

Section 114 Information Collection Request Emissions Test Report

CalPortland Company, Inc.
Oro Grande Cement Plant
EPA Registry ID: 110065032850
19409 National Trails Hwy
Oro Grande, CA 92368
Report No. M234508A





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19409 National Trails Hwy
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**Report Submittal Date:
February 14, 2024**

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1.0 INTRODUCTION

Mostardi Platt conducted an air emissions test program for CalPortland Company, Inc. at the Oro Grande Cement Plant located in Oro Grande, California. All testing was performed as described in the *Code of Federal Regulations*, Title 40, Part 60, Appendix A (40CFR60), Methods 1, 2, 3A, 4, 26A, and 40CFR63, Appendix A, (40CFR63) Method 320.

This test program was completed to satisfy the requirements of the United States Environmental Protection Agency (USEPA) Section 114 Information Collection Request for Portland Cement Manufacturing facilities.

The identification of individuals associated with the test program is summarized below:

Location	Address	Contact
Test Coordinator	CalPortland Company, Inc. Oro Grande Cement Plant 19409 National Trails Hwy Oro Grande, CA 92368	Catalina Elias Environmental Manager (760) 269-1135 celias@calportland.com
Test Company Representative	Mostardi Platt 7715 Commercial Way, Suite 155 Henderson, NV 89011	Mr. Richard J. Sollars II Regional Manager (630) 993-2100 rsollars@mp-mail.com

2.0 TEST REQUIREMENTS

Testing was performed at the kiln stack. The following table presents a list of the parameters tested, the applicable methodologies utilized, and average test results:

Source	Parameter Tested	Test Results	Method/Regulation Citation
Kiln Stack Mill On	Hydrogen Fluoride (HF)	≤ 0.10 ppmvw	USEPA Method 320, 40CFR63, Appendix A
		≤ 0.13 ppmvd @7% O ₂	
		≤ 0.10 lb/hr	
		≤ 0.0004 lb/ton clinker	
	HF ¹	≤ 0.13 ppmvd	Method 26A, 40CFR60, Appendix A
		≤ 0.15 ppmvd @7% O ₂	
		≤ 0.12 lb/hr	
		≤ 0.0005 lb/ton clinker	
	Chlorine (Cl ₂) ¹	≤ 0.04 ppmvd	USEPA Method 26A, 40CFR60, Appendix A
		≤ 0.05 ppmvd @7% O ₂	
		≤ 0.13 lb/hr	
		≤ 0.0005 lb/ton clinker	
	Hydrogen Cyanide (HCN)	0.86 ppmvw	USEPA Method 320, 40CFR63, Appendix A
		1.08 ppmvd @7% O ₂	
		1.17 lb/hr	
		0.0045 lb/ton clinker	
	Oxygen (O ₂)	8.9 % (dry)	USEPA Method 3A, 40CFR60, Appendix A
	Carbon Dioxide (CO ₂)	20.8 % (dry)	USEPA Method 320, 40CFR63, Appendix A
	Moisture (H ₂ O)	8.6 %	USEPA Method 320, 40CFR63, Appendix A
	Cyclonic Flow Determination	PASS	USEPA Method 1, 40CFR60, Appendix A, Section 11.4
	Three-point O ₂ Stratification Determination	< 5 %	USEPA Method 3A, 40CFR60, Appendix A and Method 7E, Section 8.1.2

¹ HF and Cl₂ Method 26A results are reported as the average from Train A and Train B.

Source	Parameter Tested	Test Results	Method/Regulation Citation
Kiln Stack Mill Off	Hydrogen Fluoride (HF)	≤ 0.10 ppmvw	USEPA Method 320, 40CFR63, Appendix A
		≤ 0.15 ppmvd @7% O ₂	
		≤ 0.12 lb/hr	
		≤ 0.0004 lb/ton clinker	
	HF ²	≤ 0.11 ppmvd	Method 26A, 40CFR60, Appendix A
		≤ 0.16 ppmvd @7% O ₂	
		≤ 0.12 lb/hr	
		≤ 0.0005 lb/ton clinker	
	Chlorine (Cl ₂) ¹	≤ 0.03 ppmvd	USEPA Method 26A, 40CFR60, Appendix A
		≤ 0.04 ppmvd @7% O ₂	
		≤ 0.13 lb/hr	
		≤ 0.0005 lb/ton clinker	
	Hydrogen Cyanide (HCN)	1.14 ppmvw	USEPA Method 320, 40CFR63, Appendix A
		1.68 ppmvd @7% O ₂	
		1.81 lb/hr	
		0.0069 lb/ton clinker	
	Oxygen (O ₂)	10.7 % (dry)	USEPA Method 3A, 40CFR60, Appendix A
	Carbon Dioxide (CO ₂)	17.7 % (dry)	USEPA Method 320, 40CFR63, Appendix A
	Moisture (H ₂ O)	7.7 %	USEPA Method 320, 40CFR63, Appendix A
	Cyclonic Flow Determination	PASS	USEPA Method 1, 40CFR60, Appendix A, Section 11.4
	Three-point O ₂ Stratification Determination	< 5 %	USEPA Method 3A, 40CFR60, Appendix A and Method 7E, Section 8.1.2

