LAFARGE
NORTH AMERICA

September 27, 2010

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AIR ENFORCEMENT BRANCH
U.S. EPA REGION 5

Illinois Environmental Protection Agency
Bureau of Air
Compliance Section (MC 40)
P.O. Box 19276
Springfield, IL 62794-9276

RE: 30 Month Demonstration of Compliance with Dioxin and Furan Limits.
Facility ID. No.: 127855AAA

Dear Sir/Madame:

40 CFR Supart LLL requires a demonstration of compliance with dioxin and furan emissions limits and the establishment of operating temperature limits at least every 30 months. The last compliance demonstration at the Lafarge Joppa plant was on April 29th and 30th, 2008 for kilns 2 and 1 respectively. The next compliance demonstration is due by November 29th and 30th, 2010 for the kilns.

Demonstration of Compliance testing was conducted on June 29 and September 8th and 10th, 2010. The June 29th, 2010 test results demonstrated non-compliance for Kiln 2 at an operating temperature greater than that tested in 2008. Kiln 1 was not operating during the June test event due to maintenance and consequently was not tested at that time. On September 8th and 10th testing on both kilns demonstrated compliance. The following table summarizes the results of the testing.

Source	Test Date	Avg Temp (°F)	Emission (ng/DSCM @ 7%0_2 TEQ)	Standard[1] (ng/DSCM @ 7% O_2, TEQ)
Kiln 1	9/10/10	443.73	0.09	0.20
Kiln 2	6/29/10	418.73	0.75	0.40
Kiln 2	9/8/10	392.71	0.16	0.40

Enclosed is the test report for this work. As of the date of this letter Lafarge will reset its temperature limit to 443.7°F for kiln 1 and 392.7 °F for kiln 2.

[1] Dioxins and furans are limited by Subpart LLL, Section §63.1343 to 0.40 ng/DSCM @ 7% O_2 TEQ when the average temperature at the inlet to the particulate matter control device is 400 °F or less and .20 ng/DSCM @ 7% O_2, TEQ when the average temperature at the inlet to the particulate matter control device is greater than 400 °F.

Lafarge – North America, Joppa Plant
2500 Portland Road • Grand Chain, IL 62941
Office: 618-543-3900 • Fax: 618-543-7413

LAFARGE
NORTH AMERICA

If you have any questions please contact me at 618/543-3925.

Sincerely,

Louis Derose
Environmental and Public Relations Manager
Lafarge North America – Joppa Plant

Enclosures

cc:

Illinois Environmental Protection Agency
Division of Air Pollution Control
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Peoria, IL 61614

Illinois EPA – Air Permit Section
Illinois Environmental Protection Agency
Division of Air Pollution Control Permit Section (MC 11)
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Springfield, IL 62794-9506

USEPA (AE – 17J)
Air & Radiation Division
77 West Jackson Boulevard
Chicago, IL 60604

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2500 Portland Road • Grand Chain, IL 62941
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PC MACT Compliance Test Report

As Defined By The
Code of Federal Regulations; Title 40 Part 60

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U.S. EPA REGION 5

RMCEINC Project #2010-11015

LAFARGE - NORTH AMERICA
JOPPA PLANT
KILN 1 & 2 STACKS
JOPPA, ILLINOIS

FACILITY ID #: 127855AAA

PREPARED FOR:
LAFARGE NORTH AMERICA

BY:

RMC ENVIRONMENTAL, INC. – CHICAGO REGIONAL OFFICE

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REPORT CERTIFICATION

The sampling, analysis, and data collection performed for this report were carried out under my direction and supervision, and I hereby certify that this test report is authentic and accurate, to the best of my knowledge.

Date 9/22/2010

Signature

Rachel Chleborowicz, QSTI
Sr. Project Manager
RMC ENVIRONMENTAL, INC.

1.0 PROJECT SUMMARY

Company Information

Address:	Lafarge North America Joppa Plant 2500 Portland Road Joppa, Illinois 60121
Contact:	Louis Derose
Telephone Number:	618-543-3925
Source Tested:	Kilns 1 & 2
Facility ID No.:	127855AAA

Testing Firm Information

Address:	RMC ENVIRONMENTAL, INC. 9226 North 2nd Street Machesney Park, Iliinois 61115
Contact:	Rachel Chleborowicz
Telephone Number:	815-378-6150 Mobile 815-425-1102 Fax RMCE@AirMonitoring.com

Test Information

Test Requested By:	Lafarge North America	
Source Contact:	Louis Derose	
Telephone Number:	618-543-3925	
Test Objective:	CFR; Title 40 Part 60, Appendix 4, PC Mact Compliance Testing (Kiln 2).	
Test Methods:	EPA Methods 1 - 5 and 23	
Test Dates:	June 29 & September 8 & 10, 2010	
EPA / Illinois Representatives On-site:	Scott Arnold	Illinois Environmental Protection Agency
Source Test Coordinators:	Louis Derose	Lafarge North America
Test Personnel:	Gregory Chleborowicz,	RMCEInc
	Andrew McDermand,	RMCEInc

2.0 SUMMARY AND DISCUSSION OF RESULTS

The requirements of 40 CFR60, Subpart LL require demonstration of compliance with dioxin and furan emissions limits and the establishment of operating temperature limits every 30 months. The last compliance demonstration at the Lafarge Joppa plant was on April 29th and 30th, 2008 for Kilns 2 and 1 respectively. The results of the testing demonstrated compliance on Kiln 1 at 446.4°F and on Kiln 2 at 395.9°F. The next compliance demonstration is due by November 29th and 30th, 2010 for the kilns.

Demonstration of Compliance testing was conducted on June 29 and September 8th and 10th, 2010 according to the requirements of the Code of Federal Regulations; Title 40 Part 60 & 63. RMCEINC calculated the dioxin / furan concentrations in terms of the pollutant emission rate – ng/DSCM @ %7 O_2, TEQ.

The June 29th 2010 test results demonstrated non-compliance for Kiln 2 at an operating temperature greater than that tested in 2008. Kiln 1 was not operating during the June test event due to maintenance and consequently was not tested at that time. On September 8th and 10th, 2010 both kilns were tested and demonstrated compliance at temperatures consistent with past successful testing.

The emissions for dioxins / furans are limited by Subpart LLL, Section §63.1343 to 0.40 ng/DSCM @ 7% O_2, TEQ when the average temperature at the inlet to the particulate matter control device is 400 °F or less and 0.20 ng/DSCM @ 7% O_2, TEQ when the average temperature at the inlet to the particulate matter control device is greater than 400 °F. The testing was conducted while the source operated within the full load range. The test results and the permitted limits for this facility are listed in **Table 2-1** as well as the parameters tested during this program.

TABLE.2-1 Facility Compliance Test Results and Permitted Limits

PARAMETER	K2-M23-01	K2-M23-02	K2-M23-03	AVERAGE
KILN 2 RESULTS:				
Test Date	6/29/10	6/29/10	6/29/10	
Test Time	1020 - 1325	1345- 1650	1710 – 2015	
Dioxin / Furan Emissions (ng/DSCM @ 7% O_2 TEQ)	0.42	0.64	1.18	0.75
Emission Limit, §63.1343, APCD > 400 °F	0.20 ng/DSCM @ 7% O_2 TEQ			
Volumetric Flow Rate, DSCFM	136,039	136,769	136,825	136,543
Temperature, °F	418.2	419.3	419.3	418.9
Oxygen Concentration, %	8.5	9.0	8.7	8.7
APCD Inlet Temperature, °F[1]	418.19[1]	418.70[1]	419.30[1]	418.73[1]
PARAMETER	**K2-M23-01**	**K2-M23-02**	**K2-M23-03**	**AVERAGE**
KILN 2 RESULTS:				
Test Date	9/8/10	9/8/10	9/8/10	
Test Time	835-1145	1200-1510	1523-1835	
Dioxin / Furan Emissions (ng/DSCM @ 7% O_2 TEQ)	0.10	0.15	0.21	0.16
Emission Limit, §63.1343, APCD < 400 °F	0.40 ng/DSCM @ 7% O_2 TEQ			
Volumetric Flow Rate, DSCFM	150,050	151,498	150,303	151,284
Temperature, °F	376.1	376.5	377.6	376.7
Oxygen Concentration, %	8.4	8.1	8.8	8.4
APCD Inlet Temperature, °F	392.69	392.36	393.10	392.71
PARAMETER	**K1-M23-01**	**K1-M23-02**	**K1-M23-03**	**AVERAGE**
KILN 1 RESULTS:				
Test Date	9/10/10	9/10/10	9/10/10	
Test Time	855-1205	1220-1528	1545-1854	
Dioxin / Furan Emissions (ng/DSCM @ 7% O_2 TEQ)	0.11	0.10	0.08	0.09
Emission Limit, §63.1343, APCD > 400 °F	0.20 ng/DSCM @ 7% O_2 TEQ			
Volumetric Flow Rate, DSCFM	87,968	86,663	88,240	87,624
Temperature, °F	393.1	394.6	392.6	
Oxygen Concentration, %	7.9	8.0	7.6	7.8
APCD Inlet Temperature, °F	443.51	443.52	444.16	443.73

[1] other than during a period of malfunction or scheduled compliance test, Kiln 2's temperatures have been below the 400°F tested in 2008 during all operation.

The compliance test program measured exhaust gas concentrations of Dioxins and Furans utilizing wet methods, to demonstrate compliance with the federal requirements. RMCEINC used procedures that conform to the requirements of CFR; Title 40 Part 51, 60 & 63 and EPA Test Methods 1, 2, 3, 4, 5 and 23 (CFR; Title 40 Part 60, Appendix A). The equipment and procedures RMCEINC used in meeting these requirements are described below. The corresponding test data is presented in **Appendix A, B & C.**

The Compliance tests were initiated on June 28 and September 8, 2010 for Kiln 2 and September 10, 2010 for Kiln 1. All tests were concluded on the same day.

3.0 SOURCE CEMS DESCRIPTIONS

3.1 Source Description

The heart of the Portland cement manufacturing process is the pyroprocessing system, which transforms raw mix into "clinker". The sequence of events that leads up to the final product can be divided into four stages:

1). Evaporation of uncombined water as the material temperature increases to $100^{O}C$.

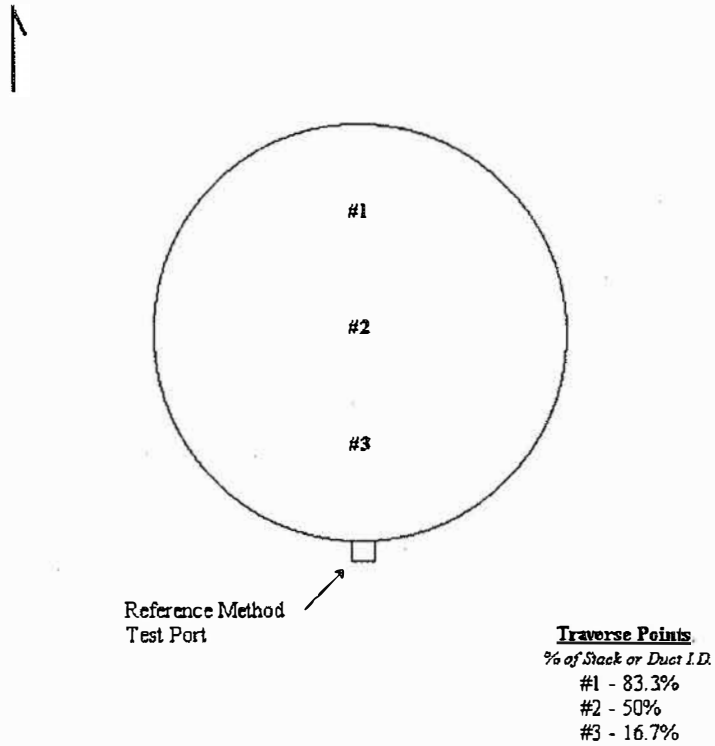
2). Dehydration as the temperature of the material increases from $100^{O}C$ to $430^{O}C$.

3). Calcination occurs between $900^{O}C$ and $982^{O}C$ and forms calcium oxide (CaO). During this stage, carbon dioxide (CO_2) evolves.

4). Reaction of the oxides in the kiln's burning zone form cement "clinker" at approximately $1510^{O}C$.

The kilns at the Lafarge North America - Joppa Facility use coal, petroleum coke and whole tires as fuel. At, and inside the feed end of Kiln 1, the hot gasses are cooled by a spray water system. Next the gasses from Kiln 1 continue up the riser through preheater cyclones and enter an electrostatic precipitator at temperatures that do not exceed limits established for dioxin and furan control ($446.4^{O}F$ as demonstrated in 2008). Kiln 2's hot gases exit the feed end of the kiln, continue up the riser through preheater cyclones and a spray water tower to cool the gases before entering the bag house at temperatures that do not exceed limits established for dioxin and furan control ($395.9^{O}F$ as demonstrated in 2008). Induced draft fans, located between the bag house or ESP and each kiln's stack draws the gases from the kilns and pushes them up the stacks. The primary emission from this facility are particulate matter (PM), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), and carbon dioxide (CO_2). This test program is to determine compliance with the PC MACT specifications regulating all Portland Cement Facilities.

FIGURE 3-1. SOURCE STACK CROSS DIAGRAM



Stack / Duct Information

Shape of the test plane	Kiln 1 - Round	Kiln 2 - Round
Internal diameter	132 "	108 "
Reference sampling system approximate height (AGL)	115' 6"	110'6.5"
Source sampling system approximate height (AGL)	105'	95'

4.0 REFERENCE TEST EQUIPMENT AND PROCEDURES

The certification test program measured exhaust gas concentrations of O_2/ CO_2, and Dioxins / Furans, and exhaust gas flow rate for comparison to the source permitted limits. RMCEINC used the procedures that conform to the requirements of CFR; Title 40 Part 60, Appendix B and EPA Test Methods 1, 2, 3, 3A, 4, 5 and 23 (CFR; Title 40 Part 60, Appendix A). The equipment and procedures RMCEINC used in meeting these requirements are described below.

4.1 Dioxin/Furan Emissions Testing

Samples for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF) are withdrawn isokinetically from the source using an EPA Method 23 sampling train.

Sample Collection. The sampling train consists of a Pyrex glass nozzle, a heated borosilicate glass probe, a Whatman EPM2000 glass fiber filter maintained at a temperature of $248^{O}F \pm 25^{O}F$, a water-cooled condenser, a sorbent trap containing XAD-2 resin, five chilled impingers, and a metering console. Each of the 12 points were sampled for 15 minutes, resulting in net run times of 180 minutes. The water-cooled condenser and

sorbent trap were arranged in a manner that allowed the condensate to drain vertically through the trap. Gas entering the trap was maintained at or below 68°F.

The first impinger (optional knockout) remained empty, the second and third impingers each contained 100 ml of DI water, the fourth remains empty, and the fifth contains preweighed silica gel. Sealing greases were not used on any portion of the sample train.

Sample Train Component Preparation. Glassware. All glass parts of the sample train including the sorbent trap were pre-cleaned prior to sampling according to the following procedures. The glassware was capped with pre-cleaned foil or glass plugs until sample train assembly. Following sample recovery, the glassware was reused at the same sampling location. All glassware is cleaned and treated in accordance with EPA Method 23.

XAD-2 Resin: The XAD-2 resin is purchased pre-cleaned from Supelco Chromatography Products (or similar). The sorbent trap was charged with 20 to 30 grams of the pre-cleaned resin. Care was taken to ensure that the resin is kept at temperatures below 120°F before and after sample collection to prevent resin decomposition. The period of time between charging the trap and use in the field was minimized and did not exceed 14 days.

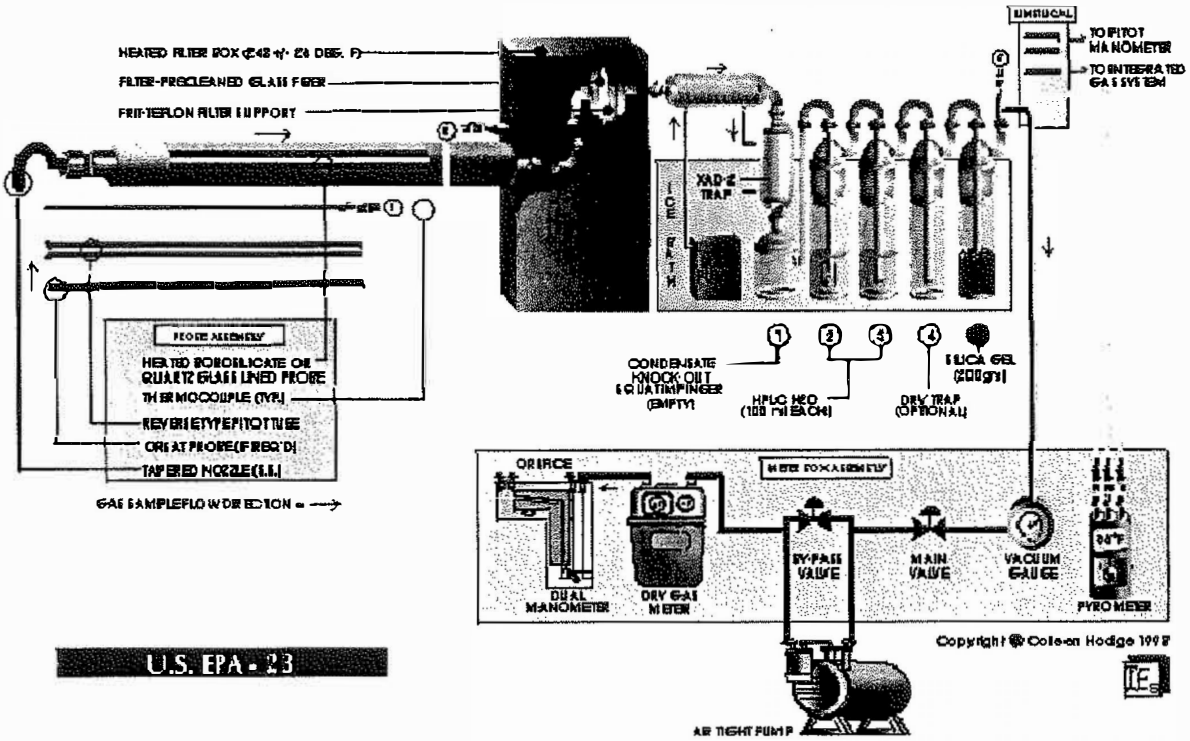
Sample Recovery. Recovery of the samples and assembly of the sample trains for reuse were conducted in the laboratory located at the job site. The DI water reagent was returned to the original 1000-ml glass jar, weighed, the weight recorded on the label, and the liquid level marked. The silica gel was returned to the original tarred container, weighed, and the weight recorded on the label. The volume of water vapor condensed in the impingers and the volume of water vapor collected in the XAD resin and silica gel were summed and entered into moisture content calculations.

The sample exposed components of the sampling train up to the XAD cartridge was rinsed with acetone, methylene chloride, then toluene (archived), and finally with acetone (which was discarded). All samples were stored at 40°F until analyzed.

One field blank was recovered per location. A field blank consisted of a complete sampling train, which is assembled as though to collect a sample, but flue gas was not be pulled through the train. The field blank train was leak checked the same number of times as a sampling train used during a run. The train was placed at the sampling location for the duration of one run. The train was then disassembled for recovery using the same procedure used to recover actual samples. The field blank was obtained using a train that has previously been used to collect at least one actual sample from the test site.

Sample Analysis. The filter(s), XAD-2 resin, acetone, methylene chloride, and toluene rinses were analyzed for PCDD/PCDF according to EPA Method 23. All extracts from one run were combined and volume reduced to 1 ml resulting in one extract per run from which an aliquot was taken for analysis.

FIGURE 4-1. REFERENCE METHOD SAMPLING SYSTEM DIAGRAM – EPA METHOD 23



4.2 Volumetric Flow Rates

RMCEINC determined the number and location of the traverse points for volumetric flow rate measurement according to the procedures outlined in EPA Method 1. When determining the location and number of sample points, RMCEINC took into account the number of sample ports, duct configuration, and location of upstream and downstream flow disturbances.

The flue gas velocity and volumetric flow rate were determined according to the procedures of EPA Method 2. A Type S Pitot tube with a Type K thermocouple was used to measure velocity pressure and stack gas temperature at each sample point. Each Pitot tube conformed to the geometric specifications of EPA Method 2 and was assigned a coefficient of 0.84. An umbilical cord connected the Pitot tube to a calibrated digital differential pressure indicator or inclined manometer and digital temperature readout. RMCEINC leak-checked the Pitot tube prior to conducting the traverse.

RMCEINC determined the flue gas composition and molecular weight using EPA Methods 3A and 4 procedures during the test. The Method 23 sampling train was used for the moisture calculations.

5.0 REFERENCE EQUIPMENT QUALITY ASSURANCE PROCEDURES

RMCEINC followed the calibration and quality assurance procedures of EPA Methods 1, 2, 3A, 4, 5 and 23 throughout the test program. The maintenance for our meterboxes, probes, analyzers and a majority of our other test equipment is performed off site by either Clean Air Engineering or Millenium Instruments. These companies ensure that our equipment is operating correctly and within the specification of the respective methods. All equipment is calibrated in accordance with the EPA Methods and guidelines. The meter box calibrations, and pitot tube inspections are included in **Appendix E**.

RMCEINC uses computers throughout the test program. Spreadsheets and software programs are checked in our office for accuracy. Software used by RMCEINC is structured to eliminate human errors in data entry where possible by automating the process. When possible RMCEINC, inputs field data directly into the DAS system and eliminates the hand written field data sheets. These systems provide an accurate measurement of the raw test data and are not used to modify or change test data in any manner. Equations used in these systems are taken directly from the CFR when possible and notations are provided if originated from an alternate source or customized in any manner.

The laboratory utilized for this test program is a NELAP Certified Laboratory. A copy of the chain of custody for this test program is included in **Appendix F**.

RMCEINC uses computers throughout the test program. Spreadsheets and software programs are checked in our office for accuracy. Software used by RMCEINC is structured to eliminate human errors in data entry where possible by automating the process. When possible, RMCEINC inputs field data directly into the DAS system and eliminates the hand written field data sheets. These systems provide an accurate measurement of the raw test data and are not used to modify or change test data in any manner. Equations used in the systems are taken directly from the CFR when possible and notations are provided if originated from an alternate source or customized in any manner.

RMCEINC uses an incline manometer or digital manometer across the Pitot tube to measure pressure differentials. Incline manometers are leveled and zeroed before beginning a test and as needed through out the testing program. Digital manometers are checked at five (5) points throughout the operating range prior to beginning a test program and are rechecked as needed throughout the test.

APPENDIX A. DIOXIN / FURAN SUMMARY TABLES

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results

Plant	Lafarge North America	Run	K2-M23-01	Time Start	835
Test Location	Kiln 2	Date	8-Sep-10	Time End	1145
Condition	Maximum - Kiln Temp < 400 Deg F	Baro	29.89	Run Time	180

Dry Gas Meter Volume, ACF	143.617	Vmstd, DSCM	3.90	Weight, Ms	28.41
Meter Box Calibration (Gamma)	0.983	Water Collected,ml	729.5	Stack Dia, in	9160.88
Static Pressure	-0.77	Vwstd, %	34.34	Nozzle Dia, In	0.25
Delta H, in H2O	2.24	Moisture Content, %	19.97	Delta p, In H2O	1.12
Meter Box Temp, F	84	Fraction, Mfd	0.800	Velocity, Ft/sec	75.48
Stack Temp, F	376	Oxygen, %	8.4	Qaw, ACFM	288,098
Stack Pressure, in H2O	29.833	Carbon Dioxide, %	16.7	Qstd, DSCFM	145,205
Vmstd, DSCF	137.6402	Weight, Md	31.01	Isokenetic, %	94.7

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.037		0.009492	0.009492	0.009492
1,2,3,7,8 PeCDD	pecdd	0.5	0.037		0.009466	0.004733	0.004733
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.015		0.003746	0.000375	0.000375
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.029		0.007465	0.000747	0.000747
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.018		0.004566	0.000457	0.000457
1,2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.145		0.037199	0.000372	0.000372
OCDD	ocdd	0.001	0.274		0.070293	0.000070	0.000070
2,3,7,8 TCDF	tcdf	0.1	0.752		0.192921	0.019292	0.019292
1,2,3,7,8 PeCDF	pecdf	0.05	0.238		0.061057	0.003053	0.003053
2,3,4,7,8 PeCDF	pecdf	0.5	0.319		0.081837	0.040919	0.040919
1,2,3,4,7,8 HxCDF	hxcdf	0.1	0.131		0.033607	0.003361	0.003361
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.116		0.029759	0.002976	0.002976
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.094		0.024012	0.002401	0.002401
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.004		0.001003	0.000100	0.000100
1,2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.226		0.057979	0.000580	0.000580
1,2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.034		0.008825	0.000088	0.000088
OCDF	ocdf	0.001	0.152		0.038995	0.000039	0.000039

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		Emissions ng/m3 @ 7% O2	Emissions gr/DSCF @7% O2
Total TCDD	2.790		0.716	0.716	Dioxin TEQ w/ EMPC	0.0181	
Total PeCDD	0.960		0.246	0.246	Furan TEQ w/ EMPC	0.0595	
Total HxCDD	0.450		0.115	0.115	Total TEQ w/ EMPC	0.0990	4.21E-11
Total HpCDD	0.308		0.079	0.079	Dioxin TEQ w/o EMPC	0.0181	
Total OCDD	0.274		0.070	0.070	Furan TEQ w/o EMPC	0.0595	
					Total TEQ w/o EMPC	**0.0990**	4.21E-11
Total TCDF	31.700		8.132	8.132	Total Dioxins w/ EMPC	1.3642	
Total PeCDF	4.970		1.275	1.275	Total Furans w/ EMPC	10.9130	
Total HxCDF	1.110		0.285	0.285	Total w/ EMPC	12.2772	
Total HpCDF	0.322		0.083	0.083	Total Dioxins w/o EMPC	1.3642	
Total OCDF	0.152		0.039	0.039	Total Furans w/o EMPC	10.9130	
					Total w/o EMPC	12.2772	

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results
REVISED

Plant	Lafarge North America	Run	K2-M23-02	Time Start	1200
Test Location	Kiln 2	Date	8-Sep-10	Time End	1510
Condition	Maximum	Baro	29.89	Run Time	180

Dry Gas Meter Volume, ACF	144.832	Vmstd, DSCM	3.90	Weight, Ms	28.56
Meter Box Calibration (Gamma)	0.983	Water Collected,ml	695.7	Stack Dia, in	9160.88
Static Pressure	-0.79	Vwstd, %	32.75	Nozzle Dia, In	0.25
Delta H, in H2O	2..24	Moisture Content, %	19.23	Delta p, In H2O	1.12
Meter Box Temp, F	89	Fraction, Mfd	0.808	Velocity, Ft/sec	75.32
Stack Temp, F	377	Oxygen, %	8.1	Qaw, ACFM	287,516
Stack Pressure, in H2O	29.832	Carbon Dioxide, %	17.2	Qstd, DSCFM	146,062
Vmstd, DSCF	137.54047	Weight, Md	31.08	Isokenetic, %	94.4

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.067		0.017278	0.017278	0.017278
1,2,3,7,8 PeCDD	pecdd	1	0.048		0.012220	0.012220	0.012220
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.015		0.003748	0.000375	0.000375
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.025		0.006470	0.000647	0.000647
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.018		0.004621	0.000462	0.000462
2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.092		0.023568	0.000236	0.000236
OCDD	ocdd	0.001	0.188		0.048265	0.000048	0.000048
2,3,7,8 TCDF	tcdf	0.1	1.200		0.308076	0.030808	0.030808
1,2,3,7,8 PeCDF	pecdf	0.05	0.377		0.096787	0.004839	0.004839
2,3,4,7,8 PeCDF	pecdf	0.5	0.504		0.129392	0.064696	0.064696
1,2,3,4,7,8 HxCDF	hxcdf	0.1	0.155		0.039793	0.003979	0.003979
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.151		0.038766	0.003877	0.003877
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.098		0.025211	0.002521	0.002521
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.005		0.001350	0.000135	0.000135
2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.163		0.041847	0.000418	0.000418
2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.023		0.005776	0.000058	0.000058
OCDF	ocdf	0.001	0.116		0.029781	0.000030	0.000030

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		**Emissions ng/m3 @ 7% O2**	**Emissions gr/DSCF @7% O2**
Total TCDD	4.410		1.132	1.132	Dioxin TEQ w/ EMPC	0.0340	
Total PeCDD	1.470		0.377	0.377	Furan TEQ w/ EMPC	0.0875	
Total HxCDD	0.446		0.115	0.115	Total TEQ w/ EMPC	0.1549	**6.77E-11**
Total HpCDD	0.207		0.053	0.053	Dioxin TEQ w/o EMPC	0.0340	
Total OCDD	0.188		0.048	0.048	Furan TEQ w/o EMPC	0.0875	
					Total TEQ w/o EMPC	**0.1549**	**6.77E-11**
Total TCDF	50.300		12.914	12.914	Total Dioxins w/ EMPC	1.8738	
Total PeCDF	8.070		2.072	2.072	Total Furans w/ EMPC	16.7281	
Total HxCDF	1.290		0.331	0.331	Total w/ EMPC	18.6019	
Total HpCDF	0.226		0.058	0.058	Total Dioxins w/o EMPC	1.8738	
Total OCDF	0.116		0.030	0.030	Total Furans w/o EMPC	16.7281	
					Total w/o EMPC	18.6019	

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results
REVISED

Plant	Lafarge North America	Run	K2-M23-03	Time Start	1523
Test Location	Kiln 2	Date	8-Sep-10	Time End	1835
Condition	Maximum	Baro	29.89	Run Time	180

Dry Gas Meter Volume, ACF	143.395	Vmstd, DSCM	3.88	Weight, Ms	28.48
Meter Box Calibration (Gamma)	0.983	Water Collected,ml	682.4	Stack Dia, Ft	9160.88
Static Pressure	-0.77	Vwstd, %	32.12	Nozzle Dia, In	0.25
Delta H, in H2O	2.2	Moisture Content, %	19.00	Delta p, In H2O	1.1
Meter Box Temp, F	86	Fraction, Mfd	0.810	Velocity, Ft/sec	74.79
Stack Temp, F	378	Oxygen, %	8.8	Qaw, ACFM	285,486
Stack Pressure, in H2O	29.833	Carbon Dioxide, %	16.2	Qstd, DSCFM	145,273
Vmstd, DSCF	136.9106	Weight, Md	30.94	Isokenetic, %	99.2

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.085		0.021871	0.021871	0.021871
1,2,3,7,8 PeCDD	pecdd	0.5	0.072		0.018441	0.009220	0.009220
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.022		0.005648	0.000565	0.000565
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.037		0.009414	0.000941	0.000941
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.018		0.004668	0.000467	0.000467
1,2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.093		0.024037	0.000240	0.000240
OCDD	ocdd	0.001	0.157		0.040492	0.000040	0.000040
2,3,7,8 TCDF	tcdf	0.1	1.610		0.415236	0.041524	0.041524
1,2,3,7,8 PeCDF	pecdf	0.05	0.466		0.120186	0.006009	0.006009
2,3,4,7,8 PeCDF	pecdf	0.5	0.748		0.192917	0.096459	0.096459
1,2,3,4,7,8 HxCDF	hxcdf	0.1	0.186		0.047971	0.004797	0.004797
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.171		0.044103	0.004410	0.004410
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.114		0.029402	0.002940	0.002940
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.005		0.001354	0.000135	0.000135
1,2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.163		0.042039	0.000420	0.000420
1,2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.023		0.005803	0.000058	0.000058
OCDF	ocdf	0.001	0.104		0.026823	0.000027	0.000027

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		Emissions ng/m3 @ 7% O2	Emissions gr/DSCF @7% O2
Total TCDD	5.460		1.408	1.408	Dioxin TEQ w/ EMPC	0.0383	
Total PeCDD	1.990		0.513	0.513	Furan TEQ w/ EMPC	0.1801	
Total HxCDD	0.544		0.140	0.140	Total TEQ w/ EMPC	0.2184	**9.55E-11**
Total HpCDD	0.214		0.055	0.055	Dioxin TEQ w/o EMPC	0.0383	
Total OCDD	0.157		0.040	0.040	Furan TEQ w/o EMPC	0.1801	
					Total TEQ w/o EMPC	0.2184	**9.55E-11**
Total TCDF	59.800		15.423	15.423	Total Dioxins w/ EMPC	2.4784	
Total PeCDF	10.800		2.785	2.785	Total Furans w/ EMPC	21.5009	
Total HxCDF	1.620		0.418	0.418	Total w/ EMPC	23.9792	
Total HpCDF	0.246		0.063	0.063	Total Dioxins w/o EMPC	2.4784	
Total OCDF	0.104		0.027	0.027	Total Furans w/o EMPC	21.5009	
					Total w/o EMPC	23.9792	

Three Run Average 0.16

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results

Plant	Lafarge North America	Run	K1-M23-01	Time Start	855
Test Location	Kiln 1	Date	10-Sep-10	Time End	1205
Condition	Maximum Kiln Temp > 400 Deg F	Baro	30.05	Run Time	180

Dry Gas Meter Volume, ACF	130.512	Vmstd, DSCM	3.63	Weight, Ms	29.38
Meter Box Calibration (Gamma)	0.983	Water Collected,ml	518	Stack Dia, in	13684.78
Static Pressure	-0.10	Vwstd, %	24.38	Nozzle Dia, In	0.41
Delta H, in H2O	1.88	Moisture Content, %	15.98	Delta p, In H2O	0.12
Meter Box Temp, F	73.3	Fraction, Mfd	0.840	Velocity, Ft/sec	24.46
Stack Temp, F	393.1	Oxygen, %	7.9	Qaw, ACFM	139,454
Stack Pressure, in H2O	30.038	Carbon Dioxide, %	20.2	Qstd, DSCFM	72,801
Vmstd, DSCF	128.157	Weight, Md	31.55	Isokenetic, %	102.8

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.040		0.010938	0.010938	0.010938
1,2,3,7,8 PeCDD	pecdd	0.5	0.065		0.017827	0.008913	0.008913
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.025		0.006778	0.000678	0.000678
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.038		0.010580	0.001058	0.001058
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.023		0.006420	0.000642	0.000642
1,2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.082		0.022455	0.000225	0.000225
OCDD	ocdd	0.001	0.105		0.028930	0.000029	0.000029
2,3,7,8 TCDF	tcdf	0.1	0.554		0.152642	0.015264	0.015264
1,2,3,7,8 PeCDF	pecdf	0.05	0.192		0.052901	0.002645	0.002645
2,3,4,7,8 PeCDF	pecdf	0.5	0.398		0.109660	0.054830	0.054830
1,2,3,4,7,8 HxCDF	hxcdf	0.1	0.119		0.032788	0.003279	0.003279
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.110		0.030308	0.003031	0.003031
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.078		0.021491	0.002149	0.002149
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.005		0.001389	0.000139	0.000139
1,2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.120		0.033063	0.000331	0.000331
1,2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.014		0.003802	0.000038	0.000038
OCDF	ocdf	0.001	0.046		0.012619	0.000013	0.000013

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		Emissions ng/m3 @ 7% O2	Emissions gr/DSCF @7% O2
Total TCDD	4.37		1.204	1.204	Dioxin TEQ w/ EMPC	0.0240	
Total PeCDD	2.04		0.562	0.562	Furan TEQ w/ EMPC	0.0711	
Total HxCDD	0.77		0.212	0.212	Total TEQ w/ EMPC	0.1114	4.87E-11
Total HpCDD	0.10		0.028	0.028	Dioxin TEQ w/o EMPC	0.0240	
Total OCDD	0.11		0.029	0.029	Furan TEQ w/o EMPC	0.0711	
					Total TEQ w/o EMPC	0.1114	4.87E-11
Total TCDF	20.50		5.648	5.648	Total Dioxins w/ EMPC	2.1756	
Total PeCDF	4.12		1.135	1.135	Total Furans w/ EMPC	7.4591	
Total HxCDF	0.63		0.174	0.174	Total w/ EMPC	9.6348	
Total HpCDF	0.02		0.006	0.006	Total Dioxins w/o EMPC	2.1756	
Total OCDF	0.05		0.013	0.013	Total Furans w/o EMPC	7.4591	
					Total w/o EMPC	9.6348	

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results
REVISED

Plant	Lafarge North America	Run	K1-M23-02	Time Start	1220
Test Location	Kiln 1	Date	10-Sep-10	Time End	1528
Condition	Maximum Kiln Temp > 400 Deg F	Baro	30.05	Run Time	180

Dry Gas Meter Volume, ACF	130.512	Vmstd, DSCM	3.61	Weight, Ms	29.57
Meter Box Calibration (Gamma)	0.983	Water Collected,ml	503.1	Stack Dia, in	13684.78
Static Pressure	-0.15	Vwstd, %	23.68	Nozzle Dia, In	0.41
Delta H, in H2O	1.83	Moisture Content, %	15.65	Delta p, In H2O	0.12
Meter Box Temp, F	75.5	Fraction, Mfd	0.843	Velocity, Ft/sec	24.40
Stack Temp, F	394.6	Oxygen, %	8	Qaw, ACFM	139,141
Stack Pressure, in H2O	30.039	Carbon Dioxide, %	21.2	Qstd, DSCFM	72,799
Vmstd, DSCF	127.61498	Weight, Md	31.71	Isokenetic, %	99.6

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.032		0.008854	0.008854	0.008854
1,2,3,7,8 PeCDD	pecdd	1	0.056		0.015412	0.015412	0.015412
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.020		0.005617	0.000562	0.000562
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.045		0.012534	0.001253	0.001253
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.020		0.005506	0.000551	0.000551
2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.094		0.025871	0.000259	0.000259
OCDD	ocdd	0.001	0.125		0.034587	0.000035	0.000035
2,3,7,8 TCDF	tcdf	0.1	0.397		0.109849	0.010985	0.010985
1,2,3,7,8 PeCDF	pecdf	0.05	0.154		0.042611	0.002131	0.002131
2,3,4,7,8 PeCDF	pecdf	0.5	0.300		0.083009	0.041505	0.041505
1,2,3,4,7,8 HxCDF	hxcdf	0.1	0.096		0.026480	0.002648	0.002648
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.093		0.025650	0.002565	0.002565
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.074		0.020559	0.002056	0.002056
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.007		0.001818	0.000182	0.000182
2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.118		0.032650	0.000327	0.000327
2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.013		0.003597	0.000036	0.000036
OCDF	ocdf	0.001	0.055		0.015135	0.000015	0.000015

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		Emissions ng/m3 @ 7% O2	Emissions gr/DSCF @7% O2
Total TCDD	5.84		1.616	1.61[illegible]	[illegible]oxin TEQ w/ EM[illegible]C	0.0290	
Total PeCDD	2.80		0.775	0.77[illegible]	[illegible]uran TEQ w/ EMPC	0.0555	
Total HxCDD	1.35		0.374	0.37[illegible]	[illegible]otal TEQ w/ EM[illegible]C	0.0963	4.21E-11
Total HpCDD	0.11		0.031	0.0[illegible]	[illegible]xin TEQ w/o EM[illegible]C	0.0290	
Total OCDD	0.13		0.035	0.0[illegible]	[illegible]ran TEQ w/o EM[illegible]C	0.0555	
					[illegible]tal TEQ w/o EM[illegible]C	0.0963	4.21E-11
Total TCDF	16.40		4.538	4.5[illegible]	[illegible]al Dioxins w/ EM[illegible]C	3.0488	
Total PeCDF	3.13		0.866	0.8[illegible]	[illegible]tal Furans w/ EMPC	6.0148	
Total HxCDF	0.57		0.157	0.1[illegible]	Total w/ E[illegible]C	9.0636	
Total HpCDF	0.02		0.006	0.0[illegible]	[illegible] Dioxins w/o E[illegible]C	3.0488	
Total OCDF	0.05		0.015	0.0[illegible]	[illegible]l Furans w/o EM[illegible]C	6.0148	
					Total w/o E[illegible]C	9.0636	

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results
REVISED

Plant	Lafarge North America	Run	K1-M23-03	Time Start	1545
Test Location	Kiln 1	Date	10-Sep-10	Time End	1854
Condition	Maximum Kiln Temp > 400 Deg F	Baro	30.05	Run Time	180

Dry Gas Meter Volume, ACF	130.308	Vmstd, DSCM	3.60	Weight, Ms	29.61
Meter Box Calibration (Gamma)	0.983	Water Collected,ml	462	Stack Dia, Ft	13684.78
Static Pressure	-0.16	Vwstd, %	21.75	Nozzle Dia, In	0.41
Delta H, in H2O	1.89	Moisture Content, %	14.61	Delta p, In H2O	0.12
Meter Box Temp, F	76.9	Fraction, Mfd	0.854	Velocity, Ft/sec	24.36
Stack Temp, F	392.6	Oxygen, %	7.8	Qaw, ACFM	138,885
Stack Pressure, in H2O	30.038	Carbon Dioxide, %	20.5	Qstd, DSCFM	73,734
Vmstd, DSCF	127.1018	Weight, Md	31.59	Isokenetic, %	100.9

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.027		0.007529	0.007529	0.007529
1,2,3,7,8 PeCDD	pecdd	0.5	0.045		0.012446	0.006223	0.006223
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.022		0.006001	0.000600	0.000600
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.037		0.010251	0.001025	0.001025
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.017		0.004834	0.000483	0.000483
1,2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.082		0.022697	0.000227	0.000227
OCDD	ocdd	0.001	0.135		0.037505	0.000038	0.000038
2,3,7,8 TCDF	tcdf	0.1	0.360		0.100013	0.010001	0.010001
1,2,3,7,8 PeCDF	pecdf	0.05	0.151		0.041950	0.002097	0.002097
2,3,4,7,8 PeCDF	pecdf	0.5	0.238		0.066120	0.033060	0.033060
1,2,3,4,7,8 HxCDF	hxcdf	0.1	0.162		0.045006	0.004501	0.004501
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.100		0.027670	0.002767	0.002767
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.075		0.020725	0.002072	0.002072
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.007		0.001836	0.000184	0.000184
1,2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.185		0.051396	0.000514	0.000514
1,2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.051		0.014224	0.000142	0.000142
OCDF	ocdf	0.001	0.203		0.056396	0.000056	0.000056

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC
Total TCDD	5.690		1.581	1.[illegible]
Total PeCDD	2.530		0.703	0.[illegible]
Total HxCDD	0.951		0.264	0.[illegible]
Total HpCDD	0.105		0.029	0.[illegible]
Total OCDD	0.135		0.038	0.[illegible]
Total TCDF	11.600		3.223	3.[illegible]
Total PeCDF	2.320		0.645	[illegible]
Total HxCDF	0.470		0.131	0.[illegible]
Total HpCDF	0.073		0.020	0.0[illegible]
Total OCDF	0.203		0.056	[illegible]

