vmstd = 17.64 x Vm x Y x ((Pbar + (DH / 13.6)) / (Tmf + 460))	Vmstd	cubic feet	163.45	165.30	164.83
Average Moisture Content of Stack Gas MC = ((0.04707 x Vwc + 0.04715 x Vwsg) / ((0.04707 x Vwc + 0.04715 x Vwsg) + (Vmstd)) x 100	MC	% Vol	10.97	10.86	10.89
Molecular Weight of Stack Gas, dry Md = (0.44 x %CO ₂) + (0.32 x %O ₂) + (0.28 x (%N ₂ + %CO))	Md	lb/lbmol	28.84	28.84	28.84
Molecular Weight of Stack Gas, wet Ms = Md x (1 - (MC/100)) + 18 x (MC/100)	Ms	lb/lbmol	27.65	27.66	27.66
Average Stack Gas Velocity Vs = 85.49 x Cp x (dP) ^{0.5} x ((Tsr/(Ps x Ms)) ^{0.5})	Vs	ft/sec	42.34	42.61	42.40
Actual Volumetric Air Flow Rate Qa = 60 x Vs x A	Qa	acfm	70,834	71,288	70,941
Volumetric Air Flow Rate at Standard Conditions Qs = Qa x (528 / (Ts + 460)) x (Ps / 29.92)	Qs	scfm	62,492	63,208	63,008
Dry Volumetric Air Flow Rate at Standard Conditions Qd = Qa x (1 - (MC / 100)) x (528 / Tsr) x (Ps / 29.92)	Qd	dscfm	55,634	56,341	56,145
Nozzle Cross-Sectional Area An = (3.14 x Dn ²) / (4 x 144)	An	sq. ft	0.000346	0.000346	0.000346
Isokinetic Variation I = (0.0945 x Tsr x Vmstd) / (Ps x Vs x An x theta x (1 - (MC / 100)))	I	%	98.6	98.5	98.5

Determination of Mercury Emissions ASTM
D 6784-02 Ontario Hydro Method Furnace 12
Hood Exhaust #1201 (SV 111) Research
Testing on 7/9/2014 & 7/10/2014

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	7/9/2014	7/10/2014	7/10/2014
Test Period	-	-	1312 - 1719	753 - 1159	1249 - 1735
Run Time	theta	min	240	240	240
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	55,634	56,341	56,145
Meter Volume at Standard Conditions	Vmstd	cubic feet	163.45	165.30	164.83
Sample Loading					
Mercury Loading			<u>Run 1</u>	<u>Run 2</u>	<u>Run 3</u>
<u>Front Half</u>					
Particle Bound	M _{ParticleND-Hg}	µg	< 0.015	< 0.015	< 0.015
<u>Back Half</u>					
Oxidized (KCl impinger)	M _{OxidizedND-Hg}	µg	< 0.110	< 0.100	< 0.110
Elemental (HNO ₃ /H ₂ O ₂ + H ₂ SO ₄ /KMnO ₄ imp.)	M _{ElementalND-Hg}	µg	0.668	0.523	0.617
Total Mercury	M _{TotalND-Hg}	µg	0.793	0.638	0.742
Calculated Data					
	Symbol	Units	Run 1	Run 2	Run 3
Mercury Concentrations					
$C_{PND-Hg} = M_{ParticleND-Hg} / V_{mstd}$	C _{PND-Hg}	µg/dscf	< 9.2E-05	< 9.1E-05	< 9.1E-05
$C_{OND-Hg} = M_{OxidizedND-Hg} / V_{mstd}$	C _{OND-Hg}	µg/dscf	< 6.7E-04	< 6.0E-04	< 6.7E-04
$C_{END-Hg} = M_{ElementalND-Hg} / V_{mstd}$	C _{END-Hg}	µg/dscf	4.1E-03	3.2E-03	3.7E-03
$C_{TND-Hg} = M_{TotalND-Hg} / V_{mstd}$	C _{TND-Hg}	µg/dscf	4.9E-03	3.9E-03	4.5E-03
$C_{ParticleND-Hg} = M_{ParticleND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{ParticleND-Hg}	lb/dscf	< 2.0E-13	< 2.0E-13	< 2.0E-13
$C_{OxidizedND-Hg} = M_{OxidizedND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{OxidizedND-Hg}	lb/dscf	< 1.5E-12	< 1.3E-12	< 1.5E-12
$C_{ElementalND-Hg} = M_{ElementalND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{ElementalND-Hg}	lb/dscf	9.0E-12	7.0E-12	8.2E-12
$C_{TotalND-Hg} = M_{TotalND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{TotalND-Hg}	lb/dscf	1.1E-11	8.5E-12	9.9E-12
Mercury Emission Rate					
$E_{ParticleND-Hg} = C_{ParticleND-Hg} \times Q_d \times 60$	E _{ParticleND-Hg}	lb/hr	< 6.8E-07	< 6.8E-07	< 6.8E-07
$E_{OxidizedND-Hg} = C_{OxidizedND-Hg} \times Q_d \times 60$	E _{OxidizedND-Hg}	lb/hr	< 5.0E-06	< 4.5E-06	< 5.0E-06
$E_{ElementalND-Hg} = C_{ElementalND-Hg} \times Q_d \times 60$	E _{ElementalND-Hg}	lb/hr	3.0E-05	2.4E-05	2.8E-05
$E_{TotalND-Hg} = C_{TotalND-Hg} \times Q_d \times 60$	E _{TotalND-Hg}	lb/hr	3.6E-05	2.9E-05	3.3E-05

Note: The "<" sign indicates the mass is below method detection limits. All calculations use the detection limit for concentration and emissions determinations.

Determination of Mercury Emissions
NO DETECTION LIMIT
ASTM D 6784-02 Ontario Hydro Method
Furnace 12 Hood Exhaust #1201 (SV 111)
Research Testing on 7/9/2014 & 7/10/2014

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	7/9/2014	7/10/2014	7/10/2014
Test Period	-	-	1312 - 1719	753 - 1159	1249 - 1735
Run Time	theta	min	240	240	240
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	55,634	56,341	56,145
Meter Volume at Standard Conditions	Vmstd	cubic feet	163.45	165.30	164.83
Sample Loading					
Mercury Loading			<u>Run 1</u>	<u>Run 2</u>	<u>Run 3</u>
Front Half					
Particle Bound	M _{Particle-Hg}	µg	0.006	0.008	0.006
Back Half					
Oxidized (KCl impinger)	M _{Oxidized-Hg}	µg	0.037	0.045	0.037
Elemental (HNO ₃ /H ₂ O ₂ + H ₂ SO ₄ /KMnO ₄ imp.)	M _{Elemental-Hg}	µg	0.666	0.516	0.610
Total Mercury	M _{Total-Hg}	µg	0.708	0.568	0.652
Calculated Data					
Mercury Concentrations					
$C_{P-Hg} = M_{ParticleND-Hg} / V_{mstd}$	C _{P-Hg}	µg/dscf	3.4E-05	4.5E-05	3.3E-05
$C_{O-Hg} = M_{OxidizedND-Hg} / V_{mstd}$	C _{O-Hg}	µg/dscf	2.2E-04	2.7E-04	2.2E-04
$C_{E-Hg} = M_{ElementalND-Hg} / V_{mstd}$	C _{E-Hg}	µg/dscf	4.1E-03	3.1E-03	3.7E-03
$C_{T-Hg} = M_{TotalND-Hg} / V_{mstd}$	C _{T-Hg}	µg/dscf	4.3E-03	3.4E-03	4.0E-03
$C_{Particle-Hg} = M_{Particle-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Particle-Hg}	lb/dscf	7.4E-14	1.0E-13	7.4E-14
$C_{Oxidized-Hg} = M_{Oxidized-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Oxidized-Hg}	lb/dscf	4.9E-13	5.9E-13	4.9E-13
$C_{Elemental-Hg} = M_{Elemental-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Elemental-Hg}	lb/dscf	9.0E-12	6.9E-12	8.2E-12
$C_{Total-Hg} = M_{Total-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Total-Hg}	lb/dscf	9.5E-12	7.6E-12	8.7E-12
Mercury Emission Rate					
$E_{Particle-Hg} = C_{Particle-Hg} \times Q_d \times 60$	E _{Particle-Hg}	lb/hr	2.5E-07	3.4E-07	2.5E-07
$E_{Oxidized-Hg} = C_{Oxidized-Hg} \times Q_d \times 60$	E _{Oxidized-Hg}	lb/hr	1.6E-06	2.0E-06	1.6E-06
$E_{Elemental-Hg} = C_{Elemental-Hg} \times Q_d \times 60$	E _{Elemental-Hg}	lb/hr	3.0E-05	2.3E-05	2.7E-05
$E_{Total-Hg} = C_{Total-Hg} \times Q_d \times 60$	E _{Total-Hg}	lb/hr	3.2E-05	2.6E-05	2.9E-05

Note: The Detection Limit was removed for this data set. These Results should be used for informational purposes only.

Determination of Volumetric Air Flow Rate, Gas Composition, and Moisture Content

EPA Methods 2, 3, 4 and Ontario Hydro Method ASTM D6784-02

Furnace 12 Waste Gas #1205 (SV 114)

Research Testing on 7/9/2014 & 7/10/2014

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	7/9/2014	7/10/2014	7/10/2014
Test Period	-	-	1312 - 1719	753 - 1159	1248 - 1735
Number of Sample Ports	-	-	2	2	2
Number of Traverse Points	-	-	24	24	24
Duct Dimensions (diameter or Length x Width)	D, L X W	inches	71.50	71.50	71.50
Barometric Pressure	Pbar	in. Hg	29.21	29.35	29.35
Stack Static Pressure	Pg	in. H ₂ O	-0.11	-0.11	-0.11
Average Stack Temperature	Tsf	degrees F	139	139	139
Actual Dry Gas Meter Volume	Vm	cubic feet	166.50	159.23	175.70
Dry Gas Meter Calibration Factor	Y	-	0.9972	0.9972	0.9972
Average Orifice Meter Pressure Drop	DH	in H ₂ O	1.61	1.63	1.82
Average Meter Temperature	Tmf	degrees F	95	85	90
Pitot Tube Coefficient	Cp	-	0.84	0.84	0.84
Average Square Root of Velocity Head	(DP) ^{0.5}	-	0.718	0.727	0.766
Volume of Water Vapor Condensed in Impingers	Vwc	ml	787	787	787
Mass of Water Vapor Collected in Desiccant	Vwsg	g	25	25	25
Orsat Results, Dry Basis					
Oxygen	%O ₂	%v/v	17.1	17.1	17.1
Carbon Dioxide	%CO ₂	%v/v	1.90	1.90	1.90
Nitrogen + Carbon Monoxide	%N ₂ + %CO	%v/v	81.0	81.0	81.0
Nozzle Diameter	Dn	inches	0.252	0.252	0.252
Run Time	theta	minutes	240	240	240
Calculated Data	Symbol	Units	Run 1	Run 2	Run 3
Average Absolute Stack Temperature Tsr = Tsf + 460	Tsr	degrees R	599	599	599
Stack Pressure Ps = Pbar + Pg / 13.6	Ps	in. Hg	29.20	29.34	29.34
Duct Area A = 3.14 x D ² / (4 x 144) or A = L x W / 144	A	Sq. ft	27.883	27.883	27.883
Meter Volume at Standard Conditions Vmstd = 17.64 x Vm x Y x ((Pbar + (DH / 13.6)) / (Tmf + 460))	Vmstd	cubic feet	154.87	151.56	165.79
Average Moisture Content of Stack Gas MC = ((0.04707 x Vwc + 0.04715 x Vwsg) / ((0.04707 x Vwc + 0.04715 x Vwsg) + (Vmstd))) x 100	MC	% Vol	19.36 see note	19.44 see note	18.74
Molecular Weight of Stack Gas, dry Md = (0.44 x %CO ₂) + (0.32 x %O ₂) + (0.28 x (%N ₂ + %CO))	Md	lb/lbmol	28.99	28.99	28.99
Molecular Weight of Stack Gas, wet Ms = Md x (1-(MC/100))+18 x (MC/100)	Ms	lb/lbmol	26.86	26.85	26.93
Average Stack Gas Velocity Vs = 85.49 x Cp x (dP) ^{0.5} x ((Tsr/(Ps x Ms)) ^{0.5})	Vs	ft/sec	45.03	45.49	47.86
Actual Volumetric Air Flow Rate Qa = 60 x Vs x A	Qa	acfm	75,340	76,108	80,077
Volumetric Air Flow Rate at Standard Conditions Qs = Qa x (528 / (Ts + 460)) x (Ps / 29.92)	Qs	scfm	64,857	65,795	69,222
Dry Volumetric Air Flow Rate at Standard Conditions Qd = Qa x (1 - (MC / 100)) x (528 / Tsr) x (Ps / 29.92)	Qd	dscfm	52,297	53,005	56,253
Nozzle Cross-Sectional Area An = (3.14 x Dn ²) / (4 x 144)	An	sq. ft	0.000346	0.000346	0.000346
Isokinetic Variation I = (0.0945 x Tsr x Vmstd) / (Ps x Vs x An x theta x (1 - (MC / 100)))	I	%	99.4	96.0	98.9

Note: Moisture Content limited to moisture at saturation

Determination of Mercury Emissions ASTM
D 6784-02 Ontario Hydro Method Furnace 12
Waste Gas #1205 (SV 114) Research Testing
on 7/9/2014 & 7/10/2014

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	7/9/2014	7/10/2014	7/10/2014
Test Period	-	-	1312 - 1719	753 - 1159	1248 - 1735
Run Time	theta	min	240	240	240
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	52,297	53,005	56,253
Meter Volume at Standard Conditions	Vmstd	cubic feet	154.87	151.56	165.79
Sample Loading					
Mercury Loading			<u>Run 1</u>	<u>Run 2</u>	<u>Run 3</u>
Front Half					
Particle Bound	M _{ParticleND-Hg}	µg	0.025	0.027	< 0.020
Back Half					
Oxidized (KCl impinger)	M _{OxidizedND-Hg}	µg	< 0.130	< 0.140	< 0.130
Elemental (HNO ₃ /H ₂ O ₂ + H ₂ SO ₄ /KMnO ₄ imp.)	M _{ElementalND-Hg}	µg	1.00	0.947	1.04
Total Mercury	M _{TotalND-Hg}	ug	1.16	1.11	1.19
Calculated Data					
	Symbol	Units	Run 1	Run 2	Run 3
Mercury Concentrations					
$C_{PND-Hg} = M_{ParticleND-Hg} / V_{mstd}$	C _{PND-Hg}	µg/dscf	1.6E-04	1.8E-04	< 1.2E-04
$C_{COND-Hg} = M_{OxidizedND-Hg} / V_{mstd}$	C _{COND-Hg}	µg/dscf	< 8.4E-04	< 9.2E-04	< 7.8E-04
$C_{END-Hg} = M_{ElementalND-Hg} / V_{mstd}$	C _{END-Hg}	µg/dscf	6.5E-03	6.2E-03	6.3E-03
$C_{TND-Hg} = M_{TotalND-Hg} / V_{mstd}$	C _{TND-Hg}	µg/dscf	7.5E-03	7.4E-03	7.2E-03
$C_{ParticleND-Hg} = M_{ParticleND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{ParticleND-Hg}	lb/dscf	3.5E-13	3.9E-13	< 2.66E-13
$C_{OxidizedND-Hg} = M_{OxidizedND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{OxidizedND-Hg}	lb/dscf	< 1.9E-12	< 2.0E-12	< 1.7E-12
$C_{ElementalND-Hg} = M_{ElementalND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{ElementalND-Hg}	lb/dscf	1.4E-11	1.4E-11	1.4E-11
$C_{TotalND-Hg} = M_{TotalND-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{TotalND-Hg}	lb/dscf	1.6E-11	1.6E-11	1.6E-11
Mercury Emission Rate					
$E_{ParticleND-Hg} = C_{ParticleND-Hg} \times Q_d \times 60$	E _{ParticleND-Hg}	lb/hr	1.1E-06	1.2E-06	< 9.0E-07
$E_{OxidizedND-Hg} = C_{OxidizedND-Hg} \times Q_d \times 60$	E _{OxidizedND-Hg}	lb/hr	< 5.8E-06	< 6.5E-06	< 5.8E-06
$E_{ElementalND-Hg} = C_{ElementalND-Hg} \times Q_d \times 60$	E _{ElementalND-Hg}	lb/hr	4.5E-05	4.4E-05	4.7E-05
$E_{TotalND-Hg} = C_{TotalND-Hg} \times Q_d \times 60$	E _{TotalND-Hg}	lb/hr	5.2E-05	5.2E-05	5.4E-05

Note: The "<" sign indicates the mass is below method detection limits. All calculations use the detection limit for concentration and emissions determinations.

**Determination of Mercury Emissions *NO*
DETECTION LIMIT**

ASTM D 6784-02 Ontario Hydro Method
Furnace 12 Waste Gas #1205 (SV 114)
Research Testing on 7/9/2014 & 7/10/2014

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	7/9/2014	7/10/2014	7/10/2014
Test Period	-	-	1312 - 1719	753 - 1159	1248 - 1735
Run Time	theta	min	240	240	240
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	52,297	53,005	56,253
Meter Volume at Standard Conditions	Vmstd	cubic feet	154.87	151.56	165.79
Sample Loading					
Mercury Loading			<u>Run 1</u>	<u>Run 2</u>	<u>Run 3</u>
Front Half					
Particle Bound	M _{Particle-Hg}	µg	0.021	0.024	0.015
Back Half					
Oxidized (KCl impinger)	M _{Oxidized-Hg}	µg	0.057	0.059	0.050
Elemental (HNO ₃ /H ₂ O ₂ + H ₂ SO ₄ /KMnO ₄ imp.)	M _{Elemental-Hg}	µg	0.997	0.940	1.04
Total Mercury	M _{Total-Hg}	µg	1.07	1.02	1.10
Calculated Data					
	Symbol	Units	Run 1	Run 2	Run 3
Mercury Concentrations					
$C_{P-Hg} = M_{ParticleND-Hg} / V_{mstd}$	C _{P-Hg}	µg/dscf	1.3E-04	1.6E-04	8.7E-05
$C_{O-Hg} = M_{OxidizedND-Hg} / V_{mstd}$	C _{O-Hg}	µg/dscf	3.7E-04	3.9E-04	3.0E-04
$C_{E-Hg} = M_{ElementalND-Hg} / V_{mstd}$	C _{E-Hg}	µg/dscf	6.4E-03	6.2E-03	6.2E-03
$C_{T-Hg} = M_{TotalND-Hg} / V_{mstd}$	C _{T-Hg}	µg/dscf	6.9E-03	6.7E-03	6.6E-03
$C_{Particle-Hg} = M_{Particle-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Particle-Hg}	lb/dscf	2.9E-13	3.5E-13	1.9E-13
$C_{Oxidized-Hg} = M_{Oxidized-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Oxidized-Hg}	lb/dscf	8.1E-13	8.5E-13	6.6E-13
$C_{Elemental-Hg} = M_{Elemental-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Elemental-Hg}	lb/dscf	1.4E-11	1.4E-11	1.4E-11
$C_{Total-Hg} = M_{Total-Hg} \times 2.205 \times 10^{-9} / V_{mstd}$	C _{Total-Hg}	lb/dscf	1.5E-11	1.5E-11	1.5E-11
Mercury Emission Rate					
$E_{Particle-Hg} = C_{Particle-Hg} \times Q_d \times 60$	E _{Particle-Hg}	lb/hr	9.2E-07	1.1E-06	6.5E-07
$E_{Oxidized-Hg} = C_{Oxidized-Hg} \times Q_d \times 60$	E _{Oxidized-Hg}	lb/hr	2.5E-06	2.7E-06	2.2E-06
$E_{Elemental-Hg} = C_{Elemental-Hg} \times Q_d \times 60$	E _{Elemental-Hg}	lb/hr	4.5E-05	4.3E-05	4.6E-05
$E_{Total-Hg} = C_{Total-Hg} \times Q_d \times 60$	E _{Total-Hg}	lb/hr	4.8E-05	4.7E-05	4.9E-05

Note: The Detection Limit was removed for this data set. These Results should be used for informational purposes only.

Appendix B

Field Data Sheets



ONTARIO HYDRO - FIELD DATA SHEET - RUN 1

Project	Northshore Mining Company			Meter ID	C-7	Probe ID	6-2	Bar.Press.	29.21	in. Hg	Sample Train Leak Rate, cfm:			
Sample Location	Furnace 12 Hood Exhaust #1201 SV 111			Meter Y	0.9914	Pitot Tube No.	6-2	Stat Press.	-0.2	in. H ₂ O	Pretest	0.000	at 13	in. Hg
Date	07/09/14			Orifice dH@	1.8280	Pitot Cp	0.84	Posttest				0.000	at 7	in. Hg
Test	1	Run #	1	Liner Type:		Glass		Pretest Pitot leak Check Pos				PASS	@ >3" w.c	
Operators	TAK /TJW2							Posttest Pitot leak Check Neg				PASS	@ >3" w.c	

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft ³	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft ³	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °°F					Moisture Content, %
									Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	
Start Time	1312	840.30												
1	10.0	847.20	0.440	1.50	6.97	847.27	*	122	*	*	*	90	88	11.0
2	20.0	854.22	0.430	1.47	6.89	854.16	*	125	*	*	*	94	89	11.0
3	30.0	861.62	0.510	1.75	7.54	861.71	*	125	*	*	*	96	90	11.0
4	40.0	869.30	0.520	1.79	7.64	869.34	*	125	*	*	*	97	91	11.0
5	50.0	876.95	0.530	1.83	7.73	877.07	*	124	*	*	*	98	92	11.0
6	60.0	884.90	0.550	1.90	7.89	884.96	*	124	*	*	*	99	93	11.0
7	70.0	892.62	0.530	1.84	7.77	892.73	*	123	*	*	*	100	94	11.0
8	80.0	900.42	0.520	1.80	7.70	900.43	*	124	*	*	*	100	94	11.0
9	90.0	907.99	0.480	1.67	7.40	907.83	*	124	*	*	*	100	95	11.0
10	100.0	915.32	0.460	1.60	7.25	915.07	*	124	*	*	*	101	95	11.0
11	110.0	922.00	0.390	1.36	6.68	921.75	*	124	*	*	*	102	96	11.0
12	120.0	928.82	0.370	1.29	6.52	928.28	*	123	*	*	*	103	97	11.0
13	130.0	935.58	0.440	1.54	7.13	935.41	*	122	*	*	*	102	99	11.0
14	140.0	942.63	0.430	1.50	7.03	942.44	*	126	*	*	*	104	99	11.0
15	150.0	950.00	0.490	1.71	7.53	949.97	*	125	*	*	*	105	100	11.0
16	160.0	957.51	0.500	1.75	7.62	957.59	*	125	*	*	*	106	101	11.0
17	170.0	965.50	0.540	1.90	7.94	965.53	*	124	*	*	*	107	102	11.0
18	180.0	973.40	0.550	1.94	8.03	973.56	*	123	*	*	*	107	103	11.0
19	190.0	981.43	0.540	1.90	7.96	981.52	*	124	*	*	*	108	102	11.0
20	200.0	989.35	0.540	1.90	7.96	989.48	*	124	*	*	*	108	103	11.0
21	210.0	996.95	0.500	1.76	7.67	997.14	*	124	*	*	*	108	103	11.0
22	220.0	1004.60	0.490	1.73	7.59	1004.73	*	124	*	*	*	108	104	11.0
23	230.0	1011.63	0.410	1.45	6.95	1011.68	*	124	*	*	*	107	103	11.0
24	240.0	1018.67	0.410	1.44	6.93	1018.61	*	124	*	*	*	106	103	11.0
End Time	1719													
Run Time	240		Avg DH=	1.68			Avg Ts=	124.00				Avg Tm=	99.83	

Integrated Gas Sampling Data :

Bag No.	NA
Bag Vol.	NA liters
Leak Rate	NA cc/min

Filter No.	4Q0380
Nozzle No.	Glass
Nozzle Dn.	0.252

MOISTURE RECOVERY DATA :

Impinger	1	2	3	4	Desiccant	Total
Final wt., g	402	0	0	0	463	
Initial wt., g	0	0	0	0	437	
Difference	402	0	0	0	26	428

* Data not recorded, but assumed to be within the limits of the test method



ONTARIO HYDRO - FIELD DATA SHEET - RUN 2

Project	Northshore Mining Company			Meter ID	C-7	Probe ID	6-2	Bar.Press.	29.35	in. Hg	Sample Train Leak Rate, cfm:			
Sample Location	Furnace 12 Hood Exhaust #1201 SV 111			Meter Y	0.9914	Pitot Tube No.	6-2	Stat Press.	-0.2	in. H2O	Pretest	0.000	at 12 in. Hg	
Date	07/10/14			Orifice dH@	1.8280	Pitot Cp	0.84				Posttest	0.000	at 8 in. Hg	
Test	1	Run #	2			Liner Type:	Glass				Pretest Pitot leak Check Pos	Pass	@ >3" w.c	
Operators	TAK /TJW2											Posttest Pitot leak Check Neg	Pass	@ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H2O	Orifice DH in. H2O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F					Moisture Content, %
									Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	
Start Time	0753	19.10												
1	10.0	25.92	0.460	1.54	6.97	26.07	*	123	*	*	*	79	77	11.0
2	20.0	32.80	0.460	1.54	6.99	33.06	*	123	*	*	*	84	78	11.0
3	30.0	40.20	0.510	1.72	7.40	40.45	*	123	*	*	*	87	80	11.0
4	40.0	47.70	0.520	1.76	7.50	47.95	*	124	*	*	*	89	82	11.0
5	50.0	55.50	0.550	1.87	7.74	55.69	*	124	*	*	*	90	84	11.0
6	60.0	63.40	0.560	1.91	7.83	63.52	*	124	*	*	*	92	85	11.0
7	70.0	71.40	0.550	1.88	7.78	71.30	*	124	*	*	*	92	86	11.0
8	80.0	78.90	0.550	1.88	7.79	79.09	*	123	*	*	*	93	87	11.0
9	90.0	86.70	0.510	1.75	7.51	86.61	*	124	*	*	*	94	88	11.0
10	100.0	94.16	0.510	1.75	7.53	94.13	*	124	*	*	*	93	89	11.0
11	110.0	100.90	0.400	1.37	6.67	100.80	*	124	*	*	*	93	89	11.0
12	120.0	107.20	0.340	1.17	6.15	106.94	*	124	*	*	*	93	89	11.0
13	130.0	114.10	0.440	1.51	6.99	113.94	*	124	*	*	*	90	89	11.0
14	140.0	121.03	0.440	1.51	6.97	120.91	*	124	*	*	*	91	89	11.0
15	150.0	128.10	0.500	1.71	7.43	128.34	*	125	*	*	*	91	88	11.0
16	160.0	135.70	0.520	1.78	7.57	135.91	*	125	*	*	*	90	88	11.0
17	170.0	143.66	0.570	1.95	7.93	143.84	*	124	*	*	*	90	87	11.0
18	180.0	151.60	0.570	1.95	7.92	151.76	*	124	*	*	*	89	87	11.0
19	190.0	159.40	0.560	1.91	7.84	159.61	*	124	*	*	*	89	87	11.0
20	200.0	167.20	0.550	1.88	7.77	167.38	*	124	*	*	*	90	86	11.0
21	210.0	174.63	0.490	1.68	7.34	174.72	*	123	*	*	*	90	86	11.0
22	220.0	181.94	0.480	1.64	7.26	181.99	*	124	*	*	*	90	86	11.0
23	230.0	188.54	0.390	1.33	6.55	188.53	*	124	*	*	*	90	86	11.0
24	240.0	194.80	0.370	1.26	6.38	194.91	*	124	*	*	*	89	87	11.0
End Time	1159													
Run Time	240		Avg DH=	1.68			Avg Ts=	123.88				Avg Tm=	87.88	

Integrated Gas Sampling Data :

Bag No.	NA
Bag Vol.	NA liters
Leak Rate	NA cc/min

Filter No.	4Q0387
Nozzle No.	Glass
Nozzle Dn.	0.252

MOISTURE RECOVERY DATA :