² HF and Cl₂ Method 26A results are reported as the average from Train A and Train B.

3.0 QA SPECIFICATIONS AND PROCESS DIAGRAM

3-1 QA/QC Specifications

Parameter	Method	QA/QC Specification	Acceptance Criteria	Actual Result
HCN	320	Method Detection Limit	0.5 ppm	0.2 ppmvw
		SNR	>2500 at 64 scans	7271 (Run 1 Average)
		S Beam	>0.9	1.461 (Run 1 Average)
		Direct HCN Analysis	±5% of tag value	4.9%
		Dynamic Spike Analysis	≤10% of total sample volume	6.9%
			Spike gas ~twice native concentration or 3-4 ppm addition to native concentration	+3.3 ppm
			≤±20% of expected value or ≤±0.5 ppm, whichever is less restrictive	<20%
		Residuals	≤±0.3 ppm, or ≤±5% of measured value, whichever is less restrictive	0.2 ppmvw
Cl ₂	26A	Detection Limit	300 µg	150 µg
		Paired Train Agreement	≤10% Relative Deviation or ≤0.2 ppm, whichever is less restrictive.	≤10% Relative Deviation

3-2 Process Description and Process Flow Diagram

The pyro-processing line produces Portland cement clinker using coal for the fuel source (injected into both the kiln and the tower). Natural gas is used for startup heat. The clinker discharging from the kiln is cooled using a cooler that provides hot combustion air to the kiln and precalciner. Air not used by the kiln or precalciner is cooled in an air-to-air heat exchanger and cleaned with a cloth filter baghouse. The clinker is processed into cement by the two-compartment 4,500mm X 10,500mm ball mill.

Portland cement is a finely ground, manufactured mineral product that, when combined with water, sand, gravel, and other materials, forms concrete. Its manufacturing consists of mining limestone and small amounts of clay and silica, followed by crushing and then firing within a pyro-processing system. The rate of firing is determined by tower design, air velocity, slope and rotational velocity of the kiln. As the material enters at the top of the tower, the particles are separated by air suspension to expose all surfaces to the heated air stream. As the progression of the material moves downward from vessel to vessel, the material temperature increases to the point that the material is calcined using fuel introduced in the tower. The tower is designed to achieve an approximate 94% calcination rate prior to the material entering the kiln. The remainder of the material calcination and clinkering is achieved in the kiln itself. The peak temperature of the process is approximately 2600 degrees Fahrenheit which chemically converts the calcined raw feed into small, grayish-black pellets called clinker. When the clinker is mixed with small amounts of gypsum (which regulates setting time) and ground into a very fine powder (inside the ball mill), the product is known as cement.

4.0 TEST PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed as described in the Title 40, *Code of Federal Regulations*, Part 60, Appendix A (40CFR60), Methods 1, 2, 3A, 4, 26A, and 40CFR63, Appendix A, Method 320; and the latest revisions thereof. Where applicable, the *Quality Assurance Handbook for Air Pollution Measurement Systems*, Volume III, Stationary Source Specific Methods, United States Environmental Protection Agency (USEPA) 600/R-94/038c, September 1994 was used to supplement procedures in addition to the appended "Draft General Test Plan".

4.1 Method 1 Sample and Velocity Traverse Determination

Sample points for testing are determined using USEPA Test Method 1, 40CFR60, Appendix A. The characteristics of the measurement location is summarized below.

Sample Point Selection

Test Location	Stack Diameter	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
Main Kiln	13.5 Feet	10.52	16.96	HF/Cl ₂ (26A)	12
				O ₂ (3A)	3 (stratification)
				HCN/HF/CO ₂ (320/3A)	1

A cyclonic flow check was performed in accordance with Section 11.4, which demonstrated it meets the criteria of an average value of less than 20° and therefore is considered to be a suitable testing location for flow rate measurements.

4.2 Method 2 Volumetric Flow Rate Determination

The gas velocity and volumetric flowrate were determined using Method 2, 40CFR60, Appendix A, as an integrated part of the HF/Cl₂ sampling system.