	Emissions ng/m3 @ 7% O2	Emissions gr/DSCF @7% O2
Dioxin TEQ w/ EMPC	0.0171	
Furan TEQ w/ EMPC	0.0588	
Total TEQ w/ EMPC	0.0759	3.32E-11
Dioxin TEQ w/o EMPC	0.0171	
Furan TEQ w/o EMPC	0.0588	
Total TEQ w/o EMPC	0.0759	3.32E-11
Total Dioxins w/ EMPC	2.7742	
Total Furans w/ EMPC	4.3234	
Total w/ EMPC	7.0975	
Total Dioxins w/o EMPC	2.7742	
Total Furans w/o EMPC	4.3234	
Total w/o EMPC	7.0975	

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results

Plant	Lafarge North America	Run	K2-M23-01	Time Start	1020
Test Location	Kiln 2	Date	29-Jun-10	Time End	1325
Condition	Maximum	Baro	29.89	Run Time	180

Dry Gas Meter Volume, ACF	137.903	Vmstd, DSCM	3.82	Weight, Ms	28.26
Meter Box Calibration (Gamma)	1.005	Water Collected,ml	732.1	Stack Dia, in	9160.88
Static Pressure	-0.75	Vwstd, %	34.46	Nozzle Dia, In	0.25
Delta H, in H2O	1.87	Moisture Content, %	20.34	Delta p, In H2O	1.03
Meter Box Temp, F	84	Fraction, Mfd	0.797	Velocity, Ft/sec	74.28
Stack Temp, F	416	Oxygen, %	8.5	Qaw, ACFM	283,539
Stack Pressure, in H2O	29.835	Carbon Dioxide, %	15.9	Qstd, DSCFM	135,760
Vmstd, DSCF	134.9996	Weight, Md	30.88	Isokenetic, %	103.1

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.053		0.013810	0.013810	0.013810
1,2,3,7,8 PeCDD	pecdd	0.5	0.233		0.060944	0.030472	0.030472
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.083		0.021657	0.002166	0.002166
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.149		0.038973	0.003897	0.003897
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.216		0.056497	0.005650	0.005650
1,2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.186		0.048651	0.000487	0.000487
OCDD	ocdd	0.001	0.194		0.050743	0.000051	0.000051
2,3,7,8 TCDF	tcdf	0.1	3.580		0.936391	0.093639	0.093639
1,2,3,7,8 PeCDF	pecdf	0.05	0.905		0.236713	0.011836	0.011836
2,3,4,7,8 PeCDF	pecdf	0.5	1.180		0.308643	0.154321	0.154321
1,2,3,4,7,8 HxCDF	hxcdf	0.1	1.320		0.345262	0.034526	0.034526
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.651		0.170277	0.017028	0.017028
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.011		0.002746	0.000275	0.000275
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.349		0.091285	0.009129	0.009129
1,2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.363		0.094947	0.000949	0.000949
1,2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.033		0.008605	0.000086	0.000086
OCDF	ocdf	0.001	0.179		0.046820	0.000047	0.000047

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		**Emissions ng/m3 @ 7% O2**	**Emissions gr/DSCF @7% O2**
Total TCDD	2.480		0.649	0.649	Dioxin TEQ w/ EMPC	0.0634	
Total PeCDD	3.050		0.798	0.798	Furan TEQ w/ EMPC	0.2558	
Total HxCDD	2.470		0.646	0.646	Total TEQ w/ EMPC	0.4241	**1.85E-10**
Total HpCDD	0.417		0.109	0.109	Dioxin TEQ w/o EMPC	0.0634	
Total OCDD	0.194		0.051	0.051	Furan TEQ w/o EMPC	0.2558	
					Total TEQ w/o EMPC	**0.4241**	**1.85E-10**
Total TCDF	8.610		2.252	2.252	Total Dioxins w/ EMPC	2.5248	
Total PeCDF	14.700		3.845	3.845	Total Furans w/ EMPC	8.9227	
Total HxCDF	6.420		1.679	1.679	Total w/ EMPC	11.4475	
Total HpCDF	0.523		0.137	0.137	Total Dioxins w/o EMPC	2.5248	
Total OCDF	0.179		0.047	0.047	Total Furans w/o EMPC	8.9227	
					Total w/o EMPC	11.4475	

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results
REVISED

Plant	Lafarge North America	Run	K2-M23-02	Time Start	1345
Test Location	Kiln 2	Date	29-Jun-10	Time End	1650
Condition	Maxi mum	Baro	29.89	Run Time	180

Dry Gas Meter Volume, ACF	132.943	Vmstd, DSCM	3.67	Weight, Ms	28.49
Meter Box Calibration (Gamma)	1.005	Water Collected,ml	654.9	Stack Dia, in	9160.88
Static Pressure	-0.79	Vwstd, %	30.83	Nozzle Dia, In	0.25
Delta H, in H2O	1.73	Moisture Content, %	19.22	Delta p, In H2O	1.02
Meter Box Temp, F	86.4	Fraction, Mfd	0.808	Velocity, Ft/sec	73.64
Stack Temp, F	416.2	Oxygen, %	9	Qaw, ACFM	281,094
Stack Pressure, in H2O	29.832	Carbon Dioxide, %	16.4	Qstd, DSCFM	136,422
Vmstd, DSCF	129.52794	Weight, Md	30.98	Isokenetic, %	98.4

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.107		0.029169	0.029169	0.029169
1,2,3,7,8 PeCDD	pecdd	1	0.228		0.062155	0.062155	0.062155
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.090		0.024535	0.002453	0.002453
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.175		0.047707	0.004771	0.004771
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.285		0.077694	0.007769	0.007769
2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.257		0.070061	0.000701	0.000701
OCDD	ocdd	0.001	0.281		0.076604	0.000077	0.000077
2,3,7,8 TCDF	tcdf	0.1	7.410		2.020047	0.202005	0.202005
1,2,3,7,8 PeCDF	pecdf	0.05	0.841		0.229266	0.011463	0.011463
2,3,4,7,8 PeCDF	pecdf	0.5	1.130		0.308050	0.154025	0.154025
1,2,3,4,7,8 HxCDF	hxcdf	0.1	1.380		0.376203	0.037620	0.037620
1,2,3,6,7,8 HxCDF	hxcdf	0.1	0.679		0.185103	0.018510	0.018510
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.012		0.003380	0.000338	0.000338
2,3,4,6,7,8 HxCDF	hxcdf	0.1	0.414		0.112861	0.011286	0.011286
2,3,4,6,7,8 HpCDF	hpcdf	0.01	0.488		0.133034	0.001330	0.001330
2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.052		0.014149	0.000141	0.000141
OCDF	ocdf	0.001	0.277		0.075513	0.000076	0.000076

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		**Emissions ng/m3 @ 7% O2**	**Emissions gr/DSCF @7% O2**
Total TCDD	5.400		1.472	1.472	Dioxin TEQ w/ EMPC	0.1251	
Total PeCDD	3.270		0.891	0.891	Furan TEQ w/ EMPC	0.2743	
Total HxCDD	2.810		0.766	0.766	Total TEQ w/ EMPC	0.6353	**2.78E-10**
Total HpCDD	0.587		0.160	0.160	Dioxin TEQ w/o EMPC	0.1251	
Total OCDD	0.281		0.077	0.077	Furan TEQ w/o EMPC	0.2743	
					Total TEQ w/o EMPC	**0.6353**	**2.78E-10**
Total TCDF	68.500		18.674	18.674	Total Dioxins w/ EMPC	3.9319	
Total PeCDF	14.900		4.062	4.062	Total Furans w/ EMPC	28.8703	
Total HxCDF	6.340		1.728	1.728	Total w/ EMPC	32.8022	
Total HpCDF	0.648		0.177	0.177	Total Dioxins w/o EMPC	3.9319	
Total OCDF	0.277		0.076	0.076	Total Furans w/o EMPC	28.8703	
					Total w/o EMPC	32.8022	

DIOXIN-FURAN EMISSION CALCULATIONS

Sampling Data & Results
REVISED

Plant	Lafarge North America	Run	K2-M23-03	Time Start	1710
Test Location	Kiln 2	Date	29-Jun-10	Time End	2015
Condition	Maximum	Baro	29.89	Run Time	180

Dry Gas Meter Volume, ACF	133.088	Vmstd, DSCM	3.68	Weight, Ms	28.51
Meter Box Calibration (Gamma)	1.005	Water Collected,ml	679.8	Stack Dia, Ft	9160.88
Static Pressure	-0.77	Vwstd, %	32.00	Nozzle Dia, In	0.25
Delta H, in H2O	1.73	Moisture Content, %	19.77	Delta p, In H2O	1.03
Meter Box Temp, F	85.6	Fraction, Mfd	0.802	Velocity, Ft/sec	73.53
Stack Temp, F	405.8	Oxygen, %	8.7	Qaw, ACFM	280,670
Stack Pressure, in H2O	29.833	Carbon Dioxide, %	17.2	Qstd, DSCFM	136,929
Vmstd, DSCF	129.8593	Weight, Md	31.10	Isokenetic, %	99.2

		TEF Factors	ng	EMPC	ng/m3	TEQ w/o EMPC	TEQ w/ EMPC
2,3,7,8 TCDD	tcdd	1	0.192		0.052208	0.052208	0.052208
1,2,3,7,8 PeCDD	pecdd	0.5	0.458		0.124537	0.062269	0.062269
1,2,3,4,7,8 HxCDD	hxcdd	0.1	0.225		0.061181	0.006118	0.006118
1,2,3,6,7,8 HxCDD	hxcdd	0.1	0.429		0.116652	0.011665	0.011665
1,2,3,7,8,9 HxCDD	hxcdd	0.1	0.601		0.163421	0.016342	0.016342
1,2,3,4,6,7,8 HpCDD	hpcdd	0.01	0.645		0.175385	0.001754	0.001754
OCDD	ocdd	0.001	0.559		0.152001	0.000152	0.000152
2,3,7,8 TCDF	tcdf	0.1	13.500		3.670856	0.367086	0.367086
1,2,3,7,8 PeCDF	pecdf	0.05	1.800		0.489447	0.024472	0.024472
2,3,4,7,8 PeCDF	pecdf	0.5	2.490		0.677069	0.338534	0.338534
1,2,3,4,7,8 HxCDF	hxcdf	0.1	3.130		0.851095	0.085109	0.085109
1,2,3,6,7,8 HxCDF	hxcdf	0.1	1.480		0.402435	0.040243	0.040243
1,2,3,7,8,9 HxCDF	hxcdf	0.1	0.036		0.009816	0.000982	0.000982
2,3,4,6,7,8 HxCDF	hxcdf	0.1	1.010		0.274634	0.027463	0.027463
1,2,3,4,6,7,8 HpCDF	hpcdf	0.01	1.360		0.369805	0.003698	0.003698
1,2,3,4,7,8,9 HpCDF	hpcdf	0.01	0.124		0.033717	0.000337	0.000337
OCDF	ocdf	0.001	0.667		0.181367	0.000181	0.000181

Total Dioxin-Furan Emissions

	ng	EMPC	ng/m3 without EMPC	ng/m3 with EMPC		Emissions ng/m3 @ 7% O2	Emissions gr/DSCF @7% O2
Total TCDD	8.510		2.314	2.314	Dioxin TEQ w/ EMPC	0.1715	
Total PeCDD	7.120		1.936	1.936	Furan TEQ w/ EMPC	1.0119	
Total HxCDD	5.830		1.585	1.585	Total TEQ w/ EMPC	1.1833	5.17E-10
Total HpCDD	1.480		0.402	0.402	Dioxin TEQ w/o EMPC	0.1715	
Total OCDD	0.559		0.152	0.152	Furan TEQ w/o EMPC	1.0119	
					Total TEQ w/o EMPC	1.1833	5.17E-10
Total TCDF	99.700		27.110	27.110	Total Dioxins w/ EMPC	7.2801	
Total PeCDF	30.300		8.239	8.239	Total Furans w/ EMPC	45.2988	
Total HxCDF	13.500		3.671	3.671	Total w/ EMPC	52.5789	
Total HpCDF	2.050		0.557	0.557	Total Dioxins w/o EMPC	7.2801	
Total OCDF	0.667		0.181	0.181	Total Furans w/o EMPC	45.2988	
					Total w/o EMPC	52.5789	

Three Run Average 0.75

APPENDIX B. REFERENCE TEST DATA

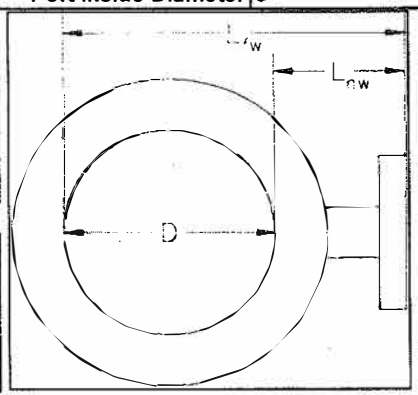
- ◊ **Method 1**
- ◊ **Method 2**
- ◊ **Method 3**
- ◊ **Method 4**
- ◊ **Method 5/23**

KILN 2 - FIELD DATA

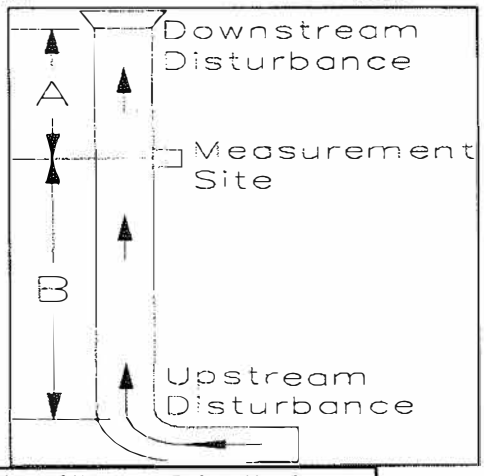
METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name	LaFarge	**Date**	09/08/10
Sampling Location	Kiln 2	**Project #**	2010-11015
Operator	AM/GC	**# of Ports Available**	4
Stack Type	Circular	**# of Ports Used**	4
Stack Size	Large	**Port Inside Diameter**	6

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	120.00	in
Distance to Near Wall of Stack	(L_{nw})	12.00	in
(=Lfw - Lnw) **Diameter of Stack**	(D)	108.00	in
(=3.14(D/2/Cunits)2) **Area of Stack**	(A_s)	63.62	ft^2



Distance from Port to Disturbances			
Distance Upstream	(B)	1140.00	in
(=B/D) **Diameters Upstream**	(B_D)	10.56	diameters
Distance Downstream	(A)	1020.00	in
(=A/D) **Diameters Downstream**	(A_D)	9.44	diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		Minimum Number of[1] Traverse Points	
Up Stream	Down Stream	Particulate Points	Velocity Points
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec		12	12
Downstream Spec		12	12
Traverse Pts Required		12	12

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.
[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

Number of Traverse Points Used			
4	Ports by	3	Across
12	Pts Used	12	Required
☑	Particulate	☐	Velocity

Location of Traverse Points in Circular Stacks						
Traverse Point Number	(Fraction of Stack Diameter from Inside Wall to Traverse Point) Number of Traverse Points on a Diameter					
	2	4	6	8	10	12
1	.146	.067	.044	.032	.026	.021
2	.854	.250	.146	.105	.082	.067
3		.750	.296	.194	.146	.118
4		.933	.704	.323	.226	.177
5			.854	.677	.342	.250
6			.956	.806	.658	.356
7				.895	.774	.644
8				.968	.854	.750
9					.918	.823
10					.974	.882
11						.933
12						.979

Traverse Point Locations			
Traverse Point Number	**Fraction of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Nipple Length**
		in	in
1	0.044	4 6/8	16 6/8
2	0.146	15 6/8	27 6/8
3	0.296	32	44
4			
5			
6			
7			
8			
9			
10			
11			
12			

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name	LaFarge			**Date**	09/08/10
Sampling Location	Kiln 2			**Project #**	2010- 11015
Operator	AM/GC			**# of Ports Used**	4
Stack Type	Circular			**Pitot Identification**	
Pitot Leak Check	☑	**PreTest**	☑ **PostTest**	**Pitot Coefficient (C_p)**	0.84

Stack Dimensions			
Diameter or Length of Stack	(D)	84.00	in
Width of Stack	(W)		in
Area of Stack	(A_s)	38.48	ft^2

Pressures			
Barometric Pressure	(P_b)	29.95	in Hg
Static Pressure	(P_{static})	-0.75	in H_2O
Absolute Stack Pressure	(P_s)	29.89	in Hg

Stack Gas Composition				
Composition Data:	**Actual**	☑	**Estimated**	☐
Carbon Dioxide Concentration	(%CO_2)	18.0	%	
Oxygen Concentration	(%O_2)	8.2	%	
Carbon Monoxide Concentration	(%CO)	0.0	%	
Nitrogen Concentration	(%N_2)	73.8	%	
Stack Moisture Content	(B_{ws})	16.500		
Stack Dry Molecular Weight	(M_d)	31.21	lb/lb-mole	
Stack Wet Molecular Weight	(M_s)	29.03	lb/lb-mole	

Results			
Avg Stack Gas Velocity	(v_s)	74.1	ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})	5415928	dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})	90265	dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})	171118	ascf/min

Stack Cross Section Schematic

Velocity Traverse Data

Run Number	K2-M23-V1		
Run Time			
Traverse Point	**Velocity Head** (Δp)	**Stack Temp** (t_s)	**Local Velocity** $(v_s)_i$
	in H_2O	°F	ft/sec
A-1	0.93	373	67.8
A-2	0.99	372	70.0
A-3	1.10	376	73.9
B-1	1.20	375	77.2
B-2	1.30	375	80.3
B-3	1.30	374	80.3
C-1	0.95	377	68.7
C-2	0.97	376	69.4
C-3	1.00	378	70.6
D-1	1.00	375	70.4
D-2	1.30	374	80.3
D-3	1.30	376	80.4
Average[1]	1.05	375	

[1] Please report the average of the square roots of Δp, or, $(\Delta p)^{1/2}_{avg} = {}^1/_n\Sigma(\Delta p^{1/2})$

Formulas Used

$A_s = DW/K_u$ for Rectangular Stacks

$A_s = (\pi(D/2)^2)/K_u$ for Circular Stacks

where $K_u = 1$ for metric units

where $K_u = 144$ (in^2/ft^2) for English units

$P_s = P_{bar} + P_{static}/13.6$

$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$

$M_d = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%CO)$

$M_s = M_d(1 - B_{ws}) + 18B_{ws}$

$(\Delta p)^{1/2}_{avg} = {}^1/_n\Sigma(\Delta p^{1/2})$

$T_{s(avg)} = {}^1/_n\Sigma t_s + T_u$

where $T_u = 273$ °K for metric units

where $T_u = 460$ °R for English units

$v_s = K_pC_p(\Delta p)^{1/2}_{avg}\,(T_{s(avg)}/(P_sM_s))^{1/2}$

where $K_p = 34.97$ for metric units

where $K_p = 85.49$ for English units

$Q_{sd} = 3600(1 - B_{ws})v_sA_s(T_{std}/T_{s(avg)})(P_s/P_{std})$

where $T_{std} = 293$ °K, $P_{std} = 760$ mm Hg, for metric units

where $T_{std} = 528$ °R, $P_{std} = 29.92$ in Hg, for English units

METHOD 3 - GAS ANALYSIS FOR THE DETERMINATION OF DRY MOLECULAR WEIGHT

Plant Name	LaFarge			Date	09/08/10
Sampling Location	Kiln 2			Project #	2010- 11015
Operator	AM/GC			# of Ports Used	4
Fuel Type	N/A	Minimum Fuel Factor		Maximum Fuel Factor	
Orsat Leak Check	☑	PreTest	☑	PostTest	Orsat Identification

Gas Analysis Data

Run Number	K2-M23-1			Run Start Time	8:35	Run Stop Time		11:45
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
Orsat	16.7	25.1		16.7	8.4	0.0	74.9	31.01	0.00
	16.7	25.1		16.7	8.4	0.0	74.9	31.01	0.00
	16.7	25.1		16.7	8.4	0.0	74.9	31.01	0.00
Results			Averages	16.7	8.4	0.0	74.9	31.01	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.749		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	73.9	percent	Fuel Factor in Handbook Range?			☑

Gas Analysis Data

Run Number	K2-M23-2			Run Start Time	12:00	Run Stop Time		15:10
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
Orsat	17.2	25.3		17.2	8.1	0.0	74.7	31.08	0.00
	17.2	25.3		17.2	8.1	0.0	74.7	31.08	0.00
	17.2	25.3		17.2	8.1	0.0	74.7	31.08	0.00
Results			Averages	17.2	8.1	0.0	74.7	31.08	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.744		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	69.7	percent	Fuel Factor in Handbook Range?			☑

Gas Analysis Data

Run Number	K2-M23-3			Run Start Time	3:23	Run Stop Time		6:35
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
Orsat	16.2	25.0		16.2	8.8	0.0	75.0	30.94	0.00
	16.2	25.0		16.2	8.8	0.0	75.0	30.94	0.00
	16.2	25.0		16.2	8.8	0.0	75.0	30.94	0.00
Results			Averages	16.2	8.8	0.0	75.0	30.94	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.747		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	80.0	percent	Fuel Factor in Handbook Range?			☑

Fuel Factor Fo

Fuel Type	Minimum	Maximum
Coal, Anthracite	1.016	1.130
Coal, Lignite	1.016	1.130
Coal, Bituminous	1.083	1.230
Oil, Distillate	1.260	1.413
Oil, Residual	1.210	1.370
Gas, Natural	1.600	1.836
Gas, Propane	1.434	1.586
Gas, Butane	1.405	1.553
Wood	1.000	1.120
Wood Bark	1.003	1.130

Formulas Used

$\%CO_2 = V_{CO2}$

$\%O_2 = V_{O2} - V_{CO2}$

$\%CO = V_{CO} - V_{O2}$

$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$

$M_d = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%CO)$

$\Delta M_d = M_d - M_{davg}$

$F_o = (20.9 - \%O_2 - .5\%CO)/(\%CO_2 + \%CO)$

$\%EA=100(\%O_2-.5\%CO)/(.264\%NO_2-(\%O_2-.5\%CO))$

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	LaFarge				**Date**	09/08/10
Sampling Location	Kiln 2				**Project #**	2010-11015
Operator	AM/GC				**# of Ports Used**	4
Stack Type	Circular				**Meter Box Number**	001
Train Leak Check	☑	**PreTest**	☑	**PostTest**	**Meter Cal Factor (Y)**	0.983

Moisture Content Data								
Run Number	K2-M23-1		**Run Start Time**		8:35	**Run Stop Time**		11:45
Total Meter Volume	(V_m)	143.617	dcf	**Barometric Press.**		(P_b)	29.95	in Hg
Avg Meter Temp	$(t_m)_{avg}$	84	°F	**Stack Static Press.**		(P_{static})	-0.75	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	376	°F	**Avg Orifice Press.**		$(\Delta H)_{avg}$	2.24	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	g	ml	ml	ml
Contents		DI	DI	DI	Sil Gel	XAD		
Final Value	$(V_f),(W_f)$	500.00	365.00		232.00	270.04		
Initial Value	$(V_i),(W_i)$	50.00	150.00		200.00	237.54		
Net Value	$(V_n),(W_n)$	450.0	215.0		32.0	32.5		
Results								
Total Volume	(V_t)	697.50	ml	**Water Vol Condensed**		$(V_{wc(std)})$	32.831	scf
Total Weight	(W_t)	32.00	g	**Water Vol Weighed**		$(V_{wsg(std)})$	1.509	scf
Std Meter Volume	$(V_{m(std)})$	138.011	dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$	100.0	%
Calc Moisture Content	$(B_{ws(calc)})$	19.9	%	**Final Moisture Content**		(B_{ws})	19.9	%

Moisture Content Data								
Run Number	K2-M23-2		**Run Start Time**		12:00	**Run Stop Time**		15:10
Total Meter Volume	(V_m)	144.832	dcf	**Barometric Press.**		(P_b)	29.95	in Hg
Avg Meter Temp	$(t_m)_{avg}$	89	°F	**Stack Static Press.**		(P_{static})	-0.79	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	377	°F	**Avg Orifice Press.**		$(\Delta H)_{avg}$	2.24	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	g	ml	ml	ml
Contents		DI	DI	DI	Sil Gel	XAD		
Final Value	$(V_f),(W_f)$	500.00	342.00		228.50	244.60		
Initial Value	$(V_i),(W_i)$	50.00	150.00		200.00	219.70		
Net Value	$(V_n),(W_n)$	450.0	192.0		28.5	24.9		
Results								
Total Volume	(V_t)	666.90	ml	**Water Vol Condensed**		$(V_{wc(std)})$	31.391	scf
Total Weight	(W_t)	28.50	g	**Water Vol Weighed**		$(V_{wsg(std)})$	1.344	scf
Std Meter Volume	$(V_{m(std)})$	137.910	dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$	100.0	%
Calc Moisture Content	(B_{ws})	19.2	%	**Final Moisture Content**		(B_{ws})	19.2	%

Moisture Content Data								
Run Number	K2-M23-3		**Run Start Time**		3:23	**Run Stop Time**		6:35
Total Meter Volume	(V_m)	143.395	dcf	**Barometric Press.**		(P_b)	29.95	in Hg
Avg Meter Temp	$(t_m)_{avg}$	86	°F	**Stack Static Press.**		(P_{static})	-0.77	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	378	°F	**Avg Orifice Press.**		$(\Delta H)_{avg}$	2.20	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	g	ml	ml	ml
Contents		DI	DI	DI	Sil Gel	XAD		
Final Value	$(V_f),(W_f)$	490.00	330.90		234.70	254.20		
Initial Value	$(V_i),(W_i)$	50.00	150.00		200.00	227.40		
Net Value	$(V_n),(W_n)$	440.0	180.9		34.7	26.8		
Results								
Total Volume	(V_t)	647.70	ml	**Water Vol Condensed**		$(V_{wc(std)})$	30.487	scf
Total Weight	(W_t)	34.70	g	**Water Vol Weighed**		$(V_{wsg(std)})$	1.636	scf
Std Meter Volume	$(V_{m(std)})$	137.257	dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$	100.0	%
Calc Moisture Content	(B_{ws})	19.0	%	**Final Moisture Content**		(B_{ws})	19.0	%

ISOKINETIC SAMPLING DATA

Plant Name	LaFarge	Date	9/8/2010
Sampling Location	Kiln 2	Project #	2010- 11015
Operator	AM/GC	Run #	K2-M23-1
# of Points Across	3	# of Ports Used	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	375	°F
Avg Gas Meter Temp	(t_m)	80	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.89	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.10	in H_2O
Stack Moisture Content	(B_{ws})	20.0	%
Stack Dry Molecular Weight	(M_{ds})	31.21	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.750	acfm
DP to DH isokinetic Factor	(K)	1.99	

Sampling Equipment			
Meter #	001		
Meterbox Cal. Factor	(Y)	0.983	
Nozzle #	N250		
Actual Nozzle Diameter	(D_{na})	0.2500	in
Req. Nozzle Diameter	(D_{ni})	0.2447	in
Probe # / Length	P96	96.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.75	in H_2O
Absolute Stack Pressure	(P_s)	29.89	in Hg
Absolute Meter Pressure	(P_m)	30.09	in Hg

ΔV_m		Leak Checks			
Pre	16	ft^3/min	@	0	in Hg
Mid		ft^3/min	@		in Hg
Post	16	ft^3/min	@	0	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?		☑	Orsat OK?		☑

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	8:35:00	216.545	1.100	2.188	2.200	375	78	76	247	52	6.0
A-2	15.0	8:50:00	228.477	1.200	2.387	2.400	376	80	77	249	52	6.0
A-3	30.0	9:05:00	240.808	1.000	1.989	2.000	374	82	78	251	52	6.0
B-1	45.0	9:20:00	252.721	0.990	1.969	2.000	375	83	79	249	53	6.0
B-2	60.0	9:35:00	264.033	1.200	2.387	2.400	377	85	80	250	53	6.0
B-3	75.0	9:50:00	276.106	1.300	2.585	2.600	378	85	81	249	54	7.0
C-1	90.0	10:05:00	288.782	0.970	1.929	1.900	378	87	83	250	54	6.0
C-2	105.0	10:20:00	300.256	1.100	2.188	2.200	376	88	84	249	55	6.0
C-3	120.0	10:35:00	312.759	1.300	2.585	2.600	374	89	84	251	55	7.0
D-1	135.0	10:50:00	325.644	0.990	1.969	2.000	375	90	85	250	56	6.0
D-2	150.0	11:05:00	337.071	1.100	2.188	2.200	378	90	85	248	56	6.0
D-3	165.0	11:20:00	348.880	1.200	2.387	2.400	377	92	86	250	56	6.0
Last Pt	180.0	11:45:00	360.162									
Last Pt	180.0	11:45:00	360.162						Maximum Vacuum			7.0
Average Values				1.12		2.24	376	86	82	249	54	
								84				

ISOKINETIC SAMPLING DATA

Plant Name	LaFarge	Date	9/8/2010
Sampling Location	Kiln 2	Project #	2010- 11015
Operator	AM/GC	Run #	K2-M23-2
# of Points Across	3	# of Ports Used	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	375	°F
Avg Gas Meter Temp	(t_m)	80	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.89	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.10	in H_2O
Stack Moisture Content	(B_{ws})	20.0	%
Stack Dry Molecular Weight	(M_{ds})	31.01	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.798	acfm
DP to DH Isokinetic Factor	(K)	1.99	

Sampling Equipment			
Meter #	001		
Meterbox Cal. Factor	(Y)	0.983	
Nozzle #	N250		
Actual Nozzle Diameter	(D_{na})	0.2500	in
Req. Nozzle Diameter	(D_{ni})	0.2520	in
Probe # / Length	P96	96.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.79	in H_2O
Absolute Stack Pressure	(P_s)	29.89	in Hg
Absolute Meter Pressure	(P_m)	30.09	in Hg

ΔV_m		Leak Checks			
Pre	19	ft^3/min	@	0	in Hg
Mid		ft^3/min	@		in Hg
Post	19	ft^3/min	@	0	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?		☑	Orsat OK?		☑

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	12:00:00	360.620	1.000	1.987	2.000	378	83	82	248	51	5.0
A-2	15.0	12:15:00	371.954	1.300	2.583	2.600	377	84	82	249	51	6.0
A-3	30.0	12:30:00	385.061	1.200	2.384	2.400	375	86	83	250	52	5.0
B-1	45.0	12:45:00	397.275	0.980	1.947	2.000	376	88	84	248	52	5.0
B-2	60.0	13:00:00	409.427	1.000	1.987	2.000	378	90	85	250	53	5.0
B-3	75.0	13:15:00	420.629	1.200	2.384	2.400	377	91	86	249	53	5.0
C-1	90.0	13:30:00	432.251	0.990	1.967	2.000	375	92	87	251	53	5.0
C-2	105.0	13:45:00	444.013	1.300	2.583	2.600	379	92	88	249	54	6.0
C-3	120.0	14:00:00	456.769	1.100	2.186	2.200	378	94	90	251	54	5.0
D-1	135.0	14:15:00	468.832	0.960	1.907	1.900	374	95	90	248	55	5.0
D-2	150.0	14:30:00	480.774	1.200	2.384	2.400	375	96	91	251	55	5.0
D-3	165.0	14:45:00	493.159	1.200	2.384	2.400	376	96	92	250	56	5.0
Last Pt	180.0	15:10:00	505.452									
Final Value	180.0	15:10:00	505.452							Maximum Vacuum		6.0
Average Values				1.12		2.24	377	91	87	250	53	
								89				

ISOKINETIC SAMPLING DATA

Plant Name	LaFarge	Date	9/8/2010
Sampling Location	Kiln 2	Project #	2010- 11015
Operator	AM/GC	Run #	K2-M23-3
# of Points Across	3	# of Ports Used	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	375	°F
Avg Gas Meter Temp	(t_m)	88	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.89	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.10	in H_2O
Stack Moisture Content	(B_{ws})	20.0	%
Stack Dry Molecular Weight	(M_{ds})	31.08	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.805	acfm
DP to DH Isokinetic Factor	(K)	2.02	

Sampling Equipment			
Meter #	001		
Meterbox Cal. Factor	(Y)	0.983	
Nozzle #	N250		
Actual Nozzle Diameter	(D_{na})	0.2500	in
Req. Nozzle Diameter	(D_{nl})	0.2514	in
Probe # / Length	P96	96.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.77	in H_2O
Absolute Stack Pressure	(P_s)	29.89	in Hg
Absolute Meter Pressure	(P_m)	30.09	in Hg

ΔV_m		Leak Checks			
Pre	0	ft^3/min	@	19	in Hg
Mid		ft^3/min	@		in Hg
Post	0	ft^3/min	@	19	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?	☑		Orsat OK?	☑	

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	3:23:00	505.966	1.10	2.22	2.20	378	83	81	249	52	6.0
A-2	15.0	3:38:00	517.833	0.99	2.00	2.00	376	84	82	250	52	6.0
A-3	30.0	3:53:00	528.990	1.30	2.62	2.60	379	85	82	248	52	7.0
B-1	45.0	4:08:00	542.112	0.98	1.98	2.00	379	86	83	251	53	6.0
B-2	60.0	4:23:00	553.285	1.00	2.02	2.00	376	88	84	249	53	6.0
B-3	75.0	4:38:00	564.877	1.20	2.42	2.40	377	89	84	250	53	6.0
C-1	90.0	4:53:00	576.989	1.00	2.02	2.00	375	90	84	251	54	6.0
C-2	105.0	5:08:00	588.734	1.30	2.62	2.60	378	90	85	251	54	7.0
C-3	120.0	5:23:00	601.360	1.10	2.22	2.20	380	91	85	250	55	6.0
D-1	135.0	5:38:00	613.546	1.10	2.22	2.20	378	91	85	250	55	6.0
D-2	150.0	5:53:00	625.902	0.97	1.96	2.00	377	90	84	251	56	6.0
D-3	165.0	6:08:00	637.774	1.10	2.22	2.20	378	89	82	249	56	6.0
Last Pt	180.0	6:35:00	649.361									
Final Value	180.0	6:35:00	649.361							Maximum Vacuum		7.0
Average Values				1.10		2.20	378	88	83	250	54	
								86				

METHOD 5 - DETERMINATION OF PARTICULATE EMISSIONS - RESULTS

Plant Name	LaFarge	Date	09/08/10
Sampling Location	Kiln 2	Project #	2010-
Operator	AM/GC	Stack Type	Circular

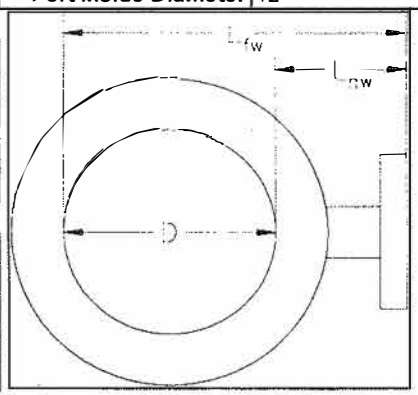
Historical Data						
Run Number		K2-M23-1	K2-M23-2	K2-M23-3	Average	
Run Start Time		8:35	12:00	3:23		hh:mm
Run Stop Time		11:45	15:10	6:35		hh:mm
Meter Calibration Factor	(Y)	0.983	0.983	0.983		
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840		
Actual Nozzle Diameter	(D_{na})	0.250	0.250	0.250		in
Stack Test Data						
Initial Meter Volume	$(V_m)_i$	216.545	360.620	505.966		ft^3
Final Meter Volume	$(V_m)_f$	360.162	505.452	649.361		ft^3
Total Meter Volume	(V_m)	143.617	144.832	143.395	143.948	ft^3
Total Sampling Time	(Θ)	180.0	180.0	180.0	180.0	min
Average Meter Temperature	$(t_m)_{avg}$	83.6	88.6	85.7	86.0	°F
Average Stack Temperature	$(t_s)_{avg}$	376.1	376.5	377.6	376.7	°F
Barometric Pressure	(P_b)	29.95	29.95	29.95	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.75	-0.79	-0.77	-0.77	in H_2O
Absolute Stack Pressure	(P_s)	29.89	29.89	29.89	29.89	in Hg
Average Orifice Pressure Drop	$(\Delta H)_{avg}$	2.24	2.24	2.20	2.23	in H_2O
Absolute Meter Pressure	(P_m)	30.11	30.11	30.11	30.11	in Hg
Avg Square Root Pitot Pressure	$(\Delta p^{1/2})_{avg}$	1.06	1.06	1.05	1.05	$(in\ H_2O)^{1/2}$
Moisture Content Data						
Impingers 1-3 Water Volume Gain	(V_n)	665.0	666.9	620.9	650.9	ml
Impinger 4 Silica Gel Weight Gain	(W_n)	32.0	28.5	34.7	31.7	g
Total Water Volume Collected	(V_{lc})	697.1	695.5	655.7	682.7	ml
Standard Water Vapor Volume	$(V_w)_{std}$	32.811	32.735	30.862	32.136	scf
Standard Meter Volume	$(V_m)_{std}$	138.011	137.910	137.257	137.726	dscf
Calculated Stack Moisture	($B_{ws(calc)}$)	19.2	19.2	18.4	18.9	%
Saturated Stack Moisture	($B_{ws(svp)}$)	100.00	100.0	100.0	100.0	%
Reported Stack Moisture Content	(B_{ws})	19.2	19.2	18.4	18.9	%
Gas Analysis Data						
Carbon Dioxide Percentage	($\%CO_2$)	16.7	17.2	16.2	16.7	%
Oxygen Percentage	($\%O_2$)	8.4	8.1	8.8	8.4	%
Carbon Monoxide Percentage	(%CO)	0.0	0.0	0.0	0.0	%
Nitrogen Percentage	($\%N_2$)	74.9	74.7	75.0	74.9	%
Dry Gas Molecular Weight	(M_d)	31.01	31.08	30.94	31.01	lb/lb-mole
Wet Stack Gas Molecular Weight	(M_s)	28.51	28.57	28.57	28.55	lb/lb-mole
Calculated Fuel Factor	(F_o)	0.749	0.744	0.747	0.747	
Fuel F-Factor	(F_d)	0	0	0	0	dscf/mmBtu
Percent Excess Air	(%EA)	73.9	69.7	80.0	74.5	%
Volumetric Flow Rate Data						
Average Stack Gas Velocity	(v_s)	75.20	75.08	74.32	74.87	ft/sec
Stack Cross-Sectional Area	(A_s)	63.62	63.62	63.62		ft^2
Actual Stack Flow Rate	(Q_{aw})	287054	286569	283697	285773	acfm
Wet Standard Stack Flow Rate	(Q_{sw})	10868	10843	10721	10810	wkscfh
Dry Standard Stack Flow Rate	(Q_{sd})	146337	146047	145879	146087	dscfm
Percent of Isokinetic Rate	(I)	97.8	97.9	97.6	97.7	%
Emission Rate Data						
Mass of Particulate on Filter	(m_f)					mg
Mass of Particulate in Acetone	(m_a')					mg
Mass due to Acetone Blank	(W_a)					mg
Total Mass of Particulates	(m_n)					mg
Stack Particulate Concentration	(c_s)					g/dscf
	(c_s)					gr/dscf
Particulate Emission Rate	(E)					kg/hr
	(E)					lbs/hr
	(E)					lbs/mmBtu
(Pt 75 App F Sect. 5.2.1) Heat Input	(HI)	#DIV/0!	#DIV/0!	#DIV/0!		mmBtu/Hr

KILN 1 - FIELD DATA

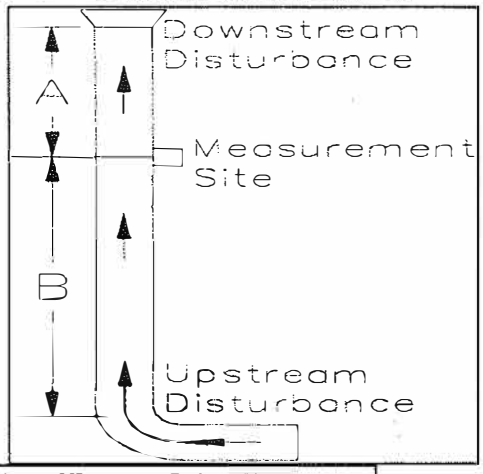
METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name	Lafarge Corporation	Date	9/10/2010
Sampling Location	Kiln 1 Stack	Project #	2010-11015
Operator	AM/GC	# of Ports Available	4
Stack Type	Circular	# of Ports Used	4
Stack Size	Large	Port Inside Diameter	12

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	150.00	in
Distance to Near Wall of Stack	(L_{nw})	6.00	in
(=Lfw - Lnw) Diameter of Stack	(D)	144.00	in
(=3.14(D/2/Cunits)2) Area of Stack	(A_s)	113.10	ft^2



Distance from Port to Disturbances			
Distance Upstream	(B)	1020.00	in
(=B/D) Diameters Upstream	(B_D)	7.08	diameters
Distance Downstream	(A)	300.00	in
(=A/D) Diameters Downstream	(A_D)	2.08	diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		Minimum Number of[1] Traverse Points	
Up Stream	Down Stream	Particulate Points	Velocity Points
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec		12	12
Downstream Spec		12	12
Traverse Pts Required		12	12

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.
[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

Number of Traverse Points Used			
4	Ports by	3	Across
12	Pts Used	12	Required
☑	Particulate	☐	Velocity

Location of Traverse Points in Circular Stacks						
Traverse Point Number	(Fraction of Stack Diameter from Inside Wall to Traverse Point) Number of Traverse Points on a Diameter					
	2	4	6	8	10	12
1	.146	.067	.044	.032	.026	.021
2	.854	.250	.146	.105	.082	.067
3		.750	.296	.194	.146	.118
4		.933	.704	.323	.226	.177
5			.854	.677	.342	.250
6			.956	.806	.658	.356
7				.895	.774	.644
8				.968	.854	.750
9					.918	.823
10					.974	.882
11						.933
12						.979

Traverse Point Locations			
Traverse Point Number	Fraction of Stack Diameter	Distance from Inside Wall	Distance Including Nipple Length
		in	in
1	0.044	6 3/8	12 3/8
2	0.146	21	27
3	0.296	42 5/8	48 5/8
4			
5			
6			
7			
8			
9			
10			
11			
12			

24 7/8" + 12" for 39 60 5/8 port nipple

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name	Lafarge Corporation	**Date**	9/10/2010
Sampling Location	Kiln 1 Stack	**Project #**	2010-11015
Operator	AM/GC	**# of Ports Used**	4
Stack Type	Circular	**Pitot Identification**	
Pitot Leak Check	☑ PreTest ☑ PostTest	**Pitot Coefficient (C_p)**	0.84

Stack Dimensions			
Diameter or Length of Stack	(D)	144.00	in
Width of Stack	(W)		in
Area of Stack	(A_s)	113.10	ft^2

Pressures			
Barometric Pressure	(P_b)	30.05	in Hg
Static Pressure	(P_{static})	-0.15	in H_2O
Absolute Stack Pressure	(P_s)	30.04	in Hg