Impinger	1	2	3	4	Desiccant	Total
Final wt., g	402	0	0	0	463	
Initial wt., g	0	0	0	0	437	
Difference	402	0	0	0	26	428

* Data not recorded, but assumed to be within the limits of the test method



ONTARIO HYDRO - FIELD DATA SHEET - RUN 3

Project	Northshore Mining Company			Meter ID	C-7	Probe ID	6-2	Bar.Press.	29.35	in. Hg	Sample Train Leak Rate, cfm:			
Sample Location	Furnace 12 Hood Exhaust #1201 SV 111			Meter Y	0.9914	Pitot Tube No.	6-2	Stat Press.	-0.2	in. H2O	Pretest	0.000	at 14	in. Hg
Date	07/10/14			Orifice dH@	1.8280	Pitot Cp	0.84				Posttest	0.000	at 6	in. Hg
Test	1	Run #	3			Liner Type:	Glass				Pretest Pitot leak Check Pos	PASS	@ >3" w.c	
Operators	TAK /TJW2								Posttest Pitot leak Check Neg			PASS	@ >3" w.c	

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft ³	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft ³	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F					Moisture Content, %
									Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	
Start Time	1249	195.20												
1	10.0	202.00	0.440	1.50	6.91	202.11	*	120	*	*	*	82	82	11.0
2	20.0	208.92	0.440	1.49	6.88	208.99	*	124	*	*	*	84	82	11.0
3	30.0	216.30	0.510	1.72	7.42	216.40	*	124	*	*	*	87	83	11.0
4	40.0	223.70	0.520	1.77	7.52	223.92	*	124	*	*	*	90	84	11.0
5	50.0	233.40	0.550	1.88	7.77	231.69	*	122	*	*	*	91	85	11.0
6	60.0	239.40	0.570	1.95	7.92	239.61	*	123	*	*	*	89	87	11.0
7	70.0	247.25	0.550	1.88	7.79	247.39	*	122	*	*	*	93	88	11.0
8	80.0	255.20	0.540	1.86	7.76	255.16	*	120	*	*	*	95	89	11.0
9	90.0	262.40	0.460	1.58	7.17	262.32	*	123	*	*	*	97	90	11.0
10	100.0	269.70	0.460	1.59	7.20	269.52	*	121	*	*	*	98	91	11.0
11	110.0	276.17	0.380	1.31	6.54	276.06	*	123	*	*	*	99	93	11.0
12	120.0	282.64	0.380	1.32	6.56	282.62	*	123	*	*	*	99	94	11.0
13	130.0	289.67	0.450	1.57	7.15	289.77	*	122	*	*	*	97	95	11.0
14	140.0	297.00	0.450	1.56	7.13	296.90	*	124	*	*	*	98	95	11.0
15	150.0	304.55	0.520	1.80	7.67	304.58	*	124	*	*	*	98	95	11.0
16	160.0	312.18	0.520	1.80	7.67	312.25	*	124	*	*	*	99	95	11.0
17	170.0	320.07	0.530	1.84	7.75	320.01	*	124	*	*	*	100	95	11.0
18	180.0	328.20	0.550	1.92	7.93	327.93	*	121	*	*	*	101	96	11.0
19	190.0	335.87	0.530	1.84	7.78	335.71	*	124	*	*	*	103	97	11.0
20	200.0	343.50	0.530	1.86	7.81	343.52	*	122	*	*	*	103	98	11.0
21	210.0	350.80	0.500	1.75	7.59	351.10	*	123	*	*	*	103	99	11.0
22	220.0	358.35	0.500	1.75	7.59	358.69	*	124	*	*	*	104	99	11.0
23	230.0	365.42	0.410	1.43	6.88	365.57	*	124	*	*	*	105	100	11.0
24	240.0	372.49	0.400	1.40	6.80	372.37	*	124	*	*	*	105	100	11.0
End Time	1735													
Run Time	240		Avg DH=	1.68			Avg Ts=	122.88				Avg Tm=	94.42	

Integrated Gas Sampling Data :

Bag No.	NA
Bag Vol.	NA liters
Leak Rate	NA cc/min

Filter No.	4Q0386
Nozzle No.	Glass
Nozzle Dn.	0.252

MOISTURE RECOVERY DATA :

Impinger	1	2	3	4	Desiccant	Total
Final wt., g	402	0	0	0	463	
Initial wt., g	0	0	0	0	437	
Difference	402	0	0	0	26	428

* Data not recorded, but assumed to be within the limits of the test method



ONTARIO HYDRO - FIELD DATA SHEET - RUN 1

Project	Northshore Mining Company				Meter ID	C-9	Probe ID	6-4	Bar.Press.	29.21	in. Hg	Sample Train Leak Rate, cfm:				
Sample Location	Furnace 12 Waste Gas #1205 SV 114				Meter Y	0.9972	Pitot Tube No.	6-4	Stat Press.	-0.1	in. H2O	Pretest	0.000	at 12	in. Hg	
Date	07/09/14				Orifice dH@	2.0087	Pitot Cp	0.84				Posttest	0.000	at 6	in. Hg	
Test	E7	Run #	1					Liner Type:	Glass					Pretest Pitot leak Check Pos	PASS	@ >3" w.c
Operators	TAK /DAH													Posttest Pitot leak Check Neg	PASS	@ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H2O	Orifice DH in. H2O	Ideal Point Volume Vm, ft3	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °°F					Moisture Content, %
									Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	
Start Time	1312	332.25												
1	10.0	339.00	0.520	1.60	6.87	339.12	*	138	*	*	*	87	86	19.8
2	20.0	345.90	0.520	1.59	6.86	345.97	*	141	*	*	*	90	86	19.8
3	30.0	353.20	0.580	1.78	7.26	353.24	*	141	*	*	*	92	87	19.8
4	40.0	360.60	0.590	1.82	7.35	360.58	*	140	*	*	*	93	88	19.8
5	50.0	367.90	0.570	1.76	7.24	367.82	*	140	*	*	*	94	88	19.8
6	60.0	375.20	0.570	1.76	7.25	375.07	*	139	*	*	*	95	89	19.8
7	70.0	382.30	0.540	1.68	7.08	382.15	*	138	*	*	*	96	92	19.8
8	80.0	389.50	0.560	1.75	7.24	389.38	*	137	*	*	*	96	90	19.8
9	90.0	396.20	0.490	1.52	6.75	396.13	*	139	*	*	*	96	91	19.8
10	100.0	403.10	0.500	1.56	6.83	402.96	*	138	*	*	*	96	91	19.8
11	110.0	409.50	0.400	1.24	6.10	409.05	*	140	*	*	*	97	92	19.8
12	120.0	415.55	0.400	1.25	6.11	415.16	*	139	*	*	*	98	92	19.8
13	130.0	422.45	0.540	1.69	7.12	422.28	*	137	*	*	*	96	93	19.8
14	140.0	429.30	0.530	1.66	7.05	429.33	*	137	*	*	*	98	93	19.8
15	150.0	436.20	0.520	1.62	6.98	436.31	*	139	*	*	*	99	94	19.8
16	160.0	443.15	0.540	1.69	7.12	443.43	*	140	*	*	*	99	94	19.8
17	170.0	450.70	0.590	1.85	7.46	450.89	*	138	*	*	*	99	95	19.8
18	180.0	458.10	0.590	1.86	7.47	458.36	*	136	*	*	*	100	96	19.8
19	190.0	465.44	0.520	1.64	7.03	465.39	*	136	*	*	*	101	96	19.8
20	200.0	472.60	0.540	1.70	7.16	472.55	*	138	*	*	*	101	97	19.8
21	210.0	479.50	0.490	1.54	6.82	479.37	*	139	*	*	*	101	97	19.8
22	220.0	486.30	0.500	1.57	6.89	486.27	*	138	*	*	*	101	97	19.8
23	230.0	492.59	0.400	1.25	6.16	492.42	*	140	*	*	*	100	97	19.8
24	240.0	498.75	0.410	1.29	6.23	498.65	*	139	*	*	*	100	97	19.8
End Time	1719													
Run Time	240		Avg DH=	1.61			Avg Ts=	138.63				Avg Tm=	94.65	

Integrated Gas Sampling Data :

Bag No.	NA
Bag Vol.	NA liters
Leak Rate	NA cc/min

Filter No.	4q0378
Nozzle No.	Glass
Nozzle Dn.	0.252

MOISTURE RECOVERY DATA :

Impinger	1	2	3	4	Desiccant	Total
Final wt., g	787	0	0	0	473	
Initial wt., g	0	0	0	0	448	
Difference	787	0	0	0	25	812

* Data not recorded, but assumed to be within the limits of the test method



ONTARIO HYDRO - FIELD DATA SHEET - RUN 2

Project	Northshore Mining Company			Meter ID	C-9	Probe ID	6-4	Bar.Press.	29.35	in. Hg	Sample Train Leak Rate, cfm:				
Sample Location	Furnace 12 Waste Gas #1205 SV 114			Meter Y	0.9972	Pitot Tube No.	6-4	Stat Press.	-0.1	in. H2O	Pretest	0.000	at 12	in. Hg	
Date	07/10/14			Orifice dH@	2.0087	Pitot Cp	0.84					Posttest	0.000	at 7	in. Hg
Test	E7	Run #	2			Liner Type:	Glass					Pretest Pitot leak Check Pos	PASS	@ >3" w.c	
Operators	TAK /DAH									Posttest Pitot leak Check Neg				PASS	@ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft ³	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft ³	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F					Moisture Content, %
									Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	
Start Time	0753	500.00												
1	10.0	507.09	0.580	1.75	7.12	507.12	*	138	*	*	*	77	76	19.8
2	20.0	514.10	0.580	1.74	7.10	514.21	*	140	*	*	*	82	77	19.8
3	30.0	521.10	0.550	1.67	6.97	521.18	*	141	*	*	*	85	79	19.5
4	40.0	528.15	0.560	1.72	7.08	528.27	*	138	*	*	*	87	80	19.5
5	50.0	535.25	0.570	1.75	7.17	535.44	*	138	*	*	*	88	81	19.5
6	60.0	542.60	0.570	1.76	7.19	542.62	*	137	*	*	*	89	83	19.5
7	70.0	549.70	0.550	1.70	7.08	549.70	*	137	*	*	*	89	84	19.5
8	80.0	556.60	0.540	1.67	7.01	556.71	*	138	*	*	*	90	84	19.5
9	90.0	563.10	0.430	1.33	6.26	562.98	*	138	*	*	*	90	85	19.5
10	100.0	569.30	0.430	1.33	6.27	569.24	*	139	*	*	*	90	86	19.5
11	110.0	575.60	0.450	1.39	6.41	575.65	*	140	*	*	*	89	86	19.5
12	120.0	581.70	0.430	1.33	6.26	581.91	*	140	*	*	*	89	86	19.5
13	130.0	588.70	0.540	1.67	7.02	588.93	*	140	*	*	*	86	85	19.5
14	140.0	595.70	0.540	1.66	6.99	595.92	*	140	*	*	*	87	85	19.5
15	150.0	603.00	0.590	1.82	7.31	603.23	*	140	*	*	*	86	84	19.5
16	160.0	610.30	0.600	1.85	7.37	610.60	*	139	*	*	*	86	84	19.5
17	170.0	617.70	0.600	1.85	7.36	617.96	*	140	*	*	*	85	83	19.5
18	180.0	625.10	0.600	1.85	7.36	625.32	*	138	*	*	*	85	83	19.5
19	190.0	632.22	0.550	1.69	7.04	632.36	*	139	*	*	*	85	83	19.5
20	200.0	639.20	0.550	1.70	7.05	639.41	*	137	*	*	*	85	83	19.5
21	210.0	646.33	0.510	1.57	6.79	646.20	*	138	*	*	*	86	83	19.5
22	220.0	653.00	0.500	1.54	6.71	652.91	*	140	*	*	*	86	83	19.5
23	230.0	659.23	0.440	1.35	6.30	659.21	*	139	*	*	*	85	83	19.5
24	240.0	655.44	0.450	1.38	6.36	665.57	*	141	*	*	*	85	84	19.5
End Time	1159													
Run Time	240		Avg DH=	1.63			Avg Ts=	138.96				Avg Tm=	84.63	

Integrated Gas Sampling Data :

Bag No.	NA
Bag Vol.	NA liters
Leak Rate	NA cc/min

Filter No.	4Q0379
Nozzle No.	Glass
Nozzle Dn.	0.252

MOISTURE RECOVERY DATA :

Impinger	1	2	3	4	Desiccant	Total
Final wt., g	787	0	0	0	473	
Initial wt., g	0	0	0	0	448	
Difference	787	0	0	0	25	812

* Data not recorded, but assumed to be within the limits of the test method



ONTARIO HYDRO - FIELD DATA SHEET - RUN 3

Project	Northshore Mining Company				Meter ID	C-9	Probe ID	6-4	Bar.Press.	29.35	in. Hg	Sample Train Leak Rate, cfm:			
Sample Location	Furnace 12 Waste Gas #1205 SV 114				Meter Y	0.9972	Pitot Tube No.	6-4	Stat Press.	-0.1	in. H2O	Pretest	0.000	at 12	in. Hg
Date	07/10/14				Orifice dH@	2.0087	Pitot Cp	0.84				Posttest	0.000	at 6	in. Hg
Test	E7	Run #	3				Liner Type:	Glass					Pretest Pitot leak Check Pos	PASS	@ >3" w.c
Operators	TAK /DAH												Posttest Pitot leak Check Neg	PASS	@ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H2O	Orifice DH in. H2O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F					Moisture Content, %
									Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	
Start Time	1248	665.80												
1	10.0	673.00	0.600	1.83	7.28	673.08	*	139	*	*	*	78	79	19.5
2	20.0	680.29	0.590	1.79	7.21	680.29	*	140	*	*	*	80	79	19.5
3	30.0	687.70	0.620	1.88	7.40	687.69	*	141	*	*	*	83	79	19.5
4	40.0	695.20	0.640	1.96	7.55	695.23	*	139	*	*	*	86	80	19.5
5	50.0	702.70	0.640	1.96	7.57	702.80	*	140	*	*	*	87	82	19.5
6	60.0	710.30	0.650	2.00	7.66	710.46	*	139	*	*	*	85	84	19.5
7	70.0	717.93	0.650	2.01	7.68	718.14	*	136	*	*	*	89	85	19.5
8	80.0	725.80	0.660	2.05	7.76	725.90	*	137	*	*	*	90	86	19.5
9	90.0	733.05	0.570	1.77	7.22	733.11	*	139	*	*	*	92	87	19.5
10	100.0	740.30	0.560	1.74	7.17	740.29	*	139	*	*	*	93	88	19.5
11	110.0	746.99	0.480	1.50	6.66	746.94	*	138	*	*	*	94	89	19.5
12	120.0	753.61	0.480	1.50	6.66	753.61	*	139	*	*	*	95	89	19.5
13	130.0	761.05	0.610	1.91	7.53	761.13	*	138	*	*	*	92	90	19.5
14	140.0	768.30	0.610	1.90	7.50	768.63	*	140	*	*	*	94	90	19.5
15	150.0	775.87	0.600	1.87	7.45	776.08	*	140	*	*	*	94	90	19.5
16	160.0	783.50	0.630	1.96	7.63	783.72	*	140	*	*	*	94	90	19.5
17	170.0	791.33	0.640	2.00	7.71	791.42	*	138	*	*	*	95	91	19.5
18	180.0	799.10	0.650	2.04	7.78	799.21	*	138	*	*	*	96	91	19.5
19	190.0	806.70	0.620	1.95	7.61	806.82	*	137	*	*	*	96	92	19.5
20	200.0	814.40	0.630	1.97	7.66	814.48	*	140	*	*	*	96	92	19.5
21	210.0	821.37	0.540	1.69	7.11	821.59	*	138	*	*	*	97	92	19.5
22	220.0	828.40	0.540	1.69	7.10	828.69	*	140	*	*	*	97	93	19.5
23	230.0	835.00	0.460	1.44	6.55	835.24	*	141	*	*	*	98	93	19.5
24	240.0	841.50	0.440	1.38	6.42	841.66	*	140	*	*	*	98	93	19.5
End Time	1735													
Run Time	240		Avg DH=	1.82			Avg Ts=	139.00				Avg Tm=	89.65	

Integrated Gas Sampling Data :

Bag No.	NA
Bag Vol.	NA liters
Leak Rate	NA cc/min

Filter No.	4Q0388
Nozzle No.	Glass
Nozzle Dn.	0.252

MOISTURE RECOVERY DATA :

Impinger	1	2	3	4	Desiccant	Total
Final wt., g	787	0	0	0	473	
Initial wt., g	0	0	0	0	448	
Difference	787	0	0	0	25	812

* Data not recorded, but assumed to be within the limits of the test method

Appendix C

Laboratory Reports and Sample Chain of Custody

Laboratory Results Summary of Ontario Hydro Analysis

Furnace 12 Hood Exhaust #1201 (SV 111)

Research Testing on 7/9/2014 & 7/10/14

Filter	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	< 0.005	< 0.005	< 0.005	< 0.005
Analysis #2, Total µg	< 0.005	< 0.005	< 0.005	< 0.005
Average, Total µg	< 0.005	< 0.005	< 0.005	<0.005
Front Half Rinse	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	< 0.01	< 0.01	< 0.01	< 0.01
Analysis #2, Total µg	< 0.01	< 0.01	< 0.01	< 0.01
Average, Total µg	< 0.01	< 0.01	< 0.01	< 0.01
KCl	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	< 0.11	< 0.10	< 0.11	< 0.05
Analysis #2, Total µg	< 0.11	< 0.10	< 0.11	< 0.05
Average, Total µg	< 0.11	< 0.10	< 0.11	< 0.05
H ₂ O ₂ /HNO ₃	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	< 0.013	<0.013	<0.013	< 0.025
Analysis #2, Total µg	< 0.013	<0.013	<0.013	< 0.025
Average, Total µg	< 0.013	<0.013	< 0.013	< 0.025
KMnO ₄	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.660	0.516	0.607	<0.025
Analysis #2, Total µg	0.650	0.504	0.600	<0.025
Average, Total µg	0.655	0.510	0.604	<0.025

(1) All reagent blanks are Non-Detect; therefore, no blank correction is calculated.

(2) Per the Ontario Hydro Method, the NH₂OH.HCL reagent blank is not applied to the samples.

Laboratory Results Summary of Ontario Hydro Analysis

Furnace 12 Hood Exhaust #1201 (SV 111)

Research Testing on 7/9/2014 & 7/10/14

Filter	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.003	0.005	0.004	0.001
Analysis #2, Total µg	0.003	0.004	0.003	0.001
Average, Total µg	0.003	0.005	0.004	0.001
Front Half Rinse	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.003	0.003	0.002	0.002
Analysis #2, Total µg	0.002	0.003	0.002	0.001
Average, Total µg	0.003	0.003	0.002	0.002
KCl	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.038	0.048	0.036	0.005
Analysis #2, Total µg	0.035	0.041	0.037	0.008
Average, Total µg	0.037	0.045	0.037	0.007
H ₂ O ₂ /HNO ₃	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.012	0.006	0.006	0.024
Analysis #2, Total µg	0.009	0.005	0.006	0.024
Average, Total µg	0.011	0.006	0.006	0.024
KMnO ₄	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.660	0.516	0.607	0.008
Analysis #2, Total µg	0.650	0.504	0.600	0.010
Average, Total µg	0.655	0.510	0.604	0.009

(1) All Detection Limits were removed for this data set. These Results should be used for informational purposes only.

(2) Blank corrections were not performed due to all blanks below detection limits and following method procedures.

(3) Per the Ontario Hydro Method, the NH₂OH.HCL reagent blank is not applied to the samples.

Laboratory Results Summary of Ontario Hydro Analysis

Furnace 12 Waste Gas #1205 (SV 114)
Research Testing on 7/9/2014 & 7/10/14

Filter	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total ug	0.015	0.017	< 0.01	<0.005
Analysis #2, Total ug	0.014	0.017	< 0.01	<0.005
Average, Total ug	0.015	0.017	< 0.01	<0.005
Front Half Rinse	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total ug	< 0.01	< 0.01	< 0.01	< 0.01
Analysis #2, Total ug	< 0.01	< 0.01	< 0.01	< 0.01
Average, Total ug	< 0.01	< 0.01	< 0.01	< 0.01
KCl	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total ug	< 0.13	< 0.14	< 0.13	< 0.05
Analysis #2, Total ug	< 0.13	< 0.14	< 0.13	< 0.05
Average, Total ug	< 0.13	< 0.14	< 0.13	< 0.05
H ₂ O ₂ /HNO ₃	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total ug	< 0.013	< 0.013	< 0.013	< 0.025
Analysis #2, Total ug	< 0.013	< 0.013	< 0.013	< 0.025
Average, Total ug	< 0.013	< 0.013	< 0.013	< 0.025
KMnO ₄	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total ug	0.980	0.933	1.04	< 0.025
Analysis #2, Total ug	1.000	0.935	1.02	< 0.025
Average, Total ug	0.990	0.934	1.03	< 0.025

(1) All reagent blanks are Non-Detect; therefore, no blank correction is calculated.

(2) Per the Ontario Hydro Method, the NH₂OH.HCL reagent blank is not applied to the samples.

Laboratory Results Summary of Ontario Hydro Analysis

Furnace 12 Waste Gas #1205 (SV 114)
Research Testing on 7/9/2014 & 7/10/14

Filter	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.015	0.017	0.007	0.001
Analysis #2, Total µg	0.014	0.017	0.008	0.001
Average, Total µg	0.015	0.017	0.008	0.001
Front Half Rinse	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.005	0.007	0.007	0.002
Analysis #2, Total µg	0.007	0.007	0.007	0.001
Average, Total µg	0.006	0.007	0.007	0.002
KCl	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.043	0.062	0.043	0.005
Analysis #2, Total µg	0.071	0.055	0.056	0.008
Average, Total µg	0.057	0.059	0.050	0.007
H ₂ O ₂ /HNO ₃	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.007	0.006	0.005	0.024
Analysis #2, Total µg	0.006	0.005	0.005	0.024
Average, Total µg	0.007	0.006	0.005	0.024
KMnO ₄	Run 1	Run 2	Run 3	Reagent Blank
Analysis #1, Total µg	0.980	0.933	1.04	0.008
Analysis #2, Total µg	1.00	0.935	1.02	0.010
Average, Total µg	0.990	0.934	1.030	0.009

(1) All Detection Limits were removed for this data set. These Results should be used for informational purposes only.

(2) Blank corrections were not performed due to all blanks below detection limits and following method procedures.

(3) Per the Ontario Hydro Method, the NH₂OH.HCL reagent blank is not applied to the samples.

Barr Engineering

5150 West 76th Street
Edina, MN 55439

Project Number: 28/38-1005.4012EN 002

Mercury

Ontario Hydro Method Analysis

Analytical Report
22731



Element One, Inc.

6319-D Carolina Beach Rd., Wilmington, NC 28412
910-793-0128 FAX:910-792-6853 e1lab@e1lab.com

The following data for Analytical Report 22731
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

A handwritten signature in black ink, appearing to be 'KS', followed by a long horizontal line extending to the right.

Katie Strickland, Chemist
July 28, 2014

Report Reviewed and Finalized By:

A handwritten signature in black ink, appearing to be 'Ken Smith'.

Ken Smith, Laboratory Director
July 28, 2014

SUMMARY OF RESULTS

Summary of Analysis

Summary of OHM Mercury Analysis

Run Number		Average Total Catch, µg	Filter µg	FH Rinse µg	KCl µg	H ₂ O ₂ /HNO ₃ µg	KMnO ₄ µg	NH ₂ OH. HCl µg
-----	----	-----	-----	-----	-----	-----	-----	-----
T1-OHM-R1	# 1	0.655	< 0.005	< 0.01	< 0.11	< 0.013	0.660	-----
	# 2		< 0.005	< 0.01	< 0.11	< 0.013	0.650	-----
T1-OHM-R2	# 1	0.510	< 0.005	< 0.01	< 0.10	< 0.013	0.516	-----
	# 2		< 0.005	< 0.01	< 0.10	< 0.013	0.504	-----
T1-OHM-R3	# 1	0.603	< 0.005	< 0.01	< 0.11	< 0.013	0.607	-----
	# 2		< 0.005	< 0.01	< 0.11	< 0.013	0.600	-----
T2-OHM-R1	# 1	1.01	0.015	< 0.01	< 0.13	< 0.013	0.980	-----
	# 2		0.014	< 0.01	< 0.13	< 0.013	1.00	-----
T2-OHM-R2	# 1	0.951	0.017	< 0.01	< 0.14	< 0.013	0.933	-----
	# 2		0.017	< 0.01	< 0.14	< 0.013	0.935	-----
T2-OHM-R3	# 1	1.03	< 0.01	< 0.01	< 0.13	< 0.013	1.04	-----
	# 2		< 0.01	< 0.01	< 0.13	< 0.013	1.02	-----
Reagent Blank	# 1	0.030	< 0.005	< 0.01	< 0.05	< 0.025	< 0.025	0.029
	# 2		< 0.005	< 0.01	< 0.05	< 0.025	< 0.025	0.032

ANALYTICAL NARRATIVE

Element One Analytical Narrative

Client:	Barr Engineering	Element One #:	22731
Client ID:	23/38-1005.4012EN 002	Analyst:	LAL & MPG
Method:	OHM	Dates Received:	07/15/14
Analytes:	Hg	Dates Analyzed:	07/17-24/14

Summary of Analysis

The Ontario Hydro Method (OHM) samples were prepared and analyzed according to method protocol. Samples were analyzed for mercury on a PS Analytical Millennium Galahad CVAF analyzer.

Ontario Hydro Mercury Catch Summary

The Ontario Hydro Method employs five different fractions to collect mercury in its various states in a flue gas stream. Particle-bound mercury is collected in the filter, ash and front-half rinse. Oxidized mercury (Hg_2^{2+} and Hg^{2+}) is collected in the potassium chloride (KCl) fraction. The acidified hydrogen peroxide ($\text{H}_2\text{O}_2/\text{HNO}_3$) and potassium permanganate (KMnO_4) fractions are utilized to collect elemental mercury (Hg^0). Total mercury refers to all mercury, however generated or entrained, in the flue gas stream.

Detection Limits

The Ontario Hydro Method Millennium Galahad CVAF instrument reporting limit for mercury was 0.001 μg per aliquot analyzed, which is 0.05 $\mu\text{g}/\text{L}$ for a 20 ml aliquot.

Analysis QA/QC

Duplicate analyses relative percent difference (RPD), triplicate analysis relative standard deviation (RSD), and spike sample recovery are summarized in the Quality Control Section.

Due to matrix interference, it was necessary to analyze all T2 filter samples at a minimum two-fold dilution.

*Ref. page 8; spike recoveries for T1-OHM-R3 filter sample were below laboratory guidelines of 90-110% with 74%, 79%; sample was reanalyzed at a two-fold dilution resulting in recoveries of 99%, 100%. Sample T2-OHM-R3 spike recoveries were outside of QA limits for the HNO_3 FH rinse, KCl, and $\text{H}_2\text{O}_2/\text{HNO}_3$ fractions with 113%, 110%, 86%, 86% and 77%, 77%, respectively. Samples were reanalyzed at a two-fold dilution, resulting in recoveries of 103%, 105% for the KCl fraction and 104%, 100% for the $\text{H}_2\text{O}_2/\text{HNO}_3$ fraction. The FH HNO_3 fraction resulted in similar recoveries and did not reach acceptable spike recovery. These samples were non-detect for mercury at all dilutions.

All other QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. The hydroxylamine reagent blank sample resulted in detectable traces of mercury. The reported results relate only to the items tested or calibrated.