Velocity pressures were determined by traversing the duct with wind tunnel calibrated S-type pitot tube. Temperatures were measured using K-type thermocouples with calibrated digital temperature indicators. The molecular weight and moisture content of the gases were also determined to permit the calculation of the volumetric flowrate.

4.3 Method 3A Oxygen (O₂) and Carbon Dioxide (CO₂) Determination

O₂ and CO₂ concentrations were determined in accordance with Method 3A, 40CFR60, Appendix A and Method 320, 40CFR63, Appendix A, respectively. A Servomex analyzer was used to determine O₂ concentrations while the MKS 2030 analyzer was used to determine CO₂ concentrations. The O₂ instrument has a paramagnetic detector and operates in a nominal range of 0-25%.

A list of calibration gases used and the results of all calibration and other required quality assurance checks are found in the appendix of this report. Copies of calibration gas certifications are also appended.

4.4 Method 26A Hydrogen Fluoride (HF) and Chlorine (Cl₂) Determination

HF and Cl₂ concentrations and emission rates were determined in accordance with Method 26A, 40CFR60, Appendix A. Paired sampling trains were used to collect the samples. A total of twelve (12) test points were sampled per run on the kiln stack. The sample was extracted isokinetically from the gas stream and passed through dilute sulfuric acid (0.1N H₂SO₄). HF was collected in the dilute acid. Cl₂ was collected in the dilute sodium hydroxide (0.1N NaOH) solution. The sample train consisted of a Teflon coated nozzle, a heated borosilicate glass probe liner, a Teflon® filter placed on the outlet of the glass probe liner, and six impingers. The first two impingers contained the 0.1N H₂SO₄, the third remained empty (and was recovered with the first two impingers), the fourth and fifth impingers contained the 0.1N NaOH, while the sixth impinger contained silica gel to absorb any remaining moisture. A de-ionized water rinse was performed on each set of impingers, and samples were stored in Nalgene sample containers for transport. The 0.1N H₂SO₄ impinger catch samples were analyzed for HF while the 0.1N NaOH impinger catch samples were analyzed for Cl₂. A method detection limit (MDL) of 150 µg was determined for both HF and Cl₂ using the "Definition and Procedure for the Determination of the Method Detection Limit, Revision 2". All equipment used was calibrated in accordance with the specifications of the method. Calibration data is appended.

Hand recorded field data sheets were reviewed and scans are retained on the Mostardi Platt network. Copies of this data is available upon request.

4.5 Method 320 Speciated Flue Gas Concentration Determinations

The sampling procedures for HCN and HF were performed in accordance with USEPA Method 320, 40CFR63, Appendix A. Data was continuously recorded with a data logging system throughout sampling, with brief interruption to properly label reference spectra.

The average gas effluent concentrations were determined from the average gas concentration displayed by the MKS 2030 analyzer. The Method 320 sampling system vaporizes water droplets similar to Method 26A. The difference is that Method 320 is an extractive method that calculates concentration based on compounds continuously flowing through the FTIR gas cell where the Method 26A captures water vapor in an impinger train. Calculating Method 320 concentrations on a dry basis uses the water vapor contained in the FTIR gas cell. In order to calculate lb/hr, the dry FTIR concentration is used in combination with the dry stack gas volumetric flow rate.

All sampling system components were heated to 375°F +/- 25°F, including: stainless steel sample probe, stainless steel calibration tee, in line glass fiber particulate filter, Teflon® sample line, heated head sample pump, and FTIR detector cell. The sample pump distributes the gas sample to the instrument at a steady sample flow rate (+/- 10%). All components of the sampling system are constructed of stainless steel, glass, or Teflon®.

FTIR technology works on the principle that most gases absorb infrared light. This is true for all compounds except for homonuclear diatomic molecules and noble gases such as: N₂, O₂, H₂, He, Ne, and Ar. Vibrations, stretches, bends, and rotations within the bonds of a molecule determine the infrared absorption distinctiveness. The absorption creates a "fingerprint" which is

unique for each given compound. The quantity of infrared light absorbed is proportional to the gas concentration. Most compounds have absorbencies at different infrared frequencies, thus allowing the simultaneous analysis of multiple compounds at one time. The FTIR software compares each sample spectrum to a user-selected list of calibration references and concentration data is generated.

FTIR data was collected using an MKS MultiGas 2030 FTIR spectrometer. Data was generated at 0.5 cm^{-1} . Each Spectra was derived from the coaddition of 62-64 scans with a new data point generated approximately every minute. HCN analyte spiking assured the ability of the FTIR to quantify HCN in the presence of effluent gas. All analyte spikes were introduced using an instrument grade stainless steel rotameter. All QA/QC procedures were within the acceptance criteria allowance of the applicable methodology and the "General Test Plan."