Stack Gas Composition				
Composition Data:	**Actual**	☑	**Estimated**	☐
Carbon Dioxide Concentration	(%CO_2)	19.5	%	
Oxygen Concentration	(%O_2)	8.5	%	
Carbon Monoxide Concentration	(%CO)	0.0	%	
Nitrogen Concentration	(%N_2)	72.0	%	
Stack Moisture Content	(B_{ws})	16.000		
Stack Dry Molecular Weight	(M_d)	31.46	lb/lb-mole	
Stack Wet Molecular Weight	(M_s)	29.31	lb/lb-mole	

Results			
Avg Stack Gas Velocity	(v_s)	25.9	ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})	5508456	dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})	91808	dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})	175492	ascf/min

Stack Cross Section Schematic

Velocity Traverse Data			
Run Number		K1-M23-V1	
Run Time			
Traverse Point	**Velocity Head** (Δp)	**Stack Temp** (t_s)	**Local Velocity** $(v_s)_i$
	in H_2O	°F	ft/sec
A-1	0.11	390	23.4
A-2	0.14	393	26.4
A-3	0.13	392	25.5
B-1	0.12	391	24.5
B-2	0.16	393	28.3
B-3	0.14	395	26.5
C-1	0.10	390	22.3
C-2	0.12	389	24.4
C-3	0.13	388	25.4
D-1	0.13	391	25.5
D-2	0.16	392	28.3
D-3	0.18	390	29.9
Average[1]	0.37	391	

[1] Please report the average of the square roots of Δp, or, $(\Delta p)^{1/2}_{avg} = {}^1/_n\Sigma(\Delta p^{1/2})$

Formulas Used

$A_s = DW/K_u$ for Rectangular Stacks

$A_s = (\pi(D/2)^2)/K_u$ for Circular Stacks

where $K_u = 1$ for metric units

where $K_u = 144$ (in^2/ft^2) for English units

$P_s = P_{bar} + P_{static}/13.6$

$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$

$M_d = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%CO)$

$M_s = M_d(1 - B_{ws}) + 18B_{ws}$

$(\Delta p)^{1/2}_{avg} = {}^1/_n\Sigma(\Delta p^{1/2})$

$T_{s(avg)} = {}^1/_n\Sigma t_s + T_u$

where $T_u = 273$ °K for metric units

where $T_u = 460$ °R for English units

$v_s = K_pC_p(\Delta p)^{1/2}_{avg}(T_{s(avg)}/(P_sM_s))^{1/2}$

where $K_p = 34.97$ for metric units

where $K_p = 85.49$ for English units

$Q_{sd} = 3600(1 - B_{ws})v_sA_s(T_{std}/T_{s(avg)})(P_s/P_{std})$

where $T_{std} = 293$ °K, $P_{std} = 760$ mm Hg, for metric units

where $T_{std} = 528$ °R, $P_{std} = 29.92$ in Hg, for English units

METHOD 3 - GAS ANALYSIS FOR THE DETERMINATION OF DRY MOLECULAR WEIGHT

Plant Name	Lafarge Corporation			Date	9/10/2010
Sampling Location	Kiln 1 Stack			Project #	2010-11015
Operator	AM/GC			# of Ports Used	4
Fuel Type	N/A	Minimum Fuel Factor		Maximum Fuel Factor	
Orsat Leak Check	☑ PreTest	☑ PostTest		Orsat Identification	

Gas Analysis Data

Run Number	K1-M23-1			Run Start Time	8:55	Run Stop Time		12:05
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
CEMS	20.2	28.1		20.2	7.9	0.0	71.9	31.55	0.00
	20.2	28.1		20.2	7.9	0.0	71.9	31.55	0.00
	20.2	28.1		20.2	7.9	0.0	71.9	31.55	0.00
Results			Averages	20.2	7.9	0.0	71.9	31.55	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.644		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	71.3	percent	Fuel Factor in Handbook Range?			☑

Gas Analysis Data

Run Number	K1-M23-2			Run Start Time	12:20	Run Stop Time		15:28
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
CEMS	21.2	29.2		21.2	8.0	0.0	70.8	31.71	0.00
	21.2	29.2		21.2	8.0	0.0	70.8	31.71	0.00
	21.2	29.2		21.2	8.0	0.0	70.8	31.71	0.00
Results			Averages	21.2	8.0	0.0	70.8	31.71	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.608		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	74.8	percent	Fuel Factor in Handbook Range?			☑

Gas Analysis Data

Run Number	K1-M23-3			Run Start Time	3:45	Run Stop Time		6:54
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
CEMS	20.5	28.1		20.5	7.6	0.0	71.9	31.58	0.00
	20.5	28.1		20.5	7.6	0.0	71.9	31.58	0.00
	20.5	28.1		20.5	7.6	0.0	71.9	31.58	0.00
Results			Averages	20.5	7.6	0.0	71.9	31.58	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.649		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	66.8	percent	Fuel Factor in Handbook Range?			☑

Fuel Factor Fo

Fuel Type	Minimum	Maximum
Coal, Anthracite	1.016	1.130
Coal, Lignite	1.016	1.130
Coal, Bituminous	1.083	1.230
Oil, Distillate	1.260	1.413
Oil, Residual	1.210	1.370
Gas, Natural	1.600	1.836
Gas, Propane	1.434	1.586
Gas, Butane	1.405	1.553
Wood	1.000	1.120
Wood Bark	1.003	1.130

Formulas Used

$\%CO_2 = V_{CO2}$

$\%O_2 = V_{O2} - V_{CO2}$

$\%CO = V_{CO} - V_{O2}$

$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$

$M_d = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%CO)$

$\Delta M_d = M_d - M_{davg}$

$F_o = (20.9 - \%O_2 - .5\%CO)/(\%CO_2 + \%CO)$

$\%EA = 100(\%O_2 - .5\%CO)/(.264\%NO_2 - (\%O_2 - 5\%CO))$

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	Lafarge Corporation			**Date**	9/10/2010
Sampling Location	Kiln 1 Stack			**Project #**	2010-11015
Operator	AM/GC			**# of Ports Used**	4
Stack Type	Circular			**Meter Box Number**	001
Train Leak Check	☑	**PreTest**	☑ **PostTest**	**Meter Cal Factor (Y)**	0.983

Moisture Content Data								
Run Number	K1-M23-1		**Run Start Time**		8:55	**Run Stop Time**		12:05
Total Meter Volume	(V_m)	130.512	dcf	**Barometric Press.**		(P_b)	30.05	in Hg
Avg Meter Temp	$(t_m)_{avg}$	73	°F	**Stack Static Press.**		(P_{static})	-0.16	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	393	°F	**Avg Orifice Press.**		$(\Delta H)_{avg}$	1.88	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	ml	g	ml	ml
Contents		DI	DI	DI	DI	Sil Gel	XAD	
Final Value	$(V_f),(W_f)$	438.00	97.00	124.00	3.00	236.00	277.10	
Initial Value	$(V_i),(W_i)$	50.00	50.00	100.00	0.00	200.00	254.20	
Net Value	$(V_n),(W_n)$	388.0	47.0	24.0	3.0	36.0	22.9	
Results								
Total Volume	(V_t)	484.90	ml	**Water Vol Condensed**		$(V_{wc(std)})$	22.824	scf
Total Weight	(W_t)	36.00	g	**Water Vol Weighed**		$(V_{wsg(std)})$	1.697	scf
Std Meter Volume	$(V_{m(std)})$	128.160	dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$	100.0	%
Calc Moisture Content	$(B_{ws(calc)})$	16.1	%	**Final Moisture Content**		(B_{ws})	16.1	%

Moisture Content Data								
Run Number	K1-M23-2		**Run Start Time**		12:20	**Run Stop Time**		15:28
Total Meter Volume	(V_m)	128.826	dcf	**Barometric Press.**		(P_b)	30.05	in Hg
Avg Meter Temp	$(t_m)_{avg}$	76	°F	**Stack Static Press.**		(P_{static})	-0.15	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	395	°F	**Avg Orifice Press.**		$(\Delta H)_{avg}$	1.83	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	g	g	g	ml	ml
Contents		DI	DI	DI	DI	Sil Gel	XAD	
Final Value	$(V_f),(W_f)$	458.00	91.00	119.00	3.00	235.00	231.00	
Initial Value	$(V_i),(W_i)$	50.00	50.00	100.00	0.00	200.00	210.10	
Net Value	$(V_n),(W_n)$	408.0	41.0	19.0	3.0	35.0	20.9	
Results								
Total Volume	(V_t)	469.90	ml	**Water Vol Condensed**		$(V_{wc(std)})$	22.118	scf
Total Weight	(W_t)	57.00	g	**Water Vol Weighed**		$(V_{wsg(std)})$	2.688	scf
Std Meter Volume	$(V_{m(std)})$	125.958	dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$	100.0	%
Calc Moisture Content	(B_{ws})	16.5	%	**Final Moisture Content**		(B_{ws})	16.5	%

Moisture Content Data								
Run Number	K1-M23-3		**Run Start Time**		3:45	**Run Stop Time**		6:54
Total Meter Volume	(V_m)	130.308	dcf	**Barometric Press.**		(P_b)	30.05	in Hg
Avg Meter Temp	$(t_m)_{avg}$	77	°F	**Stack Static Press.**		(P_{static})	-0.16	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	393	°F	**Avg Orifice Press.**		$(\Delta H)_{avg}$	1.89	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	g	ml	ml	ml
Contents		DI	DI	DI	DI	Sil Gel	XAD	
Final Value	$(V_f),(W_f)$	442.00	105.00	113.00	2.00	237.00	221.30	
Initial Value	$(V_i),(W_i)$	50.00	50.00	100.00	0.00	200.00	189.50	
Net Value	$(V_n),(W_n)$	392.0	55.0	13.0	2.0	37.0	31.8	
Results								
Total Volume	(V_t)	528.80	ml	**Water Vol Condensed**		$(V_{wc(std)})$	24.891	scf
Total Weight	(W_t)	2.00	g	**Water Vol Weighed**		$(V_{wsg(std)})$	0.094	scf
Std Meter Volume	$(V_{m(std)})$	127.098	dscf	**Sat. Moisture Content**		$(B_{ws(svp)})$	100.0	%
Calc Moisture Content	(B_{ws})	16.4	%	**Final Moisture Content**		(B_{ws})	16.4	%

ISOKINETIC SAMPLING DATA

Plant Name	Lafarge Corporation	Date	9/10/2010
Sampling Location	Kiln 1 Stack	Project #	2010- 11015
Operator	AM/GC	Run #	K1-M23-1
# of Points Across	3	# of Ports Used	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	390	°F
Avg Gas Meter Temp	(t_m)	75	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.89	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	0.13	in H_2O
Stack Moisture Content	(B_{ws})	14.8	%
Stack Dry Molecular Weight	(M_{ds})	31.46	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.750	acfm
DP to DH Isokinetic Factor	(K)	15.54	

Sampling Equipment			
Meter #	001		
Meterbox Cal. Factor	(Y)	0.983	
Nozzle #	N410		
Actual Nozzle Diameter	(D_{na})	0.4100	in
Req. Nozzle Diameter	(D_{ni})	0.4115	in
Probe # / Length	P-96	96.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	30.05	in Hg
Stack Static Pressure	(P_{static})	-0.16	in H_2O
Absolute Stack Pressure	(P_s)	30.04	in Hg
Absolute Meter Pressure	(P_m)	30.19	in Hg

ΔV_m		Leak Checks			
Pre	0.001	ft^3/min	@	17	in Hg
Mid		ft^3/min	@		in Hg
Post	0.001	ft^3/min	@	17	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?		☑	Orsat OK?		☑

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	8:55:00	649.841	0.100	1.554	1.500	390	71	70	250	50	5.0
A-2	15.0	9:10:00	659.623	0.130	2.021	2.000	392	72	70	249	50	5.0
A-3	30.0	9:25:00	670.675	0.140	2.176	2.100	391	72	71	250	51	5.0
B-1	45.0	9:40:00	682.214	0.110	1.710	1.700	393	73	71	248	51	5.0
B-2	60.0	9:55:00	692.497	0.120	1.865	1.800	394	74	72	247	51	5.0
B-3	75.0	10:10:00	703.061	0.150	2.331	2.300	390	74	72	246	51	5.0
C-1	90.0	10:25:00	714.990	0.120	1.865	1.800	393	74	73	249	52	5.0
C-2	105.0	10:40:00	726.213	0.120	1.865	1.800	395	75	73	250	52	5.0
C-3	120.0	10:55:00	737.012	0.130	2.021	2.000	394	75	73	251	52	5.0
D-1	135.0	11:10:00	748.546	0.100	1.554	1.500	396	76	74	250	52	5.0
D-2	150.0	11:25:00	758.157	0.140	2.176	2.100	395	77	75	251	53	5.0
D-3	165.0	11:40:00	769.254	0.130	2.021	2.000	394	77	75	250	53	5.0
Last Pt	180.0	12:05:00	780.353									
Last Pt	180.0	12:05:00	780.353							Maximum Vacuum		5.0
Average Values				0.12		1.88	393	74	72	249	52	
								73				

ISOKINETIC SAMPLING DATA

Plant Name	Lafarge Corporation	**Date**	9/10/2010
Sampling Location	Kiln 1 Stack	**Project #**	2010-[illegible]
Operator	AM/GC	**Run #**	K1-M23-2
# of Points Across	3	**# of Ports Used**	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	390	°F
Avg Gas Meter Temp	(t_m)	75	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.89	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	0.13	in H_2O
Stack Moisture Content	(B_{ws})	16.0	%
Stack Dry Molecular Weight	(M_{ds})	31.55	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.725	acfm
DP to DH Isokinetic Factor	(K)	15.20	

Sampling Equipment			
Meter #	001		
Meterbox Cal. Factor	(Y)	0.983	
Nozzle #	N410		
Actual Nozzle Diameter	(D_{na})	0.4100	in
Req. Nozzle Diameter	(D_{ni})	0.4072	in
Probe # / Length	P-96	96.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	30.05	in Hg
Stack Static Pressure	(P_{static})	-0.15	in H_2O
Absolute Stack Pressure	(P_s)	30.04	in Hg
Absolute Meter Pressure	(P_m)	30.19	in Hg

ΔV_m			Leak Checks		
Pre	0	ft^3/min	@	18	in Hg
Mid		ft^3/min	@		in Hg
Post	0.001	ft^3/min	@	18	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?	☑		Orsat OK?	☑	

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	12:20:00	780.682	0.110	1.672	1.700	390	73	72	248	52	6.0
A-2	15.0	12:35:00	790.854	0.130	1.975	2.000	393	73	72	250	52	6.0
A-3	30.0	12:50:00	801.937	0.120	1.823	1.800	392	74	72	250	52	6.0
B-1	45.0	13:05:00	812.847	0.120	1.823	1.800	394	76	73	248	53	6.0
B-2	60.0	13:20:00	823.712	0.100	1.520	1.500	395	77	73	247	[illegible]	6.0
B-3	75.0	13:35:00	833.319	0.140	2.127	2.100	394	77	74	248	54	6.0
C-1	90.0	13:50:00	845.448	0.130	1.975	2.000	393	78	74	250	[illegible]	6.0
C-2	105.0	14:05:00	856.713	0.110	1.672	1.700	397	79	74	251	[illegible]	6.0
C-3	120.0	14:20:00	866.817	0.120	1.823	1.800	396	79	7[illegible]	251	[illegible]	6.0
D-1	135.0	14:35:00	877.624	0.100	1.520	1.500	398	79	7[illegible]	250	[illegible]	6.0
D-2	150.0	14:50:00	887.021	0.140	2.127	2.100	397	80	7[illegible]	250	[illegible]	6.0
D-3	165.0	15:05:00	897.736	0.130	1.975	2.000	396	80	77	249	[illegible]	6.0
Last Pt	180.0	15:28:00	909.508									
Final Value	180.0	15:28:00	909.508							**Maximum Va[illegible]**		6.0
Average Values				0.12		1.83	395	77	74	249		
								76				

ISOKINETIC SAMPLING DATA

Plant Name	Lafarge Corporation	Date	9/10/2010
Sampling Location	Kiln 1 Stack	Project #	2010- 1101
Operator	AM/GC	Run #	K1-M23-3
# of Points Across	3	# of Ports Used	4

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	390	°F
Avg Gas Meter Temp	(t_m)	90	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.89	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	0.12	in H_2O
Stack Moisture Content	(B_{ws})	16.0	%
Stack Dry Molecular Weight	(M_{ds})	31.71	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.716	acfm
DP to DH Isokinetic Factor	(K)	15.63	

Sampling Equipment			
Meter #	001		
Meterbox Cal. Factor	(Y)	0.983	
Nozzle #	N410		
Actual Nozzle Diameter	(D_{na})	0.4100	in
Req. Nozzle Diameter	(D_{ni})	0.4075	in
Probe # / Length	P-96	96.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	30.05	in Hg
Stack Static Pressure	(P_{static})	-0.16	in H_2O
Absolute Stack Pressure	(P_s)	30.04	in Hg
Absolute Meter Pressure	(P_m)	30.19	in Hg

ΔV_m		Leak Checks			
Pre	0.001	ft^3/min	@	17	in Hg
Mid		ft^3/min	@		in Hg
Post	0.001	ft^3/min	@	17	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?		☑	Orsat OK?		☑

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	3:45:00	909.913	0.11	1.72	1.70	392	75	72	248	51	5.0
A-2	15.0	4:00:00	920.154	0.13	2.03	2.00	393	75	72	250	51	5.0
A-3	30.0	4:15:00	931.282	0.12	1.88	1.90	394	76	73	251	51	5.0
B-1	45.0	4:30:00	941.991	0.13	2.03	2.00	395	78	74	252	52	5.0
B-2	60.0	4:45:00	953.233	0.11	1.72	1.70	394	78	74	250	53	5.0
B-3	75.0	5:00:00	963.719	0.10	1.56	1.60	394	79	74	248	53	5.0
C-1	90.0	5:15:00	973.654	0.14	2.19	2.20	391	79	76	249	54	5.0
C-2	105.0	5:30:00	985.140	0.13	2.03	2.00	391	80	76	250	54	5.0
C-3	120.0	5:45:00	996.438	0.13	2.03	2.00	390	81	77	248	55	5.0
D-1	135.0	6:00:00	1007.317	0.10	1.56	1.60	390	81	77	248	55	5.0
D-2	150.0	6:15:00	1018.075	0.13	2.03	2.00	393	81	78	249	56	5.0
D-3	165.0	6:30:00	1029.486	0.13	2.03	2.00	394	82	78	250	56	5.0
Last Pt	180.0	6:54:00	1040.221									
Final Value	180.0	6:54:00	1040.221							Vacuum		5.0
Average Values				0.12		1.89	393	79				
								77				

METHOD 5 - DETERMINATION OF PARTICULATE EMISSIONS - RESULTS

Plant Name	Lafarge Corporation	**Date**	9/10/2010
Sampling Location	Kiln 1 Stack	**Project #**	2010- 1101
Operator	AM/GC	**Stack Type**	Circular

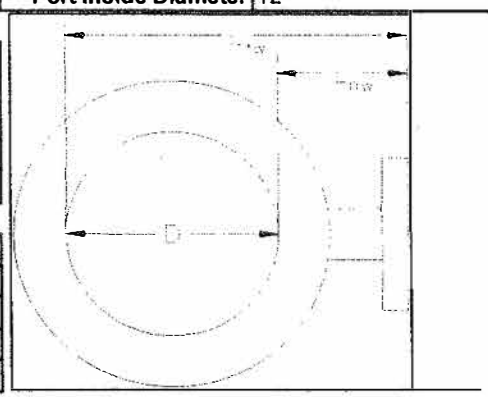
Historical Data						
Run Number		K1-M23-1	K1-M23-2	K1-M23-3	**Average**	
Run Start Time		8:55	12:20	3:45		hh:mm
Run Stop Time		12:05	15:28	6:54		hh:mm
Meter Calibration Factor	(Y)	0.983	0.983	0.983		
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840		
Actual Nozzle Diameter	(D_{ns})	0.410	0.410	0.410		in
Stack Test Data						
Initial Meter Volume	(V_m)$_i$	649.841	780.682	909.913		ft^3
Final Meter Volume	(V_m)$_f$	780.353	909.508	1040.221		ft^3
Total Meter Volume	(V_m)	130.512	128.826	130.308	129.882	ft^3
Total Sampling Time	(Θ)	180.0	180.0	180.0	180.0	min
Average Meter Temperature	(t_m)$_{avg}$	73.3	75.5	76.9	75.3	°F
Average Stack Temperature	(t_s)$_{avg}$	393.1	394.6	392.6	393.4	°F
Barometric Pressure	(P_b)	30.05	30.05	30.05	30.05	in Hg
Stack Static Pressure	(P_{static})	-0.16	-0.15	-0.16	-0.16	in H_2O
Absolute Stack Pressure	(P_s)	30.04	30.04	30.04	30.04	in Hg
Average Orifice Pressure Drop	(ΔH)$_{avg}$	1.88	1.83	1.89	1.87	in H_2O
Absolute Meter Pressure	(P_m)	30.19	30.18	30.19	30.19	in Hg
Avg Square Root Pitot Pressure	($\Delta p^{1/2}$)$_{avg}$	0.35	0.35	0.35	0.35	(in H_2O)$^{1/2}$
Moisture Content Data						
Impingers 1-3 Water Volume Gain	(V_n)	459.0	468.0	460.0	462.3	ml
Impingers 4 Silica Gel Weight Gain	(W_n)	58.9	35.0	2.0	32.0	g
Total Water Volume Collected	(V_{lc})	518.0	503.1	462.0	494.4	ml
Standard Water Vapor Volume	(V_w)$_{std}$	24.383	23.679	21.747	23.269	scf
Standard Meter Volume	(V_m)$_{std}$	128.160	125.958	127.098	127.072	dscf
Calculated Stack Moisture	($B_{ws(calc)}$)	16.0	15.8	14.6	15.5	%
Saturated Stack Moisture	($B_{ws(svp)}$)	100.00	100.0	100.0	100.0	%
Reported Stack Moisture Content	(B_{ws})	16.0	15.8	14.6	15.5	%
Gas Analysis Data						
Carbon Dioxide Percentage	(%CO_2)	20.2	21.2	20.5	20.6	%
Oxygen Percentage	(%O_2)	7.9	8.0	7.6	7.8	%
Carbon Monoxide Percentage	(%CO)	0.0	0.0	0.0	0.0	%
Nitrogen Percentage	(%N_2)	71.9	70.8	71.9	71.5	%
Dry Gas Molecular Weight	(M_d)	31.55	31.71	31.58	31.61	lb/lb-mole
Wet Stack Gas Molecular Weight	(M_s)	29.38	29.54	29.60	29.51	lb/lb-mole
Calculated Fuel Factor	(F_o)	0.644	0.608	0.649	0.634	
Fuel F-Factor	(F_d)	0	0	0	0	dscf/mmBtu
Percent Excess Air	(%EA)	71.3	74.8	66.8	71.0	
Volumetric Flow Rate Data						
Average Stack Gas Velocity	(v_s)	24.83	24.46	24.49	24.59	ft/sec
Stack Cross-Sectional Area	(A_s)	113.10	113.10	113.10		ft²
Actual Stack Flow Rate	(Q_{aw})	168504	165976	166208	166896	acfm
Wet Standard Stack Flow Rate	(Q_{sw})	6282	6177	6200	6220	wscfm
Dry Standard Stack Flow Rate	(Q_{sd})	87968	86663	88240	87624	dscfm
Percent of Isokinetic Rate	(I)	99.8	99.6	98.7	99.4	
Emission Rate Data						
Mass of Particulate on Filter	(m_f)					g
Mass of Particulate in Acetone	(m_a')					g
Mass due to Acetone Blank	(W_a)	0.0	0.0	0.0	0.0	g
Total Mass of Particulates	(m_n)					g
Stack Particulate Concentration	(c_s)					g/dscf
	(c_s)					gr/dscf
Particulate Emission Rate	(E)					kg/hr
	(E)					lb/hr
	(E)					lbs/mmBtu
(Pt 75 App F Sect. 5.2.1) **Heat Input**	(HI)	#DIV/0!	#DIV/0!	#DIV/0!		mmBtu/hr

KILN 2 - FIELD DATA

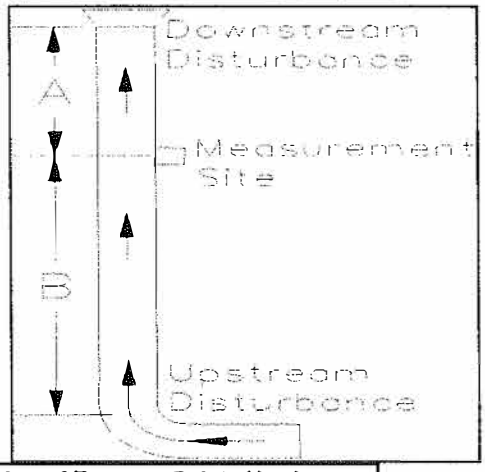
METHOD 1 - SAMPLE AND VELOCITY TRAVERSES FOR CIRCULAR SOURCES

Plant Name	LaFarge	**Date**	06/29/10
Sampling Location	Kiln 2	**Project #**	2010-11015
Operator	AM/GC	**# of Ports Available**	2
Stack Type	Circular	**# of Ports Used**	2
Stack Size	Large	**Port Inside Diameter**	12

Circular Stack or Duct Diameter			
Distance to Far Wall of Stack	(L_{fw})	120.00	in
Distance to Near Wall of Stack	(L_{nw})	12.00	in
(=Lfw - Lnw) **Diameter of Stack**	(D)	108.00	in
(=3.14(D/2/Cunits)2) **Area of Stack**	(A_s)	63.62	ft^2



Distance from Port to Disturbances			
Distance Upstream	(B)	1140.00	in
(=B/D) **Diameters Upstream**	(B_D)	10.56	diameters
Distance Downstream	(A)	1020.00	in
(=A/D) **Diameters Downstream**	(A_D)	9.44	diameters



Number of Traverse Points Required			
Diameters to Flow Disturbance		**Minimum Number of[1] Traverse Points**	
Up Stream	**Down Stream**	**Particulate Points**	**Velocity Points**
2.00-4.99	0.50-1.24	24	16
5.00-5.99	1.25-1.49	20	16
6.00-6.99	1.50-1.74	16	12
7.00-7.99	1.75-1.99	12	12
>= 8.00	>=2.00	8 or 12[2]	8 or 12[2]
Upstream Spec		12	12
Downstream Spec		12	12
Traverse Pts Required		12	12

[1] Check Minimum Number of Points for the Upstream and Downstream conditions, then use the largest.
[2] 8 for Circular Stacks 12 to 24 inches
12 for Circular Stacks over 24 inches

Number of Traverse Points Used			
2	**Ports by**	6	**Across**
12	**Pts Used**	12	**Required**
☑	**Particulate**	☐	**Velocity**

Location of Traverse Points in Circular Stacks						
Traverse Point Number	(Fraction of Stack Diameter from Inside Wall to Traverse Point) Number of Traverse Points on a Diameter					
	2	4	6	8	10	12
1	.146	.067	.044	.032	.026	.021
2	.854	.250	.146	.105	.082	.067
3		.750	.296	.194	.146	.118
4		.933	.704	.323	.226	.177
5			.854	.677	.342	.250
6			.956	.806	.658	.356
7				.895	.774	.644
8				.968	.854	.750
9					.918	.823
10					.974	.882
11						.933
12						.979

Traverse Point Locations			
Traverse Point Number	**Fraction of Stack Diameter**	**Distance from Inside Wall**	**Distance Including Nipple Length**
		in	in
1	0.044	4 6/8	16 6/8
2	0.146	15 6/8	27 6/8
3	0.296	32	44
4	0.704	76	88
5	0.854	92 2/8	104 2/8
6	0.956	103 2/8	115 2/8
7			
8			
9			
10			
11			
12			

METHOD 2 - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE

Plant Name	LaFarge	Date	06/29/10
Sampling Location	Kiln 2	Project #	2010-11015
Operator	AM/GC	# of Ports Used	2
Stack Type	Circular	Pitot Identification	P120
Pitot Leak Check	☑ PreTest ☑ PostTest	Pitot Coefficient (C_p)	0.84

Stack Dimensions			
Diameter or Length of Stack	(D)	108.00	in
Width of Stack	(W)		in
Area of Stack	(A_s)	63.62	ft^2

Pressures			
Barometric Pressure	(P_b)	30.01	in Hg
Static Pressure	(P_{static})	-0.75	in H_2O
Absolute Stack Pressure	(P_s)	29.95	in Hg

Stack Gas Composition			
Composition Data:	Actual ☑	Estimated ☐	
Carbon Dioxide Concentration	(%CO_2)	19.8	%
Oxygen Concentration	(%O_2)	8.2	%
Carbon Monoxide Concentration	(%CO)	0.0	%
Nitrogen Concentration	(%N_2)	72.0	%
Stack Moisture Content	(B_{ws})	16.500	
Stack Dry Molecular Weight	(M_d)	31.50	lb/lb-mole
Stack Wet Molecular Weight	(M_s)	29.27	lb/lb-mole

Results			
Avg Stack Gas Velocity	(v_s)	72.9	ft/sec
Avg Stack Dry Std Flow Rate	(Q_{sd})	9095312	dscf/hr
Avg Stack Dry Std Flow Rate	(Q_{sd})	151589	dscf/min
Avg Stack Wet Flow Rate	(Q_{aw})	278380	ascf/min

Stack Cross Section Schematic

Velocity Traverse Data

Run Number		K2-M23-V1	
Run Time			
Traverse Point	Velocity Head (Δp)	Stack Temp (t_s)	Local Velocity $(v_s)_i$
	in H_2O	°F	ft/sec
A-1	0.94	348	66.8
A-2	0.98	349	68.3
A-3	1.10	352	72.5
A-4	1.30	351	78.7
A-5	1.30	350	78.7
A-6	1.20	352	75.7
B-1	0.95	350	67.3
B-2	0.97	353	68.1
B-3	1.00	352	69.1
B-4	1.20	351	75.7
B-5	1.30	350	78.7
B-6	1.20	349	75.6
Average[1]	1.06	351	

[1] Please report the average of the square roots of Δp, or, $(\Delta p)^{1/2}_{avg} = {}^1/_n\Sigma(\Delta p^{1/2})$

Formulas Used

$A_s = DW/K_u$ for Rectangular Stacks

$A_s = (\pi(D/2)^2)/K_u$ for Circular Stacks

where $K_u = 1$ for metric units

where $K_u = 144$ (in^2/ft^2) for English units

$P_s = P_{bar} + P_{static}/13.6$

$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$

$M_d = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%CO)$

$M_s = M_d(1 - B_{ws}) + 18B_{ws}$

$(\Delta p)^{1/2}_{avg} = {}^1/_n\Sigma(\Delta p^{1/2})$

$T_{s(avg)} = {}^1/_n\Sigma t_s + T_u$

where $T_u = 273$ °K for metric units

where $T_u = 460$ °R for English units

$v_s = K_pC_p(\Delta p)^{1/2}_{avg}(T_{s(avg)}/(P_sM_s))^{1/2}$

where $K_p = 34.97$ for metric units

where $K_p = 85.49$ for English units

$Q_{sd} = 3600(1 - B_{ws})v_sA_s(T_{std}/T_{s(avg)})(P_s/P_{std})$

where $T_{std} = 293$ °K, $P_{std} = 760$ mm Hg, for metric units

where $T_{std} = 528$ °R, $P_{std} = 29.92$ in Hg, for English units

METHOD 3 - GAS ANALYSIS FOR THE DETERMINATION OF DRY MOLECULAR WEIGHT

Plant Name	LaFarge			Date	06/29/10
Sampling Location	Kiln 2			Project #	2010-11015
Operator	AM/GC			# of Ports Used	2
Fuel Type	N/A	Minimum Fuel Factor		Maximum Fuel Factor	
Orsat Leak Check	☑	PreTest	☑	PostTest	Orsat Identification

Gas Analysis Data

Run Number	K2-M23-1			Run Start Time	10:20		Run Stop Time	13:25
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
ORSAT	15.9	24.4		15.9	8.5	0.0	75.6	30.88	0.00
	15.9	24.4		15.9	8.5	0.0	75.6	30.88	0.00
	15.9	24.4		15.9	8.5	0.0	75.6	30.88	0.00
Results			Averages	15.9	8.5	0.0	75.6	30.88	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.780		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	74.2	percent	Fuel Factor in Handbook Range?			☑

Gas Analysis Data

Run Number	K2-M23-2			Run Start Time	13:45		Run Stop Time	16:50
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
ORSAT	16.4	25.4		16.4	9.0	0.0	74.6	30.98	0.00
	16.4	25.4		16.4	9.0	0.0	74.6	30.98	0.00
	16.4	25.4		16.4	9.0	0.0	74.6	30.98	0.00
Results			Averages	16.4	9.0	0.0	74.6	30.98	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.726		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	84.2	percent	Fuel Factor in Handbook Range?			☑

Gas Analysis Data

Run Number	K2-M23-3			Run Start Time	17:10		Run Stop Time	20:15
Sample Analysis Time	Carbon Dioxide Volume (V_{CO2})	Oxygen Volume (V_{O2})	Carbon Monoxide Volume (V_{CO})	Carbon Dioxide Conc. ($\%CO_2$)	Oxygen Conc. ($\%O_2$)	Carbon Monoxide Conc. (%CO)	Nitrogen Conc. ($\%N_2$)	Dry Molecular Weight (M_d)	Molecular Weight Deviation (ΔM_d)
hh:mm	ml	ml	ml	percent	percent	percent	percent	lb/lb-mole	lb/lb-mole
ORSAT	17.2	25.9		17.2	8.7	0.0	74.1	31.10	0.00
	17.2	25.9		17.2	8.7	0.0	74.1	31.10	0.00
	17.2	25.9		17.2	8.7	0.0	74.1	31.10	0.00
Results			Averages	17.2	8.7	0.0	74.1	31.10	
Average Calculated Fuel Factor			$(F_o)_{avg}$	0.709		Molecular Wt Deviation < 0.3?			☑
Average Excess Air			$(\%EA)_{avg}$	80.1	percent	Fuel Factor in Handbook Range?			☑

Fuel Factor Fo

Fuel Type	Minimum	Maximum
Coal, Anthracite	1.016	1.130
Coal, Lignite	1.016	1.130
Coal, Bituminous	1.083	1.230
Oil, Distillate	1.260	1.413
Oil, Residual	1.210	1.370
Gas, Natural	1.600	1.836
Gas, Propane	1.434	1.586
Gas, Butane	1.405	1.553
Wood	1.000	1.120
Wood Bark	1.003	1.130

Formulas Used

$\%CO_2 = V_{CO2}$

$\%O_2 = V_{O2} - V_{CO2}$

$\%CO = V_{CO} - V_{O2}$

$\%N_2 = 100 - \%CO_2 - \%O_2 - \%CO$

$M_d = .44(\%CO_2) + .32(\%O_2) + .28(\%N_2 + \%CO)$

$\Delta M_d = M_d - M_{davg}$

$F_o = (20.9 - \%O_2 - .5\%CO)/(\%CO_2 + \%CO)$

$\%EA = 100(\%O_2 - .5\%CO)/(.264\%NO_2 - (\%O_2 - .5\%CO))$

METHOD 4 - DETERMINATION OF MOISTURE CONTENT IN STACK GASES

Plant Name	LaFarge				**Date**	06/29/10
Sampling Location	Kiln 2				**Project #**	2010-11015
Operator	AM/GC				**# of Ports Used**	2
Stack Type	Circular				**Meter Box Number**	004
Train Leak Check	☑	**PreTest**	☑	**PostTest**	**Meter Cal Factor (Y)**	1.005

Moisture Content Data							
Run Number	K2-M23-1		**Run Start Time**	10:20	**Run Stop Time**		13:25
Total Meter Volume	(V_m)	137.903	dcf	**Barometric Press.**	(P_b)	29.95	in Hg
Avg Meter Temp	$(t_m)_{avg}$	84	°F	**Stack Static Press.**	(P_{static})	-0.75	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	416	°F	**Avg Orifice Press.**	$(\Delta H)_{avg}$	1.87	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	g	ml	ml	ml
Contents		DI	DI	XAD	Sil Gel			
Final Value	$(V_f),(W_f)$	516.00	379.00	381.40	229.90			
Initial Value	$(V_i),(W_i)$	50.00	150.00	374.20	200.00			
Net Value	$(V_n),(W_n)$	466.0	229.0	7.2	29.9			
Results								
Total Volume	(V_t)	702.20	ml	**Water Vol Condensed**	$(V_{wc(std)})$	33.053	scf	
Total Weight	(W_t)	29.90	g	**Water Vol Weighed**	$(V_{wsg(std)})$	1.410	scf	
Std Meter Volume	$(V_{m(std)})$	135.248	dscf	**Sat. Moisture Content**	$(B_{ws(svp)})$	100.0	%	
Calc Moisture Content	$(B_{ws(calc)})$	20.3	%	**Final Moisture Content**	(B_{ws})	20.3	%	

Moisture Content Data							
Run Number	K2-M23-2		**Run Start Time**	13:45	**Run Stop Time**		16:50
Total Meter Volume	(V_m)	132.943	dcf	**Barometric Press.**	(P_b)	29.95	in Hg
Avg Meter Temp	$(t_m)_{avg}$	86	°F	**Stack Static Press.**	(P_{static})	-0.79	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	416	°F	**Avg Orifice Press.**	$(\Delta H)_{avg}$	1.73	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	g	ml	ml	ml
Contents		DI	DI	XAD	Sil Gel			
Final Value	$(V_f),(W_f)$	500.00	314.00	378.40	234.00			
Initial Value	$(V_i),(W_i)$	50.00	150.00	371.60	200.00			
Net Value	$(V_n),(W_n)$	450.0	164.0	6.8	34.0			
Results								
Total Volume	(V_t)	620.80	ml	**Water Vol Condensed**	$(V_{wc(std)})$	29.221	scf	
Total Weight	(W_t)	34.00	g	**Water Vol Weighed**	$(V_{wsg(std)})$	1.603	scf	
Std Meter Volume	$(V_{m(std)})$	129.791	dscf	**Sat. Moisture Content**	$(B_{ws(svp)})$	100.0	%	
Calc Moisture Content	(B_{ws})	19.2	%	**Final Moisture Content**	(B_{ws})	19.2	%	

Moisture Content Data							
Run Number	K2-M23-3		**Run Start Time**	17:10	**Run Stop Time**		20:15
Total Meter Volume	(V_m)	133.088	dcf	**Barometric Press.**	(P_b)	29.95	in Hg
Avg Meter Temp	$(t_m)_{avg}$	86	°F	**Stack Static Press.**	(P_{static})	-0.77	in H_2O
Avg Stack Temp	$(t_s)_{avg}$	416	°F	**Avg Orifice Press.**	$(\Delta H)_{avg}$	1.73	in H_2O
		Impinger 1	**Impinger 2**	**Impinger 3**	**Impinger 4**	**Impinger 5**	**Impinger 6**	**Impinger 7**
		ml	ml	ml	g	ml	ml	ml
Contents		DI	DI	XAD	Sil Gel			
Final Value	$(V_f),(W_f)$	512.00	333.00	376.50	225.40			
Initial Value	$(V_i),(W_i)$	50.00	150.00	367.10	200.00			
Net Value	$(V_n),(W_n)$	462.0	183.0	9.4	25.4			
Results								
Total Volume	(V_t)	654.40	ml	**Water Vol Condensed**	$(V_{wc(std)})$	30.803	scf	
Total Weight	(W_t)	25.40	g	**Water Vol Weighed**	$(V_{wsg(std)})$	1.198	scf	
Std Meter Volume	$(V_{m(std)})$	130.111	dscf	**Sat. Moisture Content**	$(B_{ws(svp)})$	100.0	%	
Calc Moisture Content	(B_{ws})	19.7	%	**Final Moisture Content**	(B_{ws})	19.7	%	

ISOKINETIC SAMPLING DATA

Plant Name	LaFarge	Date	6/29/2010
Sampling Location	Kiln 2	Project #	2010-11015
Operator	AM/GC	Run #	K2-M23-1
# of Points Across	6	# of Ports Used	2

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	415	°F
Avg Gas Meter Temp	(t_m)	80	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.66	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.10	in H_2O
Stack Moisture Content	(B_{ws})	20.0	%
Stack Dry Molecular Weight	(M_{ds})	31.50	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.750	acfm
DP to DH Isokinetic Factor	(K)	1.67	

Sampling Equipment			
Meter #	004		
Meterbox Cal. Factor	(Y)	1.005	
Nozzle #	N235		
Actual Nozzle Diameter	(D_{na})	0.2500	in
Req. Nozzle Diameter	(D_{ni})	0.2480	in
Probe # / Length	P120	120.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.75	in H_2O
Absolute Stack Pressure	(P_s)	29.89	in Hg
Absolute Meter Pressure	(P_m)	30.07	in Hg

ΔV_m		Leak Checks			
Pre	16	ft^3/min	@	0	in Hg
Mid		ft^3/min	@		in Hg
Post	16	ft^3/min	@	0	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?		☑	Orsat OK?		☑

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	10:20:00	551.061	0.950	1.588	1.700	415	82	81	248	53	9.0
A-2	15.0	10:35:00	562.024	0.970	1.622	1.700	416	83	81	250	53	9.0
A-3	30.0	10:50:00	573.124	1.000	1.672	1.800	416	84	82	249	53	9.0
A-4	45.0	11:05:00	584.447	1.200	2.006	2.200	417	85	82	249	53	10.0
A-5	60.0	11:20:00	596.822	1.200	2.006	2.200	416	85	82	248	54	10.0
A-6	75.0	11:35:00	609.059	1.000	1.672	1.800	415	85	83	250	54	9.0
B-1	90.0	11:55:00	620.473	0.940	1.571	1.700	414	85	83	248	54	9.0
B-2	105.0	12:10:00	631.318	0.960	1.605	1.700	416	86	83	249	54	9.0
B-3	120.0	12:25:00	642.186	0.990	1.655	1.800	418	86	84	251	54	9.0
B-4	135.0	12:40:00	653.205	1.000	1.672	1.800	417	87	84	250	55	9.0
B-5	150.0	12:55:00	664.317	1.200	2.006	2.200	418	87	85	249	55	10.0
B-6	165.0	13:10:00	676.881	1.000	1.672	1.800	418	88	85	251	56	9.0
Last Pt	180.0	13:25:00	688.964									
Last Pt	180.0	13:25:00	688.964						Maximum Vacuum			10.0
Average Values				1.03		1.87	416	85	83	249	54	
								84				

ISOKINETIC SAMPLING DATA

Plant Name	LaFarge	Date	6/29/2010
Sampling Location	Kiln 2	Project #	2010-11015
Operator	AM/GC	Run #	K2-M23-2
# of Points Across	6	# of Ports Used	2