QUALITY CONTROL SUMMARY

Summary of Quality Control Data

Mercury Duplicate Analysis RPD

(OHM QC limits: < 10% for RPD)

Run Number	Filter	FH Rinse	KCl	H ₂ O ₂ /HNO ₃	KMnO ₄	10% NH ₂ OH·HCl
T1-OHM-R1	NA	NA	NA	NA	1.6%	----
T1-OHM-R2	NA	NA	NA	NA	2.4%	----
T1-OHM-R3	NA	NA	NA	NA	1.1%	----
T2-OHM-R1	8.9%	NA	NA	NA	2.5%	----
T2-OHM-R2	1.8%	NA	NA	NA	0.2%	----
T2-OHM-R3	NA	NA	NA	NA	1.3%	----
Reagent Blank	NA	NA	NA	NA	NA	8.9%

Mercury Triplicate Analysis RSD

(OHM QC limits: < 10% for RSD)

Run Number	Filter	FH Rinse	KCl	H ₂ O ₂ /HNO ₃	KMnO ₄
T1-OHM-R2	NA	NA	NA	NA	1.4%
T2-OHM-R2	1.8%	NA	NA	NA	0.7%

Mercury Spike Recoveries

(QC limits: 90-110% for Spike Recoveries)

Run Number		Filter	FH Rinse	KCl	H ₂ O ₂ /HNO ₃	KMnO ₄
T1-OHM-R3	# 1	74%*	99%	101%	91%	107%
	# 2	79%*	98%	100%	93%	106%
T2-OHM-R3	# 1	104%	113%*	86%*	77%*	96%
	# 2	105%	110%*	86%*	77%*	99%

*See Analytical Data p. 6.

SAMPLE CUSTODY



22731
No 11486

Report Results To	Check One: <input type="checkbox"/> Barr Engineering Company 4700 West 77th Street Minneapolis, MN 55435-4803 (952) 832-2600		<input type="checkbox"/> Barr Engineering Company 7390 Ohms Lane Edina, MN 55439-2330 (952) 832-2600		Send Invoice To	Project Number 23-38-1005-40 Barr Engineering Company 4700 West 77th Street Minneapolis, MN 55435-4803 Ph. (952) 832-2600 Fax (952) 832-2601									
	Attention: _____ (Print Name)		Attention: _____ (Print Name)												
Special instructions and/or specific regulatory requirements: (method, limit of detection, etc.)						<div style="transform: rotate(-45deg); display: inline-block;"> EPA Method 5 EPA Method 202 206-H2O2 </div>									
Sample Identification		Date/Time Collected	Media I.D. #	Type								Grab	Comp.	QC	Filter
1. Filter blank		7/9/14													
2. 5% HNO3 / 10% H2O2 blank															
3. 4% HNO3 / 10% H2O2 blank															
4. DIN KCl blank															
5. DIN HNO3 blank															
6.															
7.															
8.															
9.															
10.															
Chain of Custody	Collected by (Print Name): Ben Wilke					LABORATORY:									
	Relinquished by:			Date/Time		Received by:					Date/Time				
	Relinquished by:			Date/Time		Received by:					Date/Time				
	Method of Shipment: <input type="checkbox"/> Sampler <input type="checkbox"/> FedEx <input type="checkbox"/> UPS Other: _____					Received at Lab by: Loa Burton					Date/Time 7.15.14 1225				
Collectors Signature: [Signature] Date: 7/10/14					Sample Condition upon Receipt: <input type="checkbox"/> Acceptable <input type="checkbox"/> Other (explain)										

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy

Rev. 01/01

ANALYTICAL DATA

Analytical Calculations

Mercury-

$$\text{Mercury Results } (\mu\text{g}) = \frac{\text{CVAF Results } (\mu\text{g}) * \text{Final Volume (ml)}}{\text{Aliquot (ml)}}$$

Where-

CVAF Results= Raw sample reading (μg)--*Hg-Data Sheet*

Aliquot= Sample Aliquot (Alq.)--*Hg-Data Sheet*

Final Volume (FV)--*Sample Submission*

Analytical Calculations

Spike Recovery-

$$\text{Spike (\%)} = \frac{(\text{Spiked Result } (\mu\text{g/L}) - \text{Sample Result } (\mu\text{g/L}))}{\text{Spike Amount } (\mu\text{g/L})} \times 100$$

Where-

Spike Result = Raw sample concentration (ppb)--*Hg-Data Sheet*

Sample Result = Raw sample concentration (ppb)--*Hg-Data Sheet*

Spike Amount--*Hg- Data Sheet*

Duplicate Analysis RPD-

$$\text{RPD (\%)} = \frac{(\text{Duplicate Result } (\mu\text{g/L}) - \text{Sample Result } (\mu\text{g/L}))}{\text{Average } (\mu\text{g/L})} \times 100$$

Where-

Sample Result and Duplicate Results=Raw sample concentration (ppb)--*Hg-Data Sheet*

$$\text{Average} = \frac{(\text{Duplicate} + \text{Sample Results})}{2}$$

--

Analysis Due Date 07.23.14

QA/QC/Report Due Date 07.25.14

Client: Barr Engineering
Project No 23/38-1005-1005.4012EN 002

Date Rec 07.15.14
Time Rec 1225

HNO ₃ Lot: 1113120	BrK Lot: 071714-1	Volume Marked Y / N
HF Lot: 5113050	KBrO ₃ Lot: 071714-2	Volume Loss Y / N ?
HCl Lot: 35187		pH < 2.0 Y / N <i>see volume 6/5 7/25/14</i>

Ref. Method:
OHM

Sample Identification

1	T1-OHM-R1	4	T2-OHM-R1	7	Reagent Blank
2	T1-OHM-R2	5	T2-OHM-R2		
	T1-OHM-R2 Triplicate		T2-OHM-R2 Triplicate		
3	T1-OHM-R3	6	T2-OHM-R3		
	T1-OHM-R3 Spike		T2-OHM-R3 Spike		

Analyses Requested

Samples 1-8 *7* Hg

Run / FB	Fil (C1) / Ace (C2a)		FH HNO ₃ Rinse (C2)		KCl (C3)		H ₂ O ₂ /HNO ₃ (C4)		KMnO ₄ (C5)	
	pH <2.0 Y / N		pH <2.0 Y / N		pH <2.0 Y / N		pH <2.0 Y / N		pH <2.0 Y / N	
Lab ID.	Fil ID	BV, ml	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml
1			190	200	1050	1100	160	250	750	800
2.T			196	↓	940	1000	172	↓	770	800
3.S			170	↓	1010	1100	136	↓	690	800
4			198	↓	1300	1300	148	↓	770	900
5.T			156	↓	1340	1400	210	↓	840	900
6.S			152	↓	1330	1300	116	↓	550	600

Reagent Blank

Lab ID	**MC	Fraction	pH	BV, ml	FV, ml	Comments	22731	1062	2002
7.1	C12	Filter Blank					1.3	210	840
7.2	C7	0.1N HNO ₃	< 2.0	70			2.3	250	690
7.3	C8	1.0 N KCl	4	65			3.3	190	820
7.4	C9	5% HNO ₃ / 10% H ₂ O ₂	< 2.0	72			4.3	520	780
7.5	C10	KMnO ₄ / H ₂ SO ₄	< 2.0	68			5.3	530	610
7.6	C11	10% NH ₂ OH.HCl or SO ₄	4	116			6.3	850	440
		10% HNO ₃							
		DI H ₂ O							
		HNO ₃ / H ₂ O ₂							
		5% KMnO ₄							
		Quartz Thimble							

Lab Communications

0.2 ml of 4% Boric Acid Solution (0.92513-1 OHM) was added to digested filters & cooked to
 Rec Runs: C1, C2, C3, C4, C5; RB: C12, C7, C8, C9, C10, C11—JRC 07.15.14 ~ 5ml brought to FV = 50 ml (CAC 7.25.14)

Page 1 of 1

7/16/2014 4:05:49 PM

SS Form By *228*Labeled By/Date *LAL 7.17.14*C1 Prep By/Date *JWR 7.18.14* C4 Prep By/Date *MPB 7/15/14*C2 Prep By/Date *MPB 7/15/14* C5 Prep By/Date *MPB 7/24/14*C3 Prep By/Date *MPB 7/14/14* C2a Prep By/Date *MPB 7/14/14*ID Verification By/Date *JWR 7.17.14*

Date Digested: 7-18-14 Initials: Jm Worksheet Prepared by: Jm

Auto Sample Loc.	Sample Lab ID	Sample Weight (g)	# of filters digested	Spike	Prep Volume (ml)	Weight In Micro / Weight Out Micro	Units
1	LAB+			100 mL 5% H ₂ A	50		
2	LAB						
4	-1.1		1				
5	-2.1						
6	-3.1						
8	-4.1						
9	-5.1						
10	-6.1						
12	-7.1						
13	BLK						
14	BLK						
16	BLK						
LAB+ spiked w/ 100 mL of stock A @ 25 ppm							

Element One, Inc. Form 104 - Revision 1.0

HF lot 55115

1 mL

HNO₃ lot

2 mL

HCl lot

2 mL

elementOne

MERCURY BATCH DIGESTION/RUN WORKSHEET

Date Prepared & Digested: 7-17-14 Initials: JWL/MPG Start Time: 11:30 Stop Time: 12:30

Using the Method Reagent Blank and the 0.4ug/ml Working, QC #2 & QC #3 Standards, make the following dilutions for the calibration and QC's...

A/S	Curve & QC's	ml working std	40 ml aliquot concentration	Final Vol	Working Standard Lot Numbers
7	Reagent BLK	0	0.0	400	#1 (working std): Lot #: <u>0714M-1</u> by: <u>MPG</u> QC #2 & #3 are made the same as WS #1 (0.4ug/ml) QC Std #2 Lot #: <u>0714M-2</u> QC Std #3 (QC #3): Lot #: <u>0714M-3</u>
8	0.001 ug, DL	0.025ml	0.000025	400	
9	0.002 ug	0.025ml	0.00005	200	
10	0.004ug	0.050ml	0.0001	200	
11	0.020ug	0.250ml	0.0005	200	
12	0.040ug	0.500ml	0.0010	200	
13	0.02ug=QC#2	0.5ml QC#2 std	0.00050	400	
14	0.02ug=QC#3	0.5ml QC#3 std	0.00050	400	Curve prepared by: Comments: <u>071814-2M</u> <u>QC by LAZ 7.28.14</u>

A/S	LAB #	ml used	Sample FV, ml	Dilutions	Spike ug	Client
15	<u>22731-1.2</u>	<u>20</u>	<u>200</u>			
16	<u>-2.2</u>	↓	↓			
17	<u>-2.2 Trip</u>					
18	<u>-3.2</u>					
19	<u>-3.2 +</u>					
20	<u>-4.2</u>					
21	<u>-5.2</u>					
22	<u>-5.2 T</u>					
23	<u>-6.2</u>					
24	<u>-6.2 +</u>					

NOTES: Lab blanks and spikes must be prepared with each batch digestion**Spike for Hg.** Use calibration working 0.4ug/ml standard at the rate of 0.050ml per 40ml sample.**Digestion:** To the sample add... 5ml of 33% HCL, 1ml Potassium Bromate / Potassium Bromide solution and let stand for 30minHNO₃ Lot # 1113120 HCL Lot# 35181 Hydrox Lot# 062714-1

Clear samples after digestion with 0.1ml of Hydroxylamine solution.

Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

elementOne

A/S	LAB #	ml used	Sample FV, ml	Times to run	Dilutions	Spike ug	Client
25	22731-7.2	20	200				
26	-1.3	10	1100				
27	-2.3		1000				
28	-2.3 Trip		↓				
29	-3.3		1100				
30	-3.3 +		↓				
31	-4.3		1300				
32	-5.3		1400				
33	-5.3 Trip		↓				
34	-6.3		1300				
35	-6.3 +		↓				
36	-7.3	✓	65500 JWC				
37	-1.4	20	250				
38	-2.4						
39	-2.4 Trip						
40	-3.4						
41	-3.4 +						
42	-4.4						
43	-5.4						
44	-5.4 Trip						
45	-6.4						
46	-6.4 +						
47	-7.4	✓	✓				
48							
49							
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Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

MERCURY BATCH DIGESTION/RUN WORKSHEET

Date Prepared & Digested: 072114 Initials: MPG Start Time: 11:10 Stop Time: 11:40

Using the Method Reagent Blank and the 0.4ug/ml Working, QC #2 & QC #3 Standards, make the following dilutions for the calibration and QC's...

A/S	Curve & QC's	ml working std	40 ml aliquot concentration	Final Vol	Working Standard Lot Numbers
7	Reagent BLK	0	0.0	400	#1 (working std): Lot # <u>1550909072114-1</u> by: <u>MPG</u> QC #2 & #3 are made the same as WS #1 (0.4ug/ml) QC Std #2 Lot #: <u>072114-2</u> QC Std #3 (QC #3): Lot #: <u>072114-3</u>
8	0.001 ug, DL	0.025ml	0.000025	400	
9	0.002 ug	0.025ml	0.00005	200	
10	0.004ug	0.050ml	0.0001	200	
11	0.020ug	0.250ml	0.0005	200	
12	0.040ug	0.500ml	0.0010	200	
13	0.02ug=QC#2	0.5ml QC#2 std	0.00050	400	
14	0.02ug=QC#3	0.5ml QC#3 std	0.00050	400	Curve prepared by: <u>MPG</u> Comments: <u>072114-4</u> <u>QC - 457.22.14 @ 1700</u>

A/S	LAB #	ml used	Sample FV, ml	Dilutions	Spike ug	Client
15	<u>22731-6.2</u>	<u>20</u>	<u>200</u>			
16	<u>-6.2+</u>	<u>↓</u>	<u>↓</u>			
17	<u>-6.3</u>	<u>10</u>	<u>1300</u>			
18	<u>-6.3+</u>	<u>↓</u>	<u>↓</u>			
19	<u>22731-1.4</u>	<u>20</u>	<u>250</u>			
20	<u>-2.4</u>	<u>↓</u>	<u>↓</u>			
21	<u>-2.47.7</u>	<u>↓</u>	<u>↓</u>			
22	<u>-3.4</u>	<u>↓</u>	<u>↓</u>			
23	<u>-3.4+</u>	<u>↓</u>	<u>↓</u>			
24	<u>-4.4</u>	<u>↓</u>	<u>↓</u>			

NOTES: Lab blanks and spikes must be prepared with each batch digestion**Spike for Hg,** Use calibration working 0.4ug/ml standard at the rate of 0.050ml per 40ml sample.**Digestion:** To the sample add... 5ml of 33% HCL, 1ml Potassium Bromate / Potassium Bromide solution and let stand for 30minHNO₃ Lot # 1113120 HCL Lot# 35187 Hydrox Lot# 070214-3

Clear samples after digestion with 0.1ml of Hydroxylamine solution.

Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

A/S	LAB #	ml used	Sample FV, ml	Times to run	Dilutions	Spike ug	Client
25	22731-5.4	20	250				
26	-5.4 Trip	↓	↓				
27	-6.4						
28	-6.4 +						
29	-7.4	↓	↓				
30	22731-LRB	10	50				
31	-LRB +	↓	↓				
32	-1.1						
33	-2.1						
34	-2.1 Trip						
35	-3.1						
36	-3.1 +						
37	-4.1						
38	-5.1						
39	-5.1 Trip						
40	-6.1						
41	-6.1 +						
42	-7.1	↓	↓				
43	22731-1.5	20	800				
44	-2.5	↓	↓				
45	-2.5 Trip						
46	-3.5						
47	-3.5 +		↓				
48	-4.5		900				
49	-5.5		↓				
50	-5.5 Trip		↓				
51	-6.5		600				
52	-6.5 +		↓				
53	-7.5		500				
54	-7.6	↓	↓				
55							
56							
57							

Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

elementOne

MERCURY BATCH DIGESTION/RUN WORKSHEET

Date Prepared & Digested: 07-22-14 Initials: MPG Start Time: 8:30 Stop Time: 9:10

Using the Method Reagent Blank and the 0.4ug/ml Working, QC #2 & QC #3 Standards, make the following dilutions for the calibration and QC's...

A/S	Curve & QC's	ml working std	40 ml aliquot concentration	Final Vol	Working Standard Lot Numbers
7	Reagent BLK	0	0.0	400	#1 (working std): Lot #: <u>072124-1</u> by: <u>MPG</u> QC #2 & #3 are made the same as WS #1 (0.4ug/ml) QC Std #2 Lot #: <u>072114-2</u> QC Std #3 (QC #3): Lot #: <u>072114-3</u>
8	0.001 ug, DL	0.025mL	0.000025	400	
9	0.002 ug	0.025ml	0.00005	200	
10	0.004ug	0.050ml	0.0001	200	
11	0.020ug	0.250ml	0.0005	200	
12	0.040ug	0.500ml	0.0010	200	
<u>13</u>	0.02ug=QC#2	0.5ml QC#2 std	0.00050	400	Curve prepared by: <u>MPG</u>
<u>14</u>	0.02ug=QC#3	0.5ml QC#3 std	0.00050	400	Comments: <u>072214-2M</u> <u>QC'd by 7-22-14</u> <u>@ 1700</u>

A/S	LAB #	ml used	Sample FV, ml	Dilutions	Spike ug	Client
15	<u>22731-6.3</u>	<u>5</u>	<u>1300</u>			
16	<u>-6.3+</u>	<u>↓</u>	<u>↓</u>			
17	<u>-6.4</u>	<u>10</u>	<u>250</u>			
18	<u>-6.4+</u>	<u>↓</u>	<u>↓</u>			
19	<u>LRB Fil</u>	<u>10</u>	<u>50</u>			
20	<u>LRB+ Fil</u>	<u>.4</u>	<u>↓</u>			
21	<u>-3.1</u>	<u>5</u>	<u>↓</u>			
22	<u>-3.1+</u>	<u>↓</u>	<u>↓</u>			
23	<u>-6.1</u>	<u>↓</u>	<u>↓</u>			
24	<u>-6.1+</u>	<u>↓</u>	<u>↓</u>			

NOTES: Lab blanks and spikes must be prepared with each batch digestion**Spike for Hg,** Use calibration working 0.4ug/ml standard at the rate of 0.050ml per 40ml sample.**Digestion:** To the sample add... 5ml of 33% HCL, 1ml Potassium Bromate / Potassium Bromide solution and let stand for 30minHNO₃ Lot # 1113120 HCL Lot# 35187 Hydrox Lot# 070214-3

Clear samples after digestion with 0.1ml of Hydroxylamine solution.

Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

Typed LALVerified MPG

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A/S	LAB #	ml used	Sample FV, ml	Times to run	Dilutions	Spike ug	Client
25	22731-3.5	10	800				
26	-3.5+	↓	↓				
27	-6.5	10	600				
28	-6.5+	↓	↓				
29	-7.6	10	500				
30							
31							
32							
33							
34							
35							
36							
37							
38							
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Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

elementOne

MERCURY BATCH DIGESTION/RUN WORKSHEET

Date Prepared & Digested: 7-24-14 Initials: LAL Start Time: 9:00 Stop Time: 9:30

Using the Method Reagent Blank and the 0.4ug/ml Working, QC #2 & QC #3 Standards, make the following dilutions for the calibration and QC's...

A/S	Curve & QC's	ml working std	40 ml aliquot concentration		Final Vol	Working Standard Lot Numbers	
7	Reagent BLK	0	0.0		400	#1 (working std): 072114-1 Lot #: 1350904	
8	0.001 ug, DL	0.025mL	0.000025		400	by: MPG	
9	0.002 ug	0.025ml	0.00005		200	QC #2 & #3 are made the same as WS #1 (0.4ug/ml)	
10	0.004ug	0.050ml	0.0001		200	QC Std #2	
11	0.020ug	0.250ml	0.0005		200	Lot #: 072114-2	
12	0.040ug	0.500ml	0.0010		200	QC Std #3 (QC #3): Lot #: 072114-3	
13	0.02ug=QC#2	0.5ml QC#2 std	0.00050		400	Curve prepared by: LAL	
14	0.02ug=QC#3	0.5ml QC#3 std	0.00050		400	Comments: _____ 072414-1M 1.5 run at end but labeled 1.1	
A/S	LAB #	ml used	Sample FV, ml		Dilutions	Spike ug	Client
15	22731-1.1 ^m	10	50				
16	-1.1 ^p	10	50				
17	1.5 -64	10	800				
18	2.5	10	800				
19	2.5 +rp	10	800				
20	4.5	10	900				
21	5.5	10	900				
22	5.5 +rp	10	↓				
23	7.6	20	500				
24							

NOTES: Lab blanks and spikes must be prepared with each batch digestion

Spike for Hg, Use calibration working 0.4ug/ml standard at the rate of 0.050ml per 40ml sample.

Digestion: To the sample add... 5ml of 33% HCL, 1ml Potassium Bromate / Potassium Bromide solution and let stand for 30min

HNO₃ Lot # 1113120 HCL Lot# 35182 Hydrox Lot# 070214-3

Clear samples after digestion with 0.1ml of Hydroxylamine solution.

Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

typed by LALverified by Jane

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MERCURY BATCH DIGESTION/RUN WORKSHEET

Date Prepared & Digested: 7.28.14 Initials: LAL Start Time: 10:00 Stop Time: 10:45

Using the Method Reagent Blank and the 0.4ug/ml Working, QC #2 & QC #3 Standards, make the following dilutions for the calibration and QC's...

A/S	Curve & QC's	ml working std	40 ml aliquot concentration	Final Vol	Working Standard Lot Numbers
7	Reagent BLK	0	0.0	400	#1 (working std): Lot #: <u>1130904-072814-1</u> by: <u>LAL</u> QC #2 & #3 are made the same as WS #1 (0.4ug/ml) QC Std #2 Lot #: <u>072814-2</u> QC Std #3 (QC #3): Lot #: <u>072814-3</u>
8	0.001 ug, DL	0.025ml	0.000025	400	
9	0.002 ug	0.025ml	0.00005	200	
10	0.004ug	0.050ml	0.0001	200	
11	0.020ug	0.250ml	0.0005	200	
12	0.040ug	0.500ml	0.0010	200	
13	0.02ug=QC#2	0.5ml QC#2 std	0.00050	400	
14	0.02ug=QC#3	0.5ml QC#3 std	0.00050	400	Curve prepared by: <u>LAL</u> Comments: <u>072814-1M</u> <u>GC US 7/28/14 C</u>

A/S	LAB #	ml used	Sample FV, ml	Dilutions	Spike ug	Client
15	<u>22731-4.1</u>	<u>5</u>	<u>50</u>			<u>BARR</u>
16	<u>-5.1</u>	<u>↓</u>	<u>↓</u>			<u>↓</u>
17	<u>-5.1 Trip</u>	<u>5</u>	<u>50</u>			
18						
19						
20						
21						
22						
23						
24						

NOTES: Lab blanks and spikes must be prepared with each batch digestion**Spike for Hg,** Use calibration working 0.4ug/ml standard at the rate of 0.050ml per 40ml sample.**Digestion:** To the sample add... 5ml of 33% HCL, 1ml Potassium Bromate / Potassium Bromide solution and let stand for 30minHNO₃ Lot # 11301113120 HCL Lot# 35187 Hydrox Lot# 072072114-3

Clear samples after digestion with 0.1ml of Hydroxylamine solution.

Element One, Inc Form 112 R2-Ontario Hydro Digestion Sheet

Typed by LALVerified by JWL

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22731 Barr OHM Report Packet

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PS Analytical Millennium Galahad CVAF Analyzer

Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
0		0	4.287323	212.043457	-0.031051	0	0	----	----	7/18/2014 12:25
0.001		0.001	21.991753	1042.169189	-0.248183	17704.42969	4.287323	----	----	7/18/2014 12:27
0.002		0.002	36.716015	1690.550781	-0.309939	16214.34375	4.784019	----	----	7/18/2014 12:29
0.004		0.004	75.594353	3490.708252	-0.577611	17745.10352	3.593431	----	----	7/18/2014 12:31
0.02		0.02	356.885864	16784.50195	-1.008144	17659.70898	3.73264	----	----	7/18/2014 12:33
0.04		0.04	720.263489	34002.45703	-1.622715	17889.4668	2.857412	----	----	7/18/2014 12:36
Blk		0	3.573856	-61.139503	-1.523021	17889.4668	2.857412	1	1	7/18/2014 12:39
DL		0.0012	23.497822	1104.109863	0.047664	17889.4668	2.857412	1	1	7/18/2014 12:41
QC 2		0.0216	389.43927	18108.53125	-0.20257	17889.4668	2.857412	1	1	7/18/2014 12:43
QC 3		0.0207	372.424164	17445.24609	-1.195447	17889.4668	2.857412	1	1	7/18/2014 12:46
Blk		0	2.135314	-138.725296	-1.613951	17889.4668	2.857412	1	1	7/18/2014 12:48
22731-1.2	#1	0.0032	8.645884	416.345001	0.131918	17889.4668	2.857412	20	200	7/18/2014 12:50
22731-1.2	#2	0.0021	6.564788	317.023773	0.023064	17889.4668	2.857412	20	200	7/18/2014 12:53
22731-2.2	#1	0.0034	8.951962	438.75174	0.105015	17889.4668	2.857412	20	200	7/18/2014 12:55
22731-2.2	#2	0.0025	7.34544	347.533752	-0.127255	17889.4668	2.857412	20	200	7/18/2014 12:57
22731-2.2 Trip	#1	0.0016	5.698949	261.710754	-0.282957	17889.4668	2.857412	20	200	7/18/2014 12:59
22731-2.2 Trip	#2	0.0016	5.650691	274.739502	-0.176974	17889.4668	2.857412	20	200	7/18/2014 13:01
22731-3.2	#1	0.0004	3.543528	133.634125	-0.383761	17889.4668	2.857412	20	200	7/18/2014 13:03
22731-3.2	#2	0.0009	4.554786	198.009949	0.442445	17889.4668	2.857412	20	200	7/18/2014 13:06
22731-3.2 spk	#1	0.1979	356.979309	17317.18555	0.330801	17889.4668	2.857412	20	200	7/18/2014 13:08
22731-3.2 spk	#2	0.1969	355.17218	17198.90039	-0.331502	17889.4668	2.857412	20	200	7/18/2014 13:11
22731-4.2	#1	0.005	11.846898	317.197479	-2.115651	17889.4668	2.857412	20	200	7/18/2014 13:13
22731-4.2	#2	0.0066	14.623727	677.816162	-0.486222	17889.4668	2.857412	20	200	7/18/2014 13:15
22731-5.2	#1	0.0067	14.820713	676.134155	0.178592	17889.4668	2.857412	20	200	7/18/2014 13:17
22731-5.2	#2	0.0066	14.595832	691.563843	-0.234367	17889.4668	2.857412	20	200	7/18/2014 13:20
22731-5.2 Trip	#1	0.0062	13.865593	631.989563	-0.101341	17889.4668	2.857412	20	200	7/18/2014 13:22
22731-5.2 Trip	#2	0.006	13.669451	632.237488	-0.11529	17889.4668	2.857412	20	200	7/18/2014 13:24
DL		0.0009	19.601852	711.94574	-1.993881	17889.4668	2.857412	1	1	7/18/2014 13:36
QC 2		0.0212	382.529114	17896.28516	0.191092	17889.4668	2.857412	1	1	7/18/2014 13:38
QC 3		0.0206	371.484985	17336.67188	-1.024898	17889.4668	2.857412	1	1	7/18/2014 13:41
Blk		0	2.356016	-106.735725	-1.629034	17889.4668	2.857412	1	1	7/18/2014 13:43
22731-7.2	#1	0.0023	6.925273	317.333588	0.216817	17889.4668	2.857412	20	200	7/18/2014 13:46
22731-7.2	#2	0.0015	5.470922	273.45639	0.323038	17889.4668	2.857412	20	200	7/18/2014 13:48
22731-1.3	#1	0.0375	8.963141	435.784363	0.053597	17889.4668	2.857412	10	1100	7/18/2014 13:50
22731-1.3	#2	0.0352	8.577265	406.168549	0.076239	17889.4668	2.857412	10	1100	7/18/2014 13:52
22731-2.3	#1	0.0477	11.396969	548.342529	0.034283	17889.4668	2.857412	10	1000	7/18/2014 13:54
22731-2.3	#2	0.0412	10.235337	475.575867	-0.182191	17889.4668	2.857412	10	1000	7/18/2014 13:56
22731-2.3 trip	#1	0.0543	12.572194	567.824402	-0.278089	17889.4668	2.857412	10	1000	7/18/2014 13:59
22731-2.3 trip	#2	0.0447	10.847103	495.963806	-0.375225	17889.4668	2.857412	10	1000	7/18/2014 14:01
22731-3.3	#1	0.0363	8.762034	395.535004	0.012601	17889.4668	2.857412	10	1100	7/18/2014 14:03
22731-3.3	#2	0.0367	8.8245	415.607758	-0.091514	17889.4668	2.857412	10	1100	7/18/2014 14:05
22731-3.3 spk	#1	2.2272	365.070801	17404.01563	-0.01252	17889.4668	2.857412	10	1100	7/18/2014 14:07
22731-3.3 spk	#2	2.1964	360.057129	17126.07031	-0.891183	17889.4668	2.857412	10	1100	7/18/2014 14:10
22731-4.3	#1	0.0434	8.824114	168.975494	-1.725138	17889.4668	2.857412	10	1300	7/18/2014 14:13
22731-4.3	#2	0.0715	12.691246	575.188416	-0.178055	17889.4668	2.857412	10	1300	7/18/2014 14:15
22731-5.3	#1	0.062	10.775934	483.62796	0.139341	17889.4668	2.857412	10	1400	7/18/2014 14:17
22731-5.3	#2	0.0545	9.82288	450.950165	-0.143375	17889.4668	2.857412	10	1400	7/18/2014 14:19
22731-5.3 trip	#1	0.0675	11.480192	542.296021	-0.067152	17889.4668	2.857412	10	1400	7/18/2014 14:21
22731-5.3 trip	#2	0.0628	10.885042	514.782776	-0.184129	17889.4668	2.857412	10	1400	7/18/2014 14:24
DL		0.0011	22.15193	1018.601929	-0.048087	17889.4668	2.857412	1	1	7/18/2014 14:30
QC 2		0.0211	379.682098	17613.30273	0.082542	17889.4668	2.857412	1	1	7/18/2014 14:32
QC 3		0.0203	366.805328	17083.54297	-0.991465	17889.4668	2.857412	1	1	7/18/2014 14:35

PS Analytical Millennium Galahad CVAF Analyzer

Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
Blk		-0.0001	1.716482	-230.461136	-1.716482	17889.4668	2.857412	1	1	7/18/2014 14:38
22731.7.3	#1	0.0047	4.550413	0.865877	-1.697805	17889.4668	2.857412	10	500	7/18/2014 14:45
22731.7.3	#2	0.0078	5.646437	258.712311	0.020234	17889.4668	2.857412	10	500	7/18/2014 14:48
DL		0.0011	22.279348	1054.493774	0.146685	17889.4668	2.857412	1	1	7/18/2014 15:25
QC 2		0.0215	387.96402	18147.23633	-0.273378	17889.4668	2.857412	1	1	7/18/2014 15:27
QC 3		0.0208	375.308594	17435.25586	-0.972862	17889.4668	2.857412	1	1	7/18/2014 15:30
Blk		-0.0001	1.508073	-221.494125	-1.508073	17889.4668	2.857412	1	1	7/18/2014 15:33
0		0	7.026191	285.513977	0.060677	0	0 ----	----		7/21/2014 14:14
0.001		0.001	34.50388	1543.501831	0.150174	27477.6875	7.026192 ----	----		7/21/2014 14:16
0.002		0.002	57.955616	2562.402832	-0.049901	25464.70898	7.697186 ----	----		7/21/2014 14:18
0.004		0.004	125.583992	5605.65918	-0.235852	29586.1875	4.491589 ----	----		7/21/2014 14:20
0.02		0.02	605.264832	26834.35547	-0.705721	30066.28516	3.708963 ----	----		7/21/2014 14:22
0.04		0.04	1245.77771	55502.59375	-1.112	30959.20117	0.307623 ----	----		7/21/2014 14:25
Blk		0.0004	11.892224	311.147614	-1.565236	30959.20117	0.307623	1	1	7/21/2014 14:28
DL		0.0015	45.820587	2026.438477	0.050344	30959.20117	0.307623	1	1	7/21/2014 14:30
QC 2		0.0197	610.894226	27557.39648	-0.414016	30959.20117	0.307623	1	1	7/21/2014 14:32
QC 3		0.0196	606.364441	27209.52344	-0.85297	30959.20117	0.307623	1	1	7/21/2014 14:35
Blk		0.0001	4.569993	-77.263855	-2.005852	30959.20117	0.307623	1	1	7/21/2014 14:37
227631-6.3	#1	0.043	10.546143	302.281311	-1.787323	30959.20117	0.307623	10	1300	7/21/2014 14:49
227631-6.3	#2	0.0558	13.606873	614.259888	0.16684	30959.20117	0.307623	10	1300	7/21/2014 14:51
22731-6.3 spk	#1	2.2353	532.640198	25284.76367	0.110506	30959.20117	0.307623	10	1300	7/21/2014 14:53
22731-6.3 spk	#2	2.237	533.036987	25221.14063	-0.86201	30959.20117	0.307623	10	1300	7/21/2014 14:56
22731-1.4	#1	0.0116	28.920385	1230.624023	-1.119635	30959.20117	0.307623	20	250	7/21/2014 14:59
22731-1.4	#2	0.0093	23.383207	1073.039429	-0.457837	30959.20117	0.307623	20	250	7/21/2014 15:01
22731-2.4	#1	0.0059	14.967211	661.833862	0.278357	30959.20117	0.307623	20	250	7/21/2014 15:03
22731-2.4	#2	0.0046	11.576063	523.890198	1.023965	30959.20117	0.307623	20	250	7/21/2014 15:05
22731-2.4 trip	#1	0.0048	12.277745	562.272888	0.378993	30959.20117	0.307623	20	250	7/21/2014 15:07
22731-2.4 trip	#2	0.0043	10.959977	506.026611	-0.316575	30959.20117	0.307623	20	250	7/21/2014 15:10
22731-3.4	#1	0.0061	15.362985	732.683228	-0.148744	30959.20117	0.307623	20	250	7/21/2014 15:12
22731-3.4	#2	0.0058	14.594973	637.730835	0.291868	30959.20117	0.307623	20	250	7/21/2014 15:14
22731-3.4 spk	#1	0.2266	561.486572	26147.99219	-0.079682	30959.20117	0.307623	20	250	7/21/2014 15:16
22731-3.4 spk	#2	0.2313	573.171692	26123.16992	-1.078925	30959.20117	0.307623	20	250	7/21/2014 15:19
22731-4.4	#1	0.0066	16.553415	571.059265	-1.981897	30959.20117	0.307623	20	250	7/21/2014 15:22
22731-4.4	#2	0.0064	16.200293	719.570984	-0.226539	30959.20117	0.307623	20	250	7/21/2014 15:24
DL		0.0011	33.279774	1587.011841	0.087688	30959.20117	0.307623	1	1	7/21/2014 15:26
QC 2		0.0199	617.107605	27670.64063	-0.339863	30959.20117	0.307623	1	1	7/21/2014 15:28
QC 3		0.0195	604.225281	27408.68164	-0.785003	30959.20117	0.307623	1	1	7/21/2014 15:31
Blk		0.0001	3.736518	-88.064392	-1.76004	30959.20117	0.307623	1	1	7/21/2014 15:33
22731-5.4	#1	0.006	15.244804	738.969055	-0.166306	30959.20117	0.307623	20	250	7/21/2014 15:35
22731-5.4	#2	0.0051	12.977198	602.283203	0.082739	30959.20117	0.307623	20	250	7/21/2014 15:38
22731-5.4 trip	#1	0.0043	10.958502	489.146027	0.107134	30959.20117	0.307623	20	250	7/21/2014 15:40
22731-5.4 trip	#2	0.0046	11.694109	547.597778	0.162122	30959.20117	0.307623	20	250	7/21/2014 15:42
22731-7.4	#1	0.0242	30.292496	1233.260498	-1.707061	30959.20117	0.307623	10	250	7/21/2014 15:54
22731-7.4	#2	0.0241	30.117023	1357.303345	0.054523	30959.20117	0.307623	10	250	7/21/2014 15:56
22731-2.1	#1	0.0046	28.658102	1322.823242	0.167071	30959.20117	0.307623	10	50	7/21/2014 16:13
22731-2.1	#2	0.0041	25.400885	1154.876831	-0.156028	30959.20117	0.307623	10	50	7/21/2014 16:15
22731-2.1 trip	#1	0.0039	24.500763	1123.896118	-0.136429	30959.20117	0.307623	10	50	7/21/2014 16:17
22731-2.1 trip	#2	0.0038	23.817225	1094.972412	0.028547	30959.20117	0.307623	10	50	7/21/2014 16:19
DL		0.0008	26.065605	1207.927368	0.028725	30959.20117	0.307623	1	1	7/21/2014 16:21
QC 2		0.0189	586.773865	26625.21289	-0.47023	30959.20117	0.307623	1	1	7/21/2014 16:23
QC 3		0.0194	599.416565	26590.24609	-1.29642	30959.20117	0.307623	1	1	7/21/2014 16:26
Blk		0	1.748363	-185.740082	-1.748363	30959.20117	0.307623	1	1	7/21/2014 16:29
22731-3.1	#1	0.0038	23.726822	1113.379883	-0.330314	30959.20117	0.307623	10	50	7/21/2014 16:31

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Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
22731-3.1	#2	0.0033	20.599953	920.483154	-0.228715	30959.20117	0.307623	10	50	7/21/2014 16:33
22731-3.1 spk	#1	0.0735	455.609619	21023.60742	-0.1024	30959.20117	0.307623	10	50	7/21/2014 16:35
22731-3.1 spk	#2	0.0788	488.014954	22810.55859	-0.690565	30959.20117	0.307623	10	50	7/21/2014 16:38
22731-7.1	#1	0.0012	7.549378	137.61116	-1.304886	30959.20117	0.307623	10	50	7/21/2014 17:03
22731-7.1	#2	0.0014	8.924872	371.052856	0.076859	30959.20117	0.307623	10	50	7/21/2014 17:05
DL		0.001	29.76071	1060.859375	-1.961447	30959.20117	0.307623	1	1	7/21/2014 17:17
QC 2		0.0197	609.237915	27458.06836	-0.43489	30959.20117	0.307623	1	1	7/21/2014 17:19
QC 3		0.0194	600.295654	26988.49023	-1.551931	30959.20117	0.307623	1	1	7/21/2014 17:22
Blk		0	1.63441	-233.656693	-1.63441	30959.20117	0.307623	1	1	7/21/2014 17:24
22731-7.5	#1	0.0078	9.95261	249.088425	-2.330753	30959.20117	0.307623	20	500	7/21/2014 18:06
22731-7.5	#2	0.0104	13.176092	709.849548	0.120257	30959.20117	0.307623	20	500	7/21/2014 18:08
22731-7.6	#1	0.0355	44.238716	2027.823853	-0.067421	30959.20117	0.307623	20	500	7/21/2014 18:10
DL		0.0012	37.251133	1728.445313	-0.206453	30959.20117	0.307623	1	1	7/21/2014 18:15
QC 2		0.0201	622.491882	27716.25195	-0.202358	30959.20117	0.307623	1	1	7/21/2014 18:17
QC 3		0.0201	622.967773	27349.125	-0.851283	30959.20117	0.307623	1	1	7/21/2014 18:20
Blk		0.0001	2.164443	-203.814926	-2.164443	30959.20117	0.307623	1	1	7/21/2014 18:22
0		0	6.899641	316.213623	-0.12676	0	0 ----	----		7/22/2014 12:37
0.001		0.001	25.624714	1206.647461	-0.114079	18725.07422	6.899639 ----	----		7/22/2014 12:39
0.002		0.002	45.174198	2110.111572	-0.170729	19137.2793	6.762236 ----	----		7/22/2014 12:41
0.004		0.004	82.284088	3823.933105	-0.537408	18873.125	6.96769 ----	----		7/22/2014 12:43
0.02		0.02	378.72345	17862.20313	-1.000009	18570.37109	7.461218 ----	----		7/22/2014 12:46
0.04		0.04	760.86615	36212.01563	-1.141157	18810.26758	6.547387 ----	----		7/22/2014 12:48
DL		0.001	25.085918	937.279846	-2.075245	18810.26758	6.547387	1	1	7/22/2014 12:51
QC 2		0.0235	449.271576	21058.29492	-0.565018	18810.26758	6.547387	1	1	7/22/2014 12:53
QC 3		0.0203	387.565216	18101.32422	-1.339037	18810.26758	6.547387	1	1	7/22/2014 12:56
Blk		-0.0001	5.338404	44.644562	-1.705516	18810.26758	6.547387	1	1	7/22/2014 12:58
22731-6.3	#1	0.0192	7.939933	353.523407	0.14792	18810.26758	6.547387	5	1300	7/22/2014 13:00
22731-6.3	#2	0.0233	8.236341	374.174316	-0.00057	18810.26758	6.547387	5	1300	7/22/2014 13:03
22731-6.3 spk	#1	5.3422	393.040771	18778.27734	-0.112648	18810.26758	6.547387	5	1300	7/22/2014 13:05
22731-6.3 spk	#2	5.4646	401.895203	18824.28125	-0.914683	18810.26758	6.547387	5	1300	7/22/2014 13:08
22731-3.1	#1	0.0051	16.133642	534.998657	-1.772879	18810.26758	6.547387	5	50	7/22/2014 13:29
22731-3.1	#2	0.0042	14.517047	648.704041	-0.0563	18810.26758	6.547387	5	50	7/22/2014 13:32
22731-3.1 spk	#1	0.1984	379.803497	17931.47266	0.250578	18810.26758	6.547387	5	50	7/22/2014 13:34
22731-3.1 spk	#2	0.2008	384.330261	18065.51367	-1.375124	18810.26758	6.547387	5	50	7/22/2014 13:36
22731-6.1	#1	0.0073	20.371061	740.497131	-1.706113	18810.26758	6.547387	5	50	7/22/2014 13:39
22731-6.1	#2	0.0084	22.362339	1010.503235	-0.186969	18810.26758	6.547387	5	50	7/22/2014 13:41
22731-6.1 spk	#1	0.208	397.745911	19118.32031	-0.188002	18810.26758	6.547387	5	50	7/22/2014 13:43
22731-6.1 spk	#2	0.2093	400.197388	19112.35547	-1.186551	18810.26758	6.547387	5	50	7/22/2014 13:46
DL		0.0009	23.629673	934.664429	-1.561291	18810.26758	6.547387	1	1	7/22/2014 13:49
QC 3		0.0205	392.493744	18539.8418	-1.05823	18810.26758	6.547387	1	1	7/22/2014 13:54
Blk		-0.0001	5.101309	-1.100047	-1.762999	18810.26758	6.547387	1	1	7/22/2014 13:56
22731-3.5	#1	0.6068	149.225906	6995.118164	0.615416	18810.26758	6.547387	10	800	7/22/2014 13:58
22731-3.5	#2	0.6001	147.649734	6684.375488	-0.948015	18810.26758	6.547387	10	800	7/22/2014 14:01
22731-3.5 spk	#1	2.3076	549.135315	25593.73047	-1.422037	18810.26758	6.547387	10	800	7/22/2014 14:03
22731-3.5 spk	#2	2.3012	547.635437	25546.49219	-1.802939	18810.26758	6.547387	10	800	7/22/2014 14:06
22731-6.5	#1	1.0367	331.567108	15196.51856	-1.948388	18810.26758	6.547387	10	600	7/22/2014 14:08
22731-6.5	#2	1.0232	327.338409	14935.94336	-2.11962	18810.26758	6.547387	10	600	7/22/2014 14:11
22731-6.5 spk	#1	2.1839	691.210999	32347.37891	-2.410701	18810.26758	6.547387	10	600	7/22/2014 14:13
22731-6.5 spk	#2	2.216	701.266357	32864.65625	-2.618686	18810.26758	6.547387	10	600	7/22/2014 14:15
22731-7.6	#1	0.0289	17.406416	489.172943	-2.608503	18810.26758	6.547387	10	500	7/22/2014 14:18
22731-7.6	#2	0.0312	18.295412	812.674866	0.037917	18810.26758	6.547387	10	500	7/22/2014 14:20
DL		0.0012	28.423014	1307.79541	-0.138308	18810.26758	6.547387	1	1	7/22/2014 14:23
QC 2		0.0221	421.790588	19928.04688	-0.296675	18810.26758	6.547387	1	1	7/22/2014 14:25

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Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
QC 3		0.0206	394.60965	18773.68555	-1.413167	18810.26758	6.547387	1	1	7/22/2014 14:27
Blk		0	5.711725	31.161169	-1.583612	18810.26758	6.547387	1	1	7/22/2014 14:30
22731 LRB	#1	0.0025	15.810444	788.45636	0.120457	18810.26758	6.547387	10	50	7/22/2014 15:06
22731 LRB	#2	0.0008	9.707636	431.500366	0.439932	18810.26758	6.547387	10	50	7/22/2014 15:08
22731 LRB spk	#1	2.3212	181.193695	8785.243164	0.095226	18810.26758	6.547387	0.2	50	7/22/2014 15:10
22731 LRB spk	#2	2.3123	180.523849	8527.135742	-0.904949	18810.26758	6.547387	0.2	50	7/22/2014 15:13
DL		0.0009	24.312458	960.326111	-1.262639	18810.26758	6.547387	1	1	7/22/2014 15:15
QC 2		0.0233	445.054626	20917.47656	-0.092679	18810.26758	6.547387	1	1	7/22/2014 15:17
QC 3		0.0204	390.073608	18486.21875	-1.583713	18810.26758	6.547387	1	1	7/22/2014 15:20
Blk		0	5.676105	27.957674	-1.409855	18810.26758	6.547387	1	1	7/22/2014 15:23
0		0	4.287323	212.043457	-0.031051	0	0 ----	----	----	7/18/2014 12:25
0.001		0.001	21.991753	1042.169189	-0.248183	17704.42969	4.287323 ----	----	----	7/18/2014 12:27
0.002		0.002	36.716015	1690.550781	-0.309939	16214.34375	4.784019 ----	----	----	7/18/2014 12:29
0.004		0.004	75.594353	3490.708252	-0.577611	17745.10352	3.593431 ----	----	----	7/18/2014 12:31
0.02		0.02	356.885864	16784.50195	-1.008144	17659.70898	3.73264 ----	----	----	7/18/2014 12:33
0.04		0.04	720.263489	34002.45703	-1.622715	17889.4668	2.857412 ----	----	----	7/18/2014 12:36
Blk		0	3.573856	-61.139503	-1.523021	17889.4668	2.857412	1	1	7/18/2014 12:39
DL		0.0012	23.497822	1104.109863	0.047664	17889.4668	2.857412	1	1	7/18/2014 12:41
QC 2		0.0216	389.43927	18108.53125	-0.20257	17889.4668	2.857412	1	1	7/18/2014 12:43
QC 3		0.0207	372.424164	17445.24609	-1.195447	17889.4668	2.857412	1	1	7/18/2014 12:46
Blk		0	2.135314	-138.725296	-1.613951	17889.4668	2.857412	1	1	7/18/2014 12:48
22731-1.2	#1	0.0032	8.645884	416.345001	0.131918	17889.4668	2.857412	20	200	7/18/2014 12:50
22731-1.2	#2	0.0021	6.564788	317.023773	0.023064	17889.4668	2.857412	20	200	7/18/2014 12:53
22731-2.2	#1	0.0034	8.951962	438.75174	0.105015	17889.4668	2.857412	20	200	7/18/2014 12:55
22731-2.2	#2	0.0025	7.34544	347.533752	-0.127255	17889.4668	2.857412	20	200	7/18/2014 12:57
22731-2.2 Trip	#1	0.0016	5.698949	261.710754	-0.282957	17889.4668	2.857412	20	200	7/18/2014 12:59
22731-2.2 Trip	#2	0.0016	5.650691	274.739502	-0.176974	17889.4668	2.857412	20	200	7/18/2014 13:01
22731-3.2	#1	0.0004	3.543528	133.634125	-0.383761	17889.4668	2.857412	20	200	7/18/2014 13:03
22731-3.2	#2	0.0009	4.554786	198.009949	0.442445	17889.4668	2.857412	20	200	7/18/2014 13:06
22731-3.2 spk	#1	0.1979	356.979309	17317.18555	0.330801	17889.4668	2.857412	20	200	7/18/2014 13:08
22731-3.2 spk	#2	0.1969	355.17218	17198.90039	-0.331502	17889.4668	2.857412	20	200	7/18/2014 13:11
22731-4.2	#1	0.005	11.846898	317.197479	-2.115651	17889.4668	2.857412	20	200	7/18/2014 13:13
22731-4.2	#2	0.0066	14.623727	677.816162	-0.486222	17889.4668	2.857412	20	200	7/18/2014 13:15
22731-5.2	#1	0.0067	14.820713	676.134155	0.178592	17889.4668	2.857412	20	200	7/18/2014 13:17
22731-5.2	#2	0.0066	14.595832	691.563843	-0.234367	17889.4668	2.857412	20	200	7/18/2014 13:20
22731-5.2 Trip	#1	0.0062	13.865593	631.989563	-0.101341	17889.4668	2.857412	20	200	7/18/2014 13:22
22731-5.2 Trip	#2	0.006	13.669451	632.237488	-0.11529	17889.4668	2.857412	20	200	7/18/2014 13:24
22731-6.2	#1	0.0073	15.964026	751.355774	-0.117491	17889.4668	2.857412	20	200	7/18/2014 13:26
22731-6.2	#2	0.007	15.328026	670.514832	-0.247086	17889.4668	2.857412	20	200	7/18/2014 13:28
22731-6.2 spk	#1	0.2267	408.407257	19336.07422	0.263892	17889.4668	2.857412	20	200	7/18/2014 13:31
22731-6.2 spk	#2	0.2199	396.235291	18488.74023	-1.087511	17889.4668	2.857412	20	200	7/18/2014 13:33
DL		0.0009	19.601852	711.94574	-1.993881	17889.4668	2.857412	1	1	7/18/2014 13:36
QC 2		0.0212	382.529114	17896.28516	0.191092	17889.4668	2.857412	1	1	7/18/2014 13:38
QC 3		0.0206	371.484985	17336.67188	-1.024898	17889.4668	2.857412	1	1	7/18/2014 13:41
Blk		0	2.356016	-106.735725	-1.629034	17889.4668	2.857412	1	1	7/18/2014 13:43
22731-7.2	#1	0.0023	6.925273	317.333588	0.216817	17889.4668	2.857412	20	200	7/18/2014 13:46
22731-7.2	#2	0.0015	5.470922	273.45639	0.323038	17889.4668	2.857412	20	200	7/18/2014 13:48
22731-1.3	#1	0.0375	8.963141	435.784363	0.053597	17889.4668	2.857412	10	1100	7/18/2014 13:50
22731-1.3	#2	0.0352	8.577265	406.168549	0.076239	17889.4668	2.857412	10	1100	7/18/2014 13:52
22731-2.3	#1	0.0477	11.396969	548.342529	0.034283	17889.4668	2.857412	10	1000	7/18/2014 13:54
22731-2.3	#2	0.0412	10.235337	475.575867	-0.182191	17889.4668	2.857412	10	1000	7/18/2014 13:56
22731-2.3 trip	#1	0.0543	12.572194	567.824402	-0.278089	17889.4668	2.857412	10	1000	7/18/2014 13:59
22731-2.3 trip	#2	0.0447	10.847103	495.963806	-0.375225	17889.4668	2.857412	10	1000	7/18/2014 14:01

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Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
22731-3.3	#1	0.0363	8.762034	395.535004	0.012601	17889.4668	2.857412	10	1100	7/18/2014 14:03
22731-3.3	#2	0.0367	8.8245	415.607758	-0.091514	17889.4668	2.857412	10	1100	7/18/2014 14:05
22731-3.3 spk	#1	2.2272	365.070801	17404.01563	-0.01252	17889.4668	2.857412	10	1100	7/18/2014 14:07
22731-3.3 spk	#2	2.1964	360.057129	17126.07031	-0.891183	17889.4668	2.857412	10	1100	7/18/2014 14:10
22731-4.3	#1	0.0434	8.824114	168.975494	-1.725138	17889.4668	2.857412	10	1300	7/18/2014 14:13
22731-4.3	#2	0.0715	12.691246	575.188416	-0.178055	17889.4668	2.857412	10	1300	7/18/2014 14:15
22731-5.3	#1	0.062	10.775934	483.62796	0.139341	17889.4668	2.857412	10	1400	7/18/2014 14:17
22731-5.3	#2	0.0545	9.82288	450.950165	-0.143375	17889.4668	2.857412	10	1400	7/18/2014 14:19
22731-5.3 trip	#1	0.0675	11.480192	542.296021	-0.067152	17889.4668	2.857412	10	1400	7/18/2014 14:21
22731-5.3 trip	#2	0.0628	10.885042	514.782776	-0.184129	17889.4668	2.857412	10	1400	7/18/2014 14:24
DL		0.0011	22.15193	1018.601929	-0.048087	17889.4668	2.857412	1	1	7/18/2014 14:30
QC 2		0.0211	379.682098	17613.30273	0.082542	17889.4668	2.857412	1	1	7/18/2014 14:32
QC 3		0.0203	366.805328	17083.54297	-0.991465	17889.4668	2.857412	1	1	7/18/2014 14:35
Blk		-0.0001	1.716482	-230.461136	-1.716482	17889.4668	2.857412	1	1	7/18/2014 14:38
22731.7.3	#1	0.0047	4.550413	0.865877	-1.697805	17889.4668	2.857412	10	500	7/18/2014 14:45
22731.7.3	#2	0.0078	5.646437	258.712311	0.020234	17889.4668	2.857412	10	500	7/18/2014 14:48
DL		0.0011	22.279348	1054.493774	0.146685	17889.4668	2.857412	1	1	7/18/2014 15:25
QC 2		0.0215	387.96402	18147.23633	-0.273378	17889.4668	2.857412	1	1	7/18/2014 15:27
QC 3		0.0208	375.308594	17435.25586	-0.972862	17889.4668	2.857412	1	1	7/18/2014 15:30
Blk		-0.0001	1.508073	-221.494125	-1.508073	17889.4668	2.857412	1	1	7/18/2014 15:33
0		0	7.026191	285.513977	0.060677	0	0 ----	----		7/21/2014 14:14
0.001		0.001	34.50388	1543.501831	0.150174	27477.6875	7.026192 ----	----		7/21/2014 14:16
0.002		0.002	57.955616	2562.402832	-0.049901	25464.70898	7.697186 ----	----		7/21/2014 14:18
0.004		0.004	125.583992	5605.65918	-0.235852	29586.1875	4.491589 ----	----		7/21/2014 14:20
0.02		0.02	605.264832	26834.35547	-0.705721	30066.28516	3.708963 ----	----		7/21/2014 14:22
0.04		0.04	1245.77771	55502.59375	-1.112	30959.20117	0.307623 ----	----		7/21/2014 14:25
Blk		0.0004	11.892224	311.147614	-1.565236	30959.20117	0.307623	1	1	7/21/2014 14:28
DL		0.0015	45.820587	2026.438477	0.050344	30959.20117	0.307623	1	1	7/21/2014 14:30
QC 2		0.0197	610.894226	27557.39648	-0.414016	30959.20117	0.307623	1	1	7/21/2014 14:32
QC 3		0.0196	606.364441	27209.52344	-0.85297	30959.20117	0.307623	1	1	7/21/2014 14:35
Blk		0.0001	4.569993	-77.263855	-2.005852	30959.20117	0.307623	1	1	7/21/2014 14:37
22731-6.3	#1	0.043	10.546143	302.281311	-1.787323	30959.20117	0.307623	10	1300	7/21/2014 14:49
22731-6.3	#2	0.0558	13.606873	614.259888	0.16684	30959.20117	0.307623	10	1300	7/21/2014 14:51
22731-6.3 spk	#1	2.2353	532.640198	25284.76367	0.110506	30959.20117	0.307623	10	1300	7/21/2014 14:53
22731-6.3 spk	#2	2.237	533.036987	25221.14063	-0.86201	30959.20117	0.307623	10	1300	7/21/2014 14:56
22731-1.4	#1	0.0116	28.920385	1230.624023	-1.119635	30959.20117	0.307623	20	250	7/21/2014 14:59
22731-1.4	#2	0.0093	23.383207	1073.039429	-0.457837	30959.20117	0.307623	20	250	7/21/2014 15:01
22731-2.4	#1	0.0059	14.967211	661.833862	0.278357	30959.20117	0.307623	20	250	7/21/2014 15:03
22731-2.4	#2	0.0046	11.576063	523.890198	1.023965	30959.20117	0.307623	20	250	7/21/2014 15:05
22731-2.4 trip	#1	0.0048	12.277745	562.272888	0.378993	30959.20117	0.307623	20	250	7/21/2014 15:07
22731-2.4 trip	#2	0.0043	10.959977	506.026611	-0.316575	30959.20117	0.307623	20	250	7/21/2014 15:10
22731-3.4	#1	0.0061	15.362985	732.683228	-0.148744	30959.20117	0.307623	20	250	7/21/2014 15:12
22731-3.4	#2	0.0058	14.594973	637.730835	0.291868	30959.20117	0.307623	20	250	7/21/2014 15:14
22731-3.4 spk	#1	0.2266	561.486572	26147.99219	-0.079682	30959.20117	0.307623	20	250	7/21/2014 15:16
22731-3.4 spk	#2	0.2313	573.171692	26123.16992	-1.078925	30959.20117	0.307623	20	250	7/21/2014 15:19
22731-4.4	#1	0.0066	16.553415	571.059265	-1.981897	30959.20117	0.307623	20	250	7/21/2014 15:22
22731-4.4	#2	0.0064	16.200293	719.570984	-0.226539	30959.20117	0.307623	20	250	7/21/2014 15:24
DL		0.0011	33.279774	1587.011841	0.087688	30959.20117	0.307623	1	1	7/21/2014 15:26
QC 2		0.0199	617.107605	27670.64063	-0.339863	30959.20117	0.307623	1	1	7/21/2014 15:28
QC 3		0.0195	604.225281	27408.68164	-0.785003	30959.20117	0.307623	1	1	7/21/2014 15:31
Blk		0.0001	3.736518	-88.064392	-1.76004	30959.20117	0.307623	1	1	7/21/2014 15:33
22731-5.4	#1	0.006	15.244804	738.969055	-0.166306	30959.20117	0.307623	20	250	7/21/2014 15:35
22731-5.4	#2	0.0051	12.977198	602.283203	0.082739	30959.20117	0.307623	20	250	7/21/2014 15:38