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	415	°F
Avg Gas Meter Temp	(t_m)	80	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.66	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.10	in H_2O
Stack Moisture Content	(B_{ws})	20.0	%
Stack Dry Molecular Weight	(M_{ds})	30.88	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.766	acfm
DP to DH Isokinetic Factor	(K)	1.67	

Sampling Equipment			
Meter #	004		
Meterbox Cal. Factor	(Y)	1.005	
Nozzle #	N235		
Actual Nozzle Diameter	(D_{na})	0.2500	in
Req. Nozzle Diameter	(D_{ni})	0.2496	in
Probe # / Length	P120	120.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.79	in H_2O
Absolute Stack Pressure	(P_s)	29.89	in Hg
Absolute Meter Pressure	(P_m)	30.07	in Hg

ΔV_m		Leak Checks			
Pre	19	ft^3/min	@	0	in Hg
Mid		ft^3/min	@		in Hg
Post	19	ft^3/min	@	0	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?		☑	Orsat OK?		☐

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	13:45:00	690.214	0.950	1.584	1.600	415	83	83	250	52	11.0
A-2	15.0	14:00:00	700.865	0.960	1.601	1.600	416	84	83	249	52	11.0
A-3	30.0	14:15:00	711.355	0.990	1.651	1.700	416	85	83	248	53	11.0
A-4	45.0	14:30:00	722.218	1.100	1.834	1.800	418	86	84	247	53	11.0
A-5	60.0	14:45:00	733.647	1.200	2.001	2.000	417	87	84	249	53	11.0
A-6	75.0	15:00:00	745.644	1.000	1.667	1.700	416	87	85	251	53	11.0
B-1	90.0	15:20:00	756.847	0.940	1.567	1.600	417	88	85	248	54	11.0
B-2	105.0	15:35:00	767.143	0.960	1.601	1.600	416	88	86	250	54	11.0
B-3	120.0	15:50:00	777.776	0.990	1.651	1.700	417	89	86	251	54	11.0
B-4	135.0	16:05:00	788.699	1.000	1.667	1.700	416	90	87	250	55	11.0
B-5	150.0	16:20:00	799.861	1.200	2.001	2.000	415	91	88	251	55	11.0
B-6	165.0	16:35:00	812.019	1.000	1.667	1.700	415	92	89	249	56	11.0
Last Pt	180.0	16:50:00	823.157									
Final Value	180.0	16:50:00	823.157							Maximum Vacuum		11.0
Average Values				1.02		1.73	416	88	85	249	54	
								86				

ISOKINETIC SAMPLING DATA

Plant Name	LaFarge	Date	6/29/2010
Sampling Location	Kiln 2	Project #	2010-11015
Operator	AM/GC	Run #	K2-M23-3
# of Points Across	6	# of Ports Used	2

Ideal Nozzle Diameter and IsoKinetic Factor Setup			
Pitot Tube Coefficient	(C_p)	0.840	
Avg Stack Temp	(t_s)	415	°F
Avg Gas Meter Temp	(t_m)	80	°F
DH @ 0.75 SCFM	($\Delta H@$)	1.66	in H_2O
Avg Pitot Tube Diff. Pressure	(Δp_{avg})	1.10	in H_2O
Stack Moisture Content	(B_{ws})	20.0	%
Stack Dry Molecular Weight	(M_{ds})	30.98	lb/lb-mole
Estimated Orifice Flow Rate	(Q_m)	0.739	acfm
DP to DH Isokinetic Factor	(K)	1.67	

Sampling Equipment			
Meter #	004		
Meterbox Cal. Factor	(Y)	1.005	
Nozzle #	N235		
Actual Nozzle Diameter	(D_{na})	0.2500	in
Req. Nozzle Diameter	(D_{ni})	0.2452	in
Probe # / Length	P120	120.00	ft
Liner Material	GL		
Sample Case / Oven #			
Impinger Case #			

Pressures			
Barometric Pressure	(P_b)	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.77	in H_2O
Absolute Stack Pressure	(P_s)	29.89	in Hg
Absolute Meter Pressure	(P_m)	30.07	in Hg

ΔV_m		Leak Checks			
Pre	19	ft^3/min	@	0	in Hg
Mid		ft^3/min	@		in Hg
Post	19	ft^3/min	@	0	in Hg
ΔV_m <	0.020	ft^3/min	☑	Leak Check OK?	
Pitot OK?	☑		Orsat OK?	☑	

Traverse Point #	Sampling Time (Θ)	Clock Time	Dry Gas Meter Reading (V_m)	Velocity Head (Δp)	Desired Orifice ΔH (ΔH)	Actual Orifice ΔH (ΔH)	Stack Temp (t_s)	Meter Inlet Temp (t_{mi})	Meter Outlet Temp (t_{mo})	Filter Temp	Impinger Exit Temp	Pump Vacuum
	min	hh:mm:ss	ft^3	in H_2O	in H_2O	in H_2O	°F	°F	°F	°F	°F	in Hg
A-1	0.0	17:10:00	831.887	0.96	1.60	1.60	420	84	83	250	52	8.0
A-2	15.0	17:25:00	842.541	0.98	1.63	1.60	417	85	83	249	52	8.0
A-3	30.0	17:40:00	853.474	1.00	1.67	1.70	415	85	83	251	52	8.0
A-4	45.0	17:55:00	864.209	1.10	1.84	1.80	420	85	84	249	52	8.0
A-5	60.0	18:10:00	875.585	1.20	2.00	2.00	419	86	84	248	53	8.0
A-6	75.0	18:25:00	887.848	1.00	1.67	1.70	418	86	84	251	53	8.0
B-1	90.0	18:45:00	898.485	0.94	1.57	1.60	419	87	85	250	54	8.0
B-2	105.0	19:00:00	909.154	0.97	1.62	1.60	415	87	85	250	55	8.0
B-3	120.0	19:15:00	920.343	0.99	1.65	1.70	397	88	85	252	56	8.0
B-4	135.0	19:30:00	930.686	1.00	1.67	1.70	384	89	86	251	56	8.0
B-5	150.0	19:45:00	941.872	1.20	2.00	2.00	379	89	86	250	57	8.0
B-6	165.0	20:00:00	953.671	0.99	1.65	1.70	367	90	86	250	58	8.0
Last Pt	180.0	20:15:00	964.975									
Final Value	180.0	20:15:00	964.975							Maximum Vacuum		8.0
Average Values				1.03		1.73	406	87	85	250	54	
								86				

METHOD 5 - DETERMINATION OF PARTICULATE EMISSIONS - RESULTS

Plant Name	LaFarge	**Date**	06/29/10
Sampling Location	Kiln 2	**Project #**	2010-11015
Operator	AM/GC	**Stack Type**	Circular

Historical Data						
Run Number		K2-M23-1	K2-M23-2	K2-M23-3	**Average**	
Run Start Time		10:20	13:45	17:10		hh:mm
Run Stop Time		13:25	16:50	20:15		hh:mm
Meter Calibration Factor	(Y)	1.005	1.005	1.005		
Pitot Tube Coefficient	(C_p)	0.840	0.840	0.840		
Actual Nozzle Diameter	(D_{ns})	0.250	0.250	0.250		in
Stack Test Data						
Initial Meter Volume	$(V_m)_i$	551.061	690.214	831.887		ft^3
Final Meter Volume	$(V_m)_f$	688.964	823.157	964.975		ft^3
Total Meter Volume	(V_m)	137.903	132.943	133.088	134.645	ft^3
Total Sampling Time	(Θ)	180.0	180.0	180.0	180.0	min
Average Meter Temperature	$(t_m)_{avg}$	84.1	86.4	85.6	85.4	°F
Average Stack Temperature	$(t_s)_{avg}$	416.3	416.2	405.8	412.8	°F
Barometric Pressure	(P_b)	29.95	29.95	29.95	29.95	in Hg
Stack Static Pressure	(P_{static})	-0.75	-0.79	-0.77	-0.77	in H_2O
Absolute Stack Pressure	(P_s)	29.89	29.89	29.89	29.89	in Hg
Average Orifice Pressure Drop	$(\Delta H)_{avg}$	1.87	1.73	1.73	1.77	in H_2O
Absolute Meter Pressure	(P_m)	30.09	30.08	30.08	30.08	in Hg
Avg Square Root Pitot Pressure	$(\Delta p^{1/2})_{avg}$	1.02	1.01	1.01	1.01	$(in\ H_2O)^{1/2}$
Moisture Content Data						
Impingers 1-3 Water Volume Gain	(V_n)	702.2	620.8	654.4	659.1	ml
Impinger 4 Silica Gel Weight Gain	(W_n)	29.9	34.0	25.4	29.8	g
Total Water Volume Collected	(V_{lc})	732.2	654.9	679.8	689.0	ml
Standard Water Vapor Volume	$(V_w)_{std}$	34.462	30.824	32.000	32.429	scf
Standard Meter Volume	$(V_m)_{std}$	135.248	129.791	130.111	131.717	dscf
Calculated Stack Moisture	$(B_{ws(calc)})$	20.3	19.2	19.7	19.7	%
Saturated Stack Moisture	$(B_{ws(sat)})$	100.00	100.0	100.0	100.0	%
Reported Stack Moisture Content	(B_{ws})	20.3	19.2	19.7	19.7	%
Gas Analysis Data						
Carbon Dioxide Percentage	($\%CO_2$)	15.9	16.4	17.2	16.5	%
Oxygen Percentage	($\%O_2$)	8.5	9.0	8.7	8.7	%
Carbon Monoxide Percentage	(%CO)	0.0	0.0	0.0	0.0	%
Nitrogen Percentage	($\%N_2$)	75.6	74.6	74.1	74.8	%
Dry Gas Molecular Weight	(M_d)	30.88	30.98	31.10	30.99	lb/lb-mole
Wet Stack Gas Molecular Weight	(M_s)	28.27	28.49	28.51	28.42	lb/lb-mole
Calculated Fuel Factor	(F_o)	0.780	0.726	0.709	0.738	
Fuel F-Factor	(F_d)	0	0	0	0	dscf/mmBtu
Percent Excess Air	(%EA)	74.2	84.2	80.1	79.5	%
Volumetric Flow Rate Data						
Average Stack Gas Velocity	(v_s)	74.29	73.65	73.30	73.75	ft/sec
Stack Cross-Sectional Area	(A_s)	63.62	63.62	63.62		ft^2
Actual Stack Flow Rate	(Q_{aw})	283558	281111	279803	281491	acfm
Wet Standard Stack Flow Rate	(Q_{sw})	10242	10155	10229	10209	wkscfh
Dry Standard Stack Flow Rate	(Q_{sd})	136039	136765	136825	136543	dscfm
Percent of Isokinetic Rate	(I)	103.1	98.4	98.6	100.0	%
Emission Rate Data						
Mass of Particulate on Filter	(m_f)					mg
Mass of Particulate in Acetone	(m_a')					mg
Mass due to Acetone Blank	(W_a)					mg
Total Mass of Particulates	(m_n)					mg
Stack Particulate Concentration	(c_s)					g/dscf
	(c_s)					gr/dscf
Particulate Emission Rate	(E)					kg/hr
	(E)					lbs/hr
	(E)					lbs/mmBtu
(Pt 75 App F Sect. 5.2.1) **Heat Input**	(HI)	#DIV/0!	#DIV/0!	#DIV/0!		mmBtu/Hr

APPENDIX C. LABORATORY DATA

ANALYTICAL PERSPECTIVES

12 September 2010

Rachel Chleborowiez
RMC Enivonmental
9226 N. 2nd Street
Suite C
Machesneg Park, IL 61115

Ph.: 815-378-6150

Kiln 2

Subject: Certificate of Results

Dear Rachel;

Attached to this narrative are the analytical results you requested on samples submitted for the determination of polychlorinated dibenzo-*p*-dioxins and dibenzofurans. The insert below summarizes the relevant information pertaining to your project. In particular, QC annotations bring to your attention specific analytical observations and assessments made during the sample handling and data interpretation phases. Results reported relate only to the items tested.

Project Information Summary	When applicable, see QC Annotations for details
Client Project No.	LAF9910
AP Project No.	P2636
Analytical Protocol	Method 23
No. Samples Submitted	4
No. Samples Analyzed	4
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
No. Outstanding Samples	0
Date Received	10-Sep-2010
Condition Received	Good
Temperature upon Receipt (C)	13
Extraction within Holding Time	yes
Analysis within Holding Time	yes
Data meet QA/QC Requirements	see below
Exceptions	see below
Analytical Difficulties	see below

2714 EXCHANGE DRIVE
WILMINGTON, NC 28405
PH.: 910-794-1613

QC Annotations:

1. Please see the attached appendices for a list of data qualifiers and lab identifiers that may be contained in the report.

Analytical Perspectives remains committed to serving you in the most effective manner. Should you have any questions or need additional information and technical support, please do not hesitate to contact us. Thank you for choosing Analytical Perspectives as part of your analytical support team.

Sincerely,

Heather Steele

Heather Steele, Ph.D.
Project Manager

2714 EXCHANGE DRIVE
WILMINGTON, NC 28405
PH.: 910-794-1613

APPENDIX A: DATA QUALIFIERS / DATA ATTRIBUTES	
*	The reported concentration exceeds the calibration range (upper point of the calibration curve).[1]
>	Indicates high recoveries. Shown with the numeric value at the top of the range.[1]
B	The analyte is found in the method blank, at a level that is <=10x the sample concentration.
C	Two or more congeners co-elute. In EDDs C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve).
EMPC	Represents an Estimated Maximum Possible Concentration. EMPC's arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
ETH	Indicates the presence of a diphenyl ether that appears to interfere with the quantitation of a furan. The reported concentration is the maximum.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.[1]
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve).
ND	Indicates a non-detect.
NR	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
Ra	The new ratio – [Ra] -- for 2,3,7,8-TCDD following the $^{37}Cl_4$-2,3,7,8-TCDD correction is shown between squared brackets in the DL column.[1]
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.[1]
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.
X	Indicates results reported from reinjection, refractionation, or repeat analyses.
APPENDIX B: LAB ID IDENTIFIERS	
AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the "S" indicates the split factor.

[1]Denotes data qualifiers/attributes whose use will be phased out over time

P2636 - TEQ

Project ID: LAF9910

Sample Summary Part 1 — ANALYTICAL PERSPECTIVES — **Method 23**

Analyte	0_8127_MB001	K2-M23-01	K2-M23-02	K2-M23-03	K2-M23-04
	pg	pg	pg	pg	pg
2,3,7,8-TCDD	(1.96)	37	67.3	84.8	(2.28)
1,2,3,7,8-PeCDD	(2.37)	[36.9]	[47.6]	[71.5]	(2.85)
1,2,3,4,7,8-HxCDD	(2.9)	14.6	14.6	21.9	(3.09)
1,2,3,6,7,8-HxCDD	(2.91)	29.1	25.2	36.5	(3.29)
1,2,3,7,8,9-HxCDD	(3.2)	[17.8]	18	18.1	(3.47)
1,2,3,4,6,7,8-HpCDD	(4.02)	145	91.8	93.2	(4.46)
OCDD	(5.36)	274	188	157	9.45
2,3,7,8-TCDF	(1.35)	752	1200	1610	(1.58)
1,2,3,7,8-PeCDF	(1.99)	238	377	466	(2)
2,3,4,7,8-PeCDF	(1.66)	319	504	748	(1.8)
1,2,3,4,7,8-HxCDF	(1.61)	131	155	186	(2.2)
1,2,3,6,7,8-HxCDF	(1.5)	116	151	171	(1.85)
2,3,4,6,7,8-HxCDF	(1.54)	93.6	98.2	114	(2.11)
1,2,3,7,8,9-HxCDF	(2.45)	(3.91)	(5.26)	(5.25)	(3.25)
1,2,3,4,6,7,8-HpCDF	(1.85)	226	163	172	(2.34)
1,2,3,4,7,8,9-HpCDF	(3.27)	34.4	22.5	[22.2]	(3.84)
OCDF	(5.27)	152	116	104	(4.22)
ITEF TEQ (ND=0; EMPC=0)	**0.00**	**327**	**508**	**701**	**0.00945**
ITEF TEQ (ND=0; EMPC=EMPC)	**0.00**	**347**	**531**	**737**	**0.00945**
ITEF TEQ (ND=DL/2; EMPC=0)	**2.96**	**329**	**509**	**702**	**3.46**
ITEF TEQ (ND=DL/2; EMPC=EMPC)	**2.96**	**347**	**532**	**737**	**3.46**
ITEF TEQ (ND=DL; EMPC=EMPC)	**5.92**	**348**	**532**	**737**	**6.91**
Checkcode	340-351	391-981	923-093	757-900	600-188
Lab ID	MB1_8127_DF_SDS	P2636_8127_001	P2636_8127_002RJ	P2636_8127_003	P2636_8127_004

(' – DL
EMPC

P2636 - WHO-2005-TEQ

Project ID: LAF9910

Sample Summary Part 1

ANALYTICAL PERSPECTIVES

Method 23

Analyte	0_8127_MB001	K2-M23-01	K2-M23-02	K2-M23-03	K2-M23-04
	pg	pg	pg	pg	pg
2,3,7,8-TCDD	(1.96)	37	67.3	84.8	(2.28)
1,2,3,7,8-PeCDD	(2.37)	[36.9]	[47.6]	[71.5]	(2.85)
1,2,3,4,7,8-HxCDD	(2.9)	14.6	14.6	21.9	(3.09)
1,2,3,6,7,8-HxCDD	(2.91)	29.1	25.2	36.5	(3.29)
1,2,3,7,8,9-HxCDD	(3.2)	[17.8]	18	18.1	(3.47)
1,2,3,4,6,7,8-HpCDD	(4.02)	145	91.8	93.2	(4.46)
OCDD	(5.36)	274	188	157	9.45
2,3,7,8-TCDF	(1.35)	752	1200	1610	(1.58)
1,2,3,7,8-PeCDF	(1.99)	238	377	466	(2)
2,3,4,7,8-PeCDF	(1.66)	319	504	748	(1.8)
1,2,3,4,7,8-HxCDF	(1.61)	131	155	186	(2.2)
1,2,3,6,7,8-HxCDF	(1.5)	116	151	171	(1.85)
2,3,4,6,7,8-HxCDF	(1.54)	93.6	98.2	114	(2.11)
1,2,3,7,8,9-HxCDF	(2.45)	(3.91)	(5.26)	(5.25)	(3.25)
1,2,3,4,6,7,8-HpCDF	(1.85)	226	163	172	(2.34)
1,2,3,4,7,8,9-HpCDF	(3.27)	34.4	22.5	[22.2]	(3.84)
OCDF	(5.27)	152	116	104	(4.22)
WHO-2005 TEQ (ND=0; EMPC=0)	**0.00**	**258**	**399**	**541**	**0.00283**
WHO-2005 TEQ (ND=0; EMPC=EMPC)	**0.00**	**297**	**447**	**613**	**0.00283**
WHO-2005 TEQ (ND=DL/2; EMPC=0)	**3.36**	**262**	**402**	**545**	**3.96**
WHO-2005 TEQ (ND=DL/2; EMPC=EMPC)	**3.36**	**297**	**447**	**613**	**3.96**
WHO-2005 TEQ (ND=DL; EMPC=EMPC)	**6.72**	**297**	**447**	**614**	**7.93**
Checkcode	340-351	391-981	923-093	757-900	600-188
Lab ID	MB1_8127_DF_SDS	P2636_8127_001	P2636_8127_002RJ	P2636_8127_003	P2636_8127_004

( ) = DL
[ ] = EMPC

P2636 - Totals

Project ID: LAF9910

Sample Summary Part 2

ANALYTICAL PERSPECTIVES

Method 23

Analyte	0_8127_MB001	K2-M23-01	K2-M23-02	K2-M23-03	K2-M23-04
	pg	pg	pg	pg	pg
Totals					
TCDDs	0	2790	4410	5460	0
PeCDDs	0	960	1470	1990	0
HxCDDs	0	450	446	544	0
HpCDDs	0	308	207	214	0
OCDD	0	274	188	157	9.45
TCDFs	0	31700	50300	59800	0
PeCDFs	0	4970	8070	10800	0
HxCDFs	0	1110	1290	1620	0
HpCDFs	0	322	229	246	0
OCDF	0	152	116	104	0
Total PCDD/Fs (ND=0; EMPC=0)	**0.00**	**43,000**	**66,800**	**80,900**	**9.45**
Total PCDD/Fs (ND=0; EMPC=EMPC)	**0.00**	**43,200**	**67,000**	**83,600**	**9.45**
Total PCDD/Fs (2378-X ND=DL; EMPC=EMPC)	**45.2**	**43,200**	**67,000**	**83,600**	**54.1**
Total 2378s (ND=0; EMPC=0)	**0.00**	**2,560**	**3,190**	**3,980**	**9.45**
Total 2378s (ND=0.5; EMPC=0)	**22.6**	**2,570**	**3,200**	**3,990**	**31.8**
Total 2378s (ND=1; EMPC=0)	**45.2**	**2,580**	**3,210**	**4,000**	**54.1**
Total 2378s (ND=0; EMPC=1)	**0.00**	**2,620**	**3,240**	**4,070**	**9.45**
Total 2378s (ND=0.5; EMPC=1)	**22.6**	**2,620**	**3,240**	**4,070**	**31.8**
Total 2378s (ND=1; EMPC=1)	**45.2**	**2,620**	**3,250**	**4,080**	**54.1**
Checkcode	340-351	391-981	923-093	757-900	600-188
Lab ID	MB1 8127 DF SDS	P2636_8127_001	P2636_8127_002RJ	P2636 8127 003	P2636_8127_004

( ) = DL
EMPC

P2636 - Others
Project ID: LAF9910

Sample Summary
Part 3

ANALYTICAL PERSPECTIVES

Method 23

Analyte	0_8127_MB001	K2-M23-01	K2-M23-02	K2-M23-03	K2-M23-04
	pg	pg	pg	pg	pg
Other PCDD/Fs (ND=0, EMPC=0)					
Other TCDD	0	2750	4340	5380	0
Other PeCDD	0	960	1470	1990	0
Other HxCDD	0	406	389	468	0
Other HpCDD	0	163	115	121	0
Other TCDF	0	31000	49100	58200	0
Other PeCDF	0	4410	7190	9560	0
Other HxCDF	0	737	865	1120	0
Other HpCDF	0	61.5	43.5	74.3	0
Other PCDD/Fs (ND=0, EMPC=EMPC)					
Other TCDD	0	2750	4340	5430	0
Other PeCDD	0	997	1500	1990	0
Other HxCDD	0	406	389	491	0
Other HpCDD	0	163	115	121	0
Other TCDF	0	31000	49100	60700	0
Other PeCDF	0	4440	7220	9560	0
Other HxCDF	0	757	907	1150	0
Other HpCDF	0	121	75.3	74.3	0
Checkcode	340-351	391-981	923-093	757-900	600-188
Lab ID	MB1_8127_DF_SDS	P2636_8127_001	P2636_8127_002RJ	P2636_8127_003	P2636_8127_004

( ) = DL
[ ] = EMPC

P2636 - DLs

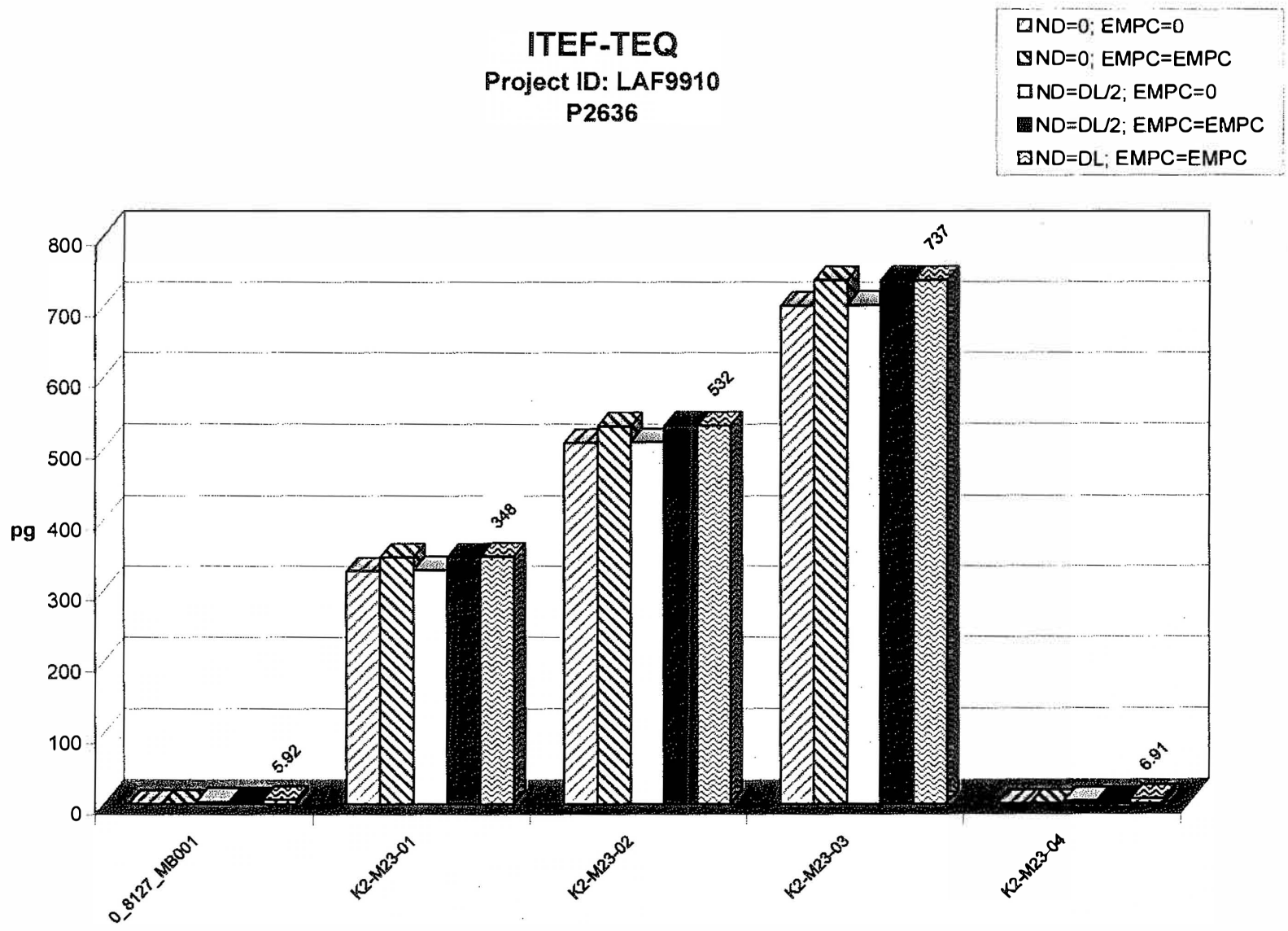
Project ID: LAF9910

Sample Summary Part 5 (DLs)

ANALYTICAL PERSPECTIVES

Method 23

Analyte	0_8127_MB001	K2-M23-01	K2-M23-02	K2-M23-03	K2-M23-04
	pg	pg	pg	pg	pg
2,3,7,8-TCDD	1.96	5.1	4.23	4.99	2.28
1,2,3,7,8-PeCDD	2.37	6.55	6.19	6.06	2.85
1,2,3,4,7,8-HxCDD	2.9	4.21	2.73	3.75	3.09
1,2,3,6,7,8-HxCDD	2.91	4.38	2.68	3.79	3.29
1,2,3,7,8,9-HxCDD	3.2	4.67	2.94	4.11	3.47
1,2,3,4,6,7,8-HpCDD	4.02	4.83	3.54	5.03	4.46
OCDD	5.36	8.26	6.88	6.97	7.64
2,3,7,8-TCDF	1.35	5.01	3.49	8.59	1.58
1,2,3,7,8-PeCDF	1.99	8.92	6.62	7	2
2,3,4,7,8-PeCDF	1.66	8	6.44	6.8	1.8
1,2,3,4,7,8-HxCDF	1.61	2.76	3.56	3.9	2.2
1,2,3,6,7,8-HxCDF	1.5	2.63	3.32	3.69	1.85
2,3,4,6,7,8-HxCDF	1.54	2.69	3.32	3.95	2.11
1,2,3,7,8,9-HxCDF	2.45	3.91	5.26	5.25	3.25
1,2,3,4,6,7,8-HpCDF	1.85	4.06	3.76	4.06	2.34
1,2,3,4,7,8,9-HpCDF	3.27	6.3	6.53	6.72	3.84
OCDF	5.27	6.17	6.07	6.06	4.22
Total TCDD	1.96	5.1	4.23	4.99	2.28
Total PeCDD	2.37	6.55	6.19	6.06	2.85
Total HxCDD	2.99	4.4	2.77	3.86	3.27
Total HpCDD	4.02	4.83	3.54	5.03	4.46
Total TCDF	1.35	5.01	3.49	8.59	1.58
Total PeCDF	1.82	8.45	6.53	6.9	1.9
Total HxCDF	1.74	2.94	3.76	4.13	2.29
Total HpCDF	2.45	5.04	4.97	5.19	2.97
Checkcode	340-351	391-981	923-093	757-900	600-188
Lab ID	MB1_8127_DF_SDS	P2636_8127_001	P2636_8127_002RJ	P2636_8127_003	P2636_8127_004


ITEF-TEQ
Project ID: LAF9910
P2636
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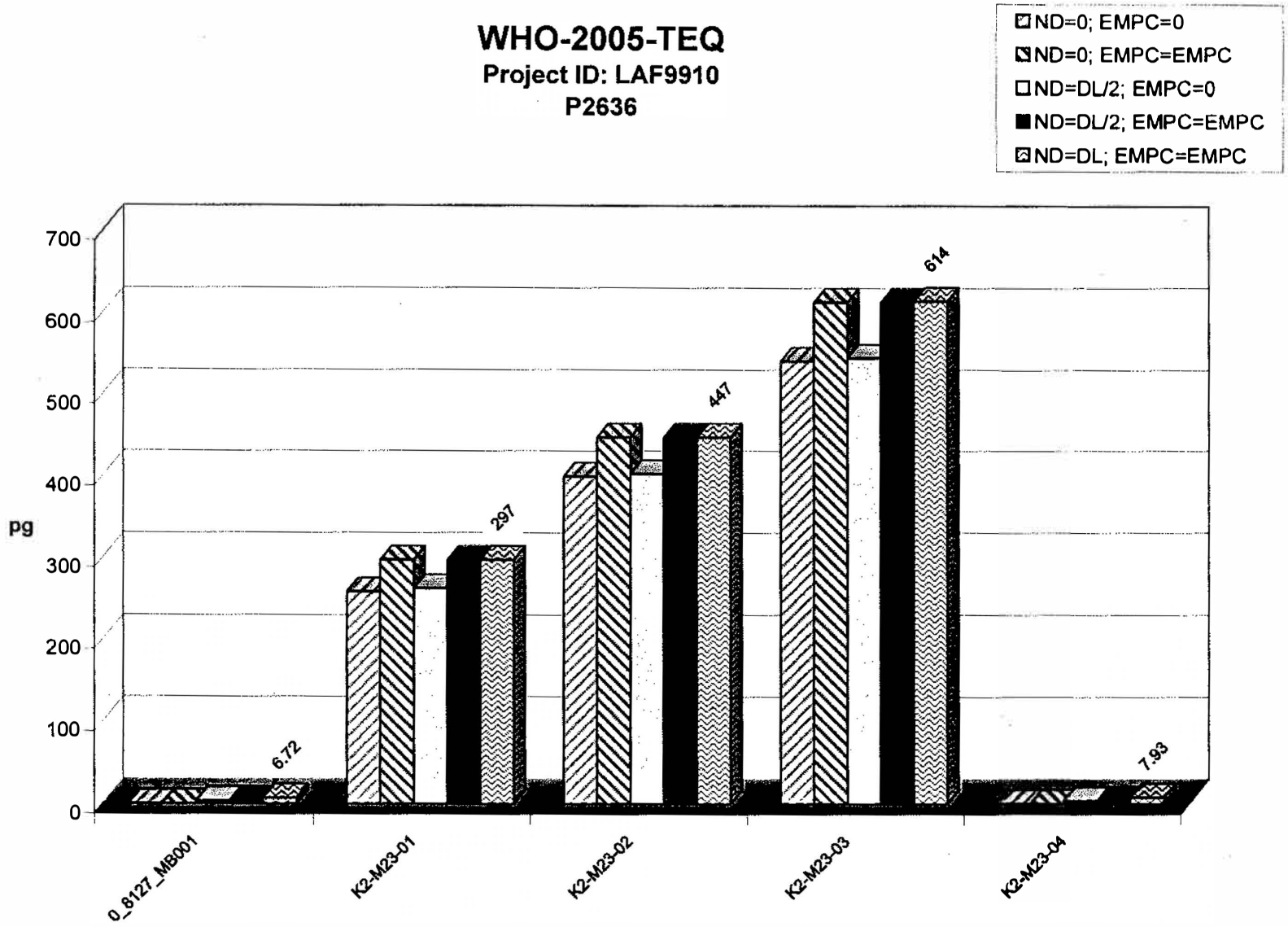
ND=0; EMPC=EMPC
ND=DL/2; EMPC=0
ND=DL/2; EMPC=EMPC
ND=DL; EMPC=EMPC
pg
800
700
600
500
400
300
200
100
0
5.92
348
532
737
6.91
0_8127_MB001
K2-M23-01
K2-M23-02
K2-M23-03
K2-M23-04


WHO-2005-TEQ
Project ID: LAF9910
P2636
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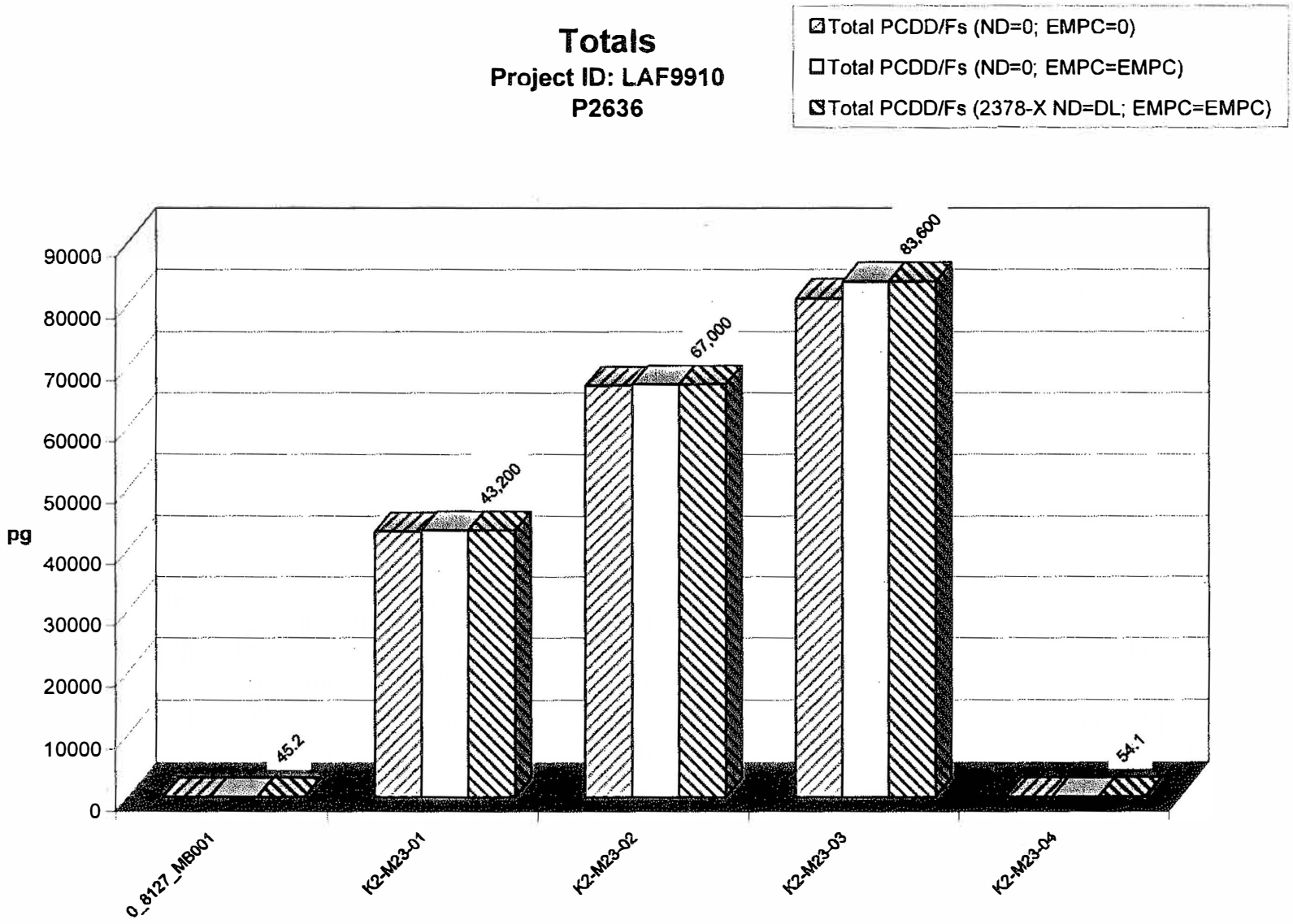
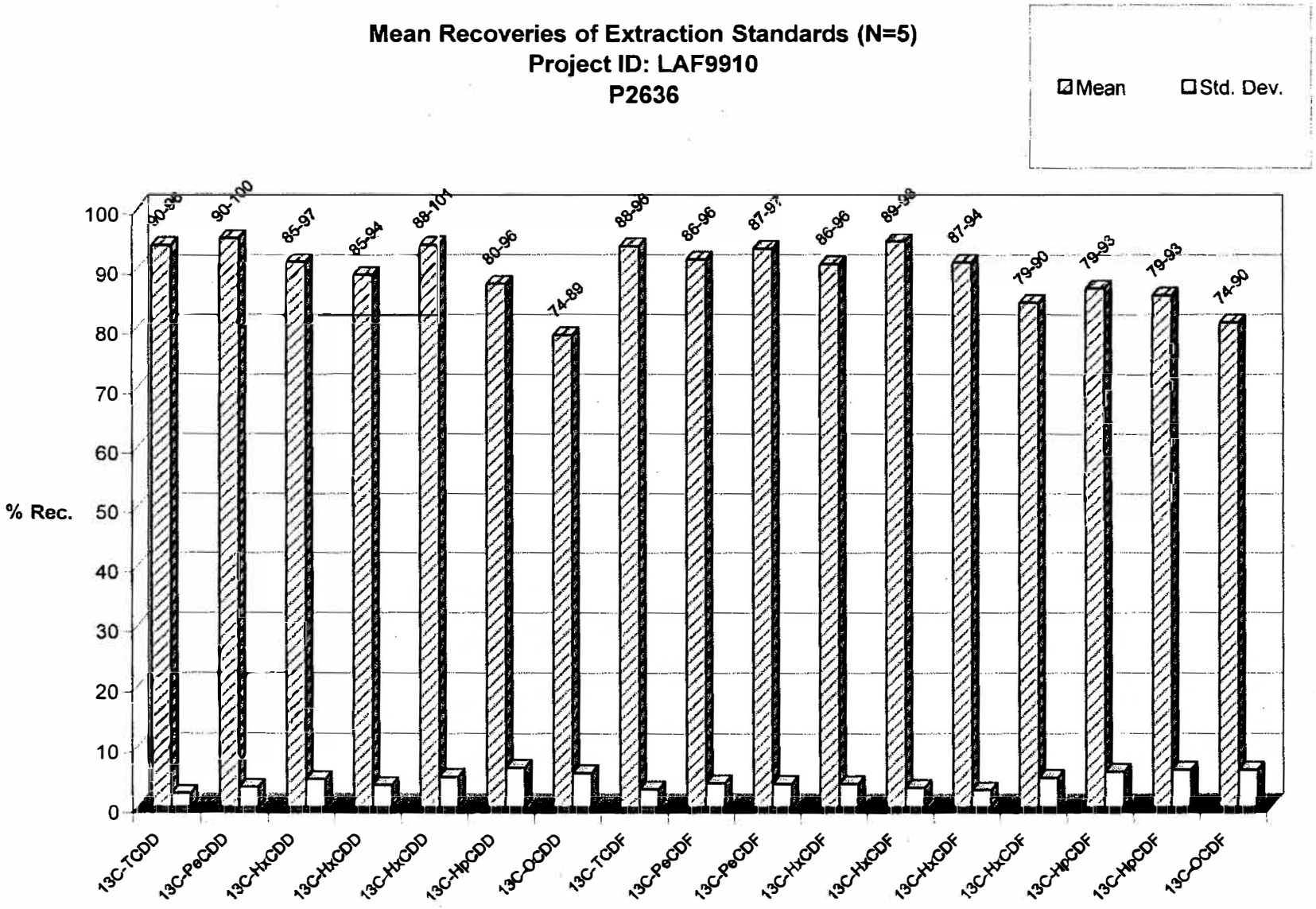
ND=0; EMPC=EMPC
ND=DL/2; EMPC=0
ND=DL/2; EMPC=EMPC
ND=DL; EMPC=EMPC
pg
700
600
500
400
300
200
100
0
6.72
297
447
614
7.93
0_8127_MB001
K2-M23-01
K2-M23-02
K2-M23-03
K2-M23-04