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Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
22731-5.4 trip	#1	0.0043	10.958502	489.146027	0.107134	30959.20117	0.307623	20	250	7/21/2014 15:40
22731-5.4 trip	#2	0.0046	11.694109	547.597778	0.162122	30959.20117	0.307623	20	250	7/21/2014 15:42
22731-6.4	#1	0.0053	13.423174	646.530029	0.176833	30959.20117	0.307623	20	250	7/21/2014 15:44
22731-6.4	#2	0.005	12.808393	631.544739	-0.067762	30959.20117	0.307623	20	250	7/21/2014 15:46
22731-6.4 spk	#1	0.1919	475.552948	22994.68164	0.161643	30959.20117	0.307623	20	250	7/21/2014 15:49
22731-6.4 spk	#2	0.1915	474.653717	22673.32227	-1.094929	30959.20117	0.307623	20	250	7/21/2014 15:51
22731-7.4	#1	0.0242	30.292496	1233.260498	-1.707061	30959.20117	0.307623	10	250	7/21/2014 15:54
22731-7.4	#2	0.0241	30.117023	1357.303345	0.054523	30959.20117	0.307623	10	250	7/21/2014 15:56
22731-2.1	#1	0.0046	28.658102	1322.823242	0.167071	30959.20117	0.307623	10	50	7/21/2014 16:13
22731-2.1	#2	0.0041	25.400885	1154.876831	-0.156028	30959.20117	0.307623	10	50	7/21/2014 16:15
22731-2.1 trip	#1	0.0039	24.500763	1123.896118	-0.136429	30959.20117	0.307623	10	50	7/21/2014 16:17
22731-2.1 trip	#2	0.0038	23.817225	1094.972412	0.028547	30959.20117	0.307623	10	50	7/21/2014 16:19
DL		0.0008	26.065605	1207.927368	0.028725	30959.20117	0.307623	1	1	7/21/2014 16:21
QC 2		0.0189	586.773865	26625.21289	-0.47023	30959.20117	0.307623	1	1	7/21/2014 16:23
QC 3		0.0194	599.416565	26590.24609	-1.29642	30959.20117	0.307623	1	1	7/21/2014 16:26
Blk		0	1.748363	-185.740082	-1.748363	30959.20117	0.307623	1	1	7/21/2014 16:29
22731-3.1	#1	0.0038	23.726822	1113.379883	-0.330314	30959.20117	0.307623	10	50	7/21/2014 16:31
22731-3.1	#2	0.0033	20.599953	920.483154	-0.228715	30959.20117	0.307623	10	50	7/21/2014 16:33
22731-3.1 spk	#1	0.0735	455.609619	21023.60742	-0.1024	30959.20117	0.307623	10	50	7/21/2014 16:35
22731-3.1 spk	#2	0.0788	488.014954	22810.55859	-0.690565	30959.20117	0.307623	10	50	7/21/2014 16:38
22731-4.1	#1	0.01	62.08799	2741.008057	-1.440049	30959.20117	0.307623	10	50	7/21/2014 16:40
22731-4.1	#2	0.01	62.21529	2900.101074	-0.410054	30959.20117	0.307623	10	50	7/21/2014 16:43
22731-5.1	#1	0.0141	87.603233	4033.238281	-0.342229	30959.20117	0.307623	10	50	7/21/2014 16:45
22731-5.1	#2	0.0139	86.532089	3923.536133	-0.261645	30959.20117	0.307623	10	50	7/21/2014 16:47
22731-5.1 trip	#1	0.0122	75.747673	3444.44165	-0.524156	30959.20117	0.307623	10	50	7/21/2014 16:49
22731-5.1 trip	#2	0.0122	75.615936	3483.320557	-0.040565	30959.20117	0.307623	10	50	7/21/2014 16:51
22731-6.1	#1	0.0064	39.669296	1768.795654	-0.31273	30959.20117	0.307623	10	50	7/21/2014 16:54
22731-6.1	#2	0.0063	39.533848	1829.967407	-0.026576	30959.20117	0.307623	10	50	7/21/2014 16:56
22731-6.1 spk	#1	0.0789	488.714203	22878.4375	-0.139533	30959.20117	0.307623	10	50	7/21/2014 16:58
22731-6.1 spk	#2	0.0821	508.635529	23835.81836	-0.921456	30959.20117	0.307623	10	50	7/21/2014 17:01
22731-7.1	#1	0.0012	7.549378	137.61116	-1.304886	30959.20117	0.307623	10	50	7/21/2014 17:03
22731-7.1	#2	0.0014	8.924872	371.052856	0.076859	30959.20117	0.307623	10	50	7/21/2014 17:05
DL		0.001	29.76071	1060.859375	-1.961447	30959.20117	0.307623	1	1	7/21/2014 17:17
QC 2		0.0197	609.237915	27458.06836	-0.43489	30959.20117	0.307623	1	1	7/21/2014 17:19
QC 3		0.0194	600.295654	26988.49023	-1.551931	30959.20117	0.307623	1	1	7/21/2014 17:22
Blk		0	1.63441	-233.656693	-1.63441	30959.20117	0.307623	1	1	7/21/2014 17:24
22731-7.5	#1	0.0078	9.95261	249.088425	-2.330753	30959.20117	0.307623	20	500	7/21/2014 18:06
22731-7.5	#2	0.0104	13.176092	709.849548	0.120257	30959.20117	0.307623	20	500	7/21/2014 18:08
DL		0.0012	37.251133	1728.445313	-0.206453	30959.20117	0.307623	1	1	7/21/2014 18:15
QC 2		0.0201	622.491882	27716.25195	-0.202358	30959.20117	0.307623	1	1	7/21/2014 18:17
QC 3		0.0201	622.967773	27349.125	-0.851283	30959.20117	0.307623	1	1	7/21/2014 18:20
Blk		0.0001	2.164443	-203.814926	-2.164443	30959.20117	0.307623	1	1	7/21/2014 18:22
0		0	6.899641	316.213623	-0.12676	0	0	----	----	7/22/2014 12:37
0.001		0.001	25.624714	1206.647461	-0.114079	18725.07422	6.899639	----	----	7/22/2014 12:39
0.002		0.002	45.174198	2110.111572	-0.170729	19137.2793	6.762236	----	----	7/22/2014 12:41
0.004		0.004	82.284088	3823.933105	-0.537408	18873.125	6.96769	----	----	7/22/2014 12:43
0.02		0.02	378.72345	17862.20313	-1.000009	18570.37109	7.461218	----	----	7/22/2014 12:46
0.04		0.04	760.86615	36212.01563	-1.141157	18810.26758	6.547387	----	----	7/22/2014 12:48
DL		0.001	25.085918	937.279846	-2.075245	18810.26758	6.547387	1	1	7/22/2014 12:51
QC 2		0.0235	449.271576	21058.29492	-0.565018	18810.26758	6.547387	1	1	7/22/2014 12:53
QC 3		0.0203	387.565216	18101.32422	-1.339037	18810.26758	6.547387	1	1	7/22/2014 12:56
Blk		-0.0001	5.338404	44.644562	-1.705516	18810.26758	6.547387	1	1	7/22/2014 12:58
22731-6.3	#1	0.0192	7.939933	353.523407	0.14792	18810.26758	6.547387	5	1300	7/22/2014 13:00

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Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
22731-6.3	#2	0.0233	8.236341	374.174316	-0.00057	18810.26758	6.547387	5	1300	7/22/2014 13:03
22731-6.3 spk	#1	5.3422	393.040771	18778.27734	-0.112648	18810.26758	6.547387	5	1300	7/22/2014 13:05
22731-6.3 spk	#2	5.4646	401.895203	18824.28125	-0.914683	18810.26758	6.547387	5	1300	7/22/2014 13:08
22731-6.4	#1	0.0282	27.741121	1148.89917	-1.6095	18810.26758	6.547387	10	250	7/22/2014 13:10
22731-6.4	#2	0.0183	20.304293	878.168884	-0.036471	18810.26758	6.547387	10	250	7/22/2014 13:12
22731-6.4 spk	#1	0.5206	398.238647	19012.65625	-0.265117	18810.26758	6.547387	10	250	7/22/2014 13:14
22731-6.4 spk	#2	0.5298	405.167023	19041.62109	-1.406412	18810.26758	6.547387	10	250	7/22/2014 13:17
22731-3.1	#1	0.0051	16.133642	534.998657	-1.772879	18810.26758	6.547387	5	50	7/22/2014 13:29
22731-3.1	#2	0.0042	14.517047	648.704041	-0.0563	18810.26758	6.547387	5	50	7/22/2014 13:32
22731-3.1 spk	#1	0.1984	379.803497	17931.47266	0.250578	18810.26758	6.547387	5	50	7/22/2014 13:34
22731-3.1 spk	#2	0.2008	384.330261	18065.51367	-1.375124	18810.26758	6.547387	5	50	7/22/2014 13:36
22731-6.1	#1	0.0073	20.371061	740.497131	-1.706113	18810.26758	6.547387	5	50	7/22/2014 13:39
22731-6.1	#2	0.0084	22.362339	1010.503235	-0.186969	18810.26758	6.547387	5	50	7/22/2014 13:41
22731-6.1 spk	#1	0.208	397.745911	19118.32031	-0.188002	18810.26758	6.547387	5	50	7/22/2014 13:43
22731-6.1 spk	#2	0.2093	400.197388	19112.35547	-1.186551	18810.26758	6.547387	5	50	7/22/2014 13:46
DL		0.0009	23.629673	934.664429	-1.561291	18810.26758	6.547387	1	1	7/22/2014 13:49
QC 3		0.0205	392.493744	18539.8418	-1.05823	18810.26758	6.547387	1	1	7/22/2014 13:54
Blk		-0.0001	5.101309	-1.100047	-1.762999	18810.26758	6.547387	1	1	7/22/2014 13:56
22731-3.5	#1	0.6068	149.225906	6995.118164	0.615416	18810.26758	6.547387	10	800	7/22/2014 13:58
22731-3.5	#2	0.6001	147.649734	6684.375488	-0.948015	18810.26758	6.547387	10	800	7/22/2014 14:01
22731-3.5 spk	#1	2.3076	549.135315	25593.73047	-1.422037	18810.26758	6.547387	10	800	7/22/2014 14:03
22731-3.5 spk	#2	2.3012	547.635437	25546.49219	-1.802939	18810.26758	6.547387	10	800	7/22/2014 14:06
22731-6.5	#1	1.0367	331.567108	15196.51856	-1.948388	18810.26758	6.547387	10	600	7/22/2014 14:08
22731-6.5	#2	1.0232	327.338409	14935.94336	-2.11962	18810.26758	6.547387	10	600	7/22/2014 14:11
22731-6.5 spk	#1	2.1839	691.210999	32347.37891	-2.410701	18810.26758	6.547387	10	600	7/22/2014 14:13
22731-6.5 spk	#2	2.216	701.266357	32864.65625	-2.618686	18810.26758	6.547387	10	600	7/22/2014 14:15
DL		0.0012	28.423014	1307.79541	-0.138308	18810.26758	6.547387	1	1	7/22/2014 14:23
QC 2		0.0221	421.790588	19928.04688	-0.296675	18810.26758	6.547387	1	1	7/22/2014 14:25
QC 3		0.0206	394.60965	18773.68555	-1.413167	18810.26758	6.547387	1	1	7/22/2014 14:27
Blk		0	5.711725	31.161169	-1.583612	18810.26758	6.547387	1	1	7/22/2014 14:30
22731 LRB	#1	0.0025	15.810444	788.45636	0.120457	18810.26758	6.547387	10	50	7/22/2014 15:06
22731 LRB	#2	0.0008	9.707636	431.500366	0.439932	18810.26758	6.547387	10	50	7/22/2014 15:08
22731 LRB spk	#1	2.3212	181.193695	8785.243164	0.095226	18810.26758	6.547387	0.2	50	7/22/2014 15:10
22731 LRB spk	#2	2.3123	180.523849	8527.135742	-0.904949	18810.26758	6.547387	0.2	50	7/22/2014 15:13
DL		0.0009	24.312458	960.326111	-1.262639	18810.26758	6.547387	1	1	7/22/2014 15:15
QC 2		0.0233	445.054626	20917.47656	-0.092679	18810.26758	6.547387	1	1	7/22/2014 15:17
QC 3		0.0204	390.073608	18486.21875	-1.583713	18810.26758	6.547387	1	1	7/22/2014 15:20
Blk		0	5.676105	27.957674	-1.409855	18810.26758	6.547387	1	1	7/22/2014 15:23
0		0	3.995001	205.89418	0.036401	0	0 ----	----		7/24/2014 10:01
0.001		0.001	27.068844	1295.110352	0.026981	23073.8418	3.995001 ----	----		7/24/2014 10:03
0.002		0.002	48.437798	2263.529297	0.102456	22221.39844	4.27915 ----	----		7/24/2014 10:05
0.004		0.004	95.959221	4422.042969	-0.434958	22939.97852	3.720254 ----	----		7/24/2014 10:07
0.02		0.02	470.410126	21965.17773	-0.932229	23358.57617	3.037879 ----	----		7/24/2014 10:09
0.04		0.04	926.272339	43253.70703	-1.491165	23106.93555	3.996425 ----	----		7/24/2014 10:12
DL		0.001	26.025686	1002.892029	-1.714102	23106.93555	3.996425	1	1	7/24/2014 10:15
QC 2		0.0199	462.912689	21962.35156	-0.068539	23106.93555	3.996425	1	1	7/24/2014 10:17
QC 3		0.0204	474.282959	22045.47656	-1.334336	23106.93555	3.996425	1	1	7/24/2014 10:19
Blk		-0.0001	1.61928	-130.715347	-1.61928	23106.93555	3.996425	1	1	7/24/2014 10:22
22731-1.1	#1	0.0031	18.52569	861.937683	0.000013	23106.93555	3.996425	10	50	7/24/2014 10:28
22731-1.1	#2	0.0029	17.370144	797.723083	-0.379513	23106.93555	3.996425	10	50	7/24/2014 10:31
22731-4.5	#1	0.9797	255.520264	11872.46582	-1.829616	23106.93555	3.996425	10	900	7/24/2014 10:46
22731-4.5	#2	1.0047	261.958038	11983.19727	-1.367421	23106.93555	3.996425	10	900	7/24/2014 10:48
22731-5.5	#1	0.933	243.529526	11189.07129	-2.217751	23106.93555	3.996425	10	900	7/24/2014 10:51

PS Analytical Millennium Galahad CVAF Analyzer

Sample ID	Inj	Conc	Pk Ht	Pk Area	Baseline	Slope	Intercept	Alq	Vol	Date/Time
22731-5.5	#2	0.9352	244.102097	11203.1416	-1.797959	23106.93555	3.996425	10	900	7/24/2014 10:53
22731-5.5 trp	#1	0.9235	241.104111	11173.80566	-1.465486	23106.93555	3.996425	10	900	7/24/2014 10:55
22731-5.5 trp	#2	0.9347	243.975891	11311.94336	-1.963709	23106.93555	3.996425	10	900	7/24/2014 10:57
DL		0.001	26.784519	1204.797363	-0.493558	23106.93555	3.996425	1	1	7/24/2014 11:04
QC 2		0.021	489.709473	22956.41016	-0.196959	23106.93555	3.996425	1	1	7/24/2014 11:06
QC 3		0.0213	497.131653	23270.45117	-1.121515	23106.93555	3.996425	1	1	7/24/2014 11:09
Blk		-0.0001	1.46435	-160.810547	-1.458559	23106.93555	3.996425	1	1	7/24/2014 11:11
22731-1.5	#1	0.6602	194.694702	9102.142578	0.085642	23106.93555	3.996425	10	800	7/24/2014 11:20
22731-1.5	#2	0.6499	191.711639	8763.375	-1.012359	23106.93555	3.996425	10	800	7/24/2014 11:22
22731-2.5	#1	0.5163	153.136856	7220.206543	-1.282331	23106.93555	3.996425	10	800	7/24/2014 11:24
22731-2.5	#2	0.5041	149.590973	7049.05127	-2.07	23106.93555	3.996425	10	800	7/24/2014 11:27
22731-2.5 trp	#1	0.5044	149.699219	7011.635742	-1.913366	23106.93555	3.996425	10	800	7/24/2014 11:29
22731-2.5 trp	#2	0.5009	148.670959	7061.90625	-1.532716	23106.93555	3.996425	10	800	7/24/2014 11:31
22731-7.6	#1	0.0289	30.723902	1237.468994	-1.723573	23106.93555	3.996425	20	500	7/24/2014 11:33
22731-7.6	#2	0.0316	33.203732	1534.514038	0.035525	23106.93555	3.996425	20	500	7/24/2014 11:35
DL		0.001	27.337742	1226.156982	-0.339404	23106.93555	3.996425	1	1	7/24/2014 11:37
QC 2		0.0205	478.433014	22121.65234	0.001509	23106.93555	3.996425	1	1	7/24/2014 11:40
QC 3		0.0199	464.730988	21624.79883	-0.895851	23106.93555	3.996425	1	1	7/24/2014 11:42
Blk		-0.0001	1.655674	-136.737198	-1.655674	23106.93555	3.996425	1	1	7/24/2014 11:45
0		0	5.707313	298.437653	-0.03807	0	0 ----	----		7/28/2014 10:57
0.001		0.001	26.460249	1254.092285	0.119357	20752.93555	5.707312 ----	----		7/28/2014 10:59
0.002		0.002	41.69413	1973.247192	-0.23365	17993.40625	6.627159 ----	----		7/28/2014 11:01
0.004		0.004	82.700882	3875.847656	-0.355718	19047.7168	5.80714 ----	----		7/28/2014 11:04
0.02		0.02	376.701447	17766.14453	-0.704252	18514.00977	6.677165 ----	----		7/28/2014 11:06
0.04		0.04	739.225281	34957.67969	-1.259676	18332.50977	7.368508 ----	----		7/28/2014 11:08
DL		0.001	24.935472	945.289368	-1.918139	18332.50977	7.368508	1	1	7/28/2014 11:11
QC 2		0.0205	382.862732	18263.10156	-0.356495	18332.50977	7.368508	1	1	7/28/2014 11:13
QC 3		0.0196	366.515472	17330.39844	-0.826096	18332.50977	7.368508	1	1	7/28/2014 11:16
Blk		-0.0003	2.504214	-88.43821	-1.921069	18332.50977	7.368508	1	1	7/28/2014 11:19
22731-4.1	#1	0.0152	35.271637	1723.654053	0.223121	18332.50977	7.368508	5	50	7/28/2014 11:21
22731-4.1	#2	0.0139	32.932045	1581.265869	-0.300765	18332.50977	7.368508	5	50	7/28/2014 11:23
22731-5.1	#1	0.0169	38.411152	1877.392456	0.220118	18332.50977	7.368508	5	50	7/28/2014 11:25
22731-5.1	#2	0.0166	37.882412	1832.96875	-0.398733	18332.50977	7.368508	5	50	7/28/2014 11:27
22731-5.1 trp	#1	0.0163	37.25724	1807.84375	-0.180398	18332.50977	7.368508	5	50	7/28/2014 11:29
22731-5.1 trp	#2	0.0173	39.13232	1818.091431	-0.572584	18332.50977	7.368508	5	50	7/28/2014 11:32
DL		0.001	25.924543	1144.761353	-0.288701	18332.50977	7.368508	1	1	7/28/2014 11:34
QC 2		0.0211	394.154755	18570.66016	-0.157879	18332.50977	7.368508	1	1	7/28/2014 11:36
QC 3		0.0203	379.738373	18010.69922	-1.327524	18332.50977	7.368508	1	1	7/28/2014 11:39
Blk		-0.0003	2.009034	-120.049736	-1.319718	18332.50977	7.368508	1	1	7/28/2014 11:41

Summary of Analysis

Summary of OHM Mercury Analysis

Run Number		Average Total Catch, µg	Filter µg	FH Rinse µg	KCl µg	H ₂ O ₂ /HNO ₃ µg	KMnO ₄ µg	NH ₂ OH. HCl µg
-----	-----	-----	-----	-----	-----	-----	-----	-----
T1-OHM-R1	# 1	0.708	0.003*	0.003*	0.038*	0.012*	0.660	-----
	# 2		0.003*	0.002*	0.035*	0.009*	0.650	-----
T1-OHM-R2	# 1	0.567	0.005*	0.003*	0.048*	0.006*	0.516	-----
	# 2		0.004*	0.003*	0.041*	0.005*	0.504	-----
T1-OHM-R3	# 1	0.651	0.004*	0.002*	0.036*	0.006*	0.607	-----
	# 2		0.003*	0.002*	0.037*	0.006*	0.600	-----
T2-OHM-R1	# 1	1.08	0.015	0.005*	0.043*	0.007*	0.980	-----
	# 2		0.014	0.007*	0.071*	0.006*	1.00	-----
T2-OHM-R2	# 1	1.02	0.017	0.007*	0.062*	0.006*	0.933	-----
	# 2		0.017	0.007*	0.055*	0.005*	0.935	-----
T2-OHM-R3	# 1	1.10	0.007*	0.007*	0.043*	0.005*	1.04	-----
	# 2		0.008*	0.007*	0.056*	0.005*	1.02	-----
Reagent Blank	# 1	0.074	0.001*	0.002*	0.005*	0.024*	0.008*	0.029
	# 2		0.001*	0.001*	0.008*	0.024*	0.010*	0.032

*Results are below detection limit and are for informational purposes only.