Totals

Project ID: LAF9910
P2636

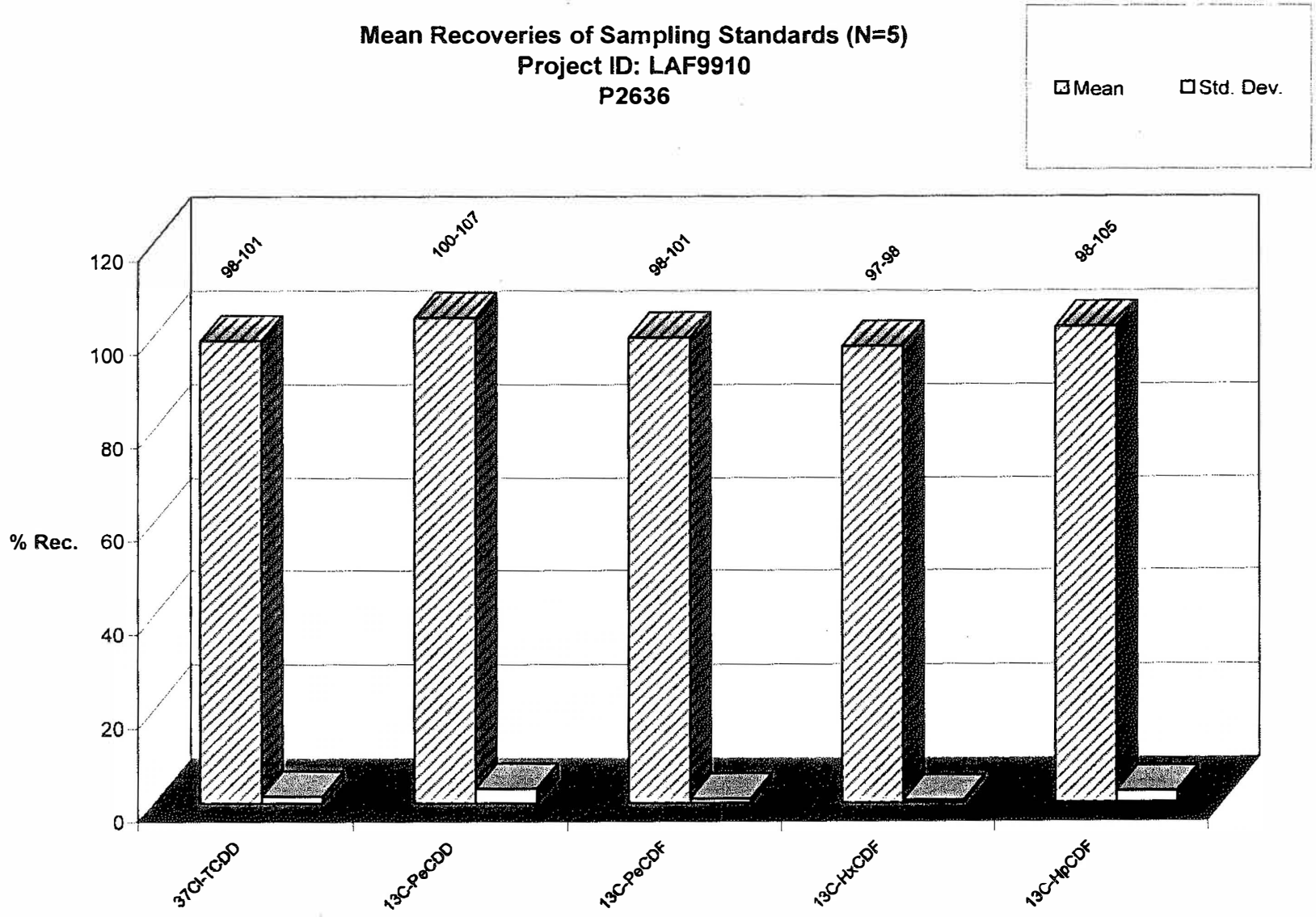


Mean Recoveries of Extraction Standards (N=5)
Project ID: LAF9910
P2636



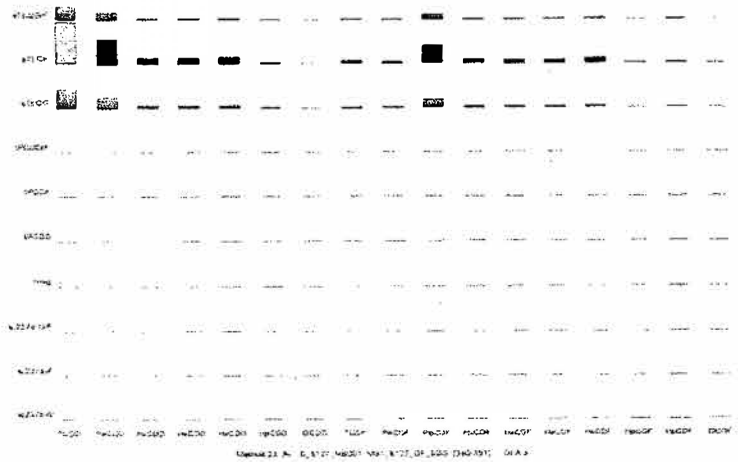
Method Specification Limits: Tetra-Hexa ES: 40-130%, Hepta-Octa ES: 25-130% (F = fail)

Mean Recoveries of Sampling Standards (N=5)
Project ID: LAF9910
P2636

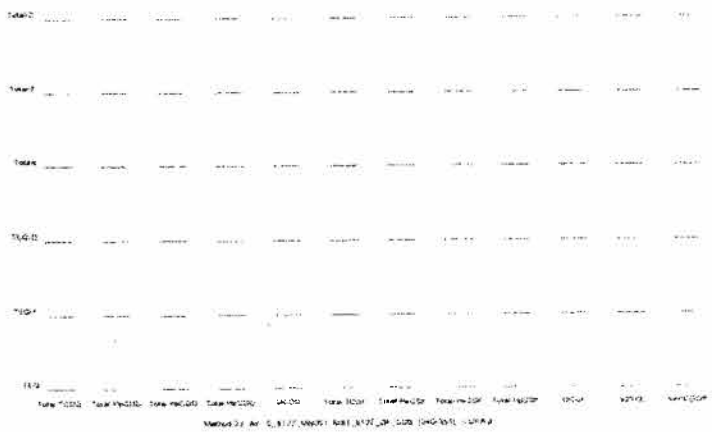


Method Specification Limits: Tetra-Octa SS: 70-130% (F = fail)

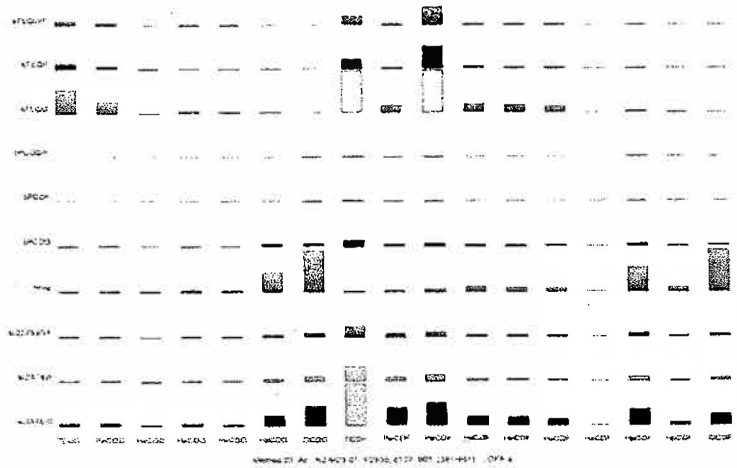
ANALYTICAL PERSPECTIVES



ANALYTICAL PERSPECTIVES



ANALYTICAL PERSPECTIVES



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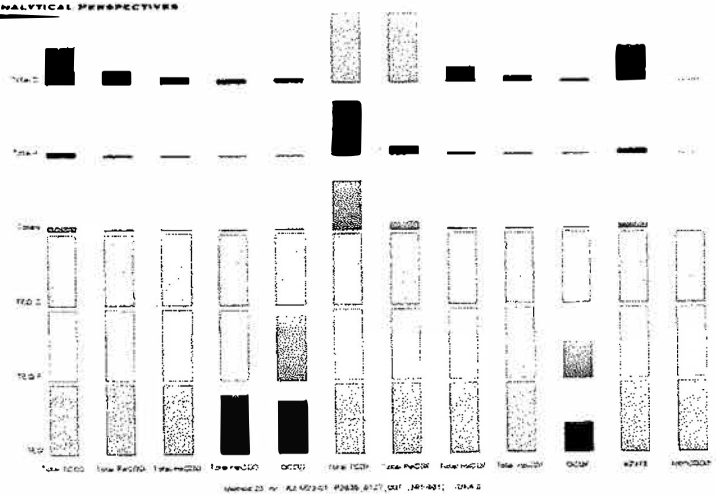
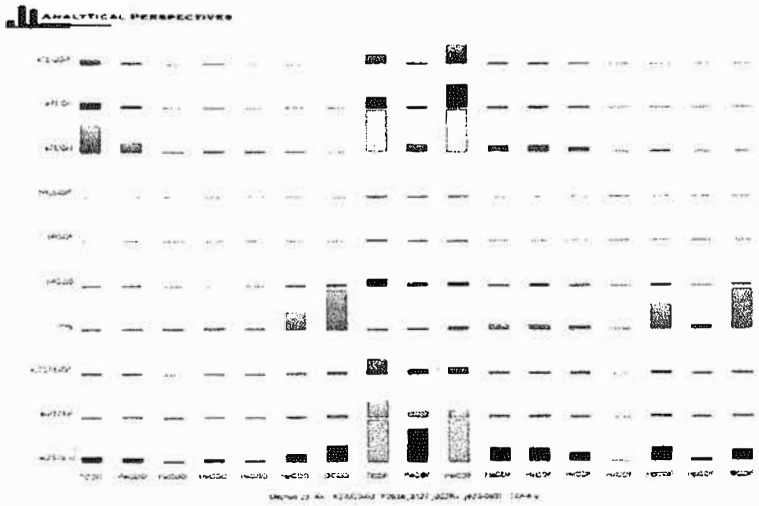
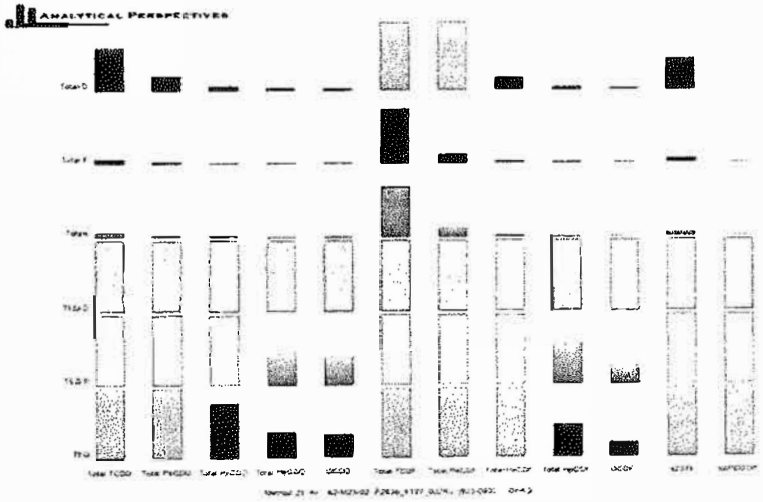
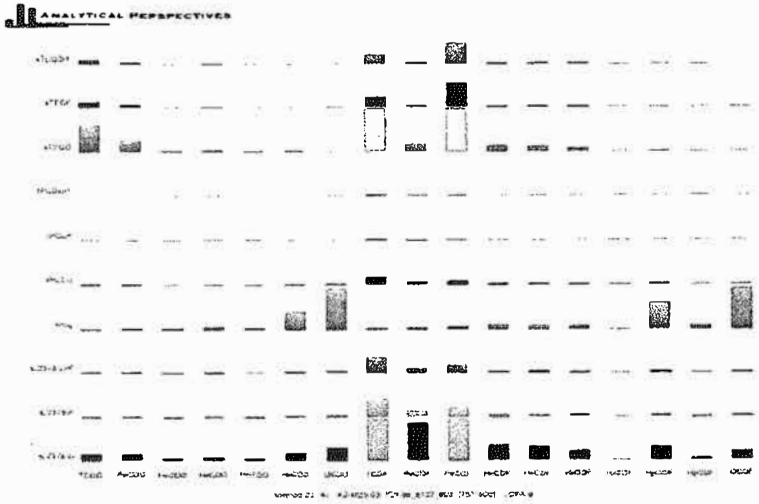



ANALYTICAL PERSPECTIVES


ANALYTICAL PERSPECTIVES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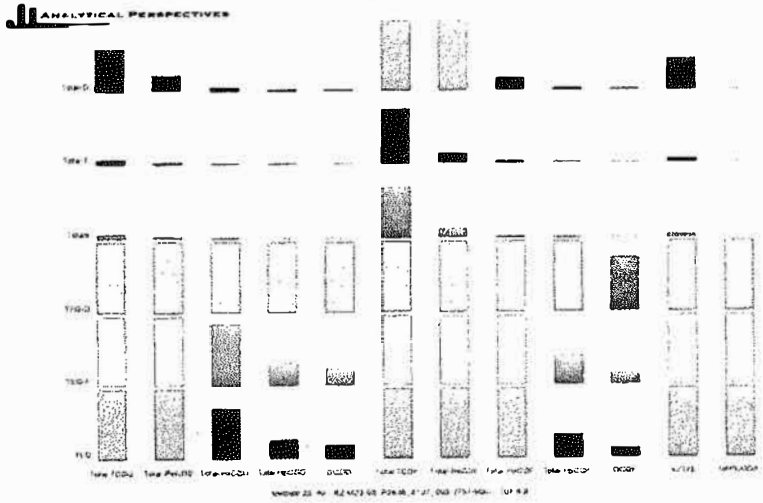
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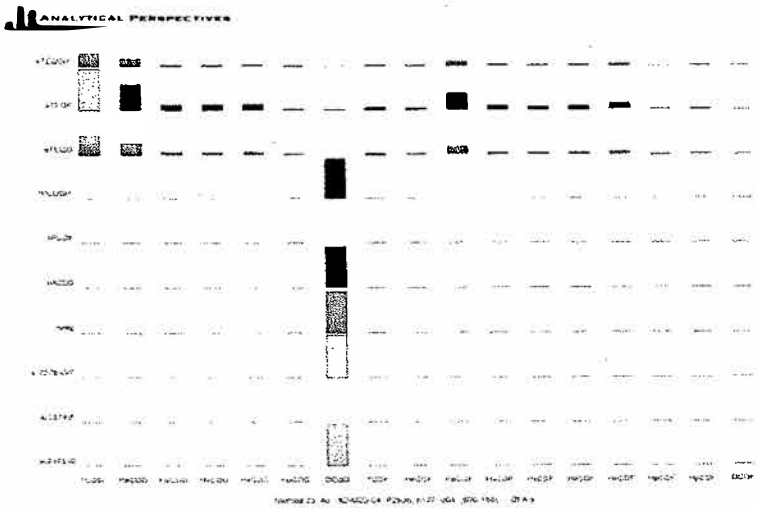
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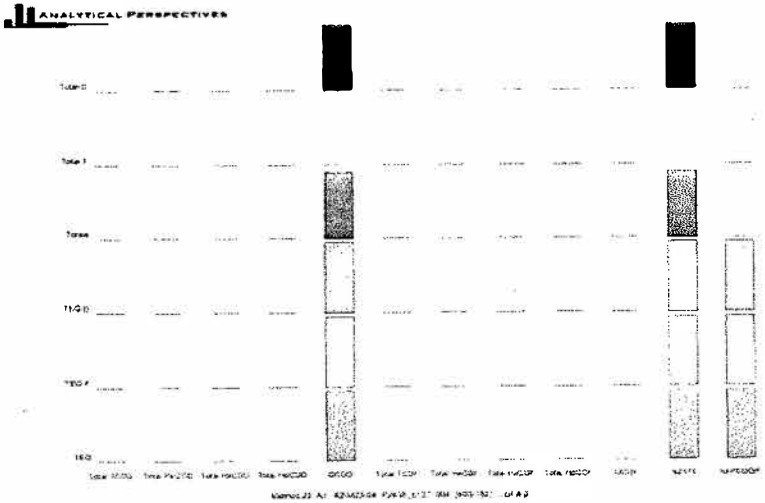
ANALYTICAL PERSPECTIVES

Sample ID: 0_8127_MB001 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2636	Date Received:	n/a
Project ID:	LAF9910	Weight/Volume:	1	Lab Sample ID	MB1_8127_DF_SDS	Date Extracted:	10 Sep 2010
Date Collected:	n/a			QC Batch No:	8127	Date Analyzed:	11 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	23:27:14

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	1.96			ES 2378-TCDD	94.9	
12378-PeCDD	ND	2.37			ES 12378-PeCDD	99.7	
123478-HxCDD	ND	2.9			ES 123478-HxCDD	96.7	
123678-HxCDD	ND	2.91			ES 123678-HxCDD	93.6	
123789-HxCDD	ND	3.2			ES 123789-HxCDD	101	
1234678-HpCDD	ND	4.02			ES 1234678-HpCDD	96.3	
OCDD	ND	5.36			ES OCDD	88.6	
2378-TCDF	ND	1.35			ES 2378-TCDF	95.1	
12378-PeCDF	ND	1.99			ES 12378-PeCDF	95.4	
23478-PeCDF	ND	1.66			ES 23478-PeCDF	96.9	
123478-HxCDF	ND	1.61			ES 123478-HxCDF	92.8	
123678-HxCDF	ND	1.5			ES 123678-HxCDF	97.4	
234678-HxCDF	ND	1.54			ES 234678-HxCDF	94.1	
123789-HxCDF	ND	2.45			ES 123789-HxCDF	90.3	
1234678-HpCDF	ND	1.85			ES 1234678-HpCDF	93.1	
1234789-HpCDF	ND	3.27			ES 1234789-HpCDF	91.6	
OCDF	ND	5.27			ES OCDF	90.2	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	97.6	
Total TCDD	ND	1.96	ND		SS 12347-PeCDD	101	
Total PeCDD	ND	2.37	ND		SS 12346-PeCDF	99.2	
Total HxCDD	ND	2.99	ND		SS 123469-HxCDF	97.7	
Total HpCDD	ND	4.02	ND		SS 1234689-HpCDF	102	
					AS 1368-TCDD	93.5	
Total TCDF	ND	1.35	ND		AS 1368-TCDF	92.1	
Total PeCDF	ND	1.82	ND				
Total HxCDF	ND	1.74	ND				
Total HpCDF	ND	2.45	ND				
Total PCDD/Fs	**ND**		**ND**				
ITEF TEQs							
TEQ: ND=0	0		0				
TEQ: ND=DL/2	2.96		2.96				
TEQ: ND=DL	5.92		5.92				

ANALYTICAL PERSPECTIVES
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www.ultratrace.com

Sample ID: K2-M23-01 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2636	Date Received:	10 Sep 2010
Project ID:	LAF9910	Weight/Volume:	1	Lab Sample ID	P2636_8127_001	Date Extracted:	10 Sep 2010
Date Collected:	08 Sep 2010			QC Batch No:	8127	Date Analyzed:	12 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	00:17:05

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	37	[Ra=0.83]			ES 2378-TCDD	95.9	
12378-PeCDD	EMPC		36.9	J	ES 12378-PeCDD	95.4	
123478-HxCDD	14.6			J	ES 123478-HxCDD	93.8	
123678-HxCDD	29.1			J	ES 123678-HxCDD	92.2	
123789-HxCDD	EMPC		17.8	J	ES 123789-HxCDD	97.2	
1234678-HpCDD	145				ES 1234678-HpCDD	92.4	
OCDD	274				ES OCDD	76.9	
2378-TCDF	752				ES 2378-TCDF	96	
12378-PeCDF	238				ES 12378-PeCDF	90.7	
23478-PeCDF	319				ES 23478-PeCDF	94.9	
123478-HxCDF	131				ES 123478-HxCDF	96.4	
123678-HxCDF	116				ES 123678-HxCDF	97.5	
234678-HxCDF	93.6				ES 234678-HxCDF	94.2	
123789-HxCDF	ND	3.91			ES 123789-HxCDF	88.6	
1234678-HpCDF	226				ES 1234678-HpCDF	90.3	
1234789-HpCDF	34.4			J	ES 1234789-HpCDF	92.7	
OCDF	152				ES OCDF	82.6	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	97.9	
Total TCDD	2790		2790		SS 12347-PeCDD	106	
Total PeCDD	960		1030		SS 12346-PeCDF	100	
Total HxCDD	450		468		SS 123469-HxCDF	98.4	
Total HpCDD	308		308		SS 1234689-HpCDF	102	
					AS 1368-TCDD	99.8	
Total TCDF	31700		31700		AS 1368-TCDF	93.1	
Total PeCDF	4970		5000				
Total HxCDF	1110		1130				
Total HpCDF	322		382				
Total PCDD/Fs	**43000**		**43200**				
ITEF TEQs							
TEQ: ND=0	327		347				
TEQ: ND=DL/2	329		347				
TEQ: ND=DL	331		348				

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Sample ID: K2-M23-02 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2636	Date Received:	10 Sep 2010
Project ID:	LAF9910	Weight/Volume:	1	Lab Sample ID	P2636_8127_002RJ	Date Extracted:	10 Sep 2010
Date Collected:	08 Sep 2010			QC Batch No:	8127	Date Analyzed:	12 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	09:57:05

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	67.3	[Ra=0.75]			ES 2378-TCDD	95.9	
12378-PeCDD	EMPC		47.6	J	ES 12378-PeCDD	95	
123478-HxCDD	14.6			J	ES 123478-HxCDD	87.4	
123678-HxCDD	25.2			J	ES 123678-HxCDD	88.2	
123789-HxCDD	18			J	ES 123789-HxCDD	90.8	
1234678-HpCDD	91.8				ES 1234678-HpCDD	80.1	
OCDD	188				ES OCDD	75.8	
2378-TCDF	1200				ES 2378-TCDF	93.3	
12378-PeCDF	377				ES 12378-PeCDF	90.1	
23478-PeCDF	504				ES 23478-PeCDF	91.9	
123478-HxCDF	155				ES 123478-HxCDF	88.2	
123678-HxCDF	151				ES 123678-HxCDF	93.3	
234678-HxCDF	98.2				ES 234678-HxCDF	89.6	
123789-HxCDF	ND	5.26			ES 123789-HxCDF	79.9	
1234678-HpCDF	163				ES 1234678-HpCDF	78.6	
1234789-HpCDF	22.5			J	ES 1234789-HpCDF	80.2	
OCDF	116				ES OCDF	74.3	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	100	
Total TCDD	4410		4410		SS 12347-PeCDD	105	
Total PeCDD	1470		1550		SS 12346-PeCDF	101	
Total HxCDD	446		446		SS 123469-HxCDF	97.8	
Total HpCDD	207		207		SS 1234689-HpCDF	105	
					AS 1368-TCDD	97.5	
Total TCDF	50300		50300		AS 1368-TCDF	93.3	
Total PeCDF	8070		8100				
Total HxCDF	1290		1340				
Total HpCDF	229		261				
Total PCDD/Fs	**66800**		**67000**				
ITEF TEQs							
TEQ: ND=0	508		531				
TEQ: ND=DL/2	509		532				
TEQ: ND=DL	511		532				

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Sample ID: K2-M23-03 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2636	Date Received:	10 Sep 2010
Project ID:	LAF9910	Weight/Volume:	1	Lab Sample ID	P2636_8127_003	Date Extracted:	10 Sep 2010
Date Collected:	08 Sep 2010			QC Batch No:	8127	Date Analyzed:	12 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	01:56:41

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	84.8	[Ra=0.80]			ES 2378-TCDD	90.5	
12378-PeCDD	EMPC		71.5		ES 12378-PeCDD	90	
123478-HxCDD	21.9			J	ES 123478-HxCDD	85.1	
123678-HxCDD	36.5			J	ES 123678-HxCDD	84.6	
123789-HxCDD	18.1			J	ES 123789-HxCDD	87.9	
1234678-HpCDD	93.2				ES 1234678-HpCDD	84.5	
OCDD	157				ES OCDD	73.6	
2378-TCDF	1610				ES 2378-TCDF	88.5	
12378-PeCDF	466				ES 12378-PeCDF	85.8	
23478-PeCDF	748				ES 23478-PeCDF	86.9	
123478-HxCDF	186				ES 123478-HxCDF	86.1	
123678-HxCDF	171				ES 123678-HxCDF	89.4	
234678-HxCDF	114				ES 234678-HxCDF	87.4	
123789-HxCDF	ND	5.25			ES 123789-HxCDF	79.3	
1234678-HpCDF	172				ES 1234678-HpCDF	82.5	
1234789-HpCDF	EMPC		22.2	J	ES 1234789-HpCDF	79.2	
OCDF	104				ES OCDF	75.9	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	98.1	
Total TCDD	5460		5510		SS 12347-PeCDD	100	
Total PeCDD	1990		2060		SS 12346-PeCDF	98.5	
Total HxCDD	544		568		SS 123469-HxCDF	96.9	
Total HpCDD	214		214		SS 1234689-HpCDF	98	
					AS 1368-TCDD	95.4	
Total TCDF	59800		62300		AS 1368-TCDF	92.4	
Total PeCDF	10800		10800				
Total HxCDF	1620		1650				
Total HpCDF	246		268				
Total PCDD/Fs	**80900**		**83600**				
ITEF TEQs							
TEQ: ND=0	701		737				
TEQ: ND=DL/2	702		737				
TEQ: ND=DL	704		737				

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Sample ID: K2-M23-04 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2636	Date Received:	10 Sep 2010
Project ID:	LAF9910	Weight/Volume:	1	Lab Sample ID	P2636_8127_004	Date Extracted:	10 Sep 2010
Date Collected:	09 Sep 2010			QC Batch No:	8127	Date Analyzed:	12 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	02:46:32

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	2.28			ES 2378-TCDD	92.5	
12378-PeCDD	ND	2.85			ES 12378-PeCDD	95.4	
123478-HxCDD	ND	3.09			ES 123478-HxCDD	92.9	
123678-HxCDD	ND	3.29			ES 123678-HxCDD	86.5	
123789-HxCDD	ND	3.47			ES 123789-HxCDD	93.3	
1234678-HpCDD	ND	4.46			ES 1234678-HpCDD	84	
OCDD	9.45			J	ES OCDD	79.5	
2378-TCDF	ND	1.58			ES 2378-TCDF	95.8	
12378-PeCDF	ND	2			ES 12378-PeCDF	95.8	
23478-PeCDF	ND	1.8			ES 23478-PeCDF	96	
123478-HxCDF	ND	2.2			ES 123478-HxCDF	90.2	
123678-HxCDF	ND	1.85			ES 123678-HxCDF	94.9	
234678-HxCDF	ND	2.11			ES 234678-HxCDF	90.2	
123789-HxCDF	ND	3.25			ES 123789-HxCDF	83.3	
1234678-HpCDF	ND	2.34			ES 1234678-HpCDF	89.3	
1234789-HpCDF	ND	3.84			ES 1234789-HpCDF	84.2	
OCDF	ND	4.22			ES OCDF	82	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	101	
Total TCDD	ND	2.28	ND		SS 12347-PeCDD	107	
Total PeCDD	ND	2.85	ND		SS 12346-PeCDF	99	
Total HxCDD	ND	3.27	ND		SS 123469-HxCDF	97.5	
Total HpCDD	ND	4.46	ND		SS 1234689-HpCDF	102	
					AS 1368-TCDD	94.2	
Total TCDF	ND	1.58	ND		AS 1368-TCDF	94.3	
Total PeCDF	ND	1.9	ND				
Total HxCDF	ND	2.29	ND				
Total HpCDF	ND	2.97	ND				
Total PCDD/Fs	**9.45**		**9.45**				
ITEF TEQs							
TEQ: ND=0	0.00945		0.00945				
TEQ: ND=DL/2	3.46		3.46				
TEQ: ND=DL	6.91		6.91				

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ANALYTICAL PERSPECTIVES

14 September 2010

Rachel Chleborowiez
RMC Enivonmental
9226 N. 2nd Street
Suite C
Machesneg Park, IL 61115

Kiln 1

Ph.: 815-378-6150

Subject: Certificate of Results

Dear Rachel;

Attached to this narrative are the analytical results you requested on samples submitted for the determination of polychlorinated dibenzo-*p*-dioxins and dibenzofurans. The insert below summarizes the relevant information pertaining to your project. In particular, QC annotations bring to your attention specific analytical observations and assessments made during the sample handling and data interpretation phases. Results reported relate only to the items tested.

Project Information Summary	When applicable, see QC Annotations for details
Client Project No.	9/0
AP Project No.	P2639
Analytical Protocol	Method 23
No. Samples Submitted	4
No. Samples Analyzed	4
No. Laboratory Method Blanks	1
No. OPRs / Batch CS3	1
No. Outstanding Samples	0
Date Received	12-Sep-2010
Condition Received	Good
Temperature upon Receipt (C)	18
Extraction within Holding Time	yes
Analysis within Holding Time	yes
Data meet QA/QC Requirements	see below
Exceptions	see below
Analytical Difficulties	see below

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ANALYTICAL PERSPECTIVES

QC Annotations:

1. Please see the attached appendices for a list of data qualifiers and lab identifiers that may be contained in the report.

Analytical Perspectives remains committed to serving you in the most effective manner. Should you have any questions or need additional information and technical support, please do not hesitate to contact us. Thank you for choosing Analytical Perspectives as part of your analytical support team.

Sincerely,

Heather Steele

Heather Steele, Ph.D.
Project Manager

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APPENDIX A: DATA QUALIFIERS / DATA ATTRIBUTES	
*	The reported concentration exceeds the calibration range (upper point of the calibration curve).[1]
>	Indicates high recoveries. Shown with the numeric value at the top of the range.[1]
B	The analyte is found in the method blank, at a level that is <=10x the sample concentration.
C	Two or more congeners co-elute. In EDDs C denotes the lowest IUPAC congener in a co-elution group and additional co-eluters for the group are shown with the number of the lowest IUPAC co-eluter.
E	The reported concentration exceeds the calibration range (upper point of the calibration curve).
EMPC	Represents an Estimated Maximum Possible Concentration. EMPC's arise in cases where the signal/noise ratio is not sufficient for peak identification (the determined ion-abundance ratio is outside the allowed theoretical range), or where there is a co-eluting interference.
ETH	Indicates the presence of a diphenyl ether that appears to interfere with the quantitation of a furan. The reported concentration is the maximum.
H/h	If the standard recovery is below the method or SOP specified value "H" is assigned. If the obtained value is less than half the specified value "h" is assigned.[1]
J	Indicates that an analyte has a concentration below the reporting limit (lowest point of the calibration curve).
ND	Indicates a non-detect.
NR	Indicates a value that is not reportable.
PR	Due to interference, the associated congener is poorly resolved.
QI	Indicates the presence of a quantitative interference.
Ra	The new ratio – [Ra] -- for 2,3,7,8-TCDD following the $^{37}Cl_4$-2,3,7,8-TCDD correction is shown between squared brackets in the DL column.[1]
SI	Denotes "Single Ion Mode" and is utilized for PCBs where the secondary ion trace has a significantly elevated noise level due to background PFK. Responses for such peaks are calculated using an EMPC approach based solely on the primary ion area(s) and may be considered estimates.[1]
U	The analyte was not detected. The estimated detection limit (EDL) may be reported for this analyte.
V	The labeled standard recovery was found to be outside of the method control limits.
X	Indicates results reported from reinjection, refractionation, or repeat analyses.
APPENDIX B: LAB ID IDENTIFIERS	
AR	Indicates use of the archived portion of the sample extract.
CU	Indicates a sample that required additional clean-up prior to MS injection/processing.
D	Indicates a dilution of the sample extract. The number that follows the "D" indicates the dilution factor.
DE	Indicates a dilution performed with the addition of ES (extraction standard) solution.
DUP	Designation for a duplicate sample.
MS	Designation for a matrix spike.
MSD	Designation for a matrix spike duplicate.
RJ	Indicates a reinjection of the sample extract.
S	Indicates a sample split. The number that follows the "S" indicates the split factor.

[1]Denotes data qualifiers/attributes whose use will be phased out over time

P2639 - TEQ

Project ID: 9/0

Sample Summary Part 1 — ANALYTICAL PERSPECTIVES — **Method 23**

Analyte	0_8128_MB001	K1-M23-01	K1-M23-02	K1-M23-03	K1-M23-04
	pg	pg	pg	pg	pg
2,3,7,8-TCDD	(2.39)	39.7	32	27.1	(2.31)
1,2,3,7,8-PeCDD	(2.62)	64.7	55.7	44.8	(3.5)
1,2,3,4,7,8-HxCDD	(2.8)	[24.6]	[20.3]	21.6	(3.49)
1,2,3,6,7,8-HxCDD	(2.75)	38.4	45.3	36.9	(3.22)
1,2,3,7,8,9-HxCDD	(3.1)	23.3	[19.9]	[17.4]	(3.59)
1,2,3,4,6,7,8-HpCDD	(4.19)	81.5	93.5	81.7	(5.1)
OCDD	(7.91)	105	125	135	12.2
2,3,7,8-TCDF	(1.69)	554	397	360	(2.08)
1,2,3,7,8-PeCDF	(1.76)	192	154	151	(1.87)
2,3,4,7,8-PeCDF	(1.69)	398	300	238	(1.82)
1,2,3,4,7,8-HxCDF	(1.71)	119	95.7	162	(1.95)
1,2,3,6,7,8-HxCDF	(1.56)	110	92.7	99.6	(1.69)
2,3,4,6,7,8-HxCDF	(1.68)	[78]	74.3	74.6	(1.98)
1,2,3,7,8,9-HxCDF	(2.54)	(5.04)	(6.57)	(6.61)	(2.78)
1,2,3,4,6,7,8-HpCDF	(1.9)	120	118	185	(2.34)
1,2,3,4,7,8,9-HpCDF	(2.53)	[13.8]	13	51.2	(3.54)
OCDF	(5)	45.8	54.7	203	(5.84)
ITEF TEQ (ND=0; EMPC=0)	**0.00**	**367**	**291**	**255**	**0.0122**
ITEF TEQ (ND=0; EMPC=EMPC)	**0.00**	**378**	**295**	**257**	**0.0122**
ITEF TEQ (ND=DL/2; EMPC=0)	**3.26**	**368**	**291**	**255**	**3.64**
ITEF TEQ (ND=DL/2; EMPC=EMPC)	**3.26**	**378**	**295**	**257**	**3.64**
ITEF TEQ (ND=DL; EMPC=EMPC)	**6.51**	**378**	**295**	**257**	**7.26**
Checkcode	370-527	179-230	826-184	864-904	558-057
Lab ID	MB1_8128_DF_SDS	P2639_8128_001	P2639_8128_002	P2639_8128_003	P2639_8128_004

= DL
EMPC

P2639 - WHO-2005-TEQ

Project ID: 9/0

Sample Summary Part 1

ANALYTICAL PERSPECTIVES

Method 23

Analyte	0_8128_MB001	K1-M23-01	K1-M23-02	K1-M23-03	K1-M23-04
	pg	pg	pg	pg	pg
2,3,7,8-TCDD	(2.39)	39.7	32	27.1	(2.31)
1,2,3,7,8-PeCDD	(2.62)	64.7	55.7	44.8	(3.5)
1,2,3,4,7,8-HxCDD	(2.8)	[24.6]	[20.3]	21.6	(3.49)
1,2,3,6,7,8-HxCDD	(2.75)	38.4	45.3	36.9	(3.22)
1,2,3,7,8,9-HxCDD	(3.1)	23.3	[19.9]	[17.4]	(3.59)
1,2,3,4,6,7,8-HpCDD	(4.19)	81.5	93.5	81.7	(5.1)
OCDD	(7.91)	105	125	135	12.2
2,3,7,8-TCDF	(1.69)	554	397	360	(2.08)
1,2,3,7,8-PeCDF	(1.76)	192	154	151	(1.87)
2,3,4,7,8-PeCDF	(1.69)	398	300	238	(1.82)
1,2,3,4,7,8-HxCDF	(1.71)	119	95.7	162	(1.95)
1,2,3,6,7,8-HxCDF	(1.56)	110	92.7	99.6	(1.69)
2,3,4,6,7,8-HxCDF	(1.68)	[78]	74.3	74.6	(1.98)
1,2,3,7,8,9-HxCDF	(2.54)	(5.04)	(6.57)	(6.61)	(2.78)
1,2,3,4,6,7,8-HpCDF	(1.9)	120	118	185	(2.34)
1,2,3,4,7,8,9-HpCDF	(2.53)	[13.8]	13	51.2	(3.54)
OCDF	(5)	45.8	54.7	203	(5.84)
WHO-2005 TEQ (ND=0; EMPC=0)	**0.00**	**316**	**255**	**227**	**0.00367**
WHO-2005 TEQ (ND=0; EMPC=EMPC)	**0.00**	**326**	**259**	**228**	**0.00367**
WHO-2005 TEQ (ND=DL/2; EMPC=0)	**3.72**	**317**	**256**	**227**	**4.300**
WHO-2005 TEQ (ND=DL/2; EMPC=EMPC)	**3.72**	**327**	**259**	**229**	**4.300**
WHO-2005 TEQ (ND=DL; EMPC=EMPC)	**7.44**	**327**	**260**	**229**	**8.6**
Checkcode	370-527	179-230	826-184	864-904	558-057
Lab ID	MB1_8128_DF_SDS	P2639_8128_001	P2639_8128_002	P2639_8128_003	P2639_8128_004

( ) = DL
[ ] = EMPC

P2639 - Totals

Project ID: 9/0

Sample Summary Part 2 — ANALYTICAL PERSPECTIVES — **Method 23**

Analyte	0_8128_MB001	K1-M23-01	K1-M23-02	K1-M23-03	K1-M23-04
	pg	pg	pg	pg	pg
Totals					
TCDDs	0	4410	5870	5710	5.46
PeCDDs	0	2100	2850	2570	0
HxCDDs	0	829	1400	1010	0
HpCDDs	0	184	205	186	0
OCDD	0	105	125	135	12.2
TCDFs	0	21000	16800	12000	0
PeCDFs	0	4710	3580	2710	0
HxCDFs	0	860	848	853	0
HpCDFs	0	143	154	309	0
OCDF	0	45.8	54.7	203	0
Total PCDD/Fs (ND=0; EMPC=0)	**0.00**	**34,400**	**31,900**	**25,600**	**17.7**
Total PCDD/Fs (ND=0; EMPC=EMPC)	**0.00**	**36,400**	**32,300**	**25,800**	**25.7**
Total PCDD/Fs (2378-X ND=DL; EMPC=EMPC)	**47.8**	**36,400**	**32,300**	**25,800**	**72.8**
Total 2378s (ND=0; EMPC=0)	**0.00**	**1,890**	**1,650**	**1,870**	**12.2**
Total 2378s (ND=0.5; EMPC=0)	**23.9**	**1,900**	**1,660**	**1,880**	**35.8**
Total 2378s (ND=1; EMPC=0)	**47.8**	**1,910**	**1,670**	**1,880**	**59.3**
Total 2378s (ND=0; EMPC=1)	**0.00**	**2,010**	**1,690**	**1,890**	**12.2**
Total 2378s (ND=0.5; EMPC=1)	**23.9**	**2,010**	**1,690**	**1,890**	**35.8**
Total 2378s (ND=1; EMPC=1)	**47.8**	**2,010**	**1,700**	**1,890**	**59.3**
Checkcode	370-527	179-230	826-184	864-904	558-057
Lab ID	MB1_8128_DF_SDS	P2639_8128_001	P2639_8128_002	P2639_8128_003	P2639_8128_004

( ) = DL
EMPC

P2639 - Others

Project ID: 9/0

Sample Summary Part 3

ANALYTICAL PERSPECTIVES

Method 23

Analyte	0_8128_MB001	K1-M23-01	K1-M23-02	K1-M23-03	K1-M23-04
	pg	pg	pg	pg	pg
Other PCDD/Fs (ND=0, EMPC=0)					
Other TCDD	0	4370	5840	5690	5.46
Other PeCDD	0	2040	2800	2530	0
Other HxCDD	0	768	1350	951	0
Other HpCDD	0	102	111	105	0
Other TCDF	0	20500	16400	11600	0
Other PeCDF	0	4120	3130	2320	0
Other HxCDF	0	631	566	470	0
Other HpCDF	0	22.6	23.2	73.4	0
Other PCDD/Fs (ND=0, EMPC=EMPC)					
Other TCDD	0	4370	5840	5690	5.46
Other PeCDD	0	2040	2940	2560	3.81
Other HxCDD	0	785	1350	951	4.21
Other HpCDD	0	102	111	105	0
Other TCDF	0	22100	16400	11600	0
Other PeCDF	0	4190	3240	2340	0
Other HxCDF	0	683	592	506	0
Other HpCDF	0	41.1	42	116	0
Checkcode	370-527	179-230	826-184	864-904	558-057
Lab ID	MB1_8128_DF_SDS	P2639_8128_001	P2639_8128_002	P2639_8128_003	P2639_8128_004