Appendix D

Calibration Data



Routine Dry Gas Meter Calibration

Control Module: C-7 Leak checks Barometric Press. -- 28.83
Date: 05/08/14 Negative Pass >5 W.C. Previous Y -- 0.9920
Technician: RMP Positive - Pass > in.Hg Previous Delta H -- 1.8806

Orifice Diff Pressure H	Wet Test Volume, Ft³	Dry Gas Meter Temp, F		Wet Test Meter Temp, F	Dry Gas Volume Ft³	Elapsed Time of Cal. Point		Meter Coefficient Y	Orifice Coefficient dH@
		Inlet	Outlet						
Nominal 0.500	Initial 4971.00	Initial 75.0	Initial 72.0	Initial 73.0	Initial 122.350			0.9919	1.7099
Actual 0.50	Final 4979.00	Final 76.0	Final 73.0	Final 73.0	Final 130.420	Minutes 19	SEC 18.97		
	Total 8.00	Average 75.5	Average 72.5	Average 73.0	Total 8.070	Minutes 19.32			
		74.0							
Nominal 1.000	Initial 4962.00	Initial 73.0	Initial 72.0	Initial 73.0	Initial 113.320			0.9937	1.7818
Actual 1.00	Final 4970.00	Final 75.0	Final 72.0	Final 73.0	Final 121.350	Minutes 13.0	SEC 56.16		
	Total 8.00	Average 74.0	Average 72.0	Average 73.0	Total 8.030	13.94			
		73.0 Tm							
Nominal 2.000	Initial 4980.00	Initial 78.0	Initial 73.0	Initial 73.0	Initial 131.420			0.9920	1.8881
Actual 2.00	Final 4988.00	Final 81.0	Final 74.0	Final 72.5	Final 139.500	Minutes 10	SEC 9.78		
	Total 8.00	Average 79.5	Average 73.5	Average 72.8	Total 8.080	10.16			
		76.5 Tm							
Nominal 3.000	Initial 4989.00	Initial 82.0	Initial 74.0	Initial 72.5	Initial 140.500			0.9892	1.8794
Actual 3.00	Final 4997.00	Final 84.0	Final 75.0	Final 72.5	Final 148.620	Minutes 8.0	SEC 17.44		
	Total 8.00	Average 83.0	Average 74.5	Average 72.5	Total 8.120	8.29			
		78.8 Tm							
Nominal 4.000	Initial 4998.00	Initial 84.0	Initial 75.0	Initial 72.5	Initial 149.640			0.9899	1.8807
Actual 4.00	Final 5008.00	Final 86.0	Final 76.0	Final 72.0	Final 159.790	Minutes 8.0	SEC 59.43		
	Total 10.00	Average 85.0	Average 75.5	Average 72.3	Total 10.150	8.99			
		80.3 Tm		Average				0.9914	1.8280



Routine Dry Gas Meter Calibration

Control Module: C-9 Leak checks Barometric Press. -- 28.96
Date: 05/20/14 Negative Pass >5 W.C. Previous Y -- 0.9899
Technician: RMP Positive - Pass > in.Hg Previous Delta H -- 2.0371

Orifice Diff Pressure H	Wet Test Volume, Ft³	Dry Gas Meter Temp, F		Wet Test Meter Temp, F	Dry Gas Volume Ft³	Elapsed Time of Cal. Point		Meter Coefficient Y	Orifice Coefficient dH@
		Inlet	Outlet						
Nominal 0.500	Initial 5018.00	Initial 72.0	Initial 67.0	Initial 73.5	Initial 503.160			1.0046	1.9407
Actual 0.50	Final 5025.00	Final 74.0	Final 69.0	Final 73.5	Final 510.080	Minutes 17	SEC 57.21		
	Total 7.00	Average 73.0	Average 68.0	Average 73.5	Total 6.920	Minutes 17.95			
		70.5							
Nominal 1.000	Initial 5011.00	Initial 70.0	Initial 64.0	Initial 73.5	Initial 496.280			0.9879	1.9335
Actual 1.00	Final 5017.00	Final 71.0	Final 65.0	Final 73.5	Final 502.270	Minutes 10.0	SEC 49.5		
	Total 6.00	Average 70.5	Average 64.5	Average 73.5	Total 5.990	10.83			
		67.5 Tm							
Nominal 2.000	Initial 5027.00	Initial 74.0	Initial 69.0	Initial 73.5	Initial 512.070			1.0014	2.0450
Actual 2.00	Final 5037.00	Final 80.0	Final 71.0	Final 73.0	Final 522.010	Minutes 13	SEC 11.69		
	Total 10.00	Average 77.0	Average 70.0	Average 73.3	Total 9.940	13.19			
		73.5 Tm							
Nominal 3.000	Initial 5038.00	Initial 80.0	Initial 72.0	Initial 73.0	Initial 523.010			1.0040	2.0495
Actual 3.00	Final 5048.00	Final 82.0	Final 72.0	Final 73.0	Final 532.960	Minutes 10.0	SEC 48.65		
	Total 10.00	Average 81.0	Average 72.0	Average 73.0	Total 9.950	10.81			
		76.5 Tm							
Nominal 4.000	Initial 5064.00	Initial 83.0	Initial 74.0	Initial 73.0	Initial 549.090			0.9879	2.0747
Actual 4.00	Final 5085.00	Final 85.0	Final 76.0	Final 73.0	Final 570.390	Minutes 19.0	SEC 50.25		
	Total 21.00	Average 84.0	Average 75.0	Average 73.0	Total 21.300	19.84			
		79.5 Tm		Average				0.9972	2.0087

Emission Measurement Center (EMC) Approved Alternate Method (ALT-009)
Alternative Method 5 Post-Test Calibration
Furnace 12 Hood Exhaust #1201 (SV 111)
Control Module C-7

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test date	-	-	7/9/2014	7/10/2014	7/10/2014
Test period	-	-	1312 - 1719	753 - 1159	1249 - 1735
Total run time	t	min	240	240	240
Total sample volume measured by dry gas meter	V _m	acf	178.4	175.7	177.3
Absolute average dry gas meter temp	T _m	°F	99.8	87.9	94.4
Absolute average dry gas meter temp	T _m	°R	559.5	547.5	554.1
Barometric pressure	P _b	inches Hg	29.2	29.4	29.4
Conversion factor (29.92/528)(0.75) ²	---	(in Hg/°R) cfm ²	0.0319	0.0319	0.0319
Average orifice meter differential	Δ h _{avg}	in. H ₂ O	1.68	1.68	1.68
Orifice meter calibration coefficient	Δ H _@	in. H ₂ O	1.83	1.83	1.83
Dry molecular weight of stack gas	M _d	lb/lb-mole	28.84	28.84	28.84
Dry molecular weight of air	---	lb/lb-mole	29.00	29.00	29.00
Specific gravity of mercury	---	Dimensionless	13.60	13.60	13.60
Dry gas meter calibration check value	Y _{qa}	Dimensionless	1.0086	1.0101	1.0085
Dry gas meter calibration factor	Y	Dimensionless	0.9914	0.9914	0.9914
Average of Y _{qa} 's from test run series	1.0091	$Y_{qa} = \frac{t}{V_m} \sqrt{\frac{0.0319 \cdot T_m}{\Delta H_{@} (P_b + \frac{\Delta h_{avg}}{13.6})} \frac{29}{M_d}} \cdot (\sqrt{\Delta h_{avg}})$			
Dry gas meter calibration factor	0.9914				
% difference between average Y _{qa} 's and Y	-1.78%				
(must be within ± 5%)					

Emission Measurement Center (EMC) Approved Alternate Method (ALT-009)
Alternative Method 5 Post-Test Calibration
Furnace 12 Waste Gas #1205 (SV 114)
Control Module C-9

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test date	-	-	7/9/2014	7/10/2014	7/10/2014
Test period	-	-	1312 - 1719	753 - 1159	1248 - 1735
Total run time	t	min	240	240	240
Total sample volume measured by dry gas meter	V _m	acf	166.5	159.2	175.7
Absolute average dry gas meter temp	T _m	°F	94.6	84.6	89.6
Absolute average dry gas meter temp	T _m	°R	554.3	544.3	549.3
Barometric pressure	P _b	inches Hg	29.2	29.4	29.4
Conversion factor (29.92/528)(0.75) ²	---	(in Hg/°R) cfm ²	0.0319	0.0319	0.0319
Average orifice meter differential	Δ h _{avg}	in. H ₂ O	1.61	1.63	1.82
Orifice meter calibration coefficient	Δ H _@	in. H ₂ O	2.01	2.01	2.01
Dry molecular weight of stack gas	M _d	lb/lb-mole	28.99	28.99	28.99
Dry molecular weight of air	---	lb/lb-mole	29.00	29.00	29.00
Specific gravity of mercury	---	Dimensionless	13.60	13.60	13.60
Dry gas meter calibration check value	Y _{qa}	Dimensionless	1.0023	1.0418	1.0035
Dry gas meter calibration factor	Y	Dimensionless	0.9972	0.9972	0.9972
Average of Y _{qa} 's from test run series	1.0159	$Y_{qa} = \frac{t}{V_m} \sqrt{\frac{0.0319 \cdot T_m}{\Delta H_{@} (P_b + \frac{\Delta h_{avg}}{13.6})} \frac{29}{M_d}} \cdot (\sqrt{\Delta h_{avg}})$			
Dry gas meter calibration factor	0.9972				
% difference between average Y _{qa} 's and Y	-1.87%				
(must be within ± 5%)					



PYROMETER CALIBRATION

Pyrometer Number: C-7 Date: 12/26/2013
Pyrometer Reference: CL-300-100F Technician: RMP

Reference (°F)	Reference (°C)	Pyrometer ° F	
		Reading	Pass/Fail
1000	538	1001	Pass
950	510	951	Pass
900	482	900	Pass
850	454	851	Pass
800	427	800	Pass
750	399	751	Pass
700	371	701	Pass
650	343	651	Pass
600	316	600	Pass
550	288	549	Pass
500	260	498	Pass
450	232	448	Pass
400	204	399	Pass
350	177	349	Pass
300	149	301	Pass
250	121	251	Pass
200	93	200	Pass
150	67	151	Pass
100	38	98	Pass
50	10	49	Pass
0	-18	0	Pass
-50	-46	-50	Pass

Pass/Fail based on +/- 0.75% of Renkin value

Technician signature:

QA signature:



PYROMETER CALIBRATION

Pyrometer Number: C-9 Date: 1/2/2014
Pyrometer Reference: CL-300-100F Technician: RMP

Reference (°F)	Reference (°C)	Pyrometer ° F	
		Reading	Pass/Fail
1000	538	1004	Pass
950	510	953	Pass
900	482	903	Pass
850	454	853	Pass
800	427	803	Pass
750	399	753	Pass
700	371	703	Pass
650	343	653	Pass
600	316	602	Pass
550	288	550	Pass
500	260	500	Pass
450	232	449	Pass
400	204	400	Pass
350	177	349	Pass
300	149	302	Pass
250	121	251	Pass
200	93	201	Pass
150	67	151	Pass
100	38	99	Pass
50	10	49	Pass
0	-18	0	Pass
-50	-46	-48	Pass

Pass/Fail based on +/- 0.75% of Renkin value

Technician signature:

QA signature:



THERMOCOUPLE CALIBRATION

Meter In THERMOCOUPLE ID T-C7-I
Cal Date: 12/30/2013

CALIBRATION TECHNICIAN: RMP

REFERENCE STANDARDS	TRACEABILITY		DATE	LABORATORY
Hart Scientific 9103-A s/n A1B289	Report No. T10-0105-2		12/27/2013	Hart Scientific
Hart Scientific 9140 s/n A1B086	Report No. T10-0105-1		12/18/2013	Hart Scientific
Temperature Calibration Points	20	70	150	
Reference Deg F (To)	20	70	150	
Probe Temp (deg F)	21.0	71.0	150.0	
Difference (degrees)	1.0	1.0	0.0	
TC Meets Method 5 Specifications: (± 5.4 °F)				
	YES	YES	YES	

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

Meter Out

THERMOCOUPLE ID T-C7-O

Cal Date: 12/30/2013

CALIBRATION TECHNICIAN: RMP

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. T10-0105-2

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points	20	70	150
Reference Deg F (To)	20	70	150
Probe Temp (deg F)	23.0	70.0	150.0
Difference (degrees)	3.0	0.0	0.0

TC Meets Method 5 Specifications: (± 5.4 °F)	YES	YES	YES
---	-----	-----	-----

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

Meter In

THERMOCOUPLE ID T-C9-I

Cal Date: 1/2/2014

CALIBRATION TECHNICIAN: RMP

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. T10-0105-2

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points	20	70	150
Reference Deg F (To)	20	70	150
Probe Temp (deg F)	23.0	70.0	150.0
Difference (degrees)	3.0	0.0	0.0

TC Meets Method 5 Specifications: (± 5.4 °F)	YES	YES	YES
---	-----	-----	-----

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

Meter Out

THERMOCOUPLE ID T-C9-O

Cal Date: 1/2/2014

CALIBRATION TECHNICIAN: RMP

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. T10-0105-2

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points	20	70	150
Reference Deg F (To)	20	70	150
Probe Temp (deg F)	22.0	70.0	149.0
Difference (degrees)	2.0	0.0	1.0

TC Meets Method 5 Specifications: (± 5.4 °F)	YES	YES	YES
---	-----	-----	-----

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

THERMOCOUPLE ID 6-2

Cal Date: 1/13/2014

Probe

CALIBRATION TECHNICIAN: RMP

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. T10-0105-2

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

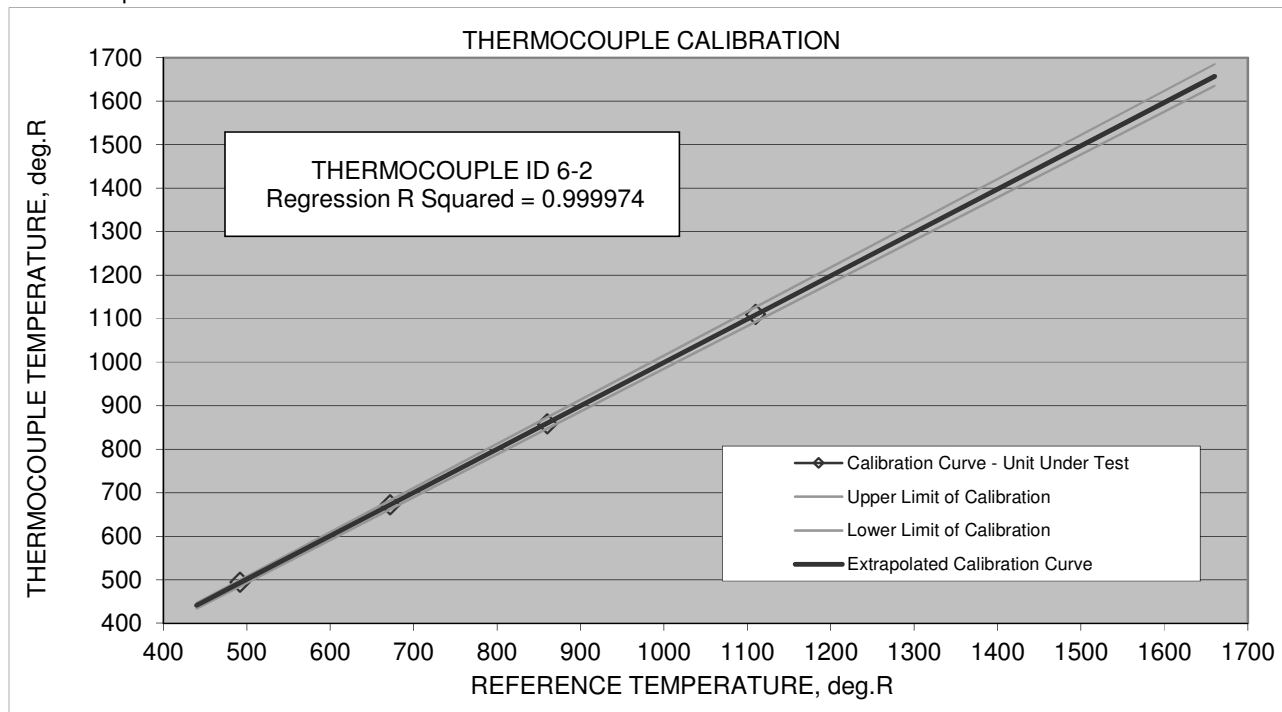
Hart Scientific

Hart Scientific

Temperature Calibration Points

32 212 400 650 Ambient

Reference Deg F (To)	32	212	400	650	70
Probe Temp (deg F)	34	212	398	650	69
Reference Temp (deg R) deg F + 460	492	672	860	1110	530
Probe Temp (deg R), deg F + 460	494	672	858	1110	529
Difference (degrees)	-2	0	2	0	1
% Diff Abs. T	0.4%	0.0%	0.2%	0.0%	0.2%
Is difference less than 1.5% at all measured points?	YES				



Are extrapolated limits less than 1.5%? YES

FAHRENHEIT
CALIBRATION RANGE
-20 1200

If not acceptable, describe corrective action:

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

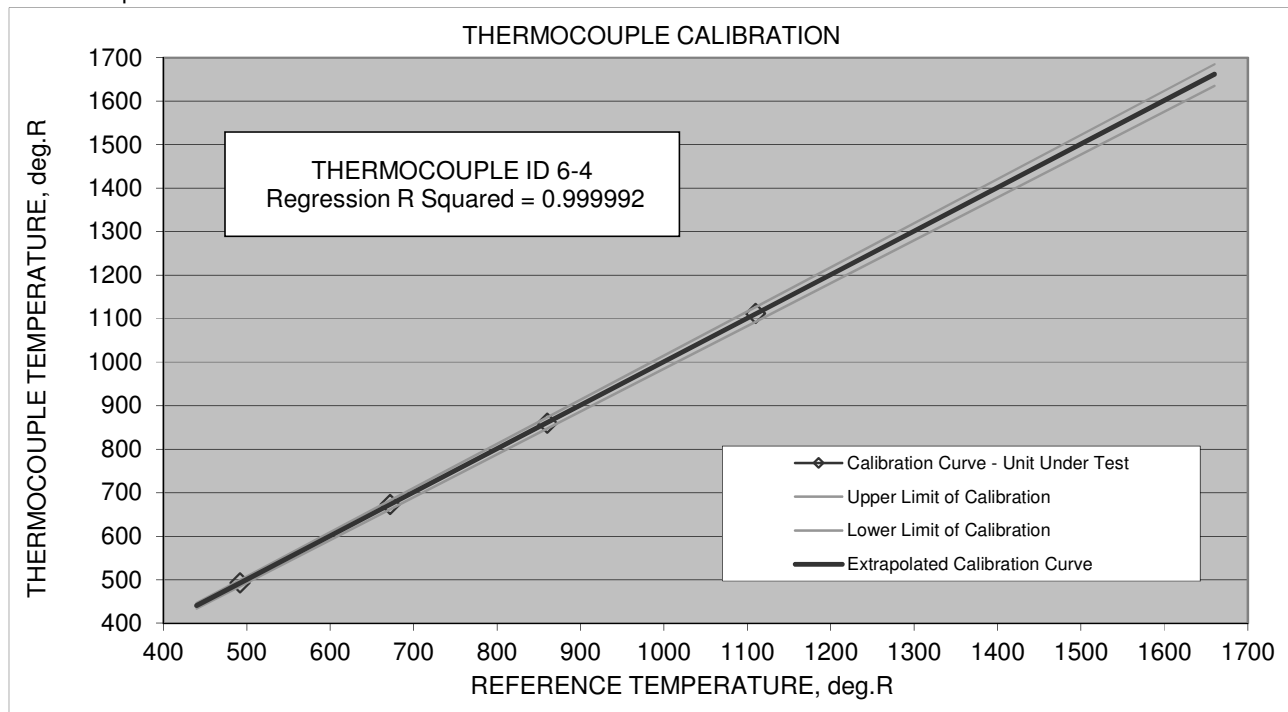
THERMOCOUPLE ID 6-4

Cal Date: 1/13/2014

Probe

CALIBRATION TECHNICIAN: RMP

REFERENCE STANDARDS	TRACEABILITY		DATE	LABORATORY	
Hart Scientific 9103-A s/n A1B289	Report No. T10-0105-2		12/27/2013	Hart Scientific	
Hart Scientific 9140 s/n A1B086	Report No. T10-0105-1		12/18/2013	Hart Scientific	
Temperature Calibration Points	32	212	400	650	Ambient
Reference Deg F (To)	32	212	400	650	70
Probe Temp (deg F)	33	213	400	652	70
Reference Temp (deg R) deg F + 460	492	672	860	1110	530
Probe Temp (deg R), deg F + 460	493	673	860	1112	530
Difference (degrees)	-1	-1	0	-2	0
% Diff Abs. T	0.2%	0.1%	0.0%	0.2%	0.0%
Is difference less than 1.5% at all measured points?	YES				



Are extrapolated limits less than 1.5%? YES

FAHRENHEIT
CALIBRATION RANGE
-20 1200

If not acceptable, describe corrective action:

Technician signature

QA signature



S-Type Pitot Tube Geometry Check

Pitot Tube Number: 6-2

Length: 6 ft

Function: M-5 Probe / Free

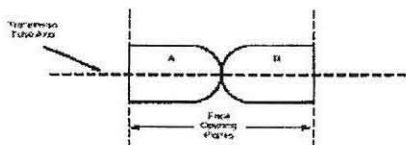
Inspection Date: 12/27/13

Technician: BAW

1. Are face openings perpendicular to tube axis?

☒ YES (go to 2)

☐ NO (go to 1a)



1a. If NO, is angle less than 10° ?

☐ YES (go to 2)

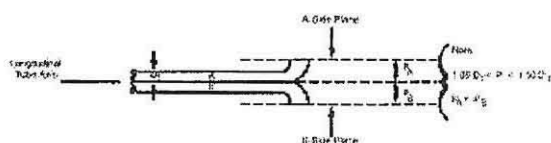
☐ NO (discontinue use)



2. Are face openings parallel to longitudinal axis?

☒ YES (go to 3)

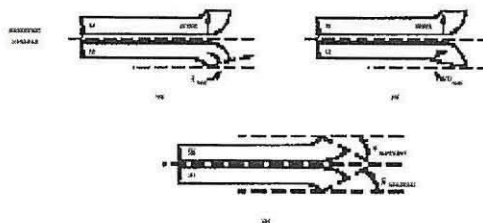
☐ NO (go to 2a)



2a. If NO, is angle less than 5° ?

☐ YES (go to 3)

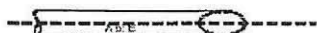
☐ NO (discontinue use)



3. Are legs of equal length?

☒ YES (go to 4)

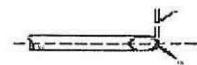
☐ NO (go to 3a)



3a. If NO, is difference less than 1/8 inch?

☐ YES (go to 4)

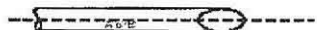
☐ NO (discontinue use)



4. Are center-lines of legs coincident?

☒ YES (go to 5)

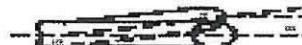
☐ NO (go to 4a)



4a. If NO, are center-lines of face openings less than 1/32 inch?

☐ YES (go to 5)

☐ NO (discontinue use)



5. Does this pitot tube pass all of the above criteria?

☒ YES

☐ NO

Technician Signature: BAW

QA Signature: BAW

BARR**S-Type Pitot Tube
Geometry Check**

Pitot Tube Number:

6-4

Length:

6 ft

Function:

M-5 Probe / Free

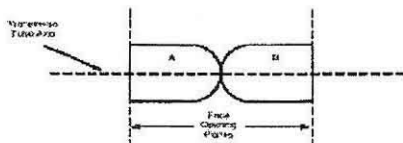
Inspection Date:

1/3/14

Technician:

BAW

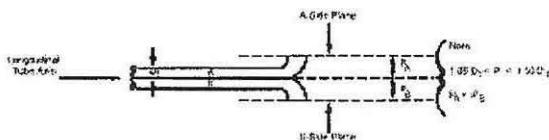
1. Are face openings perpendicular to tube axis?

☒ YES (go to 2)☐ NO (go to 1a)

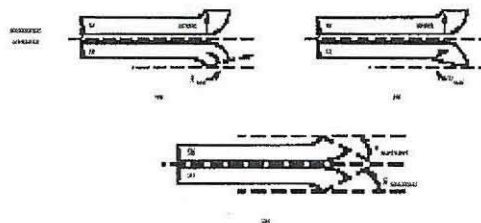
1a. If NO, is angle less than 10°?

☐ YES (go to 2)☐ NO (discontinue use)

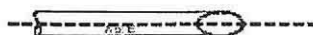
2. Are face openings parallel to longitudinal axis?

☒ YES (go to 3)☐ NO (go to 2a)

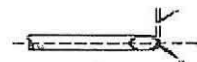
2a. If NO, is angle less than 5°?

☐ YES (go to 3)☐ NO (discontinue use)

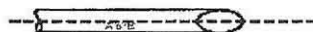
3. Are legs of equal length?

☒ YES (go to 4)☐ NO (go to 3a)

3a. If NO, is difference less than 1/8 inch?

☐ YES (go to 4)☐ NO (discontinue use)

4. Are center-lines of legs coincident?

☒ YES (go to 5)☐ NO (go to 4a)

4a. If NO, are center-lines of face openings less than 1/32 inch?

☐ YES (go to 5)☐ NO (discontinue use)

5. Does this pitot tube pass all of the above criteria?

☒ YES☐ NO

Technician Signature:

QA Signature:

Field Barometer Calibration
 Calibration to PRINCO Mercury Barometer
 Barr Engineering Company Edina Field Office

		Reference PRINCO		Field Barometer					
Date	Technician	Observation Time	Station Pressure	ID	Time	Barometric Pressure	Condition	Remarks	Offset tolerance +/- 0.10
6/2/14	TAK	1220	28.83	BA-09	1220	28.80	In Calibration	As Found	-0.03
7/28/14	TAK	0715	29.30	BA-09	0715	29.30	In Calibration	As Found	0.00

Appendix E

Process Operating Data

Air Performance Test Form

Operating Data Summary for Process Sources

Facility Information (please print)

Company Name: Northshore Mining Company

Equipment ID No: SV 111

Test date(s): 7/9/2014 - 7/10/2017

Equipment and Operating Data

- Process Equipment Description: Furnace 12 Hood Exhaust #1201
- Were the process and control equipment operated consistent with normal procedures? ☒ Yes ☐ No If no, explain: _____
- Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, pounds per hour, pressure, air flow, etc.
- Date(s) and procedure(s) of last maintenance/cleaning within 6 months:
☒ Remains unchanged from info. provided in test plan
- Process rate (amount of raw material or finished product per hour, wet or dry basis) while combusting (list fuel type(s) and ratios as appropriate _____)

Process Parameter: list type and units	Run 1	Run 2	Run 3	Run 4	Average
Fired Pellet Production Rate, LTPH	238	239	235		237
Fuel Input (list units)					
Heat Input (10 ⁶ British thermal units/hour)					

- Summarize control equipment operating data documented during testing. Values reported should reflect maximum, minimum, averages, or as approved in the test plan. (See test plan and approval letter)

Examples of APC equipment and parameters generally monitored. Monitor as in test plan and/or approval letter.

- Scrubber (list type of scrubber): DP (in. w.c.) and feed rate (gpm and psig)
- Baghouse, Cyclone, and Multi-clone: DP (in. w.c.)
- Catalytic Incinerator: (°F_{in}, °F_{out}) and Thermal Incinerator: (°F_{temperature})
- ESP: Number and identity of operating field(s)

APC and parameter monitored	Run 1	Run 2	Run 3	Run 4	Average
Secondary Voltage, kV	24	24	24		24
Primary Amperage, amps	19	19	19		19
Water Flow Rate, gpm	163	163	163		163
List pollutant & averaging basis.--should reflect permit	Run 1	Run 2	Run 3	Run 4	Average
Continuous Opacity Monitor(list hourly average)					
Monitor (list averaging basis):					
Monitor (list averaging basis):					

Abbreviations: APC=air pollution control
lbs.=pounds

gpm.=gallons per minute
psig=pressure per square inch gauge

in. w.c.=inches of water column
ΔP.=pressure drop

Note: This form provides only a summary of the operating conditions during the performance test. Additional and more detailed records are required to meet the requirements of Minn. R. 7017.2035, subp. 3. This form is to be submitted as part of the performance test report

Air Performance Test Form

Operating Data Summary for Process Sources

Facility Information (please print)

Company Name: Northshore Mining Company

Equipment ID No: SV 114

Test date(s): 07/09/14 - 07/10/14

Equipment and Operating Data

- Process Equipment Description: Furnace 12 Waste Gas #1205
- Were the process and control equipment operated consistent with normal procedures? ☒ Yes ☐ No If no, explain:
- Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, pounds per hour, pressure, air flow, etc.
- Date(s) and procedure(s) of last maintenance/cleaning within 6 months:
☒ Remains unchanged from info. provided in test plan
- Process rate (amount of raw material or finished product per hour, wet or dry basis) while combusting (list fuel type(s) and ratios as appropriate

Process Parameter: list type and units	Run 1	Run 2	Run 3	Run 4	Average
Fired Pellet Production Rate, LTPH	238	239	235		237
Fuel Input (list units)					
Heat Input (10 ⁶ British thermal units/hour)					

- Summarize control equipment operating data documented during testing. Values reported should reflect maximum, minimum, averages, or as approved in the test plan. (See test plan and approval letter)

Examples of APC equipment and parameters generally monitored. Monitor as in test plan and/or approval letter.

- Scrubber (list type of scrubber): DP (in. w.c.) and feed rate (gpm and psig)
- Baghouse, Cyclone, and Multi-clone: DP (in. w.c.)
- Catalytic Incinerator: (°F_{in}, °F_{out}) and Thermal Incinerator: (°F_{temperature})
- ESP: Number and identity of operating field(s)

APC and parameter monitored	Run 1	Run 2	Run 3	Run 4	Average
Secondary Voltage, kV	12	12	12		12
Primary Amperage, amps	6	7	7		7
Water Flow Rate, gpm	160	160	160		160
List pollutant & averaging basis.--should reflect permit	Run 1	Run 2	Run 3	Run 4	Average
Continuous Opacity Monitor(list hourly average)					
Monitor (list averaging basis):					
Monitor (list averaging basis):					

Abbreviations: APC=air pollution control
lbs.=pounds

gpm.=gallons per minute
psig=pressure per square inch gauge

in. w.c.=inches of water column
ΔP.=pressure drop

Note: This form provides only a summary of the operating conditions during the performance test. Additional and more detailed records are required to meet the requirements of Minn. R. 7017.2035, subp. 3. This form is to be submitted as part of the performance test report

Process Operating Data

	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/9/2014 13:12	240	24	12	18	7	120	134	162	160
7/9/2014 13:13	240	24	12	18	7	120	134	163	161
7/9/2014 13:14	240	24	11	17	6	120	134	163	161
7/9/2014 13:15	240	24	12	18	4	120	134	163	160
7/9/2014 13:16	240	23	11	19	5	120	134	162	159
7/9/2014 13:17	240	24	12	20	5	120	134	162	160
7/9/2014 13:18	240	24	12	19	6	120	134	162	161
7/9/2014 13:19	240	24	12	17	6	120	134	163	161
7/9/2014 13:20	240	24	11	18	6	120	134	162	159
7/9/2014 13:21	240	24	12	19	6	120	134	162	160
7/9/2014 13:22	240	24	12	19	5	120	134	163	160
7/9/2014 13:23	240	24	12	19	6	120	134	163	160
7/9/2014 13:24	240	23	11	19	6	120	134	162	161
7/9/2014 13:25	240	24	11	19	5	120	134	163	159
7/9/2014 13:26	239	24	12	18	4	121	134	163	160
7/9/2014 13:27	239	24	12	18	6	121	134	163	162
7/9/2014 13:28	239	23	12	18	7	121	134	162	160
7/9/2014 13:29	239	25	12	19	6	121	134	162	162
7/9/2014 13:30	240	24	12	19	6	121	134	163	163
7/9/2014 13:31	241	24	11	17	5	121	134	163	161
7/9/2014 13:32	242	24	12	17	6	121	134	162	161
7/9/2014 13:33	242	24	12	19	6	121	134	163	160
7/9/2014 13:34	242	23	12	19	7	121	134	164	158
7/9/2014 13:35	241	25	11	17	9	121	134	162	158
7/9/2014 13:36	241	23	12	18	7	121	134	163	160
7/9/2014 13:37	241	24	12	19	6	121	134	162	160
7/9/2014 13:38	240	24	12	18	7	121	134	163	163
7/9/2014 13:39	240	24	12	19	6	121	134	163	164
7/9/2014 13:40	239	24	12	19	7	121	134	163	161
7/9/2014 13:41	239	25	12	17	6	121	134	162	159
7/9/2014 13:42	239	24	12	18	5	121	134	163	160
7/9/2014 13:43	238	24	12	18	4	121	134	163	163
7/9/2014 13:44	238	24	12	18	4	121	134	163	160
7/9/2014 13:45	238	23	12	17	4	121	134	163	159
7/9/2014 13:46	238	25	12	17	6	121	134	163	159
7/9/2014 13:47	238	24	12	18	7	121	134	163	161
7/9/2014 13:48	238	24	11	18	6	121	134	163	160
7/9/2014 13:49	238	24	12	18	5	121	134	163	157
7/9/2014 13:50	239	24	13	17	6	121	134	163	159
7/9/2014 13:51	239	24	12	19	8	121	134	163	160
7/9/2014 13:52	239	24	12	19	7	121	134	163	159
7/9/2014 13:53	239	24	12	19	6	121	134	163	160
7/9/2014 13:54	239	24	12	19	5	121	134	162	161
7/9/2014 13:55	239	24	12	18	5	121	134	162	161
7/9/2014 13:56	239	24	12	18	5	121	134	162	161
7/9/2014 13:57	239	24	12	19	5	121	134	162	160
7/9/2014 13:58	239	25	12	20	6	121	134	162	159
7/9/2014 13:59	239	24	11	20	7	121	134	162	159
7/9/2014 14:00	239	22	11	19	6	121	134	163	160
7/9/2014 14:01	239	24	12	18	6	121	134	163	159
7/9/2014 14:02	239	23	12	19	7	121	134	163	159
7/9/2014 14:03	239	24	12	18	7	121	134	163	160
7/9/2014 14:04	240	24	12	18	6	121	134	163	161
7/9/2014 14:05	241	24	12	18	6	121	134	163	160

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/9/2014 14:06	243	24	12	19	6	121	134	163	160
7/9/2014 14:07	241	24	12	19	5	121	134	163	160
7/9/2014 14:08	239	24	12	18	5	121	134	163	161
7/9/2014 14:09	239	24	12	19	6	121	133	163	160
7/9/2014 14:10	238	24	12	19	7	121	133	163	159
7/9/2014 14:11	238	24	11	19	7	121	133	162	160
7/9/2014 14:12	238	24	12	18	6	121	133	162	161
7/9/2014 14:13	237	24	12	19	5	121	133	163	157
7/9/2014 14:14	237	23	11	21	6	121	133	163	156
7/9/2014 14:15	236	23	11	20	6	121	133	163	159
7/9/2014 14:16	236	24	12	19	7	121	133	162	160
7/9/2014 14:17	236	23	12	20	7	121	133	162	160
7/9/2014 14:18	235	24	12	18	7	121	133	163	159
7/9/2014 14:19	235	24	12	17	6	121	133	164	160
7/9/2014 14:20	234	24	13	19	6	121	133	164	161
7/9/2014 14:21	234	23	12	20	6	121	133	164	161
7/9/2014 14:22	234	24	12	19	7	121	133	163	161
7/9/2014 14:23	233	24	12	20	7	121	133	162	160
7/9/2014 14:24	233	24	12	18	6	121	133	162	161
7/9/2014 14:25	234	24	13	19	7	121	133	162	162
7/9/2014 14:26	235	24	11	18	7	121	133	163	160
7/9/2014 14:27	235	23	12	19	7	121	133	163	159
7/9/2014 14:28	236	23	12	20	6	121	133	163	160
7/9/2014 14:29	237	23	12	20	5	121	133	163	161
7/9/2014 14:30	237	24	12	19	5	121	133	162	161
7/9/2014 14:31	238	23	12	18	5	121	133	163	160
7/9/2014 14:32	239	24	12	17	6	121	133	164	160
7/9/2014 14:33	239	24	12	20	6	121	134	164	161
7/9/2014 14:34	238	24	12	22	6	121	134	163	160
7/9/2014 14:35	237	23	13	19	6	121	134	162	161
7/9/2014 14:36	236	24	12	19	6	121	134	162	161
7/9/2014 14:37	235	24	12	20	6	121	134	163	160
7/9/2014 14:38	234	23	12	20	8	121	134	163	162
7/9/2014 14:39	235	24	12	20	8	121	134	163	162
7/9/2014 14:40	236	24	11	20	7	121	134	163	161
7/9/2014 14:41	237	23	11	19	7	121	134	163	161
7/9/2014 14:42	237	24	12	18	8	121	134	163	160
7/9/2014 14:43	238	24	12	18	7	121	134	162	160
7/9/2014 14:44	236	24	12	19	6	121	134	163	162
7/9/2014 14:45	233	24	13	19	7	121	134	164	161
7/9/2014 14:46	233	24	12	18	7	121	134	164	159
7/9/2014 14:47	233	23	12	18	6	121	134	162	160
7/9/2014 14:48	233	24	12	19	6	121	133	163	161
7/9/2014 14:49	232	24	12	19	6	121	133	164	161
7/9/2014 14:50	232	24	12	18	7	121	133	163	161
7/9/2014 14:51	232	23	13	19	7	121	133	163	160
7/9/2014 14:52	232	23	12	19	6	121	133	163	158
7/9/2014 14:53	232	23	12	18	7	121	133	163	159
7/9/2014 14:54	232	22	12	19	6	121	133	162	160
7/9/2014 14:55	231	23	12	19	5	121	133	162	160
7/9/2014 14:56	231	23	12	19	6	121	133	163	161
7/9/2014 14:57	231	23	12	20	7	122	133	163	161
7/9/2014 14:58	231	24	12	20	6	122	133	163	161
7/9/2014 14:59	230	24	12	20	5	122	133	164	159

Process Operating Data

	Tonnage	Secondary	Secondary	Primary	Primary	Exhaust	Exhaust	Water Flow	Water Flow
		Voltage	Voltage	Amperage	Amperage	Temp	Temp	Rate	Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/9/2014 15:00	230	24	12	19	4	122	133	163	159
7/9/2014 15:01	230	24	13	20	5	122	133	163	161
7/9/2014 15:02	230	24	12	19	6	122	133	162	160
7/9/2014 15:03	230	23	12	19	5	122	133	163	159
7/9/2014 15:04	230	24	12	19	5	122	133	163	160
7/9/2014 15:05	230	24	12	18	6	122	133	163	159
7/9/2014 15:06	230	24	12	18	7	122	133	163	159
7/9/2014 15:07	230	23	12	18	6	122	133	163	159
7/9/2014 15:08	230	24	12	19	6	122	133	163	159
7/9/2014 15:09	230	24	12	18	6	122	133	162	159
7/9/2014 15:10	229	24	13	19	7	122	133	162	159
7/9/2014 15:11	229	24	12	19	7	122	133	163	159
7/9/2014 15:12	229	24	12	20	7	122	133	163	160
7/9/2014 15:13	229	24	12	21	6	122	133	163	161
7/9/2014 15:14	229	23	12	20	5	122	133	163	161
7/9/2014 15:15	229	23	12	19	6	122	133	163	161
7/9/2014 15:16	229	24	12	18	7	122	133	163	160
7/9/2014 15:17	230	24	12	18	7	122	133	163	163
7/9/2014 15:18	231	23	12	19	8	122	132	163	162
7/9/2014 15:19	232	23	13	19	8	122	132	162	160
7/9/2014 15:20	234	24	12	18	6	122	132	163	160
7/9/2014 15:21	235	24	11	19	6	122	132	162	159
7/9/2014 15:22	236	24	12	20	6	122	132	163	161
7/9/2014 15:23	237	24	12	21	6	122	132	164	160
7/9/2014 15:24	237	24	12	19	6	122	132	164	159
7/9/2014 15:25	238	23	12	19	5	122	132	164	159
7/9/2014 15:26	238	23	13	20	5	122	132	163	160
7/9/2014 15:27	239	23	12	19	7	122	132	164	160
7/9/2014 15:28	238	24	12	18	7	122	132	164	160
7/9/2014 15:29	237	23	12	18	6	122	133	163	160
7/9/2014 15:30	235	23	13	18	6	122	133	163	161
7/9/2014 15:31	234	24	11	19	6	122	133	163	161
7/9/2014 15:32	232	23	13	19	6	122	133	163	159
7/9/2014 15:33	231	23	12	18	5	122	133	163	160
7/9/2014 15:34	229	24	12	19	7	122	134	163	161
7/9/2014 15:35	229	23	13	20	8	122	134	163	161
7/9/2014 15:36	230	23	13	19	7	122	134	163	159
7/9/2014 15:37	231	24	12	19	6	122	134	163	160
7/9/2014 15:38	233	24	12	19	6	122	134	162	159
7/9/2014 15:39	234	24	12	19	6	122	134	162	157
7/9/2014 15:40	235	24	13	20	4	122	135	163	159
7/9/2014 15:41	236	24	13	19	4	122	135	163	161
7/9/2014 15:42	238	24	12	18	7	122	135	163	162
7/9/2014 15:43	238	24	12	18	7	122	135	163	160
7/9/2014 15:44	239	24	12	18	6	122	135	163	160
7/9/2014 15:45	239	24	12	19	6	122	136	163	160
7/9/2014 15:46	239	24	12	20	6	122	136	163	161
7/9/2014 15:47	239	24	13	20	6	122	136	163	159
7/9/2014 15:48	240	24	12	19	8	122	136	163	160
7/9/2014 15:49	240	24	12	20	7	122	136	163	161
7/9/2014 15:50	240	24	12	20	7	122	135	163	161
7/9/2014 15:51	240	23	12	18	6	122	135	162	161
7/9/2014 15:52	240	24	12	19	5	122	135	162	160
7/9/2014 15:53	241	24	13	21	6	122	135	162	159

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
XBNU300.PV - Average KEU336A.PV KEU340A.PV KIU307.PV - KIU311.PV - KTU040.PV - KTU044.PV - KFU392.PV - KFU396.PV -									
7/9/2014 15:54	241	24	12	19	7	122	134	162	159
7/9/2014 15:55	241	24	12	19	6	122	134	163	159
7/9/2014 15:56	241	24	12	21	6	122	134	163	158
7/9/2014 15:57	241	24	12	19	6	122	134	163	157
7/9/2014 15:58	241	24	12	19	6	122	134	163	159
7/9/2014 15:59	241	23	12	19	6	122	134	162	159
7/9/2014 16:00	241	24	11	18	7	122	134	162	160
7/9/2014 16:01	240	24	12	17	7	122	134	163	160
7/9/2014 16:02	240	24	12	18	6	122	134	163	160
7/9/2014 16:03	239	24	12	18	5	122	134	163	159
7/9/2014 16:04	239	23	12	18	7	122	134	163	160
7/9/2014 16:05	238	24	11	19	7	122	134	164	161
7/9/2014 16:06	238	23	12	18	6	122	133	163	160
7/9/2014 16:07	237	24	12	18	6	122	133	163	160
7/9/2014 16:08	236	24	12	18	7	122	133	162	160
7/9/2014 16:09	236	24	12	19	7	122	133	163	161
7/9/2014 16:10	236	24	13	18	6	121	133	164	161
7/9/2014 16:11	236	24	12	18	6	121	133	163	161
7/9/2014 16:12	236	24	12	19	6	121	133	163	158
7/9/2014 16:13	236	24	11	19	5	121	133	162	155
7/9/2014 16:14	236	23	11	19	6	121	133	163	161
7/9/2014 16:15	236	24	11	19	6	121	133	163	164
7/9/2014 16:16	236	24	12	19	6	121	133	163	161
7/9/2014 16:17	236	23	12	18	7	121	133	163	161
7/9/2014 16:18	236	24	12	18	8	121	133	162	160
7/9/2014 16:19	238	24	12	18	7	121	133	162	161
7/9/2014 16:20	240	23	12	19	5	121	133	162	162
7/9/2014 16:21	241	24	13	19	5	121	133	163	160
7/9/2014 16:22	243	24	12	20	7	121	133	162	159
7/9/2014 16:23	245	23	12	20	7	121	133	162	160
7/9/2014 16:24	247	24	11	19	6	121	133	162	161
7/9/2014 16:25	248	24	12	17	5	121	134	162	159
7/9/2014 16:26	250	24	12	18	7	121	134	162	157
7/9/2014 16:27	252	24	11	18	7	121	134	163	160
7/9/2014 16:28	254	23	11	18	6	121	134	162	160
7/9/2014 16:29	256	23	12	18	6	121	134	162	161
7/9/2014 16:30	258	23	12	18	6	121	134	163	161
7/9/2014 16:31	260	24	12	18	6	121	134	163	157
7/9/2014 16:32	260	24	12	19	7	121	134	162	159
7/9/2014 16:33	257	24	12	19	6	121	134	161	160
7/9/2014 16:34	255	24	12	18	6	121	134	162	160
7/9/2014 16:35	252	24	13	17	5	121	134	163	160
7/9/2014 16:36	249	24	12	17	6	121	134	162	159
7/9/2014 16:37	245	24	12	18	6	121	134	162	160
7/9/2014 16:38	242	25	13	19	7	121	134	163	162
7/9/2014 16:39	240	24	12	17	5	121	134	163	159
7/9/2014 16:40	240	24	13	18	5	121	134	164	157
7/9/2014 16:41	239	24	12	19	7	121	134	164	158
7/9/2014 16:42	239	24	12	20	7	121	134	162	158
7/9/2014 16:43	240	24	12	19	4	121	134	162	160
7/9/2014 16:44	240	24	12	17	5	121	134	162	159
7/9/2014 16:45	240	23	12	17	6	121	134	162	159
7/9/2014 16:46	241	24	11	17	6	121	134	163	161
7/9/2014 16:47	241	24	12	19	7	121	134	163	160

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/9/2014 16:48	241	24	13	21	7	121	133	163	161
7/9/2014 16:49	241	24	11	19	6	121	133	163	161
7/9/2014 16:50	241	23	12	19	6	121	133	163	160
7/9/2014 16:51	241	24	12	18	7	121	133	163	160
7/9/2014 16:52	240	23	13	19	6	121	133	162	160
7/9/2014 16:53	240	24	12	18	6	121	133	162	160
7/9/2014 16:54	240	23	12	18	6	121	134	162	159
7/9/2014 16:55	239	24	12	19	5	121	134	163	160
7/9/2014 16:56	239	24	12	19	4	121	134	162	161
7/9/2014 16:57	239	24	12	18	5	121	134	162	161
7/9/2014 16:58	238	24	12	19	6	121	134	164	160
7/9/2014 16:59	238	24	12	18	7	121	134	163	160
7/9/2014 17:00	238	24	12	19	6	121	134	162	160
7/9/2014 17:01	239	24	13	18	6	121	134	162	161
7/9/2014 17:02	239	24	12	18	5	121	134	163	161
7/9/2014 17:03	240	24	12	19	6	121	134	163	160
7/9/2014 17:04	240	24	12	21	7	121	134	163	160
7/9/2014 17:05	241	24	13	18	6	121	134	163	162
7/9/2014 17:06	241	24	12	17	6	121	134	163	160
7/9/2014 17:07	242	24	12	18	6	121	134	162	160
7/9/2014 17:08	242	24	12	19	6	121	134	162	159
7/9/2014 17:09	241	24	12	19	7	121	134	163	159
7/9/2014 17:10	239	24	12	19	6	121	134	162	160
7/9/2014 17:11	238	24	12	18	6	121	134	162	159
7/9/2014 17:12	237	24	12	18	7	121	133	164	157
7/9/2014 17:13	236	23	12	18	8	121	133	164	160
7/9/2014 17:14	235	24	12	18	7	121	133	163	160
7/9/2014 17:15	233	24	12	19	6	121	133	163	160
7/9/2014 17:16	232	24	11	19	6	121	133	161	160
7/9/2014 17:17	232	24	11	17	8	121	133	162	159
7/9/2014 17:18	233	24	12	18	7	121	133	164	159
7/9/2014 17:19	235	24	12	19	5	121	133	163	159
Run 1 Averages	238	24	12	19	6	121	134	163	160

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
XBNU300.PV - Average KEU336A.PV KEU340A.PV KIU307.PV - KIU311.PV - KTU040.PV - KTU044.PV - KFU392.PV - KFU396.PV -									
7/10/2014 7:53	239	24	12	19	9	120	134	162	161
7/10/2014 7:54	238	24	12	20	7	120	134	162	161
7/10/2014 7:55	238	23	12	18	5	120	134	163	162
7/10/2014 7:56	239	24	12	20	5	120	134	163	162
7/10/2014 7:57	239	24	12	20	5	120	134	162	160
7/10/2014 7:58	238	24	11	19	5	120	134	163	159
7/10/2014 7:59	239	24	13	20	6	120	134	164	161
7/10/2014 8:00	241	23	12	19	7	120	134	164	161
7/10/2014 8:01	242	24	13	18	6	120	134	162	159
7/10/2014 8:02	242	23	12	20	6	120	134	163	159
7/10/2014 8:03	241	24	12	20	7	120	134	163	160
7/10/2014 8:04	241	24	12	20	6	120	134	163	160
7/10/2014 8:05	240	24	12	20	7	120	134	163	159
7/10/2014 8:06	239	23	12	18	6	120	134	163	161
7/10/2014 8:07	238	24	13	19	6	120	134	164	162
7/10/2014 8:08	238	24	12	19	6	120	134	162	160
7/10/2014 8:09	237	24	13	18	8	120	134	162	160
7/10/2014 8:10	238	23	11	19	8	120	134	162	160
7/10/2014 8:11	238	24	12	18	7	120	134	163	161
7/10/2014 8:12	239	24	12	18	7	120	134	163	159
7/10/2014 8:13	239	24	12	18	6	120	134	163	159
7/10/2014 8:14	240	24	12	18	7	120	134	163	160
7/10/2014 8:15	240	24	11	18	7	120	134	163	160
7/10/2014 8:16	239	23	12	18	8	120	134	163	159
7/10/2014 8:17	238	24	12	19	7	120	134	162	159
7/10/2014 8:18	238	24	11	20	7	120	134	162	160
7/10/2014 8:19	237	24	11	18	5	120	134	162	161
7/10/2014 8:20	237	24	12	18	6	120	134	162	163
7/10/2014 8:21	236	24	12	19	6	120	134	162	162
7/10/2014 8:22	237	24	12	20	5	120	134	161	159
7/10/2014 8:23	238	24	12	19	5	120	134	162	159
7/10/2014 8:24	238	23	12	19	6	120	134	163	160
7/10/2014 8:25	239	24	12	19	6	120	134	162	161
7/10/2014 8:26	240	23	12	19	6	120	134	161	161
7/10/2014 8:27	240	24	13	19	6	120	134	162	161
7/10/2014 8:28	241	24	13	18	6	120	134	162	159
7/10/2014 8:29	240	24	12	19	5	120	134	162	161
7/10/2014 8:30	240	24	12	19	6	120	134	162	161
7/10/2014 8:31	239	24	13	19	6	120	134	163	159
7/10/2014 8:32	239	24	12	18	6	120	134	162	160
7/10/2014 8:33	239	23	11	18	7	120	134	162	160
7/10/2014 8:34	238	24	12	18	8	120	134	161	160
7/10/2014 8:35	238	24	12	18	7	120	134	162	162
7/10/2014 8:36	237	24	12	18	6	120	134	164	160
7/10/2014 8:37	237	24	12	19	7	120	134	163	160
7/10/2014 8:38	237	23	12	20	6	120	134	163	160
7/10/2014 8:39	238	24	12	20	6	120	134	162	159
7/10/2014 8:40	238	24	12	19	7	120	134	162	159
7/10/2014 8:41	239	24	12	19	5	120	134	163	160
7/10/2014 8:42	240	23	13	20	6	120	134	162	160
7/10/2014 8:43	240	23	12	18	7	120	134	163	161
7/10/2014 8:44	241	24	12	19	6	120	134	164	161
7/10/2014 8:45	240	24	12	20	6	120	134	163	160
7/10/2014 8:46	239	24	12	19	7	120	134	164	160

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
XBNU300.PV - Average KEU336A.PV KEU340A.PV KIU307.PV - KIU311.PV - KTU040.PV - KTU044.PV - KFU392.PV - KFU396.PV -									
7/10/2014 8:47	238	23	12	19	6	120	134	164	160
7/10/2014 8:48	237	24	12	18	6	120	134	163	162
7/10/2014 8:49	237	24	11	17	7	120	134	162	164
7/10/2014 8:50	237	24	13	18	7	120	134	162	160
7/10/2014 8:51	238	24	12	18	7	120	134	162	160
7/10/2014 8:52	239	24	12	17	8	120	133	163	161
7/10/2014 8:53	240	23	12	18	8	120	133	163	161
7/10/2014 8:54	240	23	12	18	6	120	133	164	159
7/10/2014 8:55	241	24	12	18	7	120	133	163	159
7/10/2014 8:56	241	24	11	18	6	120	133	163	159
7/10/2014 8:57	241	24	11	18	5	120	133	163	160
7/10/2014 8:58	241	23	12	18	5	120	133	162	161
7/10/2014 8:59	240	24	13	18	6	120	133	162	161
7/10/2014 9:00	240	23	12	18	7	120	133	162	159
7/10/2014 9:01	239	23	12	18	8	120	133	162	161
7/10/2014 9:02	239	24	11	19	7	120	133	163	160
7/10/2014 9:03	238	24	12	19	6	120	133	161	159
7/10/2014 9:04	238	23	12	19	6	120	133	160	161
7/10/2014 9:05	238	24	12	19	7	120	133	163	159
7/10/2014 9:06	237	24	12	18	7	120	133	164	160
7/10/2014 9:07	237	24	12	18	7	120	133	163	159
7/10/2014 9:08	237	24	13	18	7	120	134	164	160
7/10/2014 9:09	237	24	11	17	8	120	134	164	160
7/10/2014 9:10	237	24	11	18	7	120	134	162	159
7/10/2014 9:11	237	23	13	20	6	120	134	162	160
7/10/2014 9:12	238	24	12	19	6	120	134	163	160
7/10/2014 9:13	238	23	11	19	7	120	134	163	160
7/10/2014 9:14	238	24	12	21	6	120	134	163	160
7/10/2014 9:15	238	24	12	19	6	120	134	162	161
7/10/2014 9:16	239	24	13	18	6	120	134	163	160
7/10/2014 9:17	239	23	12	18	6	120	134	163	160
7/10/2014 9:18	239	24	13	19	7	120	134	163	160
7/10/2014 9:19	239	24	12	18	7	120	134	163	160
7/10/2014 9:20	240	24	12	20	6	120	134	162	160
7/10/2014 9:21	240	23	12	20	6	120	134	162	161
7/10/2014 9:22	240	23	12	18	5	120	134	162	163
7/10/2014 9:23	240	24	12	19	5	120	134	161	162
7/10/2014 9:24	240	23	12	20	6	120	134	161	161
7/10/2014 9:25	240	24	12	19	6	120	134	161	163
7/10/2014 9:26	239	24	12	19	8	120	134	162	163
7/10/2014 9:27	238	24	12	18	8	120	134	162	159
7/10/2014 9:28	238	24	12	17	7	120	134	162	159
7/10/2014 9:29	239	23	11	18	7	120	134	163	161
7/10/2014 9:30	239	23	11	20	7	120	134	164	161
7/10/2014 9:31	240	24	12	21	6	120	134	163	158
7/10/2014 9:32	240	24	12	19	7	120	134	162	159
7/10/2014 9:33	241	24	13	18	6	120	134	162	161
7/10/2014 9:34	240	24	13	19	5	120	134	162	160
7/10/2014 9:35	239	24	12	18	6	120	134	162	160
7/10/2014 9:36	239	24	12	19	6	120	134	162	161
7/10/2014 9:37	238	23	12	18	6	120	134	162	160
7/10/2014 9:38	238	24	12	20	6	120	134	162	159
7/10/2014 9:39	237	24	11	19	7	120	134	162	159
7/10/2014 9:40	236	24	12	19	7	120	134	161	160

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 9:41	236	24	12	19	5	120	134	163	160
7/10/2014 9:42	236	24	13	19	7	120	134	162	159
7/10/2014 9:43	237	24	11	19	6	120	134	162	159
7/10/2014 9:44	238	23	12	19	5	120	134	162	160
7/10/2014 9:45	240	24	12	18	8	120	134	162	161
7/10/2014 9:46	241	23	12	18	9	120	134	163	162
7/10/2014 9:47	242	24	12	18	8	120	134	164	163
7/10/2014 9:48	243	23	13	20	7	120	134	163	163
7/10/2014 9:49	242	23	12	22	7	120	134	162	161
7/10/2014 9:50	242	23	12	19	7	120	134	163	161
7/10/2014 9:51	242	24	11	18	6	120	134	162	160
7/10/2014 9:52	241	24	12	19	6	120	134	162	160
7/10/2014 9:53	241	24	12	19	8	120	134	163	160
7/10/2014 9:54	241	24	12	19	7	120	134	164	159
7/10/2014 9:55	241	24	13	18	7	120	134	163	160
7/10/2014 9:56	240	24	13	17	7	120	134	162	160
7/10/2014 9:57	240	24	13	18	7	120	134	163	161
7/10/2014 9:58	240	24	12	20	7	120	134	163	160
7/10/2014 9:59	239	24	12	20	6	120	134	162	160
7/10/2014 10:00	240	24	12	17	8	120	134	162	159
7/10/2014 10:01	240	22	12	17	7	120	134	163	161
7/10/2014 10:02	240	24	12	18	6	120	134	162	161
7/10/2014 10:03	240	24	12	19	7	120	134	163	160
7/10/2014 10:04	241	25	12	18	7	120	134	162	162
7/10/2014 10:05	240	23	12	20	6	120	134	162	160
7/10/2014 10:06	240	24	12	21	7	120	134	162	161
7/10/2014 10:07	240	23	13	18	7	120	134	163	161
7/10/2014 10:08	239	23	12	19	7	120	134	163	160
7/10/2014 10:09	239	24	12	19	8	120	134	162	160
7/10/2014 10:10	238	24	12	18	7	120	134	162	159
7/10/2014 10:11	238	24	12	19	7	120	134	162	159
7/10/2014 10:12	238	24	12	20	7	120	134	162	160
7/10/2014 10:13	238	24	11	19	7	120	134	162	160
7/10/2014 10:14	239	24	11	19	7	120	134	163	160
7/10/2014 10:15	239	24	13	20	8	120	134	164	160
7/10/2014 10:16	239	23	12	19	7	120	134	163	160
7/10/2014 10:17	239	24	12	20	7	120	134	163	162
7/10/2014 10:18	239	24	11	19	6	120	134	162	163
7/10/2014 10:19	239	23	11	17	7	120	134	163	161
7/10/2014 10:20	239	24	12	18	8	120	134	162	161
7/10/2014 10:21	239	24	12	19	6	120	134	162	162
7/10/2014 10:22	239	24	12	20	6	120	134	162	163
7/10/2014 10:23	240	24	12	19	8	120	134	163	163
7/10/2014 10:24	240	24	12	18	7	120	134	163	160
7/10/2014 10:25	240	24	12	18	6	120	134	163	160
7/10/2014 10:26	240	24	12	18	8	120	134	163	161
7/10/2014 10:27	240	24	12	20	6	120	134	163	161
7/10/2014 10:28	241	24	11	21	5	120	134	164	160
7/10/2014 10:29	242	23	12	20	7	120	134	163	161
7/10/2014 10:30	243	23	12	18	8	120	134	162	162
7/10/2014 10:31	243	24	12	19	7	120	134	163	159
7/10/2014 10:32	244	24	12	18	7	120	134	163	159
7/10/2014 10:33	245	23	11	18	8	120	134	163	158
7/10/2014 10:34	245	24	12	18	8	120	134	163	160