( ) = DL
[ ] = EMPC

P2639 - DLs

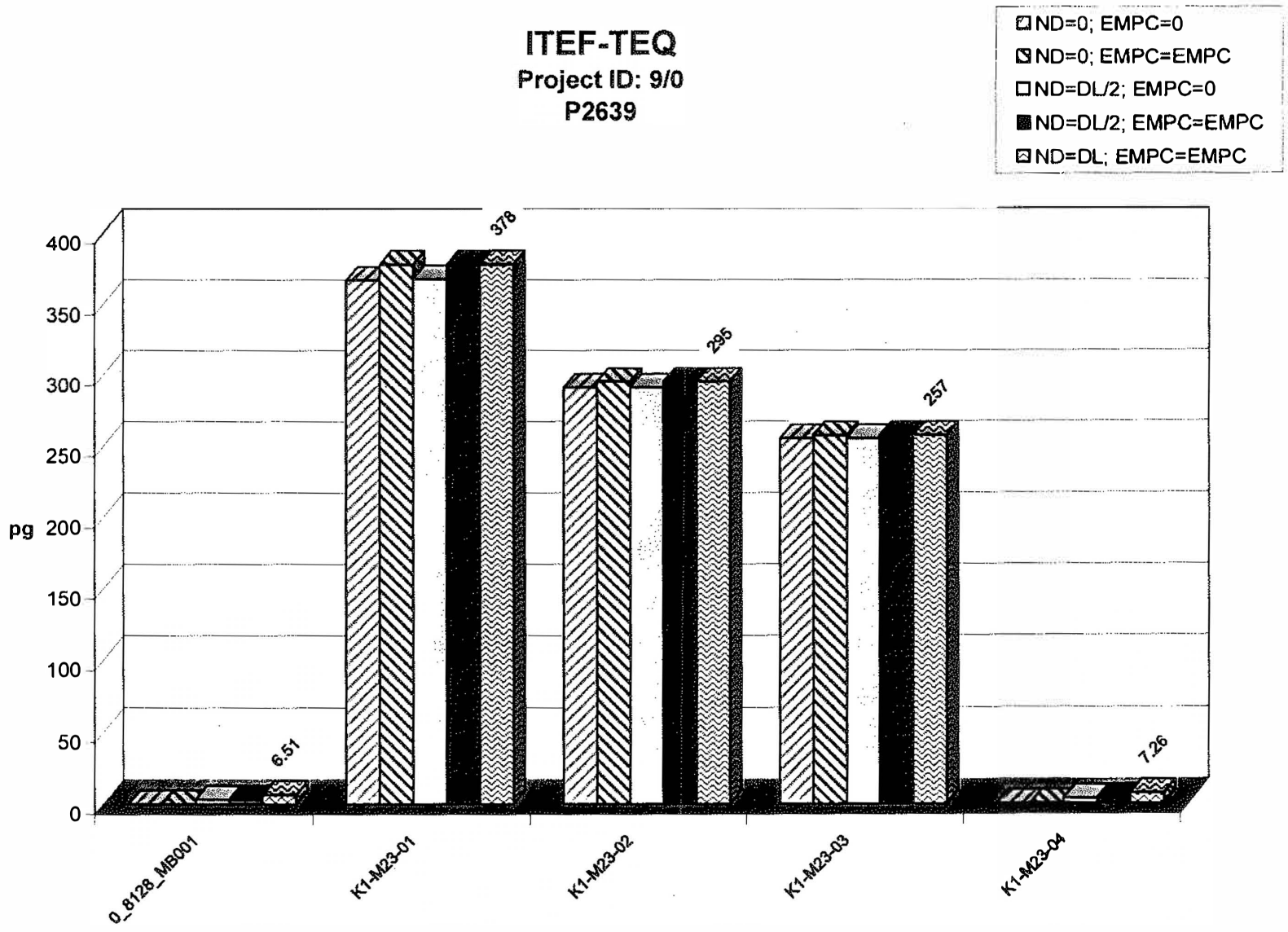
Project ID: 9/0

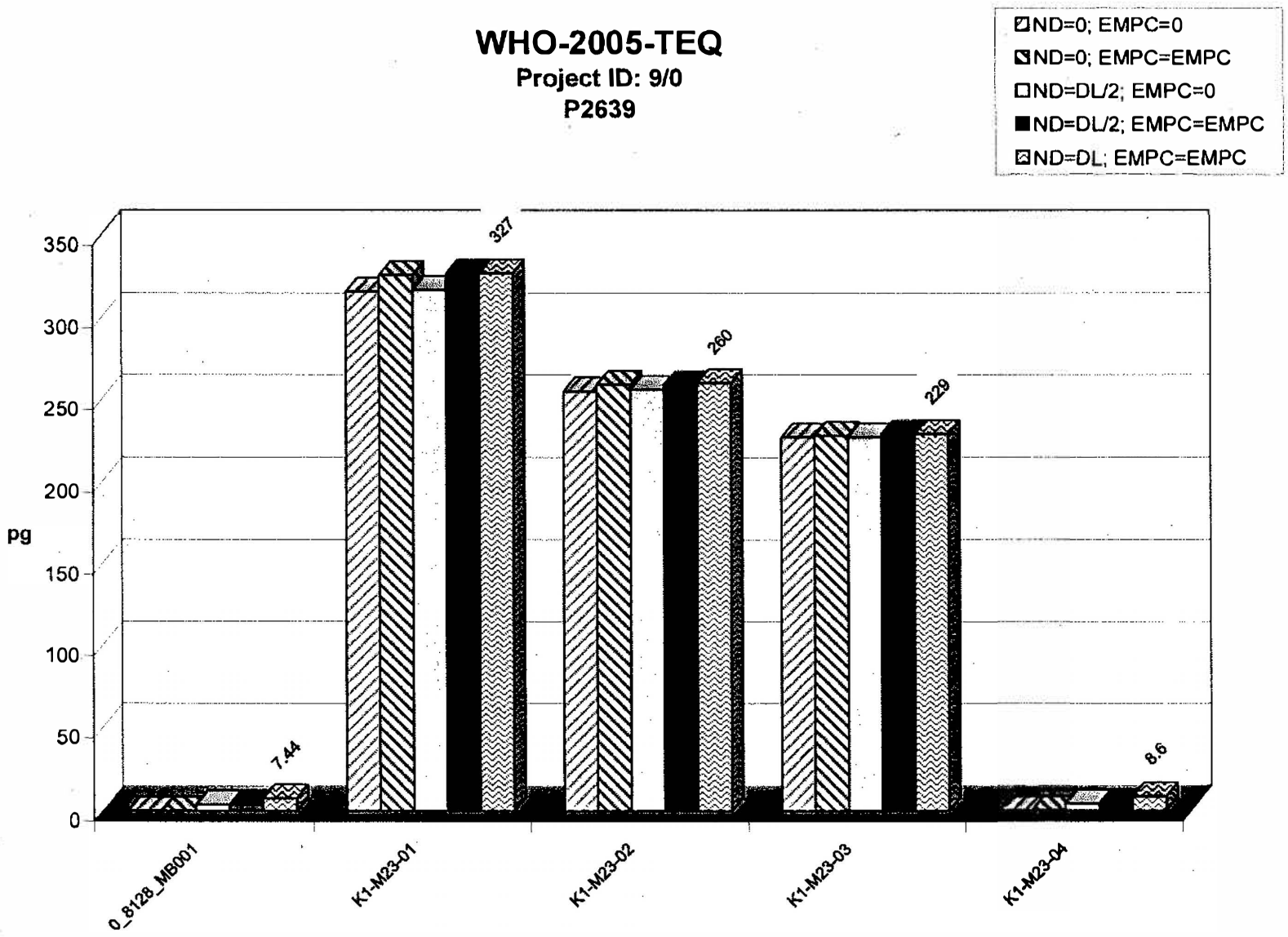
Sample Summary Part 5 (DLs)

ANALYTICAL PERSPECTIVES

Method 23

Analyte	0_8128_MB001	K1-M23-01	K1-M23-02	K1-M23-03	K1-M23-04
	pg	pg	pg	pg	pg
2,3,7,8-TCDD	2.39	3.2	3.02	2.99	2.31
1,2,3,7,8-PeCDD	2.62	7.68	9.1	8.35	3.5
1,2,3,4,7,8-HxCDD	2.8	3.86	3.74	3.33	3.49
1,2,3,6,7,8-HxCDD	2.75	3.66	3.75	3.34	3.22
1,2,3,7,8,9-HxCDD	3.1	4.19	4.33	4.24	3.59
1,2,3,4,6,7,8-HpCDD	4.19	5.86	5.11	4.34	5.1
OCDD	7.91	6.39	8.02	8.63	7.72
2,3,7,8-TCDF	1.69	2.84	2.3	2.77	2.08
1,2,3,7,8-PeCDF	1.76	9.57	9.06	6.13	1.87
2,3,4,7,8-PeCDF	1.69	8.95	8.92	6.25	1.82
1,2,3,4,7,8-HxCDF	1.71	3.45	4.45	4.38	1.95
1,2,3,6,7,8-HxCDF	1.56	3.26	3.92	4.23	1.69
2,3,4,6,7,8-HxCDF	1.68	3.79	4.04	4.94	1.98
1,2,3,7,8,9-HxCDF	2.54	5.04	6.57	6.61	2.78
1,2,3,4,6,7,8-HpCDF	1.9	3.98	4.93	4.05	2.34
1,2,3,4,7,8,9-HpCDF	2.53	6.04	7.1	7.39	3.54
OCDF	5	7.1	7.55	7.44	5.84
Total TCDD	2.39	3.2	3.02	2.99	2.31
Total PeCDD	2.62	7.68	9.1	8.35	3.5
Total HxCDD	2.87	3.88	3.93	3.63	3.42
Total HpCDD	4.19	5.86	5.11	4.34	5.1
Total TCDF	1.69	2.84	2.3	2.77	2.08
Total PeCDF	1.72	9.26	8.99	6.19	1.85
Total HxCDF	1.83	3.82	4.61	4.94	2.05
Total HpCDF	2.19	4.89	5.88	5.51	2.88
Checkcode	370-527	179-230	826-184	864-904	558-057
Lab ID	MB1_8128_DF_SDS	P2639_8128_001	P2639_8128_002	P2639_8128_003	P2639_8128_004


ITEF-TEQ
Project ID: 9/0
P2639
ND=0; EMPC=0
ND=0; EMPC=EMPC
ND=DL/2; EMPC=0
ND=DL/2; EMPC=EMPC
ND=DL; EMPC=EMPC
pg
400
350
300
250
200
150
100
50
0
6.51
378
295
257
7.26
0_8128_MB001
K1-M23-01
K1-M23-02
K1-M23-03
K1-M23-04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Project ID: 9/0
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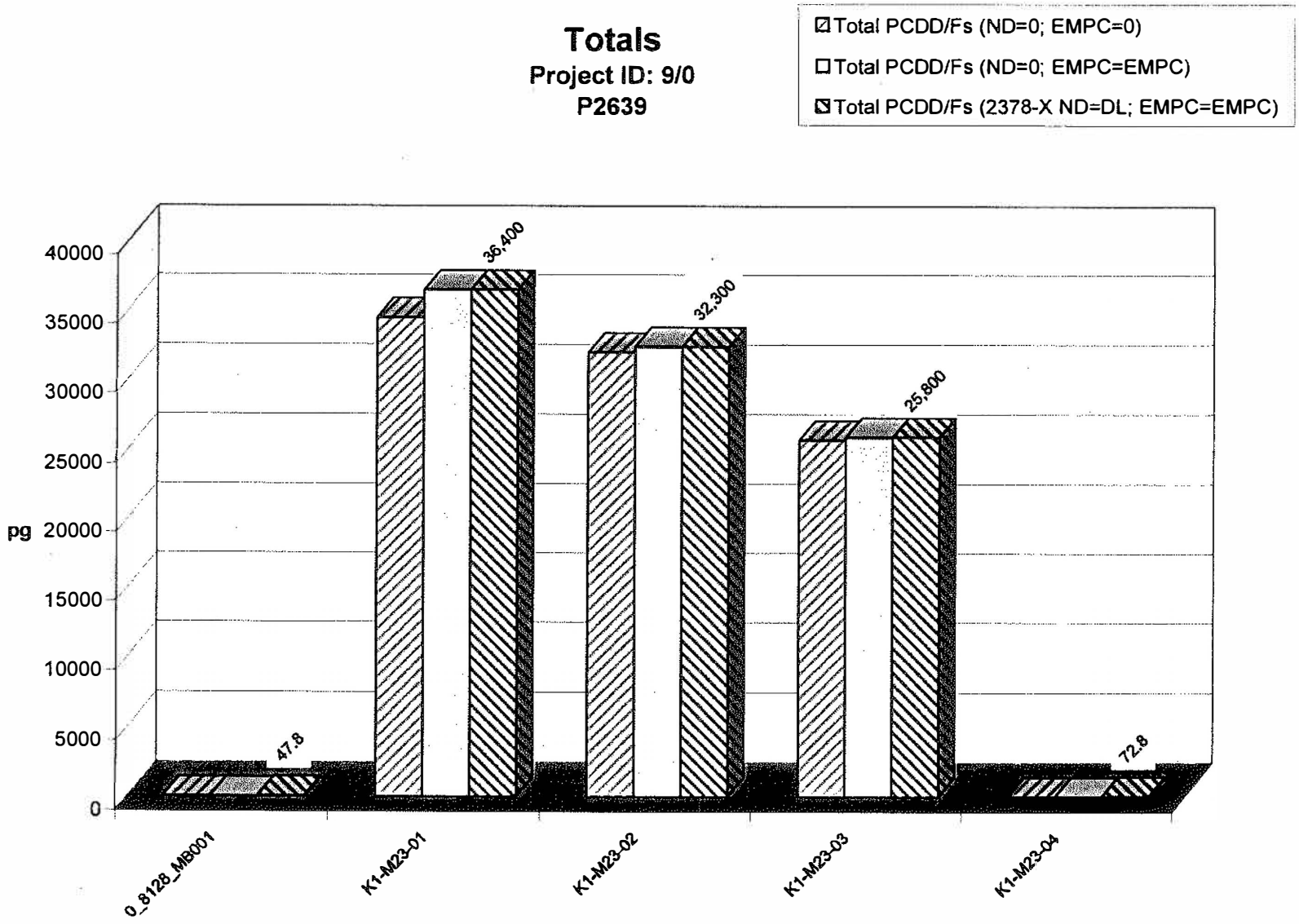
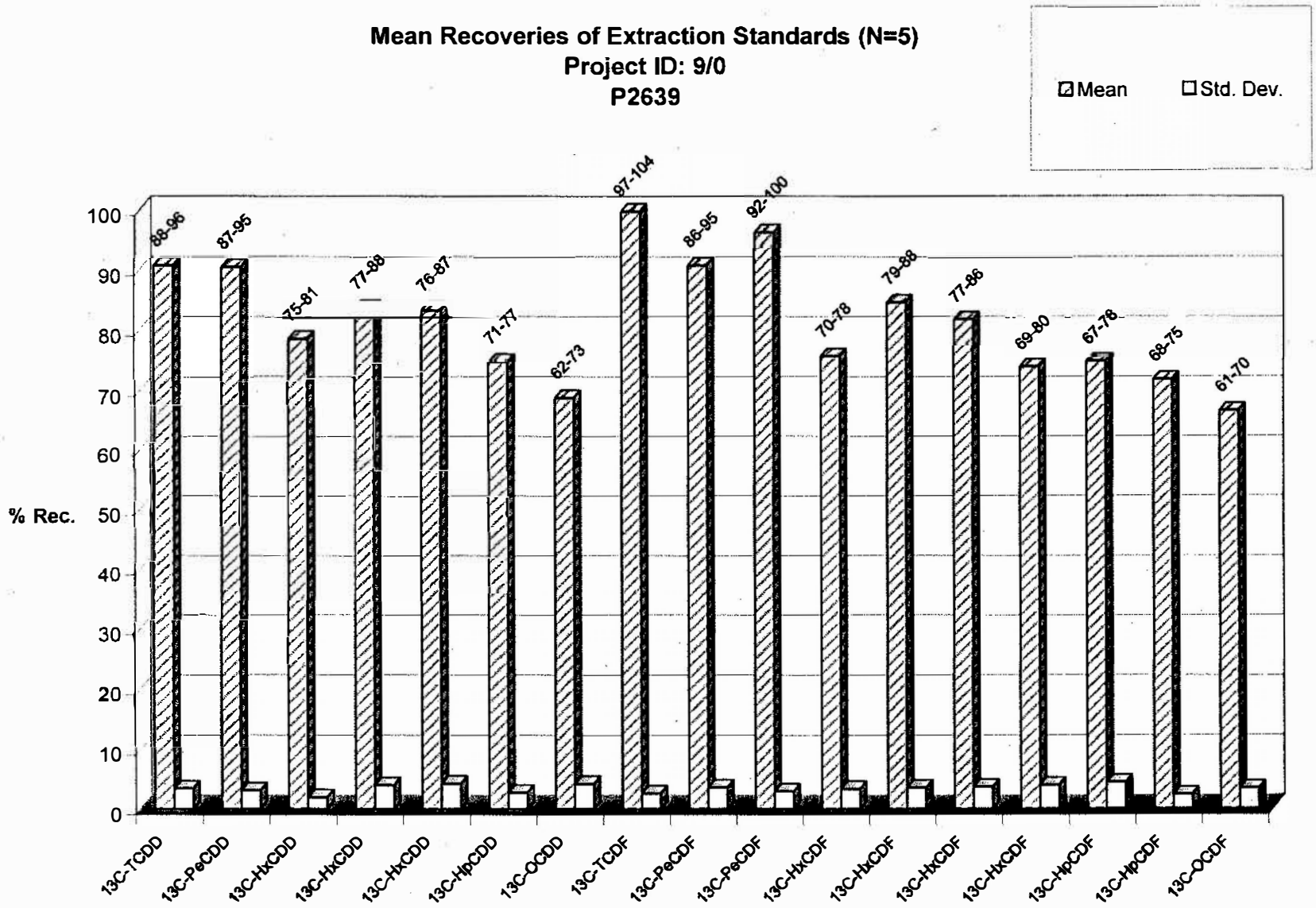
ND=0; EMPC=EMPC
ND=DL/2; EMPC=0
ND=DL/2; EMPC=EMPC
ND=DL; EMPC=EMPC
pg
350
300
250
200
150
100
50
0
7.44
327
260
229
8.6
0_8128_MB001
K1-M23-01
K1-M23-02
K1-M23-03
K1-M23-04

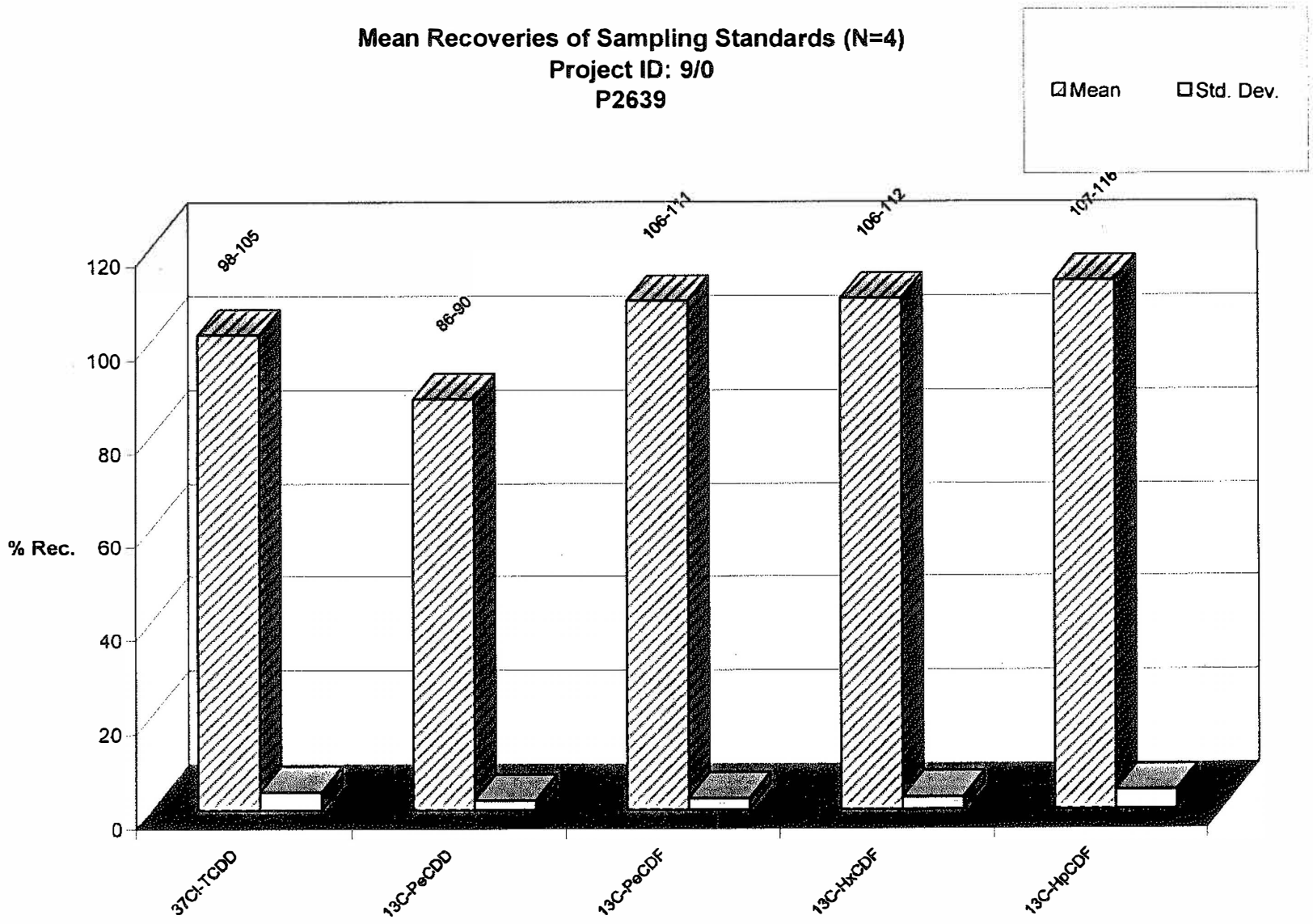

Totals
Project ID: 9/0
P2639
Total PCDD/Fs (ND=0; EMPC=0)
Total PCDD/Fs (ND=0; EMPC=EMPC)
Total PCDD/Fs (2378-X ND=DL; EMPC=EMPC)
pg
40000
35000
30000
25000
20000
15000
10000
5000
0
47.8
36,400
32,300
25,800
72.8
0_8128_MB001
K1-M23-01
K1-M23-02
K1-M23-03
K1-M23-04

Mean Recoveries of Extraction Standards (N=5)
Project ID: 9/0
P2639

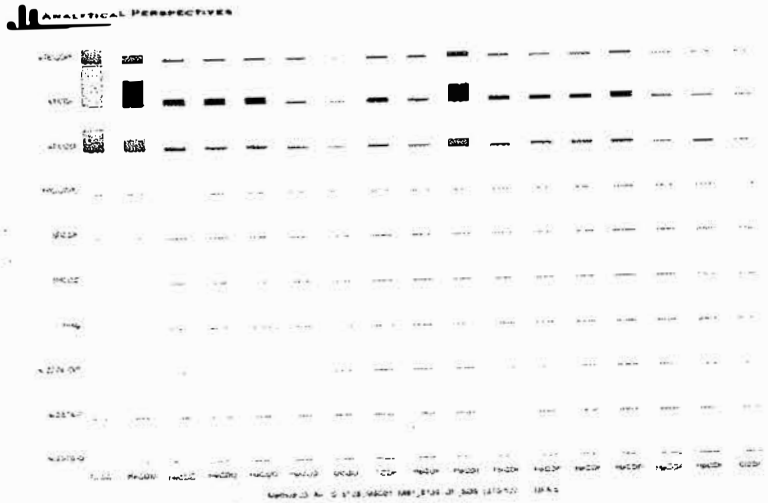


Method Specification Limits: Tetra-Hexa ES: 40-130%, Hepta-Octa ES: 25-130% (F = fail)

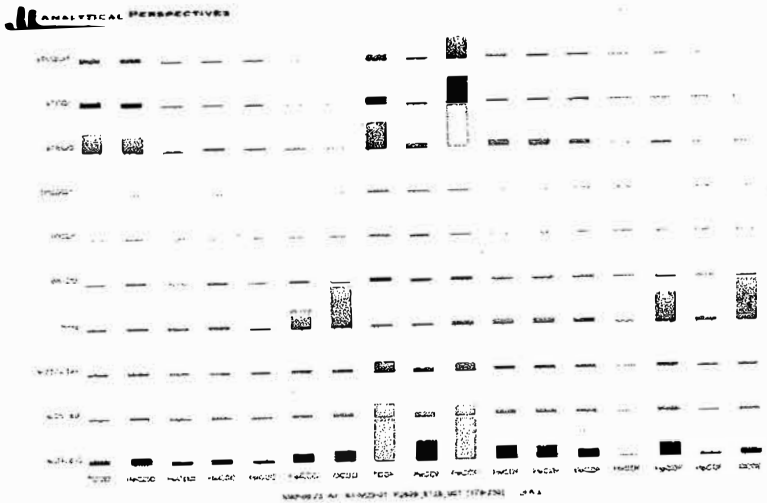
Mean Recoveries of Sampling Standards (N=4)
Project ID: 9/0
P2639

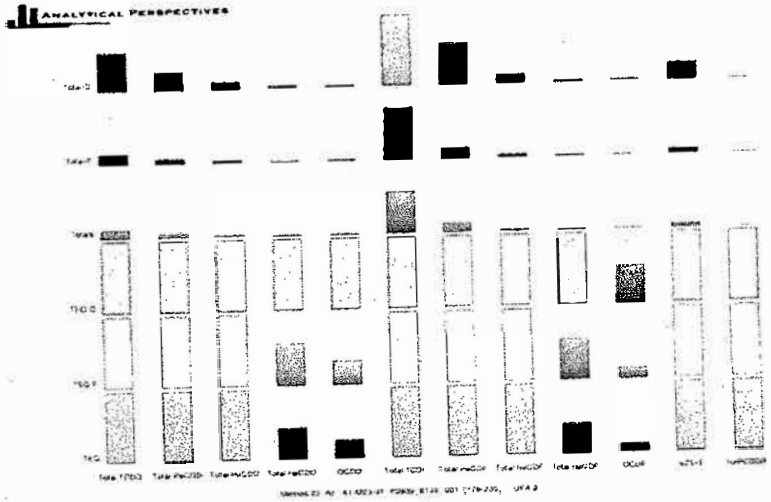


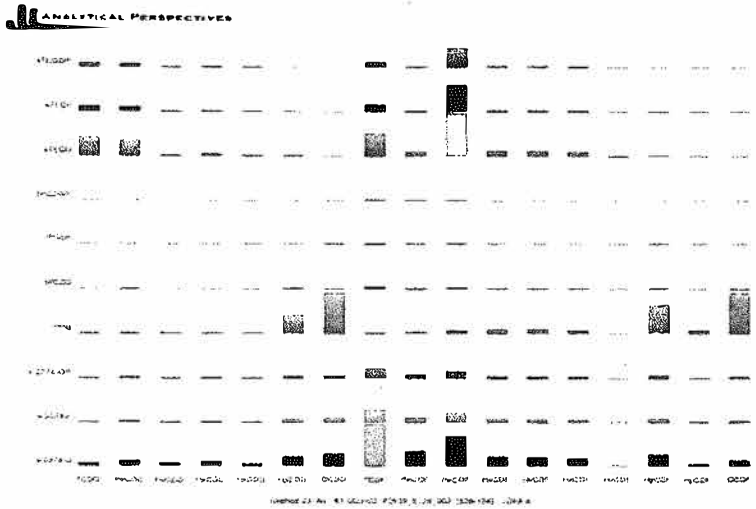
Method Specification Limits: Tetra-Octa SS: 70-130% (F = fail)

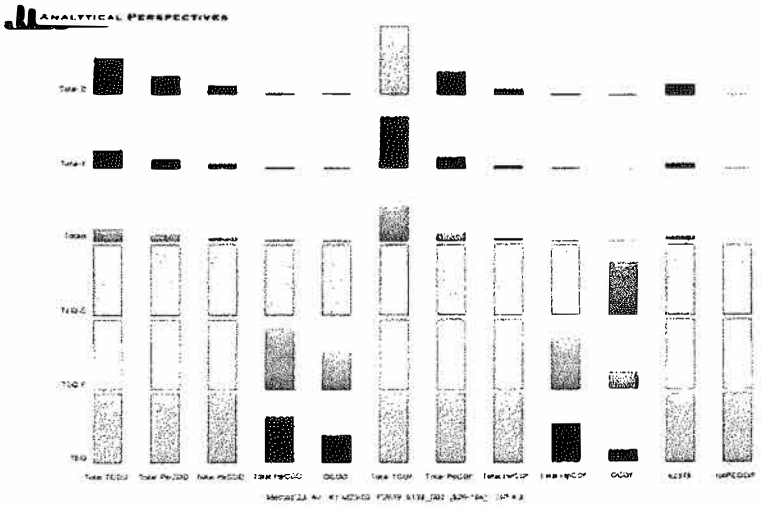

ANALYTICAL PERSPECTIVES

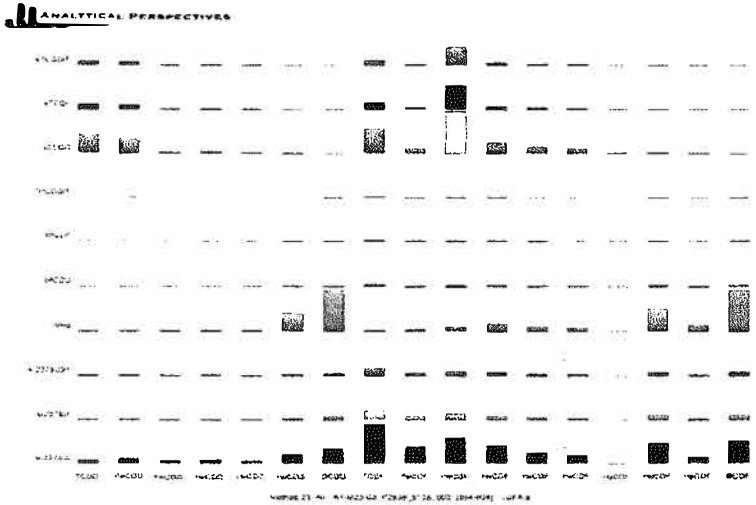
ANALYTICAL PERSPECTIVES

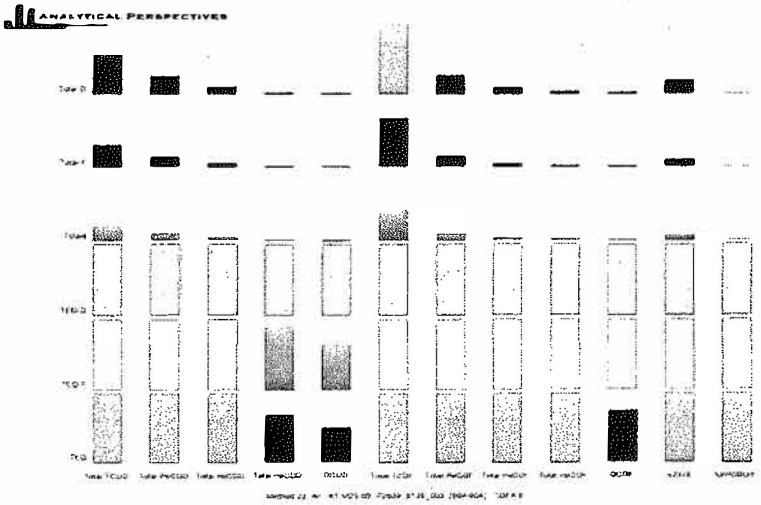

ANALYTICAL PERSPECTIVES


ANALYTICAL PERSPECTIVES

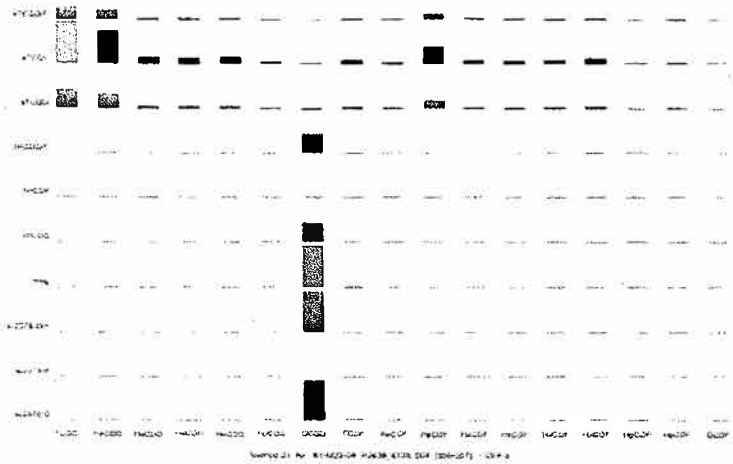

ANALYTICAL PERSPECTIVES


ANALYTICAL PERSPECTIVES

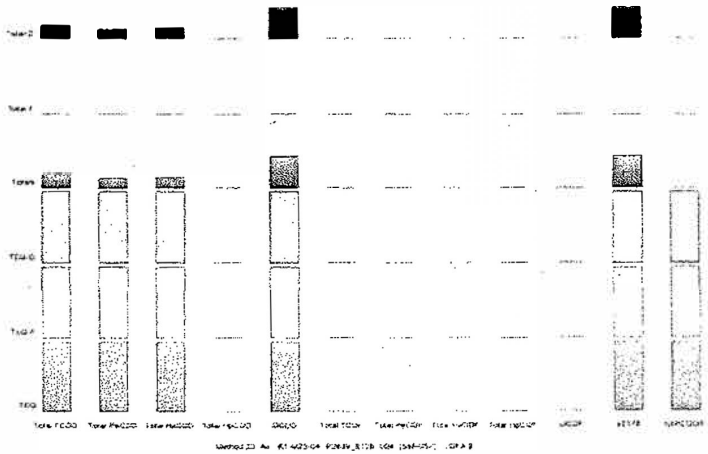

ANALYTICAL PERSPECTIVES


ANALYTICAL PERSPECTIVES

ANALYTICAL PERSPECTIVES



ANALYTICAL PERSPECTIVES



Sample ID: 0_8128_MB001 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2639	Date Received:	n/a
Project ID:	9/0	Weight/Volume:	1	Lab Sample ID	MB1_8128_DF_SDS	Date Extracted:	12 Sep 2010
Date Collected:	n/a			QC Batch No:	8128	Date Analyzed:	13 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	20:24:12

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	2.39			ES 2378-TCDD	87.7	
12378-PeCDD	ND	2.62			ES 12378-PeCDD	87.1	
123478-HxCDD	ND	2.8			ES 123478-HxCDD	75.4	
123678-HxCDD	ND	2.75			ES 123678-HxCDD	77.3	
123789-HxCDD	ND	3.1			ES 123789-HxCDD	76.2	
1234678-HpCDD	ND	4.19			ES 1234678-HpCDD	70.7	
OCDD	ND	7.91			ES OCDD	61.8	
2378-TCDF	ND	1.69			ES 2378-TCDF	96.9	
12378-PeCDF	ND	1.76			ES 12378-PeCDF	86	
23478-PeCDF	ND	1.69			ES 23478-PeCDF	92.5	
123478-HxCDF	ND	1.71			ES 123478-HxCDF	69.8	
123678-HxCDF	ND	1.56			ES 123678-HxCDF	78.9	
234678-HxCDF	ND	1.68			ES 234678-HxCDF	77.3	
123789-HxCDF	ND	2.54			ES 123789-HxCDF	68.8	
1234678-HpCDF	ND	1.9			ES 1234678-HpCDF	67	
1234789-HpCDF	ND	2.53			ES 1234789-HpCDF	68.5	
OCDF	ND	5			ES OCDF	61.2	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	0	< 70
Total TCDD	ND	2.39	ND		SS 12347-PeCDD	0	< 70
Total PeCDD	ND	2.62	ND		SS 12346-PeCDF	0	< 70
Total HxCDD	ND	2.87	ND		SS 123469-HxCDF	0	< 70
Total HpCDD	ND	4.19	ND		SS 1234689-HpCDF	0	< 70
					AS 1368-TCDD	85.3	
Total TCDF	ND	1.69	ND		AS 1368-TCDF	91.4	
Total PeCDF	ND	1.72	ND				
Total HxCDF	ND	1.83	ND				
Total HpCDF	ND	2.19	ND				
Total PCDD/Fs	**ND**		**ND**				
ITEF TEQs							
TEQ: ND=0	0		0				
TEQ: ND=DL/2	3.26		3.26				
TEQ: ND=DL	6.51		6.51				

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Sample ID: K1-M23-01 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2639	Date Received:	12 Sep 2010
Project ID:	9/0	Weight/Volume:	1	Lab Sample ID	P2639_8128_001	Date Extracted:	12 Sep 2010
Date Collected:	10 Sep 2010			QC Batch No:	8128	Date Analyzed:	13 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	21:14:11

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	39.7	[Ra=0.77]			ES 2378-TCDD	96	
12378-PeCDD	64.7				ES 12378-PeCDD	95.2	
123478-HxCDD	EMPC		24.6	J	ES 123478-HxCDD	78.8	
123678-HxCDD	38.4			J	ES 123678-HxCDD	87.8	
123789-HxCDD	23.3			J	ES 123789-HxCDD	84.8	
1234678-HpCDD	81.5				ES 1234678-HpCDD	76.4	
OCDD	105				ES OCDD	70.2	
2378-TCDF	554				ES 2378-TCDF	104	
12378-PeCDF	192				ES 12378-PeCDF	93.6	
23478-PeCDF	398				ES 23478-PeCDF	99.6	
123478-HxCDF	119				ES 123478-HxCDF	77.7	
123678-HxCDF	110				ES 123678-HxCDF	88.3	
234678-HxCDF	EMPC		78		ES 234678-HxCDF	82.8	
123789-HxCDF	ND	5.04			ES 123789-HxCDF	80	
1234678-HpCDF	120				ES 1234678-HpCDF	78	
1234789-HpCDF	EMPC		13.8	J	ES 1234789-HpCDF	74.6	
OCDF	45.8			J	ES OCDF	65.1	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	98.6	
Total TCDD	4410		4410		SS 12347-PeCDD	85.5	
Total PeCDD	2100		2100		SS 12346-PeCDF	111	
Total HxCDD	829		871		SS 123469-HxCDF	108	
Total HpCDD	184		184		SS 1234689-HpCDF	107	
					AS 1368-TCDD	87.1	
Total TCDF	21000		22700		AS 1368-TCDF	94.2	
Total PeCDF	4710		4780				
Total HxCDF	860		990				
Total HpCDF	143		175				
Total PCDD/Fs	**34400**		**36400**				
ITEF TEQs							
TEQ: ND=0	367		378				
TEQ: ND=DL/2	368		378				
TEQ: ND=DL	368		378				

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www.ultratrace.com

Sample ID: K1-M23-02 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2639	Date Received:	12 Sep 2010
Project ID:	9/0	Weight/Volume:	1	Lab Sample ID	P2639_8128_002	Date Extracted:	12 Sep 2010
Date Collected:	10 Sep 2010			QC Batch No:	8128	Date Analyzed:	13 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	22:04:11

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	32	[Ra=0.82]			ES 2378-TCDD	92.4	
12378-PeCDD	55.7				ES 12378-PeCDD	92.1	
123478-HxCDD	EMPC		20.3	J	ES 123478-HxCDD	79.7	
123678-HxCDD	45.3			J	ES 123678-HxCDD	85.2	
123789-HxCDD	EMPC		19.9	J	ES 123789-HxCDD	85.4	
1234678-HpCDD	93.5				ES 1234678-HpCDD	73.2	
OCDD	125				ES OCDD	68.6	
2378-TCDF	397				ES 2378-TCDF	99.9	
12378-PeCDF	154				ES 12378-PeCDF	95	
23478-PeCDF	300				ES 23478-PeCDF	98.7	
123478-HxCDF	95.7				ES 123478-HxCDF	78	
123678-HxCDF	92.7				ES 123678-HxCDF	86	
234678-HxCDF	74.3				ES 234678-HxCDF	85.1	
123789-HxCDF	ND	6.57			ES 123789-HxCDF	72.7	
1234678-HpCDF	118				ES 1234678-HpCDF	75.8	
1234789-HpCDF	13			J	ES 1234789-HpCDF	70.9	
OCDF	54.7			J	ES OCDF	68.2	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	105	
Total TCDD	5870		5870		SS 12347-PeCDD	89.9	
Total PeCDD	2850		2990		SS 12346-PeCDF	110	
Total HxCDD	1400		1440		SS 123469-HxCDF	110	
Total HpCDD	205		205		SS 1234689-HpCDF	114	
					AS 1368-TCDD	90.3	
Total TCDF	16800		16800		AS 1368-TCDF	96.4	
Total PeCDF	3580		3690				
Total HxCDF	848		873				
Total HpCDF	154		173				
Total PCDD/Fs	**31900**		**32300**				
ITEF TEQs							
TEQ: ND=0	291		295				
TEQ: ND=DL/2	291		295				
TEQ: ND=DL	292		295				

ANALYTICAL PERSPECTIVES
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www.ultratrace.com

Sample ID: K1-M23-03

Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2639	Date Received:	12 Sep 2010
Project ID:	9/0	Weight/Volume:	1	Lab Sample ID	P2639_8128_003	Date Extracted:	12 Sep 2010
Date Collected:	10 Sep 2010			QC Batch No:	8128	Date Analyzed:	13 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	22:54:10

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	27.1	[Ra=0.70]			ES 2378-TCDD	89.5	
12378-PeCDD	44.8			J	ES 12378-PeCDD	89.2	
123478-HxCDD	21.6			J	ES 123478-HxCDD	78.5	
123678-HxCDD	36.9			J	ES 123678-HxCDD	82.8	
123789-HxCDD	EMPC		17.4	J	ES 123789-HxCDD	83.8	
1234678-HpCDD	81.7				ES 1234678-HpCDD	77.4	
OCDD	135				ES OCDD	69.9	
2378-TCDF	360				ES 2378-TCDF	100	
12378-PeCDF	151				ES 12378-PeCDF	91.2	
23478-PeCDF	238				ES 23478-PeCDF	94.2	
123478-HxCDF	162				ES 123478-HxCDF	75.9	
123678-HxCDF	99.6				ES 123678-HxCDF	83.6	
234678-HxCDF	74.6				ES 234678-HxCDF	78.6	
123789-HxCDF	ND	6.61			ES 123789-HxCDF	73.4	
1234678-HpCDF	185				ES 1234678-HpCDF	76.7	
1234789-HpCDF	51.2				ES 1234789-HpCDF	71.4	
OCDF	203				ES OCDF	68.5	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	104	
Total TCDD	5710		5710		SS 12347-PeCDD	88.7	
Total PeCDD	2570		2600		SS 12346-PeCDF	107	
Total HxCDD	1010		1030		SS 123469-HxCDF	112	
Total HpCDD	186		186		SS 1234689-HpCDF	116	
					AS 1368-TCDD	87.5	
Total TCDF	12000		12000		AS 1368-TCDF	93	
Total PeCDF	2710		2730				
Total HxCDF	853		889				
Total HpCDF	309		352				
Total PCDD/Fs	**25600**		**25800**				
ITEF TEQs							
TEQ: ND=0	255		257				
TEQ: ND=DL/2	255		257				
TEQ: ND=DL	256		257				

ANALYTICAL PERSPECTIVES
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Sample ID: K1-M23-04 — Method 23

Client Data		Sample Data		Laboratory Data			
Name:	RMC Environmental	Matrix:	Air	Lab Project ID:	P2639	Date Received:	12 Sep 2010
Project ID:	9/0	Weight/Volume:	1	Lab Sample ID	P2639_8128_004	Date Extracted:	12 Sep 2010
Date Collected:	10 Sep 2010			QC Batch No:	8128	Date Analyzed:	13 Sep 2010
		Split:	2	Dilution:	-	Time Analyzed:	23:44:09

Analyte	Conc. (pg)	DL (pg)	EMPC (pg)	Qualifiers	Standard	ES Recoveries	Qualifiers
2378-TCDD	ND	2.31			ES 2378-TCDD	88.3	
12378-PeCDD	ND	3.5			ES 12378-PeCDD	89.2	
123478-HxCDD	ND	3.49			ES 123478-HxCDD	80.6	
123678-HxCDD	ND	3.22			ES 123678-HxCDD	85.9	
123789-HxCDD	ND	3.59			ES 123789-HxCDD	87.4	
1234678-HpCDD	ND	5.1			ES 1234678-HpCDD	76.3	
OCDD	12.2			J	ES OCDD	73.3	
2378-TCDF	ND	2.08			ES 2378-TCDF	98.4	
12378-PeCDF	ND	1.87			ES 12378-PeCDF	88.5	
23478-PeCDF	ND	1.82			ES 23478-PeCDF	96.8	
123478-HxCDF	ND	1.95			ES 123478-HxCDF	77.3	
123678-HxCDF	ND	1.69			ES 123678-HxCDF	86.6	
234678-HxCDF	ND	1.98			ES 234678-HxCDF	85.5	
123789-HxCDF	ND	2.78			ES 123789-HxCDF	75.1	
1234678-HpCDF	ND	2.34			ES 1234678-HpCDF	77.1	
1234789-HpCDF	ND	3.54			ES 1234789-HpCDF	73.9	
OCDF	ND	5.84			ES OCDF	70	
Totals					**Standard**	**SS/AS Recoveries**	
					SS 37Cl-2378-TCDD	97.6	
Total TCDD	5.46		5.46		SS 12347-PeCDD	86.5	
Total PeCDD	ND		3.81		SS 12346-PeCDF	106	
Total HxCDD	ND		4.21		SS 123469-HxCDF	106	
Total HpCDD	ND	5.1	ND		SS 1234689-HpCDF	114	
					AS 1368-TCDD	84.4	
Total TCDF	ND	2.08	ND		AS 1368-TCDF	90	
Total PeCDF	ND	1.85	ND				
Total HxCDF	ND	2.05	ND				
Total HpCDF	ND	2.88	ND				
Total PCDD/Fs	**17.7**		**25.7**				
ITEF TEQs							
TEQ: ND=0	0.0122		0.0122				
TEQ: ND=DL/2	3.64		3.64				
TEQ: ND=DL	7.26		7.26				

ANALYTICAL PERSPECTIVES
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July 21, 2010 Service Request No: E1000735

Rachel Chleborowicz
RMC Environmental, Incorporated
9226 N. 2nd Avenue
Machesney Park, IL 61115

Kiln 2 - 6/2010

Laboratory Results for: LaFarge-Joppa/2010-

Dear Rachel:

Enclosed are the results of the sample(s) submitted to our laboratory on July 2, 2010. For your reference, these analyses have been assigned our service request number **E1000735**.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the final complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. In accordance to the NELAC 2003 Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My extension is 2959. You may also contact me via email at NBrown@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Nicole Brown

Digitally signed by Nicole Brown
DN: cn=Nicole Brown, o, ou, email=nbrown@caslab.com, c=US
Date: 2010.07.30 14:41:11 -05'00'

Nicole Brown
Project Manager

Page 1 of _____

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COLUMBIA ANALYTICAL SERVICES, INC

Client:	RMC Environmental, Incorporated	**Service Request No.:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Received:**	07/02/10
Sample Matrix:	Air		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Four air samples were received for analysis at Columbia Analytical Services on 07/02/10.