Process Operating Data

	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 10:35	245	24	12	17	7	120	134	163	161
7/10/2014 10:36	245	24	13	18	6	120	134	163	160
7/10/2014 10:37	243	24	11	18	7	120	134	164	159
7/10/2014 10:38	241	23	12	20	6	120	134	163	159
7/10/2014 10:39	239	24	12	19	7	120	134	162	160
7/10/2014 10:40	237	24	12	18	6	120	134	163	159
7/10/2014 10:41	237	24	12	18	7	120	134	162	159
7/10/2014 10:42	236	24	13	18	7	120	134	163	160
7/10/2014 10:43	236	24	12	19	6	120	134	162	161
7/10/2014 10:44	238	24	12	18	5	120	134	162	160
7/10/2014 10:45	240	24	12	19	7	120	134	163	160
7/10/2014 10:46	241	23	11	18	8	120	134	163	160
7/10/2014 10:47	243	24	12	19	8	120	134	163	160
7/10/2014 10:48	244	24	12	18	7	120	134	162	159
7/10/2014 10:49	243	24	12	19	8	120	134	163	159
7/10/2014 10:50	242	23	12	21	8	120	134	163	161
7/10/2014 10:51	241	23	12	19	7	120	134	162	161
7/10/2014 10:52	240	24	13	18	7	120	134	163	160
7/10/2014 10:53	239	24	12	18	7	120	134	163	158
7/10/2014 10:54	238	23	12	19	9	120	134	163	159
7/10/2014 10:55	237	23	12	19	6	120	134	163	161
7/10/2014 10:56	236	24	12	18	6	120	134	163	159
7/10/2014 10:57	237	24	13	18	6	120	134	162	159
7/10/2014 10:58	238	24	12	19	8	120	134	162	159
7/10/2014 10:59	239	24	12	19	7	120	134	163	159
7/10/2014 11:00	240	24	12	18	8	120	134	162	162
7/10/2014 11:01	241	24	12	18	8	120	134	163	161
7/10/2014 11:02	242	24	12	19	9	120	134	164	160
7/10/2014 11:03	243	24	11	19	8	120	134	163	161
7/10/2014 11:04	243	23	13	18	7	120	134	163	161
7/10/2014 11:05	241	24	12	18	6	120	134	164	160
7/10/2014 11:06	240	23	12	19	7	120	134	163	159
7/10/2014 11:07	239	23	12	20	7	120	134	163	162
7/10/2014 11:08	237	24	12	19	6	120	134	163	163
7/10/2014 11:09	236	23	12	19	5	120	134	163	161
7/10/2014 11:10	234	24	12	18	6	120	134	163	160
7/10/2014 11:11	234	24	12	19	6	120	134	163	160
7/10/2014 11:12	235	24	12	20	5	120	134	163	160
7/10/2014 11:13	236	23	11	18	6	120	134	163	158
7/10/2014 11:14	237	24	12	19	6	120	134	162	158
7/10/2014 11:15	238	25	13	19	5	120	134	162	160
7/10/2014 11:16	239	24	12	18	6	120	134	162	160
7/10/2014 11:17	241	24	12	19	7	120	134	161	160
7/10/2014 11:18	242	23	12	19	7	120	134	161	161
7/10/2014 11:19	243	24	12	19	5	120	134	163	162
7/10/2014 11:20	242	24	12	20	5	120	134	163	162
7/10/2014 11:21	241	24	12	18	6	120	134	162	162
7/10/2014 11:22	240	24	12	19	7	120	134	163	162
7/10/2014 11:23	239	24	12	20	7	120	134	163	160
7/10/2014 11:24	238	23	12	22	7	120	134	163	160
7/10/2014 11:25	237	23	11	22	8	120	134	162	160
7/10/2014 11:26	236	24	12	21	8	120	134	162	161
7/10/2014 11:27	236	24	12	19	7	120	134	162	160
7/10/2014 11:28	237	24	11	17	6	120	134	163	159

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
XBNU300.PV - Average KEU336A.PV KEU340A.PV KIU307.PV - KIU311.PV - KTU040.PV - KTU044.PV - KFU392.PV - KFU396.PV -									
7/10/2014 11:29	238	24	12	18	7	120	134	163	161
7/10/2014 11:30	240	23	12	19	6	120	134	163	163
7/10/2014 11:31	241	23	12	19	7	120	134	162	161
7/10/2014 11:32	242	24	12	19	6	120	134	163	161
7/10/2014 11:33	244	24	12	20	6	120	134	163	161
7/10/2014 11:34	244	24	12	19	6	120	134	162	160
7/10/2014 11:35	243	24	12	20	7	120	134	163	160
7/10/2014 11:36	241	24	12	20	7	120	134	162	160
7/10/2014 11:37	240	24	12	18	6	120	134	162	161
7/10/2014 11:38	238	24	12	18	7	120	134	163	162
7/10/2014 11:39	237	24	12	19	6	120	134	163	163
7/10/2014 11:40	236	24	12	18	7	120	134	163	160
7/10/2014 11:41	235	24	12	19	6	120	134	164	159
7/10/2014 11:42	236	24	12	19	7	120	134	163	161
7/10/2014 11:43	237	24	12	18	7	120	134	161	160
7/10/2014 11:44	237	24	12	19	8	120	134	162	161
7/10/2014 11:45	238	24	12	19	8	120	134	163	163
7/10/2014 11:46	239	24	12	19	7	120	134	163	159
7/10/2014 11:47	240	24	11	19	6	120	134	163	158
7/10/2014 11:48	241	24	12	19	5	120	134	163	159
7/10/2014 11:49	241	24	12	19	5	120	134	163	160
7/10/2014 11:50	241	24	12	18	7	120	134	163	160
7/10/2014 11:51	240	24	12	20	7	120	134	162	161
7/10/2014 11:52	239	23	12	19	6	120	134	163	162
7/10/2014 11:53	238	24	12	19	6	120	134	164	162
7/10/2014 11:54	237	24	12	18	6	120	134	164	159
7/10/2014 11:55	236	24	12	20	6	120	134	162	159
7/10/2014 11:56	236	24	13	21	5	120	134	163	160
7/10/2014 11:57	236	23	11	19	5	120	134	163	160
7/10/2014 11:58	237	24	12	20	5	120	134	162	162
7/10/2014 11:59	237	24	12	21	5	120	134	162	161
Run 2 Averages	239	24	12	19	7	120	134	163	160

Process Operating Data

	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 12:48	241	24	12	20	5	120	134	162	161
7/10/2014 12:49	241	24	13	18	5	119	134	164	159
7/10/2014 12:50	241	24	12	18	7	119	134	164	158
7/10/2014 12:51	241	24	12	19	7	119	134	162	160
7/10/2014 12:52	240	24	12	21	7	119	134	162	161
7/10/2014 12:53	239	24	11	19	7	119	134	162	160
7/10/2014 12:54	239	24	12	19	8	119	134	163	160
7/10/2014 12:55	238	23	12	19	7	119	134	162	160
7/10/2014 12:56	238	24	12	18	5	119	134	162	159
7/10/2014 12:57	237	24	12	18	6	119	134	162	161
7/10/2014 12:58	238	24	12	18	6	119	134	162	161
7/10/2014 12:59	239	24	12	19	7	119	134	163	159
7/10/2014 13:00	239	24	12	19	6	119	134	163	160
7/10/2014 13:01	240	24	11	20	5	119	134	163	160
7/10/2014 13:02	240	24	12	18	6	119	134	163	159
7/10/2014 13:03	241	24	12	18	5	119	134	163	160
7/10/2014 13:04	241	24	12	18	6	119	134	162	160
7/10/2014 13:05	241	24	12	18	7	119	134	163	161
7/10/2014 13:06	241	24	12	19	7	119	134	162	162
7/10/2014 13:07	241	23	13	19	7	119	134	162	159
7/10/2014 13:08	241	23	12	19	6	119	134	162	160
7/10/2014 13:09	240	24	13	19	5	119	134	163	161
7/10/2014 13:10	240	24	12	19	7	119	134	163	160
7/10/2014 13:11	240	24	12	19	7	119	134	162	161
7/10/2014 13:12	240	24	13	18	6	119	134	163	160
7/10/2014 13:13	239	24	13	18	7	119	134	163	159
7/10/2014 13:14	239	24	12	19	6	119	134	163	160
7/10/2014 13:15	239	24	13	18	7	119	134	162	160
7/10/2014 13:16	240	24	12	18	7	119	134	162	161
7/10/2014 13:17	240	24	12	18	6	119	134	162	161
7/10/2014 13:18	241	24	12	20	7	119	134	162	161
7/10/2014 13:19	241	24	13	21	7	119	134	162	160
7/10/2014 13:20	241	24	12	18	7	119	135	162	159
7/10/2014 13:21	241	24	12	18	8	119	135	163	160
7/10/2014 13:22	241	24	12	18	7	119	135	163	161
7/10/2014 13:23	241	23	12	19	6	119	135	163	162
7/10/2014 13:24	240	24	11	19	6	119	135	163	161
7/10/2014 13:25	240	24	12	18	7	119	135	164	161
7/10/2014 13:26	240	24	12	19	7	119	135	163	161
7/10/2014 13:27	240	24	12	19	5	119	135	162	159
7/10/2014 13:28	240	23	12	18	5	119	135	163	158
7/10/2014 13:29	240	24	12	19	5	119	135	164	158
7/10/2014 13:30	210	24	11	19	7	119	133	164	160
7/10/2014 13:31	144	23	11	20	7	118	129	163	160
7/10/2014 13:32	98	23	11	20	7	117	125	163	160
7/10/2014 13:33	67	22	12	20	7	116	122	162	160
7/10/2014 13:34	62	22	11	20	7	116	120	162	158
7/10/2014 13:35	91	22	11	20	9	116	120	163	160
7/10/2014 13:36	122	23	11	19	8	116	123	163	161
7/10/2014 13:37	145	23	11	19	8	116	125	163	162
7/10/2014 13:38	157	23	11	19	7	116	125	163	161
7/10/2014 13:39	168	23	11	20	6	116	126	163	159
7/10/2014 13:40	176	23	12	20	7	117	126	162	159
7/10/2014 13:41	183	23	12	20	8	117	127	162	160

Process Operating Data

	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 13:42	195	23	12	18	7	118	127	162	161
7/10/2014 13:43	213	23	12	18	5	118	128	162	161
7/10/2014 13:44	226	23	12	19	7	119	129	163	160
7/10/2014 13:45	231	23	12	19	6	119	129	163	160
7/10/2014 13:46	235	24	12	18	5	119	130	164	159
7/10/2014 13:47	236	22	12	19	6	119	131	164	161
7/10/2014 13:48	237	24	12	20	7	119	132	163	161
7/10/2014 13:49	239	23	13	19	6	119	133	162	158
7/10/2014 13:50	240	23	12	19	6	119	134	162	160
7/10/2014 13:51	241	23	13	19	8	119	134	162	160
7/10/2014 13:52	243	24	12	19	6	119	134	163	161
7/10/2014 13:53	245	24	12	20	6	119	135	163	160
7/10/2014 13:54	246	24	12	20	7	119	135	163	160
7/10/2014 13:55	247	23	12	19	7	119	135	163	160
7/10/2014 13:56	246	24	12	19	8	119	135	163	159
7/10/2014 13:57	245	23	13	19	8	119	136	163	159
7/10/2014 13:58	244	23	12	18	6	119	136	163	160
7/10/2014 13:59	243	24	12	19	5	119	136	162	161
7/10/2014 14:00	241	23	13	19	6	119	136	162	159
7/10/2014 14:01	240	24	12	18	7	119	136	163	159
7/10/2014 14:02	240	24	12	19	6	119	136	163	159
7/10/2014 14:03	241	23	12	20	5	119	136	163	159
7/10/2014 14:04	243	24	12	20	5	119	136	163	162
7/10/2014 14:05	244	23	12	19	7	119	136	162	161
7/10/2014 14:06	245	24	12	19	6	119	136	163	162
7/10/2014 14:07	246	24	13	19	5	119	135	164	165
7/10/2014 14:08	248	24	13	19	5	119	135	163	161
7/10/2014 14:09	250	24	12	19	6	119	135	164	160
7/10/2014 14:10	250	24	12	20	8	119	135	163	161
7/10/2014 14:11	249	24	11	20	7	119	135	162	160
7/10/2014 14:12	247	24	12	19	7	119	135	162	159
7/10/2014 14:13	245	24	12	20	7	119	135	162	158
7/10/2014 14:14	244	24	12	20	5	119	135	162	158
7/10/2014 14:15	242	24	12	19	6	119	135	163	158
7/10/2014 14:16	241	24	13	18	6	119	135	162	161
7/10/2014 14:17	239	24	12	18	7	119	135	162	163
7/10/2014 14:18	238	24	12	19	7	119	134	162	162
7/10/2014 14:19	237	24	12	20	8	119	134	163	159
7/10/2014 14:20	237	24	12	20	7	119	134	163	160
7/10/2014 14:21	238	23	13	18	7	119	134	163	161
7/10/2014 14:22	238	23	12	19	7	119	134	162	160
7/10/2014 14:23	239	24	12	20	6	119	134	162	161
7/10/2014 14:24	239	23	12	20	7	119	134	163	161
7/10/2014 14:25	240	24	12	20	8	119	134	163	161
7/10/2014 14:26	238	23	11	19	7	119	134	163	161
7/10/2014 14:27	231	24	12	18	6	119	134	163	161
7/10/2014 14:28	227	23	11	19	6	119	133	163	159
7/10/2014 14:29	228	23	11	19	7	119	133	163	159
7/10/2014 14:30	231	24	11	18	7	119	133	163	161
7/10/2014 14:31	231	23	12	18	7	119	133	162	161
7/10/2014 14:32	231	24	12	18	6	119	133	162	162
7/10/2014 14:33	230	23	12	18	6	119	133	163	162
7/10/2014 14:34	231	23	12	19	6	119	133	163	162
7/10/2014 14:35	235	24	12	19	6	119	133	163	161

Process Operating Data

	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 14:36	238	23	12	18	5	119	133	163	161
7/10/2014 14:37	242	23	12	18	6	119	133	163	161
7/10/2014 14:38	245	23	12	20	6	119	134	162	162
7/10/2014 14:39	247	23	12	21	6	119	134	162	162
7/10/2014 14:40	246	24	12	19	6	119	134	162	160
7/10/2014 14:41	245	23	12	19	6	119	134	162	160
7/10/2014 14:42	244	24	12	21	7	119	134	162	161
7/10/2014 14:43	242	24	11	22	7	119	134	163	161
7/10/2014 14:44	240	24	11	19	6	119	134	163	161
7/10/2014 14:45	239	24	12	20	6	119	134	163	162
7/10/2014 14:46	238	24	12	20	5	119	134	163	164
7/10/2014 14:47	239	24	12	19	6	119	134	162	161
7/10/2014 14:48	239	24	12	19	6	119	134	163	162
7/10/2014 14:49	240	24	12	21	6	119	134	163	161
7/10/2014 14:50	240	24	13	20	5	119	134	163	161
7/10/2014 14:51	241	24	12	19	6	119	134	163	162
7/10/2014 14:52	242	23	12	19	8	119	134	162	161
7/10/2014 14:53	242	24	12	19	7	119	134	163	160
7/10/2014 14:54	243	24	12	19	7	119	134	163	160
7/10/2014 14:55	242	24	12	18	8	119	134	162	159
7/10/2014 14:56	242	24	11	19	8	119	134	162	159
7/10/2014 14:57	242	24	12	19	7	119	134	162	159
7/10/2014 14:58	242	24	12	18	8	119	134	162	159
7/10/2014 14:59	241	24	12	17	7	119	134	162	159
7/10/2014 15:00	241	24	11	20	7	119	134	163	160
7/10/2014 15:01	241	24	12	22	7	119	134	163	161
7/10/2014 15:02	240	24	12	18	5	119	134	164	159
7/10/2014 15:03	239	23	12	18	6	119	134	163	160
7/10/2014 15:04	238	23	12	18	7	119	134	162	161
7/10/2014 15:05	237	24	12	18	8	119	134	163	159
7/10/2014 15:06	237	24	11	18	8	119	134	163	159
7/10/2014 15:07	237	24	12	18	9	119	134	163	160
7/10/2014 15:08	238	24	11	18	7	119	134	163	162
7/10/2014 15:09	238	24	12	19	6	119	134	163	161
7/10/2014 15:10	238	24	12	19	7	119	134	162	161
7/10/2014 15:11	239	24	12	18	7	119	134	162	161
7/10/2014 15:12	239	24	12	18	8	119	134	163	161
7/10/2014 15:13	238	24	12	20	7	119	134	163	162
7/10/2014 15:14	237	23	12	22	6	119	134	163	162
7/10/2014 15:15	236	23	12	19	8	119	134	163	162
7/10/2014 15:16	236	24	12	18	8	119	134	162	161
7/10/2014 15:17	237	23	12	20	7	119	134	162	161
7/10/2014 15:18	238	23	12	21	5	119	134	163	160
7/10/2014 15:19	239	24	12	18	5	119	134	163	161
7/10/2014 15:20	240	24	12	19	6	119	134	164	161
7/10/2014 15:21	241	23	12	20	6	119	134	163	161
7/10/2014 15:22	241	24	12	19	6	119	134	164	160
7/10/2014 15:23	240	23	12	19	7	119	134	164	160
7/10/2014 15:24	239	24	12	19	8	119	134	164	160
7/10/2014 15:25	238	23	12	19	9	119	134	164	161
7/10/2014 15:26	236	24	12	18	7	119	134	162	163
7/10/2014 15:27	235	24	12	18	7	119	134	162	164
7/10/2014 15:28	234	23	11	19	7	119	134	162	163
7/10/2014 15:29	233	24	12	20	6	119	134	163	161

Process Operating Data

	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 15:30	233	24	11	18	7	119	134	163	162
7/10/2014 15:31	235	23	11	18	8	119	134	163	162
7/10/2014 15:32	237	24	12	19	7	119	134	163	161
7/10/2014 15:33	238	24	12	19	7	119	134	163	162
7/10/2014 15:34	240	24	12	21	7	119	134	163	162
7/10/2014 15:35	242	23	11	20	6	119	134	162	161
7/10/2014 15:36	243	24	12	19	6	119	134	163	161
7/10/2014 15:37	242	23	11	19	7	119	134	163	162
7/10/2014 15:38	241	23	12	18	6	119	134	163	161
7/10/2014 15:39	240	24	12	18	5	119	134	163	160
7/10/2014 15:40	239	23	12	19	6	119	134	163	161
7/10/2014 15:41	239	24	12	18	7	119	134	162	161
7/10/2014 15:42	240	24	11	18	6	119	134	162	160
7/10/2014 15:43	240	23	12	18	6	119	134	163	160
7/10/2014 15:44	241	24	12	18	7	119	134	163	162
7/10/2014 15:45	241	23	11	18	7	119	134	163	161
7/10/2014 15:46	242	23	12	18	6	119	134	164	159
7/10/2014 15:47	242	24	12	19	6	119	134	164	157
7/10/2014 15:48	241	24	11	19	5	120	134	162	158
7/10/2014 15:49	240	24	12	19	8	120	134	162	159
7/10/2014 15:50	240	24	12	19	8	120	134	163	159
7/10/2014 15:51	239	24	12	19	6	120	134	162	159
7/10/2014 15:52	238	23	12	19	5	120	134	162	160
7/10/2014 15:53	237	24	12	18	5	120	134	162	160
7/10/2014 15:54	237	24	12	18	6	120	134	163	161
7/10/2014 15:55	237	24	12	18	7	120	134	163	159
7/10/2014 15:56	238	24	12	17	7	120	134	163	161
7/10/2014 15:57	238	24	12	18	7	120	134	163	161
7/10/2014 15:58	239	24	12	19	8	120	134	163	160
7/10/2014 15:59	239	24	12	19	7	120	134	163	160
7/10/2014 16:00	239	23	12	20	6	120	134	163	160
7/10/2014 16:01	240	23	12	19	6	120	134	162	160
7/10/2014 16:02	239	24	12	20	7	120	134	163	160
7/10/2014 16:03	239	24	12	20	6	120	134	162	159
7/10/2014 16:04	236	24	11	19	7	120	134	163	159
7/10/2014 16:05	233	24	12	21	7	120	134	163	159
7/10/2014 16:06	235	24	12	20	6	120	134	162	160
7/10/2014 16:07	236	24	12	19	5	120	134	163	163
7/10/2014 16:08	237	24	12	19	6	120	134	163	163
7/10/2014 16:09	238	24	13	18	6	120	134	162	161
7/10/2014 16:10	239	23	11	18	6	120	134	162	160
7/10/2014 16:11	239	24	12	20	7	120	134	163	160
7/10/2014 16:12	239	24	12	21	6	120	134	163	160
7/10/2014 16:13	240	24	12	18	7	120	134	164	162
7/10/2014 16:14	241	23	12	17	6	120	134	163	161
7/10/2014 16:15	241	24	12	18	6	120	134	163	160
7/10/2014 16:16	242	23	12	19	7	120	134	163	160
7/10/2014 16:17	243	24	11	19	8	120	134	163	160
7/10/2014 16:18	243	24	12	19	7	120	134	164	160
7/10/2014 16:19	244	24	12	19	6	120	134	163	160
7/10/2014 16:20	243	23	12	20	5	120	134	163	160
7/10/2014 16:21	243	24	12	18	5	120	134	163	160
7/10/2014 16:22	242	24	12	19	5	120	134	163	159
7/10/2014 16:23	242	24	12	20	5	120	134	163	159

Process Operating Data

	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
Timestamp	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 16:24	241	24	13	20	5	120	134	163	160
7/10/2014 16:25	241	24	12	19	5	120	134	162	161
7/10/2014 16:26	240	24	12	17	5	120	134	163	162
7/10/2014 16:27	240	24	13	19	6	120	134	163	162
7/10/2014 16:28	239	24	12	20	7	120	134	162	160
7/10/2014 16:29	239	24	12	18	8	120	134	162	161
7/10/2014 16:30	240	23	13	18	8	120	134	163	161
7/10/2014 16:31	240	24	12	18	7	120	134	164	160
7/10/2014 16:32	240	24	12	18	7	120	134	165	159
7/10/2014 16:33	240	24	12	19	6	120	134	165	159
7/10/2014 16:34	240	24	11	19	6	120	134	163	160
7/10/2014 16:35	240	24	12	19	6	120	134	163	160
7/10/2014 16:36	240	24	12	20	6	120	134	164	158
7/10/2014 16:37	240	24	12	19	7	120	134	164	159
7/10/2014 16:38	240	23	12	18	7	120	134	164	160
7/10/2014 16:39	240	24	12	18	7	120	134	163	161
7/10/2014 16:40	241	23	11	18	9	120	134	162	161
7/10/2014 16:41	241	24	12	18	7	120	134	162	160
7/10/2014 16:42	241	23	12	19	6	120	134	163	159
7/10/2014 16:43	240	24	12	19	7	120	134	162	159
7/10/2014 16:44	240	24	12	19	8	120	134	162	162
7/10/2014 16:45	240	24	12	20	8	120	134	163	163
7/10/2014 16:46	240	24	12	20	8	120	134	161	160
7/10/2014 16:47	240	24	12	19	7	120	134	163	158
7/10/2014 16:48	239	24	12	20	5	120	134	162	160
7/10/2014 16:49	239	24	12	19	6	120	134	162	160
7/10/2014 16:50	239	24	12	19	7	120	134	162	161
7/10/2014 16:51	238	24	13	18	8	120	134	162	161
7/10/2014 16:52	237	24	12	18	8	120	134	163	162
7/10/2014 16:53	237	24	12	20	9	120	134	163	161
7/10/2014 16:54	236	23	12	22	9	120	134	162	161
7/10/2014 16:55	236	24	12	21	8	120	134	163	162
7/10/2014 16:56	235	24	12	17	6	120	134	163	161
7/10/2014 16:57	235	24	12	18	6	120	134	162	160
7/10/2014 16:58	236	23	13	19	7	120	134	161	161
7/10/2014 16:59	237	24	11	20	7	120	134	162	161
7/10/2014 17:00	238	24	12	18	7	120	134	162	161
7/10/2014 17:01	238	24	11	18	8	120	134	162	162
7/10/2014 17:02	239	23	11	19	8	120	134	163	161
7/10/2014 17:03	240	23	13	19	8	120	134	163	160
7/10/2014 17:04	241	24	12	18	6	120	134	163	160
7/10/2014 17:05	242	24	11	21	6	120	134	163	160
7/10/2014 17:06	242	24	12	22	7	120	134	163	160
7/10/2014 17:07	242	24	13	20	7	120	134	163	161
7/10/2014 17:08	242	24	12	19	6	120	134	162	162
7/10/2014 17:09	242	24	11	19	7	120	134	163	162
7/10/2014 17:10	242	24	12	20	6	120	134	164	159
7/10/2014 17:11	242	24	12	18	7	120	134	163	161
7/10/2014 17:12	242	24	12	19	7	120	134	162	163
7/10/2014 17:13	242	24	11	21	6	120	134	162	164
7/10/2014 17:14	241	23	12	21	7	120	134	163	162
7/10/2014 17:15	239	24	13	20	6	120	134	162	161
7/10/2014 17:16	237	24	12	18	8	120	134	163	160
7/10/2014 17:17	235	24	12	18	8	120	134	163	161

Process Operating Data

Timestamp	Tonnage	Secondary Voltage	Secondary Voltage	Primary Amperage	Primary Amperage	Exhaust Temp	Exhaust Temp	Water Flow Rate	Water Flow Rate
	Furnace 12	1201	1205	1201	1205	1201	1205	1201	1205
	EU 100, EU 104	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114	SV 111	SV 114
	XBNU300.PV	KEU336A.PV	KEU340A.PV	KIU307.PV	KIU311.PV	KTU040.PV	KTU044.PV	KFU392.PV	KFU396.PV
	XBNU300.PV - Average	KEU336A.PV	KEU340A.PV	KIU307.PV -	KIU311.PV -	KTU040.PV -	KTU044.PV -	KFU392.PV -	KFU396.PV -
7/10/2014 17:18	234	24	12	19	5	120	134	162	162
7/10/2014 17:19	235	24	12	19	5	120	134	161	161
7/10/2014 17:20	236	23	12	18	5	120	134	161	161
7/10/2014 17:21	237	24	12	19	6	120	134	162	162
7/10/2014 17:22	238	24	12	19	6	120	134	163	161
7/10/2014 17:23	239	24	12	18	5	120	134	163	160
7/10/2014 17:24	241	24	12	17	5	120	134	162	160
7/10/2014 17:25	241	24	12	18	7	120	134	163	160
7/10/2014 17:26	241	23	13	19	6	120	134	163	160
7/10/2014 17:27	240	23	12	19	5	120	134	163	161
7/10/2014 17:28	240	23	11	18	4	120	135	163	160
7/10/2014 17:29	240	24	11	19	4	120	135	163	160
7/10/2014 17:30	239	23	12	21	6	120	135	163	161
7/10/2014 17:31	239	24	12	19	7	120	135	163	160
7/10/2014 17:32	238	24	12	18	7	120	135	163	160
7/10/2014 17:33	238	24	12	19	5	120	135	163	160
7/10/2014 17:34	238	24	12	21	5	120	135	163	160
7/10/2014 17:35	238	24	12	19	6	120	135	163	159
average	235	24	12	19	7	119	134	163	160

Appendix F

Project Participants and Contact Information

Project Participants and Contact Information

Northshore Mining Company

Jennifer Ramsdell – Sr. Environmental Engineer

Barr Engineering Company

Tim Russell – Vice President/Chemical Engineer

Michael Norstrem – Project Manager/Air Quality Engineer

Tom Kuchinski – Vice President/ Stack Testing Services Coordinator

David Herbst – Air Quality Technician

T.J. Webb – Air Quality Technician

CONTACT INFORMATION

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