The samples were received at 0°C in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

B flags – Method Blanks

The Method Blank EQ1000341-01 contained low levels of 123789-HxCDD, 1234678-HpCDD and OCDD below the Method Reporting Limit (MRL). The associated compounds in the samples are flagged with 'B' flags.

MS/MSD

EQ1000341: Laboratory Control Spike/Laboratory Control Spike Duplicate (LCS/LCSD) samples were analyzed and reported in lieu of an MS/MSD for this extraction batch.

The recovery of 123678-HxCDD and 1234789-HpCDF for both EQ1000341-02 (LCS) and EQ1000341-03 (DLCS) were outside CAS control criteria. CAS-Houston follows the LCS acceptance criteria detailed in the EPA SOW DLM02.0, Section 12.2.5.3; which states, "Up to three compounds may fail to meet the recovery limits. However, frequent failures to meet the limits for recovery warrant investigation by the laboratory."

Approved by_____ **Date** 07/30/10

Xiangqiu Liang, Laboratory Director

C flags – 2378-TCDF Confirmation

Confirmation of the TCDF compound: When 2378-TCDF is detected on the DB-5 column, confirmation analyses are performed on a second column (DB-225.) The results from both the DB-5 column and the DB-225 column are included in this data package.

The valid result for the 2378-TCDF compound is reported from the confirmation column.

The confirmation results have been included on the Total TEQ summary pages.

Y flags – Labeled Standards

Samples that had recoveries of labeled standards outside the acceptance limits are flagged with 'Y' flags on the Labeled Compound summary pages. In all cases, the signal-to-noise ratios are greater than 10:1, making these data acceptable.

K flags

EMPC - When the ion abundance ratios associated with a particular compound are outside the QC limits, samples are flagged with a 'K' flag. A 'K' flag indicates an estimated maximum possible concentration for the associated compound.

Detection Limits

Detection limits are calculated for each congener in each sample by measuring the height of the noise level for each quantitation ion for the associated labeled standard. The concentration equivalent to 2.5 times the height of the noise is then calculated using the appropriate response factor and the weight of the sample. The calculated concentration equals the detection limit.

The TEQ Summary results for each sample have been calculated by CAS/Houston to include:

- WHO-2005 TEFs, The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-Like Compounds (M. Van den Berg et al., Toxicological Sciences 93(2):223-241, 2006)
- 2378-TCDF from the DB-225 column, when confirmation required
- Non-detected compounds are not included in the 'Total'

Approved by_____ _____ **Date** 07/30/10

Xiangqiu Liang, Laboratory Director

Client: RMC Environmental, Incorporated
Project: LaFarge-Joppa/2010-

Service Request: E1000735

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
E1000735-001	K2-M23-01	6/29/10	00:00
E1000735-002	K2-M23-02	6/29/10	00:00
E1000735-003	K2-M23-03	6/29/10	00:00
E1000735-004	K2-M23-04	6/29/10	00:00

Laboratory Certifications
2010-2011

STATE/PROGRAM	AGENCY	CERTIFICATION ID	EXP DATE
ARIZONA	AZ-DHS	AZ0725	05/27/11
ARKANSAS	ADEQ	10-035-0	06/16/11
CALIFORNIA	CA-ELAP	2452	02/28/11
DoD ELAP	A2LA	2897.01	11/30/11
FLORIDA/NELAP	FL-DOHS	E87611	06/30/11
HAWAII	HI-DOH	N/A	06/30/11
ILLINOIS/NELAP	IL-EPA	002380	10/06/10
ISO 17025	A2LA	2897.01	11/30/11
LOUISIANA/NELAP	LELAP	03048	06/30/10
LOUISIANA/NELAP	LDHH	LA100032	12/31/10
MAINE	ME-DOHS	2010041	06/05/12
MICHIGAN	MIDEQ	9971	06/30/10
MINNESOTA	MDH	048-999-427	12/31/10
NEVADA	NDEP	TX014112010A	07/31/10
NEW JERSEY	NJDEP	TX008	06/30/11
NEW MEXICO	NMED-DWB	N/A	06/30/11
NEW YORK/NELAP	NY-DOH	11707	04/01/11
OKLAHOMA	OKDEQ	2009-25	08/31/10
OREGON/NELAP	ORELAP	TX200002-006	03/24/10
PENNSYLVANIA/NELAP	PLAP	002	06/30/11
TENNESSEE	TNDEC	04016	06/30/11
TEXAS/NELAP	TCEQ	T104704216-10-1	06/30/11
UTAH/NELAP	UTELCP	COLU2	06/30/10
SOIL IMPORT PERMIT	USDA	P330-09-00067	03/27/12
WASHINGTON/NELAP	WA-Ecology	C1855	11/14/10
WEST VIRGINIA	WVDEP	347	06/30/11

Abbreviations, Acronyms & Definitions

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
MRL	Method Reporting Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent Recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
RRT	Relative Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-Noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

Data Qualifier Flags – Dioxin/Furans

- **B** Indicates the associated analyte is found in the method blank, as well as in the sample.

- **C** Confirmation of the TCDF compound: When 2378-TCDF is detected on the DB-5 column, confirmation analyses are performed on a second column (DB-225). The results from both the DB-5 column and the DB-225 column are included in this data package. The results from the DB-225 analyses should be used to evaluate the 2378-TCDF in the samples. The confirmed result should be used in determining the TEQ value for TCDF.

- **E** Indicates an estimated value – used when the analyte concentration exceeds the upper end of the linear calibration range.

- **J** Indicates an estimated value – used when the analyte concentration is below the method reporting limit (MRL) and above the estimated detection limit (EDL).

- **K** EMPC - When the ion abundance ratios associated with a particular compound are outside the QC limits, samples are flagged with a 'K' flag. A 'K' flag indicates an estimated maximum possible concentration for the associated compound.

- **U** Indicates the compound was analyzed and not detected.

- **Y** Samples that had recoveries of labeled standards outside the acceptance limits are flagged with 'Y'. In all cases, the signal-to-noise ratios are greater than 10:1, making these data acceptable.

- **ND** Indicates concentration is reported as 'Not Detected.'

- **S** Peak is saturated; data not reportable.

- **P** Indicates chlorodiphenyl ether interference present at the retention time of the target compound.

- **Q** Lock-mass interference by chlorodiphenyl ether compounds.

COLUMBIA ANALYTICAL SERVICES, INC. – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID E10 00 735 DB-5 DB-225 SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date: 7/27/10	Analyst: Cee	Samples: 1 – 4

Second Level - Data Review – to be filled by person doing peer review

Date: 07/28/10	Analyst: BY	Samples: 1-4

COLUMBIA ANALYTICAL SERVICES, INC. – Houston
Data Processing/Form Production and Peer Review Signatures

SR# Unique ID E1600735 DB-5 DB-225 SPB-Octyl

First Level - Data Processing - to be filled by person generating the forms

Date:	Analyst:	Samples:
7/28/10	gc	1001-004)

Second Level - Data Review – to be filled by person doing peer review

Date:	Analyst:	Samples:
07/29/10	mc	001-003

Columbia Analytical Services™

Analytical Results

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-01	**Units:**	pg
Lab Code:	E1000735-001	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/23/10 2308
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223323	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	52.8		4.75	10.0	0.67	1.001	1
1,2,3,7,8-PeCDD	233		3.85	50.0	1.66	1.000	1
1,2,3,4,7,8-HxCDD	82.8		2.59	50.0	1.25	0.998	1
1,2,3,6,7,8-HxCDD	149		2.82	50.0	1.31	1.000	1
1,2,3,7,8,9-HxCDD	216	B	2.53	50.0	1.25	1.007	1
1,2,3,4,6,7,8-HpCDD	186	B	3.07	50.0	1.14	1.000	1
OCDD	194	B	4.76	100	0.92	1.000	1
2,3,7,8-TCDF	3580	C	4.97	10.0	0.80	1.002	1
1,2,3,7,8-PeCDF	905	P	7.78	50.0	1.55	1.001	1
2,3,4,7,8-PeCDF	1180		7.47	50.0	1.59	1.023	1
1,2,3,4,7,8-HxCDF	1320		2.71	50.0	1.22	0.997	1
1,2,3,6,7,8-HxCDF	651		2.62	50.0	1.31	1.000	1
1,2,3,7,8,9-HxCDF	10.8	JK	3.16	50.0	1.53	1.032	1
2,3,4,6,7,8-HxCDF	349		2.90	50.0	1.27	1.013	1
1,2,3,4,6,7,8-HpCDF	363		2.38	50.0	1.02	1.000	1
1,2,3,4,7,8,9-HpCDF	32.9	JK	2.80	50.0	0.85	1.034	1
OCDF	179		6.70	100	0.89	1.004	1
Total Tetra-Dioxins	2480		4.75	10.0	0.74		1
Total Penta-Dioxins	3050		3.85	50.0	1.59		1
Total Hexa-Dioxins	2470		2.59	50.0	1.22		1
Total Hepta-Dioxins	417		3.07	50.0	1.05		1
Total Tetra-Furans	8610		4.97	10.0	0.81		1
Total Penta-Furans	14700		7.47	50.0	1.59		1
Total Hexa-Furans	6420		2.71	50.0	1.26		1
Total Hepta-Furans	523		2.38	50.0	1.02		1

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-01	**Units:**	Percent
Lab Code:	E1000735-001	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/23/10 2308
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223323	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	2764.288	69		40-130	0.79	1.007
13C-1,2,3,7,8-PeCDD	4000	2684.101	67		40-130	1.58	1.164
13C-1,2,3,6,7,8-HxCDD	4000	1763.968	44		40-130	1.26	0.993
13C-1,2,3,4,6,7,8-HpCDD	4000	1904.547	48		25-130	1.04	1.069
13C-OCDD	8000	2562.340	32		25-130	0.91	1.151
13C-2,3,7,8-TCDF	4000	2305.023	58		40-130	0.76	0.978
13C-1,2,3,7,8-PeCDF	4000	2871.040	72		40-130	1.59	1.127
13C-1,2,3,6,7,8-HxCDF	4000	2064.112	52		40-130	0.53	0.975
13C-1,2,3,4,6,7,8-HpCDF	4000	1999.037	50		25-130	0.45	1.045
37Cl-2,3,7,8-TCDD	4000	3595.529	90		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	4000	4385.325	110		70-130	1.25	0.998
13C-2,3,4,7,8-PeCDF	4000	3539.763	88		70-130	1.56	1.023
13C-1,2,3,4,7,8-HxCDF	4000	4042.039	101		70-130	0.54	0.997
13C-1,2,3,4,7,8,9-HpCDF	4000	4987.058	125		70-130	0.45	1.034
13C-1,2,3,7,8,9-HxCDF	4000	2561.923	64		40-130	0.53	1.006

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-01	**Units:**	pg
Lab Code:	E1000735-001	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method: 23
Prep Method: Method

Analyte Name	Result	DL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**52.8**	4.75	1	1	52.8
1,2,3,7,8-PeCDD	**233**	3.85	1	1	233
1,2,3,4,7,8-HxCDD	**82.8**	2.59	1	0.1	8.28
1,2,3,6,7,8-HxCDD	**149**	2.82	1	0.1	14.9
1,2,3,7,8,9-HxCDD	**216**	2.53	1	0.1	21.6
1,2,3,4,6,7,8-HpCDD	**186**	3.07	1	0.01	1.86
OCDD	**194**	4.76	1	0.0003	0.0582
2,3,7,8-TCDF	**937**	3.97	1	0.1	93.7
1,2,3,7,8-PeCDF	**905**	7.78	1	0.03	27.2
2,3,4,7,8-PeCDF	**1180**	7.47	1	0.3	354
1,2,3,4,7,8-HxCDF	**1320**	2.71	1	0.1	132
1,2,3,6,7,8-HxCDF	**651**	2.62	1	0.1	65.1
1,2,3,7,8,9-HxCDF	**10.8**	3.16	1	0.1	1.08
2,3,4,6,7,8-HxCDF	**349**	2.90	1	0.1	34.9
1,2,3,4,6,7,8-HpCDF	**363**	2.38	1	0.01	3.63
1,2,3,4,7,8,9-HpCDF	**32.9**	2.80	1	0.01	0.329
OCDF	**179**	6.70	1	0.0003	0.0537
		Total TEQ			1040

2005 WHO TEFs, ND = 0

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-01	**Units:**	pg
Lab Code:	E1000735-001	**Basis:**	NA
Run Type:	Reanalysis		

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/27/10 2150
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-01
		GC Column:	DB-225
Data File Name:	U137262	**Blank File Name:**	U137258
ICAL Date:	12/17/07	**Cal Ver. File Name:**	U137255

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDF	937		3.97	10.0	0.77	1.001	1

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDF	4000	2153.388	54		40-130	0.79	1.060
37Cl-2,3,7,8-TCDD	4000	2570.999	64	Y	70-130	NA	0.989

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-02	**Units:**	pg
Lab Code:	E1000735-002	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/23/10 2356
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223324	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	107		10.9	10.9	0.75	1.001	1
1,2,3,7,8-PeCDD	228		4.64	50.0	1.58	1.000	1
1,2,3,4,7,8-HxCDD	90.0		4.79	50.0	1.22	0.998	1
1,2,3,6,7,8-HxCDD	175		5.23	50.0	1.21	1.000	1
1,2,3,7,8,9-HxCDD	285	B	4.69	50.0	1.24	1.007	1
1,2,3,4,6,7,8-HpCDD	257	B	6.74	50.0	1.09	1.000	1
OCDD	281	B	10.2	100	0.85	1.000	1
2,3,7,8-TCDF	7410	CE	7.89	10.0	0.81	1.002	1
1,2,3,7,8-PeCDF	841		12.6	50.0	1.61	1.001	1
2,3,4,7,8-PeCDF	1130		12.1	50.0	1.53	1.022	1
1,2,3,4,7,8-HxCDF	1380		6.33	50.0	1.20	0.997	1
1,2,3,6,7,8-HxCDF	679		6.12	50.0	1.25	1.000	1
1,2,3,7,8,9-HxCDF	12.4	J	7.40	50.0	1.31	1.033	1
2,3,4,6,7,8-HxCDF	414		6.78	50.0	1.27	1.013	1
1,2,3,4,6,7,8-HpCDF	488		5.03	50.0	1.06	1.000	1
1,2,3,4,7,8,9-HpCDF	51.9		5.90	50.0	1.16	1.033	1
OCDF	277		13.5	100	0.91	1.004	1
Total Tetra-Dioxins	5400		10.9	10.9	0.75		1
Total Penta-Dioxins	3270		4.64	50.0	1.58		1
Total Hexa-Dioxins	2810		4.79	50.0	1.18		1
Total Hepta-Dioxins	587		6.74	50.0	1.02		1
Total Tetra-Furans	68500		7.89	10.0	0.79		1
Total Penta-Furans	14900		12.1	50.0	1.58		1
Total Hexa-Furans	6340		6.33	50.0	1.25		1
Total Hepta-Furans	648		5.03	50.0	1.06		1

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-02	**Units:**	Percent
Lab Code:	E1000735-002	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/23/10 2356
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223324	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	1888.289	47		40-130	0.79	1.007
13C-1,2,3,7,8-PeCDD	4000	1763.039	44		40-130	1.58	1.164
13C-1,2,3,6,7,8-HxCDD	4000	1163.765	29	Y	40-130	1.27	0.992
13C-1,2,3,4,6,7,8-HpCDD	4000	1285.984	32		25-130	1.06	1.068
13C-OCDD	8000	1656.650	21	Y	25-130	0.89	1.151
13C-2,3,7,8-TCDF	4000	1654.875	41		40-130	0.80	0.979
13C-1,2,3,7,8-PeCDF	4000	1940.499	49		40-130	1.62	1.127
13C-1,2,3,6,7,8-HxCDF	4000	1386.283	35	Y	40-130	0.53	0.974
13C-1,2,3,4,6,7,8-HpCDF	4000	1329.696	33		25-130	0.45	1.045
37Cl-2,3,7,8-TCDD	4000	5415.957	135	Y	70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	4000	6937.376	173	Y	70-130	1.26	0.998
13C-2,3,4,7,8-PeCDF	4000	5338.068	133	Y	70-130	1.57	1.022
13C-1,2,3,4,7,8-HxCDF	4000	6245.602	156	Y	70-130	0.53	0.997
13C-1,2,3,4,7,8,9-HpCDF	4000	7790.177	195	Y	70-130	0.45	1.033
13C-1,2,3,7,8,9-HxCDF	4000	2657.735	66		40-130	0.53	1.006

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-02	**Units:**	pg
Lab Code:	E1000735-002	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method: 23
Prep Method: Method

Analyte Name	Result	DL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**107**	10.9	1	1	107
1,2,3,7,8-PeCDD	**228**	4.64	1	1	228
1,2,3,4,7,8-HxCDD	**90.0**	4.79	1	0.1	9.00
1,2,3,6,7,8-HxCDD	**175**	5.23	1	0.1	17.5
1,2,3,7,8,9-HxCDD	**285**	4.69	1	0.1	28.5
1,2,3,4,6,7,8-HpCDD	**257**	6.74	1	0.01	2.57
OCDD	**281**	10.2	1	0.0003	0.0843
2,3,7,8-TCDF	**1780**	5.36	1	0.1	178
1,2,3,7,8-PeCDF	**841**	12.6	1	0.03	25.2
2,3,4,7,8-PeCDF	**1130**	12.1	1	0.3	339
1,2,3,4,7,8-HxCDF	**1380**	6.33	1	0.1	138
1,2,3,6,7,8-HxCDF	**679**	6.12	1	0.1	67.9
1,2,3,7,8,9-HxCDF	**12.4**	7.40	1	0.1	1.24
2,3,4,6,7,8-HxCDF	**414**	6.78	1	0.1	41.4
1,2,3,4,6,7,8-HpCDF	**488**	5.03	1	0.01	4.88
1,2,3,4,7,8,9-HpCDF	**51.9**	5.90	1	0.01	0.519
OCDF	**277**	13.5	1	0.0003	0.0831
		Total TEQ			1190

2005 WHO TEFs, ND = 0

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-02	**Units:**	pg
Lab Code:	E1000735-002	**Basis:**	NA
Run Type:	Reanalysis		

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/27/10 2227
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-01
		GC Column:	DB-225
Data File Name:	U137263	**Blank File Name:**	U137258
ICAL Date:	12/17/07	**Cal Ver. File Name:**	U137255

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDF	1780		5.36	10.0	0.78	1.001	1

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDF	4000	1505.529	38	Y	40-130	0.78	1.061
37Cl-2,3,7,8-TCDD	4000	2656.877	66	Y	70-130	NA	0.989

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Reqnest:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-03	**Units:**	pg
Lab Code:	E1000735-003	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/24/10 0044
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223325	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	192		6.95	10.0	0.74	1.001	1
1,2,3,7,8-PeCDD	458		8.79	50.0	1.53	1.001	1
1,2,3,4,7,8-HxCDD	225		4.01	50.0	1.15	0.998	1
1,2,3,6,7,8-HxCDD	429		4.38	50.0	1.23	1.000	1
1,2,3,7,8,9-HxCDD	601	B	3.93	50.0	1.21	1.007	1
1,2,3,4,6,7,8-HpCDD	645	B	4.70	50.0	1.04	1.000	1
OCDD	559	B	6.05	100	0.93	1.000	1
2,3,7,8-TCDF	13500	CE	4.94	10.0	0.77	1.002	1
1,2,3,7,8-PeCDF	1800	P	24.4	50.0	1.60	1.001	1
2,3,4,7,8-PeCDF	2490		23.5	50.0	1.61	1.023	1
1,2,3,4,7,8-HxCDF	3130	P	12.2	50.0	1.25	0.998	1
1,2,3,6,7,8-HxCDF	1480		11.8	50.0	1.29	1.000	1
1,2,3,7,8,9-HxCDF	36.1	J	14.2	50.0	1.09	1.033	1
2,3,4,6,7,8-HxCDF	1010		13.0	50.0	1.23	1.014	1
1,2,3,4,6,7,8-HpCDF	1360		3.63	50.0	1.05	1.000	1
1,2,3,4,7,8,9-HpCDF	124		4.26	50.0	1.09	1.034	1
OCDF	667		7.07	100	0.86	1.004	1
Total Tetra-Dioxins	8510		6.95	10.0	0.81		1
Total Penta-Dioxins	7120		8.79	50.0	1.57		1
Total Hexa-Dioxins	5830		4.01	50.0	1.28		1
Total Hepta-Dioxins	1480		4.70	50.0	1.06		1
Total Tetra-Furans	99700		4.94	10.0	0.77		1
Total Penta-Furans	30300		23.5	50.0	1.60		1
Total Hexa-Furans	13500		12.2	50.0	1.24		1
Total Hepta-Furans	2050		3.63	50.0	1.05		1

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-03	**Units:**	Percent
Lab Code:	E1000735-003	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/24/10 0044
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223325	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	2668.707	67		40-130	0.79	1.007
13C-1,2,3,7,8-PeCDD	4000	2541.507	64		40-130	1.56	1.164
13C-1,2,3,6,7,8-HxCDD	4000	1638.090	41		40-130	1.27	0.993
13C-1,2,3,4,6,7,8-HpCDD	4000	1773.516	44		25-130	1.06	1.069
13C-OCDD	8000	2378.362	30		25-130	0.90	1.151
13C-2,3,7,8-TCDF	4000	2349.553	59		40-130	0.81	0.978
13C-1,2,3,7,8-PeCDF	4000	2844.400	71		40-130	1.58	1.127
13C-1,2,3,6,7,8-HxCDF	4000	1949.577	49		40-130	0.53	0.974
13C-1,2,3,4,6,7,8-HpCDF	4000	1963.529	49		25-130	0.45	1.045
37Cl-2,3,7,8-TCDD	4000	3920.617	98		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	4000	4598.355	115		70-130	1.25	0.998
13C-2,3,4,7,8-PeCDF	4000	3791.122	95		70-130	1.59	1.023
13C-1,2,3,4,7,8-HxCDF	4000	4306.952	108		70-130	0.53	0.998
13C-1,2,3,4,7,8,9-HpCDF	4000	4987.421	125		70-130	0.44	1.034
13C-1,2,3,7,8,9-HxCDF	4000	2821.962	71		40-130	0.53	1.006

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-03	**Units:**	pg
Lab Code:	E1000735-003	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method: 23
Prep Method: Method

Analyte Name	Result	DL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	**192**	6.95	1	1	192
1,2,3,7,8-PeCDD	**458**	8.79	1	1	458
1,2,3,4,7,8-HxCDD	**225**	4.01	1	0.1	22.5
1,2,3,6,7,8-HxCDD	**429**	4.38	1	0.1	42.9
1,2,3,7,8,9-HxCDD	**601**	3.93	1	0.1	60.1
1,2,3,4,6,7,8-HpCDD	**645**	4.70	1	0.01	6.45
OCDD	**559**	6.05	1	0.0003	0.168
2,3,7,8-TCDF	**3520**	6.72	1	0.1	352
1,2,3,7,8-PeCDF	**1800**	24.4	1	0.03	54.0
2,3,4,7,8-PeCDF	**2490**	23.5	1	0.3	747
1,2,3,4,7,8-HxCDF	**3130**	12.2	1	0.1	313
1,2,3,6,7,8-HxCDF	**1480**	11.8	1	0.1	148
1,2,3,7,8,9-HxCDF	**36.1**	14.2	1	0.1	3.61
2,3,4,6,7,8-HxCDF	**1010**	13.0	1	0.1	101
1,2,3,4,6,7,8-HpCDF	**1360**	3.63	1	0.01	13.6
1,2,3,4,7,8,9-HpCDF	**124**	4.26	1	0.01	1.24
OCDF	**667**	7.07	1	0.0003	0.200
		Total TEQ			2520

2005 WHO TEFs, ND = 0

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-03	**Units:**	pg
Lab Code:	E1000735-003	**Basis:**	NA
Run Type:	Reanalysis		

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/27/10 2304
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-01
		GC Column:	DB-225
Data File Name:	U137264	**Blank File Name:**	U137258
ICAL Date:	12/17/07	**Cal Ver. File Name:**	U137255

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDF	**3520**		6.72	10.0	0.78	1.000	1

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDF	4000	2097.089	52		40-130	0.78	1.061
37Cl-2,3,7,8-TCDD	4000	2624.657	66	Y	70-130	NA	0.989

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-04	**Units:**	pg
Lab Code:	E1000735-004	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/24/10 0132
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223326	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	4.04	10.0			1
1,2,3,7,8-PeCDD	ND	U	2.88	50.0			1
1,2,3,4,7,8-HxCDD	ND	U	2.72	50.0			1
1,2,3,6,7,8-HxCDD	ND	U	2.97	50.0			1
1,2,3,7,8,9-HxCDD	**5.37**	BJ	2.66	50.0	1.35	1.008	1
1,2,3,4,6,7,8-HpCDD	**9.79**	BJ	3.82	50.0	1.03	1.000	1
OCDD	**29.4**	BJ	6.01	100	0.85	1.000	1
2,3,7,8-TCDF	ND	U	4.67	10.0			1
1,2,3,7,8-PeCDF	ND	U	2.98	50.0			1
2,3,4,7,8-PeCDF	ND	U	2.86	50.0			1
1,2,3,4,7,8-HxCDF	**4.32**	J	1.78	50.0	1.16	0.998	1
1,2,3,6,7,8-HxCDF	ND	U	1.72	50.0			1
1,2,3,7,8,9-HxCDF	ND	U	2.08	50.0			1
2,3,4,6,7,8-HxCDF	ND	U	1.91	50.0			1
1,2,3,4,6,7,8-HpCDF	ND	U	2.59	50.0			1
1,2,3,4,7,8,9-HpCDF	ND	U	3.04	50.0			1
OCDF	ND	U	6.02	100			1
Total Tetra-Dioxins	ND	U	4.04	10.0			1
Total Penta-Dioxins	ND	U	2.88	50.0			1
Total Hexa-Dioxins	**5.37**	J	2.72	50.0	1.35		1
Total Hepta-Dioxins	**9.79**	J	3.82	50.0	1.03		1
Total Tetra-Furans	ND	U	4.67	10.0			1
Total Penta-Furans	ND	U	2.86	50.0			1
Total Hexa-Furans	**4.32**	J	1.78	50.0	1.16		1
Total Hepta-Furans	ND	U	2.59	50.0			1

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-04	**Units:**	Percent
Lab Code:	E1000735-004	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/24/10 0132
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223326	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223316

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	2759.697	69		40-130	0.80	1.007
13C-1,2,3,7,8-PeCDD	4000	2997.078	75		40-130	1.58	1.164
13C-1,2,3,6,7,8-HxCDD	4000	2117.692	53		40-130	1.27	0.992
13C-1,2,3,4,6,7,8-HpCDD	4000	2138.163	53		25-130	1.07	1.068
13C-OCDD	8000	2775.752	35		25-130	0.91	1.151
13C-2,3,7,8-TCDF	4000	2559.789	64		40-130	0.78	0.978
13C-1,2,3,7,8-PeCDF	4000	3062.196	77		40-130	1.57	1.127
13C-1,2,3,6,7,8-HxCDF	4000	2350.495	59		40-130	0.53	0.974
13C-1,2,3,4,6,7,8-HpCDF	4000	2205.870	55		25-130	0.44	1.044
37Cl-2,3,7,8-TCDD	4000	4043.949	101		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	4000	4405.029	110		70-130	1.26	0.998
13C-2,3,4,7,8-PeCDF	4000	4183.962	105		70-130	1.55	1.022
13C-1,2,3,4,7,8-HxCDF	4000	4252.582	106		70-130	0.55	0.997
13C-1,2,3,4,7,8,9-HpCDF	4000	5247.423	131	Y	70-130	0.44	1.034
13C-1,2,3,7,8,9-HxCDF	4000	2838.078	71		40-130	0.54	1.006

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	6/29/10 0000
Sample Matrix:	Air	**Date Received:**	7/ 2/10
Sample Name:	K2-M23-04	**Units:**	pg
Lab Code:	E1000735-004	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method: 23
Prep Method: Method

Analyte Name	Result	DL	Dilution Factor	TEF	TEF - Adjusted Concentration
2,3,7,8-TCDD	ND	4.04	1	1	
1,2,3,7,8-PeCDD	ND	2.88	1	1	
1,2,3,4,7,8-HxCDD	ND	2.72	1	0.1	
1,2,3,6,7,8-HxCDD	ND	2.97	1	0.1	
1,2,3,7,8,9-HxCDD	**5.37**	2.66	1	0.1	0.537
1,2,3,4,6,7,8-HpCDD	**9.79**	3.82	1	0.01	0.0979
OCDD	**29.4**	6.01	1	0.0003	0.00882
2,3,7,8-TCDF	ND	4.67	1	0.1	
1,2,3,7,8-PeCDF	ND	2.98	1	0.03	
2,3,4,7,8-PeCDF	ND	2.86	1	0.3	
1,2,3,4,7,8-HxCDF	**4.32**	1.78	1	0.1	0.432
1,2,3,6,7,8-HxCDF	ND	1.72	1	0.1	
1,2,3,7,8,9-HxCDF	ND	2.08	1	0.1	
2,3,4,6,7,8-HxCDF	ND	1.91	1	0.1	
1,2,3,4,6,7,8-HpCDF	ND	2.59	1	0.01	
1,2,3,4,7,8,9-HpCDF	ND	3.04	1	0.01	
OCDF	ND	6.02	1	0.0003	
		Total TEQ			1.08

2005 WHO TEFs, ND = 0

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	pg
Lab Code:	EQ1000341-01	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/15/10 1854
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223160	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223158

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	ND	U	3.65	10.0			1
1,2,3,7,8-PeCDD	ND	U	1.78	50.0			1
1,2,3,4,7,8-HxCDD	ND	U	1.90	50.0			1
1,2,3,6,7,8-HxCDD	ND	U	2.08	50.0			1
1,2,3,7,8,9-HxCDD	4.64	JK	1.86	50.0	0.93	1.009	1
1,2,3,4,6,7,8-HpCDD	4.17	JK	1.87	50.0	0.84	1.000	1
OCDD	14.0	J	2.94	100	0.92	1.000	1
2,3,7,8-TCDF	ND	U	5.11	10.0			1
1,2,3,7,8-PeCDF	ND	U	1.70	50.0			1
2,3,4,7,8-PeCDF	ND	U	1.63	50.0			1
1,2,3,4,7,8-HxCDF	ND	U	1.37	50.0			1
1,2,3,6,7,8-HxCDF	ND	U	1.32	50.0			1
1,2,3,7,8,9-HxCDF	ND	U	1.60	50.0			1
2,3,4,6,7,8-HxCDF	ND	U	1.47	50.0			1
1,2,3,4,6,7,8-HpCDF	ND	U	1.78	50.0			1
1,2,3,4,7,8,9-HpCDF	ND	U	2.09	50.0			1
OCDF	ND	U	4.33	100			1
Total Tetra-Dioxins	ND	U	3.65	10.0			1
Total Penta-Dioxins	ND	U	1.78	50.0			1
Total Hexa-Dioxins	ND	U	1.90	50.0			1
Total Hepta-Dioxins	6.32	J	1.87	50.0	1.12		1
Total Tetra-Furans	ND	U	5.11	10.0			1
Total Penta-Furans	ND	U	1.63	50.0			1
Total Hexa-Furans	ND	U	1.37	50.0			1
Total Hepta-Furans	ND	U	1.78	50.0			1

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	Percent
Lab Code:	EQ1000341-01	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/15/10 1854
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223160	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223158

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	2698.538	67		40-130	0.79	1.011
13C-1,2,3,7,8-PeCDD	4000	2709.135	68		40-130	1.54	1.207
13C-1,2,3,6,7,8-HxCDD	4000	2097.716	52		40-130	1.27	0.992
13C-1,2,3,4,6,7,8-HpCDD	4000	1811.188	45		25-130	1.06	1.070
13C-OCDD	8000	2166.142	27		25-130	0.90	1.145
13C-2,3,7,8-TCDF	4000	2364.197	59		40-130	0.77	0.974
13C-1,2,3,7,8-PeCDF	4000	2745.258	69		40-130	1.58	1.161
13C-1,2,3,6,7,8-HxCDF	4000	2230.669	56		40-130	0.54	0.972
13C-1,2,3,4,6,7,8-HpCDF	4000	1816.856	45		25-130	0.44	1.047
37Cl-2,3,7,8-TCDD	4000	3702.055	93		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	4000	3618.350	90		70-130	1.24	0.998
13C-2,3,4,7,8-PeCDF	4000	4010.886	100		70-130	1.59	1.026
13C-1,2,3,4,7,8-HxCDF	4000	3861.542	97		70-130	0.54	0.997
13C-1,2,3,4,7,8,9-HpCDF	4000	5112.855	128		70-130	0.44	1.032
13C-1,2,3,7,8,9-HxCDF	4000	2971.149	74		40-130	0.54	1.006

Comments:

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: RMC Environmental, Incorporated
Project: LaFarge-Joppa/2010-
Sample Matrix: Air

Service Request: E1000735
Date Analyzed: 7/16/10

Lab Control Sample Summary
Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method: 23
Prep Method: Method

Units: pg
Basis: NA

Extraction Lot: 114918

	Lab Control Sample EQ1000341-02				Duplicate Lab Control Sample EQ1000341-03						
Analyte Name	**Result**	**Expected**	**% Rec**		**Result**	**Expected**	**% Rec**		**% Rec Limits**	**RPD**	**RPD Limit**
2,3,7,8-TCDD	**197**	200	98		**211**	200	105		70 - 130	7	20
1,2,3,7,8-PeCDD	**1090**	1000	109		**1100**	1000	110		70 - 130	1	20
1,2,3,4,7,8-HxCDD	**1040**	1000	104		**890**	1000	89		70 - 130	16	20
1,2,3,6,7,8-HxCDD	**1380**	1000	138	*	**1390**	1000	139	*	70 - 130	1	20
1,2,3,7,8,9-HxCDD	**1210**	1000	121		**1150**	1000	115		70 - 130	5	20
1,2,3,4,6,7,8-HpCDD	**1110**	1000	111		**1150**	1000	115		70 - 130	4	20
OCDD	**2090**	2000	104		**2100**	2000	105		70 - 130	1	20
2,3,7,8-TCDF	**240**	200	120		**234**	200	117		70 - 130	3	20
1,2,3,7,8-PeCDF	**1220**	1000	122		**1190**	1000	119		70 - 130	2	20
2,3,4,7,8-PeCDF	**1050**	1000	105		**1060**	1000	106		70 - 130	1	20
1,2,3,4,7,8-HxCDF	**915**	1000	91		**897**	1000	90		70 - 130	1	20
1,2,3,6,7,8-HxCDF	**1170**	1000	117		**1170**	1000	117		70 - 130	0	20
1,2,3,7,8,9-HxCDF	**1020**	1000	102		**1100**	1000	110		70 - 130	8	20
2,3,4,6,7,8-HxCDF	**964**	1000	96		**998**	1000	100		70 - 130	4	20
1,2,3,4,6,7,8-HpCDF	**1240**	1000	124		**1210**	1000	121		70 - 130	2	20
1,2,3,4,7,8,9-HpCDF	**1560**	1000	156	*	**1670**	1000	167	*	70 - 130	7	20
OCDF	**2550**	2000	127		**2570**	2000	128		70 - 130	1	20

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	pg
Lab Code:	EQ1000341-02	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/16/10 0340
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223171	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223158

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	**197**		2.37	10.0	0.76	1.001	1
1,2,3,7,8-PeCDD	**1090**		1.34	50.0	1.56	1.000	1
1,2,3,4,7,8-HxCDD	**1040**		1.44	50.0	1.26	0.998	1
1,2,3,6,7,8-HxCDD	**1380**		1.57	50.0	1.26	1.000	1
1,2,3,7,8,9-HxCDD	**1210**		1.41	50.0	1.28	1.008	1
1,2,3,4,6,7,8-HpCDD	**1110**		1.09	50.0	1.03	1.000	1
OCDD	**2090**		2.15	100	0.90	1.000	1
2,3,7,8-TCDF	**240**		3.40	10.0	0.80	1.001	1
1,2,3,7,8-PeCDF	**1220**		1.17	50.0	1.54	1.001	1
2,3,4,7,8-PeCDF	**1050**		1.13	50.0	1.55	1.028	1
1,2,3,4,7,8-HxCDF	**915**		0.917	50.0	1.26	0.998	1
1,2,3,6,7,8-HxCDF	**1170**		0.887	50.0	1.28	1.000	1
1,2,3,7,8,9-HxCDF	**1020**		1.08	50.0	1.25	1.036	1
2,3,4,6,7,8-HxCDF	**964**		0.982	50.0	1.27	1.016	1
1,2,3,4,6,7,8-HpCDF	**1240**		1.72	50.0	1.05	1.000	1
1,2,3,4,7,8,9-HpCDF	**1560**		2.01	50.0	1.05	1.032	1
OCDF	**2550**		2.06	100	0.90	1.004	1
Total Tetra-Dioxins	**197**		2.37	10.0	0.76		1
Total Penta-Dioxins	**1090**		1.34	50.0	1.56		1
Total Hexa-Dioxins	**3620**		1.44	50.0	1.26		1
Total Hepta-Dioxins	**1110**		1.09	50.0	1.03		1
Total Tetra-Furans	**240**		3.40	10.0	0.80		1
Total Penta-Furans	**2270**		1.13	50.0	1.54		1
Total Hexa-Furans	**4070**		0.917	50.0	1.26		1
Total Hepta-Furans	**2800**		1.72	50.0	1.05		1

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	Percent
Lab Code:	EQ1000341-02	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/16/10 0340
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223171	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223158

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	3040.966	76		40-130	0.76	1.012
13C-1,2,3,7,8-PeCDD	4000	2960.114	74		40-130	1.58	1.207
13C-1,2,3,6,7,8-HxCDD	4000	2292.129	57		40-130	1.28	0.992
13C-1,2,3,4,6,7,8-HpCDD	4000	2030.211	51		25-130	1.06	1.070
13C-OCDD	8000	2428.711	30		25-130	0.91	1.144
13C-2,3,7,8-TCDF	4000	2318.817	58		40-130	0.77	0.976
13C-1,2,3,7,8-PeCDF	4000	2954.072	74		40-130	1.57	1.161
13C-1,2,3,6,7,8-HxCDF	4000	2815.879	70		40-130	0.54	0.972
13C-1,2,3,4,6,7,8-HpCDF	4000	2026.833	51		25-130	0.45	1.046
37Cl-2,3,7,8-TCDD	4000	3422.505	86		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	4000	3674.273	92		70-130	1.25	0.998
13C-2,3,4,7,8-PeCDF	4000	3889.656	97		70-130	1.54	1.027
13C-1,2,3,4,7,8-HxCDF	4000	3182.692	80		70-130	0.53	0.997
13C-1,2,3,4,7,8,9-HpCDF	4000	5015.764	125		70-130	0.44	1.032
13C-1,2,3,7,8,9-HxCDF	4000	3175.125	79		40-130	0.53	1.006

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	pg
Lab Code:	EQ1000341-03	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/16/10 0428
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223172	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223158

Analyte Name	Result	Q	EDL	MRL	Ion Ratio	RRT	Dilution Factor
2,3,7,8-TCDD	211		2.54	10.0	0.75	1.001	1
1,2,3,7,8-PeCDD	1100		2.20	50.0	1.61	1.001	1
1,2,3,4,7,8-HxCDD	890		1.13	50.0	1.26	0.998	1
1,2,3,6,7,8-HxCDD	1390		1.23	50.0	1.28	1.000	1
1,2,3,7,8,9-HxCDD	1150		1.10	50.0	1.29	1.008	1
1,2,3,4,6,7,8-HpCDD	1150		1.08	50.0	1.06	1.000	1
OCDD	2100		1.66	100	0.91	1.000	1
2,3,7,8-TCDF	234		5.04	10.0	0.82	1.002	1
1,2,3,7,8-PeCDF	1190		1.45	50.0	1.56	1.001	1
2,3,4,7,8-PeCDF	1060		1.39	50.0	1.63	1.027	1
1,2,3,4,7,8-HxCDF	897		1.18	50.0	1.27	0.998	1
1,2,3,6,7,8-HxCDF	1170		1.14	50.0	1.26	1.000	1
1,2,3,7,8,9-HxCDF	1100		1.38	50.0	1.26	1.035	1
2,3,4,6,7,8-HxCDF	998		1.26	50.0	1.31	1.016	1
1,2,3,4,6,7,8-HpCDF	1210		1.55	50.0	1.03	1.000	1
1,2,3,4,7,8,9-HpCDF	1670		1.82	50.0	1.05	1.032	1
OCDF	2570		2.03	100	0.93	1.004	1
Total Tetra-Dioxins	211		2.54	10.0	0.75		1
Total Penta-Dioxins	1100		2.20	50.0	1.61		1
Total Hexa-Dioxins	3430		1.13	50.0	1.26		1
Total Hepta-Dioxins	1150		1.08	50.0	1.06		1
Total Tetra-Furans	234		5.04	10.0	0.82		1
Total Penta-Furans	2250		1.39	50.0	1.56		1
Total Hexa-Furans	4160		1.18	50.0	1.27		1
Total Hepta-Furans	2890		1.55	50.0	1.03		1

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	RMC Environmental, Incorporated	**Service Request:**	E1000735
Project:	LaFarge-Joppa/2010-	**Date Collected:**	NA
Sample Matrix:	Air	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	Percent
Lab Code:	EQ1000341-03	**Basis:**	NA

Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from Stationary Sources

Analytical Method:	23	**Date Analyzed:**	7/16/10 0428
Prep Method:	Method	**Date Extracted:**	7/9/10
Sample Amount:	1.0000	**Instrument Name:**	E-HRMS-02
		GC Column:	DB-5
Data File Name:	U223172	**Blank File Name:**	U223160
ICAL Date:	04/13/07	**Cal Ver. File Name:**	U223158

Labeled Compounds	Spike Conc.(pg)	Conc. Found (pg)	%Rec	Q	Control Limits	Ion Ratio	RRT
13C-2,3,7,8-TCDD	4000	2984.674	75		40-130	0.80	1.012
13C-1,2,3,7,8-PeCDD	4000	2973.037	74		40-130	1.54	1.207
13C-1,2,3,6,7,8-HxCDD	4000	2246.496	56		40-130	1.18	0.992
13C-1,2,3,4,6,7,8-HpCDD	4000	2063.714	52		25-130	1.06	1.069
13C-OCDD	8000	2772.725	35		25-130	0.90	1.144
13C-2,3,7,8-TCDF	4000	2276.357	57		40-130	0.76	0.976
13C-1,2,3,7,8-PeCDF	4000	3000.836	75		40-130	1.65	1.162
13C-1,2,3,6,7,8-HxCDF	4000	2507.216	63		40-130	0.53	0.972
13C-1,2,3,4,6,7,8-HpCDF	4000	2042.060	51		25-130	0.45	1.046
37Cl-2,3,7,8-TCDD	4000	3471.135	87		70-130	NA	1.001
13C-1,2,3,4,7,8-HxCDD	4000	3404.396	85		70-130	1.37	0.998
13C-2,3,4,7,8-PeCDF	4000	3872.502	97		70-130	1.57	1.026
13C-1,2,3,4,7,8-HxCDF	4000	3214.251	80		70-130	0.53	0.997
13C-1,2,3,4,7,8,9-HpCDF	4000	5520.535	138	Y	70-130	0.45	1.032
13C-1,2,3,7,8,9-HxCDF	4000	3166.199	79		40-130	0.54	1.006

Comments:

Columbia Analytical Services™

Chain of Custody

19408 Park Row, Suite 320, Houston, TX 77084
Phone (713)266-1599 Fax (713)266-0130
www.caslab.com

An Employee Owned Company

CHAIN OF CUSTODY/LABORATORY ANALYSIS REPORT FORM

Columbia Analytical Services™ 19408 Park Row, Ste 320 • Houston, TX 77084 • (713) 266-1599 • FAX (713) 266-0130

DATE 7/1/10 PAGE 1 OF 1

PROJECT NAME Lafarge - Joppa
PROJECT # 2010 -
COMPANY/ADDRESS RMC Environtal, Inc
9226 N. 2nd St.
Machey Pk, IL 61115 PHONE 815-378-6150
REPORT TO: R. Chlebowy

ANALYSIS REQUEST

SAMPLE I.D.	DATE	TIME	SAMPLE MATRIX	NUMBER OF CONTAINERS	8290	1613B	1613 TCDD only	1668 WHO	1668 Full List	EPA Method 23										REMARKS
K2-M23-01	6/29/10		Air	4						✓										
K2-M23-02				4						✓										
K2-M23-03				[redacted]						✓										
K2-M23-04				[redacted]						✓										
Field Blank	6/29/10		Air	1						✓										
Acetone Blank	6/29/10		Air	1						✓										
MeCl Blank	6/29/10		Air	1						✓										

RELINQUISHED BY:
Signature
R. Chlebowy
Printed Name
RMC Env, Inc
Firm
Date/Time 7/1/10 1600

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

TURNAROUND REQUIREMENTS (in working days)
RUSH .....5 Days
RUSH .....10 Days
STD .....15 DAYS

DELIVERABLES
___ I. Analytical Report
✓ II. Analytical Report + QC
___ IV. Data Validation Report (includes All Raw Data)

INVOICE INFORMATION:
P.O.#
Bill To P.O. Box 2831
Atlantic Beach, NC 28512

SAMPLE RECEIPT:
Opened by:
Inspected by:
Date:
Time:

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Cindy Donovan
Printed Name
CAS-Houston
Firm
7/2/10 10:50 0°C
Date/Time 10:58(a)

SPECIAL INSTRUCTIONS/COMMENTS:
(815) 378-6150
Iseal-front
Ziplock bags
sturofoam wetice
7931a 9216a 8216a

SAMPLER'S SIGNATURE

DISTRIBUTION: WHITE - return to ...nator; YELLOW - retained by originator

coc11-09

Reset Form

Print Form

Columbia Analytical Services, Inc.
Cooler Receipt Form

Client/Project: RMC Environmental, Inc/ LaFarge-Joppa Plant Service Request: E1000735

Received: 7/2/10; 1050 Opened (Date/Time): 7/2/10 ; 1058 By: CD

1. Samples were received via? ☐ *US Mail* ☑ *Fedex* ☐ *UPS* ☐ *DHL* ☐ *Courier* ☐ *Hand Delivered*
2. Samples were received in: (circle) ☑ *Cooler* ☐ *Box* ☐ *Other* _____ ☐ *NA*
3. Were custody seals present on coolers? ☑ Y ☐ N If yes, how many and where? 1-front
   If present, were custody seals intact? ☑ Y ☐ N If present, were they signed and dated? ☑ Y ☐ N
4. Is shipper's air-bill filed? ☐ NA ☐ Y ☑ N If not, record air bill number: 793692698249
5. Temperature of cooler(s) upon receipt (°C): 0
6. If applicable, list Chain of Custody numbers: _____
7. Were custody papers properly filled out (ink, signed, etc.)? ☐ NA ☑ Y ☐ N
8. Packing material used: ☐ *Inserts* ☐ *Bubble Wrap* ☐ *Blue Ice* ☑ *Wet Ice* ☐ *Sleeves* ☑ *Other* styrofoam, ziplc
9. Were the correct types of bottles used for the tests indicated? ☑ Y ☐ N
   Did all bottles arrive in good condition (i.e. unbroken, out of temp.)? *Indicate in the table below.* ☑ Y ☐ N

Sample ID	Bottle Count	Bottle Type	Out of Temp	Broken	Initials
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

10. Were all bottle labels complete (i.e. analysis, ID, etc.)? ☑ Y ☐ N
    Did all bottle labels and tags agree with custody papers? *Indicate in the table below.* ☑ Y ☐ N

Sample ID on Bottle	Sample ID on COC		Sample ID on Bottle	Sample ID on COC

11. Additional notes, discrepancies, and resolutions:

The client sent a filter blank, Acetone blank and MeCl blank. These were not logged in and will be kept in walk-in 1 until the client receives the results on all samples.

Sample Acceptance Policy

Custody Seals (desirable, mandatory if specified in SAP):

- ✓ On outside of cooler
- ✓ Seals intact, signed and dated

Chain-of-Custody documentation (mandatory):

- ✓ Properly filled out in ink & signed by the client
- ✓ Sign and date the coc for CAS/HOU upon cooler receipt
- ✓ Coc must list method number
- ✓ If no coc was submitted with the samples, complete a CAS/HOU coc for the client

Sample Integrity (mandatory):

- ✓ Sample containers must arrive in good condition (not broken or leaking)
- ✓ Sample IDs on the bottles must match the sample IDs on the coc
- ✓ The correct type of sample bottle must be used for the method requested
- ✓ The correct number of sample containers received must agree with the documentation on the coc
- ✓ The correct sample matrix must appear on the coc
- ✓ An appropriate sample volume or weight must be received

Temperature Preservatives (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6°C
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10°C
- ✓ Air samples can be shipped and stored at ambient temperature, ~23°C
- ✓ The sample temperature must be recorded on the coc
- ✓ Notify a Project Chemist if any samples are outside the acceptance temperature or have compromised sample integrity – the client must decide re: replacement sample submittal or continue with the analysis

Cooler Receipt Form, CRF (mandatory):

- ✓ Cooler receipt forms must be completed for each coc & SR#
- ✓ Sample integrity issues must be documented on the CRF
- ✓ A scan of the carrier and the airbill number must be recorded in CAS LIMS

Sample Integrity Issues/Resolutions (mandatory):

- ✓ Sample integrity issues are documented on the CRF and given to the Project Chemist for resolution with the client
- ✓ Client resolution is documented in writing (typically email or on the CRF) and filed in the project folder(s)

Service Request Summary

Folder #: E1000735
Client Name: RMC Environmental, Incorporated
Project Name: LaFarge-Joppa
Project Number: 2010-

Report To: Rachel Chleborowicz
RMC Environmental, Incorporated
9226 N. 2nd Avenue
Machesney Park, IL 61115

Phone Number: 815-378-6150
Cell Number:
Fax Number:
E-mail: rmceinc@aol.com

Project Chemist: Nicole Brown
Originating Lab: HOUSTON
Logged By: CDONOVAN
Date Received: 7/ 2/10
Internal Due Date: 7/25/10
QAP: LAB QAP
Qualifier Set: CAS Standard
Formset: CAS Standard
Merged?: N
Report to MDL?: Y
P.O. Number:
EDD: No EDD Specified

4 - 1 each-XAD-2 Gl Trap Unpreserved
4 - 1 each-Filter Glass Microfiber None

Location: E-Disposed, In Lab

CAS Samp No	Client Samp No.	Matrix	Collected		SVM 23/ PCDD PCDF
E1000735-001	K2-M23-01	Air	6/29/10	0000	II
E1000735-002	K2-M23-02	Air	6/29/10	0000	II
E1000735-003	K2-M23-03	Air	6/29/10	0000	II
E1000735-004	K2-M23-04	Air	6/29/10	0000	II

Preparation Information Benchsheet

Prep Run#: 114918
Team: Semivoa GCMS/AKODUR

Prep WorkFlow: OrgExtDioxA(60)
Prep Method: Method

Status: Prepped
Prep Date/Time: 7/9/10 10:20 AM

#	Lab Code	Client ID	B#	Method /Test	pH	Matrix	Amt. Ext.	Sample Description
1	E1000735-001	K2-M23-01	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
2	E1000735-002	K2-M23-02	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
3	E1000735-003	K2-M23-03	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
4	E1000735-004	K2-M23-04	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
5	E1000738-001	Incinerador Industrial	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
6	E1000757-001	R-1	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
7	E1000757-002	R-2	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
8	E1000757-003	R-3	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
9	E1000757-004	Blank	.01	23/PCDD PCDF		Air	1.0000	resin, filter, solvent
10	EQ1000341-01	MB		23/PCDD PCDF		Air	1.0000	
11	EQ1000341-02	LCS		23/PCDD PCDF		Air	1.0000	
12	EQ1000341-03	DLCS		23/PCDD PCDF		Air	1.0000	

Spiking Solutions

Name: 23/TO-9A Alternate Working Solution | Inventory ID 11077 | Logbook Ref: D10-54-2D | Expires On: 02/20/2015

E1000735-001	40.00µL	E1000735-002	40.00µL	E1000735-003	40.00µL	E1000735-004	40.00µL	E1000738-001	40.00µL	EQ1000341-01	40.00µL
EQ1000341-02	40.00µL	EQ1000341-03	40.00µL								

Name: 23/TO-9A Internal Working Solution | Inventory ID 13549 | Logbook Ref: D10-91-1D | Expires On: 11/19/2010

E1000735-001	40.00µL	E1000735-002	40.00µL	E1000735-003	40.00µL	E1000735-004	40.00µL	E1000738-001	40.00µL	E1000757-001	40.00µL
E1000757-002	40.00µL	E1000757-003	40.00µL	E1000757-004	40.00µL	EQ1000341-01	40.00µL	EQ1000341-02	40.00µL	EQ1000341-03	40.00µL

Name: 23/TO-9A Surrogate Working Solution | Inventory ID 16754 | Logbook Ref: D11-18-5D | Expires On: 03/31/2011

E1000735-001	40.00µL	E1000735-002	40.00µL	E1000735-003	40.00µL	E1000735-004	40.00µL	E1000738-001	40.00µL	E1000757-001	40.00µL
E1000757-002	40.00µL	E1000757-003	40.00µL	E1000757-004	40.00µL	EQ1000341-01	40.00µL	EQ1000341-02	40.00µL	EQ1000341-03	40.00µL

Name: 1613B Matrix Working Standard | Inventory ID 18620 | Logbook Ref: D11-35-5B | Expires On: 06/10/2011

EQ1000341-02	100.00µL	EQ1000341-03	100.00µL

Preparation Information Benchsheet

Prep Run#: 114918 **Prep WorkFlow:** OrgExtDioxA(60) **Status:** Prepped

Team: Semivoa GCMS/AKODUR **Prep Method:** Method **Prep Date/Time:** 7/9/10 10:20 AM

Preparation Materials

Acetone 99.5% Minimum	C2-39-7 (19146)	Carbon, High Purity	C2-40-1 (19119)	Ethyl Acetate 99.9% Minimum EtOAc	C2-41-3 (19127)
Extraction Thimbles 43 x123 mm	(1577)	Glass Wool	C2-37-2 (19132)	Sulfuric Acid Reagent Grade H2SO4	C2-40-2 (19147)
Dichloromethane (Methylene Chloride) 99.9% MeCl2	C2-41-2 (19145)	Methanol HR-GC Grade MeOH	C2-33-7 (15538)	Sodium Chloride Reagent Grade NaCl	C2-38-1 (19137)
Sodium Hydroxide Reagent Grade NaOH	C2-40-5 (19149)	Sodium Sulfate Anhydrous Reagent Grade Na2SO4	C2-36-004 (16226)	Tridecane (n-Tridecane)	C2-40-3 (19135)
Hexane (n-Hexane) 98.5% Minimum	C2-40-6 (19125)	Nonane (n-Nonane) 99%	C2-33-001 (13944)	Silica Gel Reagent Grade	C2-38-6 (19140)
Toluene 99.9% Minimum	C2-41-1 (19142)	Dioxin Prep Resin	C2-41-4 (19130)		

Preparation Steps

Step:	Extraction	Step:	Acid Clean	Step:	Silica Gel Clean	Step:	Final Volume
Started:	7/9/10 10:20	Started:	7/14/10 09:00	Started:	7/14/10 12:30	Started:	7/15/10 06:30
Finished:	7/10/10 08:00	Finished:	7/14/10 09:30	Finished:	7/14/10 14:15	Finished:	7/15/10 09:22
By:	CDONOVAN	By:	CDONOVAN	By:	CDONOVAN	By:	CDONOVAN

Comments: _____

Reviewed By: _____ Date: _____

Chain of Custody

Relinquished By: _____ Date: _____ Extracts Examined

Received By: _____ Date: _____ Yes No

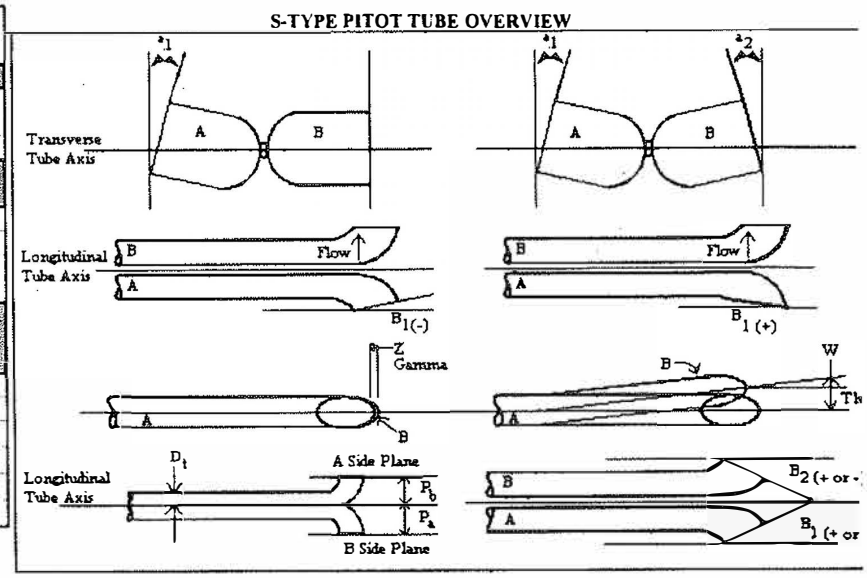
APPENDIX D. REFERENCE MEASUREMENT SYSTEM PERFORMANCE TEST DATA

- ◊ **Pitot Tube Inspections**
- ◊ **Meterbox Calibrations**

S-TYPE PITOT TUBE / M5 SAMPLING PROBE INSPECTION

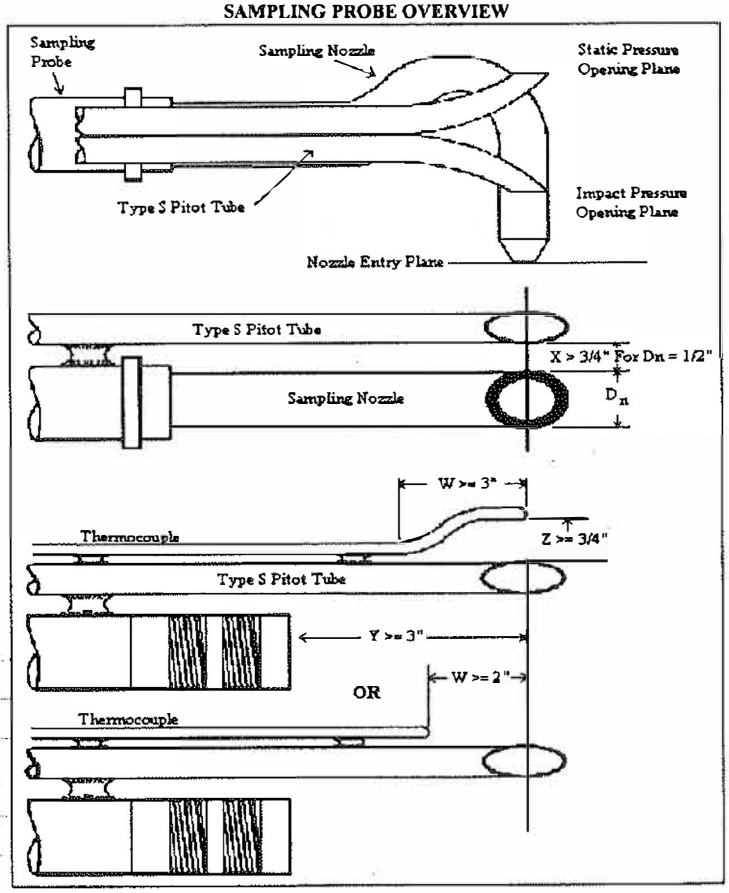
Project Number	**2010-11015**		
Probe Number	**M5-65-2**		
EPA Method 2 S-Type Pitot Criterea			
Level	Y	(Y/N)	PASS
Obstructions	N	(Y/N)	PASS
Damaged	N	(Y/N)	PASS
Type of material	SS		
-10 < alpha1 < +10	1.0	Degrees	PASS
-10 < alpha2 < +10	1.0	Degrees	PASS
-5 < Beta1 < +5	1.0	Degrees	PASS
-5 < Beta2 < +5	1.0	Degrees	PASS
z or Gamma	1.0	Degrees	
w or Theta	0.2	Degrees	
A	1.000	Inches	
{z = A Tan (Gamma)} < 0.125	0.027	Inches	PASS
{w = A Tan (Theta)} < 0.03125	0.004	Inches	PASS
$0.1875 < D_t < 0.375$	0.350	Inches	PASS
$1.05\ D_t < P_a < 1.5\ D_t$	0.500	Inches	PASS
$1.05\ D_t < P_b < 1.5\ D_t$	0.500	Inches	PASS
$\lvert P_a - P_b \rvert < 0.0625$	0.000	Inches	PASS

S-TYPE PITOT TUBE OVERVIEW



EPA Method 2 Sample Probe Criterea			
T/C Functioning	Y	(Y/N)	PASS
Obstructions	N	(Y/N)	PASS
Damaged	N	(Y/N)	PASS
Offset Thermocouple	Y	(Y/N)	
D_n	0.50	Inches	
W	3.00	Inches	PASS
X >= .75"For a D_n = .5"	0.800	Inches	PASS
Y	3.0	Inches	PASS
Z	0.800	Inches	PASS

SAMPLING PROBE OVERVIEW



COMMENTS:

4pts used -
Shorter probe

I certify that this pitot tube meets or exceeds all specifications, criteria and/ or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84.

Signature: G. C.

Date: 9/8/10

RMC Environmental, Inc.

RMC Environmental, Inc.
EPA Method 5
Meter Box Calibration
Critical Orifice Method
English Meter Box Units, English K' Factor

Revised: 12/7/01 Version: 1.1

Meterbox Number: RMC 002
Calibrated by: AMD

Date: 05/24/10
Barometric Pressure: 29.87 (in. Hg)
Theoretical Critical Vacuum: 14.09 (in. Hg)

IMPORTANT: For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT: The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		DRY GAS METER READINGS							CRITICAL ORIFICE READINGS					
		Volume	Volume	Volume	Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual	-- Ambient Temperature --		
dH	Time	Initial	Final	Total	Inlet	Outlet	Inlet	Outlet	Serial#	Coefficient	Vacuum	Initial	Final	Average
(in H2O)	(min)	(cu ft)	(cu ft)	(cu ft)	(deg F)	(deg F)	(deg F)	(deg F)	(number)	(see above)	(in Hg)	(deg F)	(deg F)	(deg F)
0.630	10.00	804.755	809.486	4.731	74.0	74.0	77.0	75.0	48	0.3476	23.0	74.0	76.0	75.0
1.100	10.00	809.486	815.773	6.287	77.0	75.0	77.0	75.0	55	0.4586	21.0	76.0	79.0	77.5
1.900	10.00	815.773	823.870	8.097	77.0	75.0	80.0	77.0	63	0.5944	20.0	79.0	82.0	80.5
3.600	10.00	823.870	834.968	11.098	80.0	77.0	85.0	80.0	73	0.8192	16.0	82.0	85.0	83.5
5.500	10.00	834.968	848.669	13.701	85.0	80.0	90.0	82.0	81	1.0131	13.0	85.0	89.0	87.0

RESULTS

DRY GAS METER		ORIFICE			DRY GAS METER		ORIFICE		
VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME NOMINAL	CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@		
Vm(std)	Vm(std)	Vcr(std)	Vcr(std)	Vcr	Value	Variation	Value	Value	Variation
(cu ft)	(liters)	(cu ft)	(liters)	(cu ft)	(number)	(number)	(in H2O)	(mm H2O)	(in H2O)
4.667	132.2	4.489	127.1	4.558	0.962	0.003	1.734	44.05	-0.042
6.197	175.5	5.909	167.3	6.027	0.953	-0.006	1.746	44.35	-0.030
7.978	225.9	7.637	216.3	7.834	0.957	-0.002	1.802	45.77	0.026
10.915	309.1	10.496	297.2	10.827	0.962	0.002	1.799	45.70	0.023
13.444	380.7	12.939	366.4	13.432	0.962	0.003	1.801	45.73	0.024
					0.959		1.776	45.12	
					Maximum Variation =	0.006	Maximum Variation =		0.042

For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02. **PASS** **Average Y = 0.959**

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2. **PASS** **Average dh@ = 1.776** (in H2O)

SIGNED: [signature] Date: 5/24/2010

Meter Box Thermal Couple Full Test Calibrations

Date: 4/12/10

Operator: TRR

Project Number: 2010-19397

Client: Semi-Annual

Meter Box ID #: RMC002

DGM Inlet			DGM Outlet			Impinger Exit			Probe			Filter		
Cal Reading (deg C)	Actual (deg C)	Deviation (deg C)	Cal Reading (deg C)	Actual (deg C)	Deviation (deg C)	Cal Reading (deg C)	Actual (deg C)	Deviation (deg C)	Cal Reading (deg F)	Actual (deg F)	Deviation (deg F)	Cal Reading (deg F)	Actual (deg F)	Deviation (deg F)
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	32.0	32.2	0.2	32.0	32.5	0.5
5.0	5.2	0.2	5.0	4.2	-0.8	5.0	5.0	0.0	212.0	212.8	0.8	212.0	214.1	2.1
10.0	10.1	0.1	10.0	9.4	-0.6	10.0	9.8	-0.2	500.0	501.4	1.4	500.0	495.5	-4.5
15.0	15.2	0.2	15.0	15.1	0.1	15.0	14.6	-0.4	800.0	810.4	10.4	800.0	795.6	-4.4
20.0	20.1	0.1	20.0	20.2	0.2	20.0	20.1	0.1	1500.0	1495.3	-4.8	1500.0	1498.3	-1.8

PreTest Meterbox Audit

Plant: Lafarge Joppa Plant
Location: Kiln 1

Test Date: 09/08/10
Auditor: AMD
Project #: 2010-11015

Meterbox I.D.:	002	**Level Manometer:**	Yes
Gamma:	0.983	**Zero Manometer:**	Yes
Delta H@	1.776	**Barometric Pressure:**	29.95

	Audit Time (Min)	Dry Gas Meter Reading (Ft^3)	Dry Gas Meter Temperature (°F)
Initial Readings =	0.0	208.230	82
Final Readings =	10.0	216.025	83

Run Time (Minutes) **Theta** =	10
Gas Volume Sampled V_m =	7.7950
Average T_m =	82.5

	Audit Gamma Limits
Lower Gamma Limit **LGL**=	*0.96 * Y =* 0.944
Upper Gamma Limit **UGL**=	*1.04 * Y =* 1.022

Audit Gamma Y_c =	**0.9748**
Meter Box Audit =	**Passed**

Ideal Sampling Rate = 0.75

$$Y_c = (Theta / V_m) * [\{ (29.92 / (460 + 68) * 0.75^2) * (T_m + 460) \} / P_{bar}]^{0.5}$$

Passed = LGL < Y_c < UGL

Failed = LGL > Y_c or Y_c > UGL

Audit Performed By: OLSIE AMD

APPENDIX F. PROCESS DATA

KILN 2
1 MINUTE AVERAGE PRECIP INLET TEMP (F)
TEST DATE: 9/8/10
DATA RANGE FROM 1:00 AM THROUGH 11:59 PM

RUN 1 AVG:	392.69 F	186.1597 C
RUN 2 AVG:	392.36 F	185.9759 C
RUN 3 AVG:	393.10 F	186.3886 C
AVG OF 3 RUNS:	392.71 F	186.1747 C

HR:MIN	TEMP (F)	AVG OF RUNS
8:30	398	
8:31	389.9	
8:32	391	
8:33	398.1	
8:34	398.2	
8:35	394.3	
8:36	392	
8:37	393.3	
8:38	395.8	
8:39	391.9	
8:40	386.4	
8:41	391.1	
8:42	395.3	
8:43	392.7	
8:44	390.7	
8:45	391.8	
8:46	391.8	
8:47	390.9	
8:48	391.1	
8:49	394.7	
8:50	396.8	
8:51	395.8	
8:52	394.5	
8:53	391.3	
8:54	391.8	
8:55	395.7	
8:56	393.3	
8:57	389.9	
8:58	396	
8:59	397.7	
9:00	394.4	
9:01	390.4	
9:02	390.5	
9:03	394.6	
9:04	394.8	
9:05	389	
9:06	390.7	
9:07	396.1	
9:08	397.2	
9:09	390.6	
9:10	386.5	
9:11	392.5	
9:12	396.4	
9:13	393.7	
9:14	389.7	
9:15	392.9	
9:16	391.8	
9:17	390.3	
9:18	391.4	
9:19	393.4	
9:20	395.5	
9:21	393.1	
9:22	390.8	
9:23	392.3	
9:24	391.8	
9:25	387.7	
9:26	386.7	
9:27	392.2	
9:28	395	
9:29	390	
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9:31	393.9	
9:32	394.3	
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9:51	389.2
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10:57	394

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14:48	394
14:49	394.2
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14:51	389.5
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14:53	388
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14:57	397.6

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15:10	397.2		392.3565445
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17:56	393.4	
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17:59	394.7	
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18:02	394.1	
18:03	394	
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18:07	393.3	
18:08	393.8	
18:09	390.6	
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18:11	39[illegible]0	
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18:19	39[illegible].6	
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18:23	39[illegible].3	
18:24	39[illegible].3	
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18:26	39[illegible].1	
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18:28	39[illegible].1	
18:29	[illegible]2	
18:30	39[illegible].1	
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18:35	39[illegible].7	393.0994819
18:36	39[illegible].7	
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18:39	39[illegible].1	
18:40	39[illegible].1	
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18:43	[illegible].2	
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18:45	39[illegible].3	
18:46	39[illegible].5	
18:47	39[illegible].4	
18:48	39[illegible].4	
18:49	39[illegible].3	
18:50	39[illegible].3	
18:51	39[illegible].3	
18:52	39[illegible].7	
18:53	39[illegible].3	
18:54	[illegible].3	
18:55	39[illegible].7	
18:56	39[illegible].3	
18:57	39[illegible].3	

KILN 1
1 MINUTE ESP INLET TEMPERATURE (F)
TEST DATE 9/10/10
DATA RANGE 1:00 AM THROUGH 23:59 PM

RUN 1 AVG:	443.51 F	214.3962 C
RUN 2 AVG:	443.52 F	214.402 C
RUN 3 AVG:	444.16 F	214.7553 C
AVG OF 3 RUNS:	443.73 F	214.5178 C

HR/MIN	TEMP (F)	AVG OR RUN
8:30	442.4	
8:31	442.7	
8:32	442.4	
8:33	442.9	
8:34	443.2	
8:35	443	
8:36	444.1	
8:37	444.3	
8:38	444.1	
8:39	443.6	
8:40	444.2	
8:41	444.1	
8:42	444.1	
8:43	444.4	
8:44	444.3	
8:45	444.2	
8:46	444.3	
8:47	443.9	
8:48	443.9	
8:49	444.1	
8:50	444.2	
8:51	443.6	
8:52	443.7	
8:53	442.4	
8:54	441.7	
8:55	441.9	
8:56	441.7	
8:57	440.9	
8:58	441.7	
8:59	441.5	
9:00	442.1	
9:01	442.4	
9:02	442.9	
9:03	443.2	
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9:05	444.3	
9:06	444.9	
9:07	444.4	
9:08	444.7	
9:09	445	
9:10	445.4	
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9:12	445.2	
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9:18	445.9	
9:19	445.7	
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9:21	445.8	
9:22	446.3	
9:23	446.1	
9:24	447.1	
9:25	446.7	
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9:27	446.4	
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9:59	444.8
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10:53	442.8
10:54	443.2
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10:57	443.5
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10:59	444.2
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11:10	444.1

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12:39	450.9
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12:51	448
12:52	447
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13:05	444.8
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13:07	445.4
13:08	445.1
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13:13	444.8
13:14	445.1
13:15	445.6
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13:17	444.7
13:18	444.8
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13:21	444.9
13:22	445.3
13:23	445.9
13:24	445.4
13:25	445.7
13:26	445.7
13:27	445.8
13:28	446
13:29	446.7
13:30	446.5
13:31	446.8
13:32	446.5
13:33	446.2
13:34	446.2
13:35	445.3
13:36	445
13:37	444.9
13:38	445.1
13:39	445
13:40	444.4
13:41	445.1
13:42	444.7
13:43	444.6
13:44	444.5
13:45	444.9
13:46	444.3
13:47	445.1
13:48	444.7
13:49	444.5
13:50	444.8
13:51	444.9
13:52	444.8
13:53	444.9
13:54	445
13:55	445.4
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13:57	445.6
13:58	445.8
13:59	445.7
14:00	444.9
14:01	445
14:02	444.5

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14:08	444.1		
14:09	443.9		
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14:11	443.5		
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14:17	445		
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14:20	445.7		
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14:35	442.3		
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14:43	437.7		
14:44	437.6		
14:45	437.1		
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14:49	435.7		
14:50	435.4		
14:51	435.3		
14:52	435.9		
14:53	436.1		
14:54	436		
14:55	436.4		
14:56	435.9		
14:57	436		
14:58	436.1		
14:59	436.6		
15:00	436.4		
15:01	436.6		
15:02	436.7		
15:03	436.5		
15:04	436.3		
15:05	436.4		
15:06	436.7		
15:07	437.1		
15:08	437		
15:09	437		
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15:16	436		
15:17	436.2		
15:18	436.1		
15:19	435.4		
15:20	435.3		
15:21	435.3		
15:22	435.1		
15:23	434.7		
15:24	434.8		
15:25	435.5		
15:26	435.5		
15:27	435.4	RUN 2	
15:28	435.7		443.5236453

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15:30	436.4
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15:32	436.8
15:33	437.1
15:34	437.2
15:35	437.3
15:36	437.3
15:37	437.1
15:38	437.4
15:39	437.5
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15:41	437.5
15:42	436.8
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15:44	437.2
15:45	437.1
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15:47	437.6
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15:51	437.9
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15:53	437.7
15:54	437.3
15:55	437.3
15:56	437.1
15:57	436.6
15:58	436.6
15:59	437.1
16:00	436.9
16:01	437.7
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16:11	438.7
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16:13	439.7
16:14	440.4
16:15	441
16:16	441.6
16:17	442.2
16:18	443.1
16:19	444.8
16:20	445.4
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16:22	447
16:23	447.3
16:24	448.2
16:25	448.1
16:26	448.2
16:27	448
16:28	447.9
16:29	447.8
16:30	447.6
16:31	447.1
16:32	447.4
16:33	447.5
16:34	447.4
16:35	446.8
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16:38	445.1
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16:52	436
16:53	436.3
16:54	436.3

16:55	436.5
16:56	436.6
16:57	436.6
16:58	436.7
16:59	436.6
17:00	436.9
17:01	437.3
17:02	437.2
17:03	437.3
17:04	436.5
17:05	436.8
17:06	437.3
17:07	436.5
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17:10	437.6
17:11	437.6
17:12	437.4
17:13	436.7
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17:24	437.6
17:25	437.7
17:26	439.1
17:27	440.1
17:28	441.4
17:29	441.6
17:30	442.5
17:31	443.3
17:32	444
17:33	444.3
17:34	445.2
17:35	445.8
17:36	446.2
17:37	446.7
17:38	447.5
17:39	447.3
17:40	448.3
17:41	448.2
17:42	448.8
17:43	448.8
17:44	449.1
17:45	449
17:46	449.7
17:47	449.5
17:48	449.6
17:49	450.1
17:50	450.2
17:51	450.4
17:52	450.3
17:53	450.6
17:54	450.4
17:55	450.9
17:56	451.2
17:57	450.6
17:58	450.9
17:59	451
18:00	451.2
18:01	451.3
18:02	451.2
18:03	451.1
18:04	450.8
18:05	450.5
18:06	450.3
18:07	450.4
18:08	450.2
18:09	450.6
18:10	450.2
18:11	449.5
18:12	449
18:13	448.2
18:14	447.8
18:15	447.9
18:16	446.8
18:17	446.2
18:18	446.3
18:19	446.3
18:20	446

18:21	446.1		
18:22	446.1		
18:23	446.3		
18:24	446.2		
18:25	446.8		
18:26	447.3		
18:27	447.2		
18:28	447.9		
18:29	448.7		
18:30	448.4		
18:31	448.9		
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18:33	450.3		
18:34	450.2		
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18:36	450.5		
18:37	450.7		
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18:41	452.5		
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18:47	453.7		
18:48	454		
18:49	454.2		
18:50	453.8		
18:51	453.4		
18:52	454.2		
18:53	453.6	RUN 3	
18:54	453.9		444.1594737
18:55	453.7		
18:56	453.6		
18:57	453.3		
18:58	453.1		
18:59	452.4		
19:00	452		
19:01	451.9		
19:02	451.3		
19:03	450.8		
19:04	450.3		
19:05	450.2		
19:06	449.4		
19:07	448		
19:08	447.8		
19:09	446.8		
19:10	446.3		

KILN 2
1 MINUTE BAG HOUSE INLET TEMP DATA (F)
TEST DATE 6/29/10
DATA RANGE 1:00 AM THROUGH 23:59 PM

RUN 1 AVG:	418.19 F
RUN 2 AVG:	418.70 F
RUN 3 AVG:	419.30 F
AVG OF 3 RUNS:	418.73 F

HR/MIN	TEMP (F)	AVG OF RUN
10:00	419.9	
10:01	417	
10:02	420.4	
10:03	425.7	
10:04	420.5	
10:05	421.8	
10:06	418.9	
10:07	420	
10:08	419.1	
10:09	416.5	
10:10	413.4	
10:11	417.6	
10:12	423.8	
10:13	421.2	
10:14	413.7	
10:15	413.1	
10:16	417.8	
10:17	418.3	
10:18	418	
10:19	418	
10:20	417.9	
10:21	420.6	
10:22	419.8	
10:23	416.2	
10:24	418	
10:25	422	
10:26	416.7	
10:27	416.8	
10:28	419.7	
10:29	418.8	
10:30	416.1	
10:31	410.8	
10:32	414.8	
10:33	422.8	
10:34	424.7	
10:35	417.1	
10:36	413.6	
10:37	412.4	
10:38	413.7	
10:39	416.2	
10:40	416.7	
10:41	417.6	
10:42	419.7	
10:43	413.5	
10:44	415.2	
10:45	421	
10:46	421.6	
10:47	420.6	
10:48	415.2	
10:49	416.4	
10:50	417.9	
10:51	421	
10:52	421.6	
10:53	421.4	
10:54	418.6	
10:55	419.5	
10:56	416	
10:57	413.7	
10:58	415.9	
10:59	422.7	
11:00	420.4	
11:01	418.6	
11:02	423.1	

11:03	421.3
11:04	420
11:05	421.1
11:06	422.3
11:07	419.9
11:08	415
11:09	416.4
11:10	421.6
11:11	421
11:12	419.5
11:13	419.6
11:14	417.9
11:15	420
11:16	419
11:17	413.7
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11:21	419.4
11:22	413
11:23	414.3
11:24	418.3
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11:26	419.1
11:27	421.2
11:28	416.9
11:29	416.8
11:30	423.6
11:31	424.6
11:32	420.5
11:33	421.6
11:34	420.6
11:35	421.9
11:36	423.8
11:37	421.1
11:38	422.2
11:39	421.8
11:40	422.4
11:41	420.6
11:42	415.2
11:43	411.4
11:44	416.2
11:45	420.1
11:46	418.8
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11:48	421.7
11:49	422.9
11:50	417.6
11:51	414.1
11:52	419
11:53	422.7
11:54	421.7
11:55	414.8
11:56	419
11:57	423
11:58	425
11:59	420.6
12:00	415.9
12:01	416.3
12:02	420.6
12:03	420.6
12:04	413.9
12:05	417.2
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12:15	420.4
12:16	411.8

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12:33	[illegible]	
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12:36	[illegible]	
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12:40	[illegible]	
12:41	[illegible]	
12:42	[illegible]	
12:43	[illegible]	
12:44	[illegible]	
12:45	[illegible]	
12:46	[illegible]	
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12:49	[illegible]	
12:50	[illegible]	
12:51	[illegible]	
12:52	[illegible]	
12:53	[illegible]	
12:54	[illegible]	
12:55	[illegible]	
12:56	[illegible]	
12:57	[illegible]	
12:58	[illegible]	
12:59	[illegible]	
13:00	[illegible]	
13:01	[illegible]	
13:02	[illegible]	
13:03	[illegible]	
13:04	[illegible]	
13:05	[illegible]	
13:06	[illegible]	
13:07	[illegible]	
13:08	[illegible]	
13:09	[illegible]	
13:10	[illegible]	
13:11	[illegible]	
13:12	[illegible]	
13:13	[illegible]	
13:14	[illegible]	
13:15	[illegible]	
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13:25	[illegible]	
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13:31	[illegible]	
13:32	[illegible]	
13:33	[illegible]	

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13:41	417
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13:53	414.2
13:54	414.4
13:55	420.3
13:56	421.4
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13:59	421.3
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14:0[illegible]	423.8
14:0[illegible]	416.2
14:0[illegible]	419.9
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14:0[illegible]	417.4
14:1[illegible]	413.7
14:1[illegible]	417.6
14:1[illegible]	417.8
14:1[illegible]	419.7
14:1[illegible]	419.3
14:1[illegible]	413.7
14:1[illegible]	411.1
14:1[illegible]	412.6
14:1[illegible]	418.7
14:1[illegible]	418
14:2[illegible]	418.8
14:2[illegible]	418.7
14:2[illegible]	419.4
14:2[illegible]	413.1
14:2[illegible]	422
14:2[illegible]	419
14:2[illegible]	408.7
14:2[illegible]	411.5
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14:2[illegible]	421.1
14:3[illegible]	418.5
14:3[illegible]	412.1
14:3[illegible]	415.3
14:3[illegible]	424.7
14:3[illegible]	421.6
14:3[illegible]	417.2
14:3[illegible]	417.8
14:3[illegible]	417.1
14:3[illegible]	415.1
14:3[illegible]	412.7
14:4[illegible]	417.4
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14:4[illegible]	420.7
14:4[illegible]	413.9
14:4[illegible]	416.7

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14:46	425.6
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14:49	426.7
14:50	425.8
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15:00	422.8
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15:15	42[illegible].3
15:16	41[illegible].2
15:17	4[illegible].1
15:18	4[illegible].4
15:19	4[illegible].6
15:20	4[illegible].8
15:21	42[illegible].3
15:22	4[illegible].6
15:23	4[illegible].6
15:24	[illegible].1
15:25	[illegible].3
15:26	4[illegible].9
15:27	4[illegible].3
15:28	4[illegible].3
15:29	42[illegible].1
15:30	4[illegible].7
15:31	4[illegible].7
15:32	[illegible].9
15:33	4[illegible].4
15:34	4[illegible].3
15:35	4[illegible].5
15:36	41[illegible].1
15:37	41[illegible].7
15:38	414.7
15:39	41[illegible]
15:40	426.[illegible]
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15:46	421.9
15:47	418.[illegible]
15:48	422.[illegible]
15:49	427.[illegible]
15:50	426.[illegible]
15:51	420
15:52	420.5
15:53	422.2
15:54	423.1
15:55	423.7
15:56	415.9
15:57	414.3
15:58	419.7

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16:01	410.4	
16:02	414.5	
16:03	422.8	
16:04	421.2	
16:05	418.8	
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16:07	417.9	
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16:09	417.4	
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16:17	421.9	
16:18	424.1	
16:19	423.7	
16:20	423.6	
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16:22	424.8	
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16:24	415.5	
16:25	419.9	
16:26	422.2	
16:27	422.9	
16:28	418.5	
16:29	414.9	
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16:33	416.3	
16:34	416.8	
16:35	423.3	
16:36	424.6	
16:37	424.6	
16:38	425.1	
16:39	428.2	
16:40	425.9	
16:41	418.2	
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16:45	426.7	
16:46	421.6	
16:47	420.4	
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16:54	421.7	
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17:01	424.1	
17:02	426.2	
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17:05	420.5	
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17:08	421	
17:09	423.4	
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17:13	421.9
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17:18	418.2
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17:22	418.2
17:2	415.1
17:2	419.7
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17:2	422
17:2	420.9
17:2	423.1
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