5.0 TEST RESULTS SUMMARIES

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Test Method: 26A

Source Condition	Mill On	Mill On	Mill On	
Date	11/7/23	11/7/23	11/7/23	
Start Time	14:15	15:40	17:10	
End Time	15:24	16:49	18:19	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Velocity, ft/sec	60.827	61.078	61.357	61.087
Gas Volumetric Flow Rate, acfm	522,399	524,560	526,955	524,638
Gas Volumetric Flow Rate, dscfm	296,358	293,593	296,177	295,376
Gas Volumetric Flow Rate, scfm	322,055	321,892	322,597	322,181
Average %CO ₂ by volume, dry basis	20.6	20.8	21.0	20.8
Average %O ₂ by volume, dry basis	9.0	8.8	8.7	8.8
Clinker Production, ton/hr	248.6	261.8	262.2	257.6
Chloride (Cl₂) Emissions				
ppm ≤	0.04	≤ 0.04	≤ 0.04	≤ 0.04
ppm@7%O ₂ ≤	0.05	≤ 0.05	≤ 0.05	≤ 0.05
lb/hr ≤	0.13	≤ 0.13	≤ 0.13	≤ 0.13
lb/ton of clinker ≤	0.0005	≤ 0.0005	≤ 0.0005	≤ 0.0005
Hydrogen Fluoride (HF) Emissions				
ppm ≤	0.13	≤ 0.13	≤ 0.13	≤ 0.13
ppm@7%O ₂ ≤	0.15	≤ 0.15	≤ 0.15	≤ 0.15
lb/hr ≤	0.12	≤ 0.12	≤ 0.12	≤ 0.12
lb/ton of clinker ≤	0.0005	≤ 0.0005	≤ 0.0005	≤ 0.0005

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Test Method: 26A

Source Condition	Mill On	Mill On	Mill On	
Date	11/7/23	11/7/23	11/7/23	
Start Time	14:15	15:40	17:10	
End Time	15:24	16:49	18:19	
	Run 1A	Run 2A	Run 3A	Average
Stack Conditions				
Average Gas Temperature, °F	307.9	312.7	314.9	311.8
Flue Gas Moisture, percent by volume	7.8%	7.5%	7.1%	7.5%
Average Flue Pressure, in. Hg	26.88	26.88	26.88	26.88
Gas Sample Volume, dscf	51.957	52.240	54.911	53.036
Average Gas Velocity, ft/sec	60.258	60.833	61.053	60.715
Gas Volumetric Flow Rate, acfm	517,512	522,454	524,345	521,437
Gas Volumetric Flow Rate, dscfm	294,634	296,558	298,193	296,462
Gas Volumetric Flow Rate, scfm	319,687	320,756	320,982	320,475
Average %CO ₂ by volume, dry basis	20.6	20.8	21.0	20.8
Average %O ₂ by volume, dry basis	9.0	8.8	8.7	8.8
Isokinetic Variance	102.8	102.7	107.4	104.3
Clinker Production, ton/hr	248.6	261.8	262.2	257.6
Chloride (Cl₂) Emissions				
ug of sample collected ≤	150.00	≤ 150.00	≤ 150.00	≤ 150.00
ppm ≤	0.04	≤ 0.03	≤ 0.03	≤ 0.03
Hydrogen Fluoride (HF) Emissions				
ug of sample collected ≤	150.00	≤ 150.00	≤ 150.00	≤ 150.00
ppm ≤	0.12	≤ 0.12	≤ 0.12	≤ 0.12

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Test Method: 26A

	Source Condition	Mill On	Mill On	Mill On	
	Date	11/7/23	11/7/23	11/7/23	
	Start Time	14:15	15:40	17:10	
	End Time	15:24	16:49	18:19	
	Run 1B	Run 2B	Run 3B	Average	
Stack Conditions					
Average Gas Temperature, °F	311.0	313.4	314.8	313.1	
Flue Gas Moisture, percent by volume	8.1%	10.0%	9.3%	9.1%	
Average Flue Pressure, in. Hg	26.88	26.88	26.88	26.88	
Gas Sample Volume, dscf	44.134	43.853	44.076	44.021	
Average Gas Velocity, ft/sec	61.395	61.323	61.661	61.460	
Gas Volumetric Flow Rate, acfm	527,285	526,665	529,564	527,838	
Gas Volumetric Flow Rate, dscfm	298,082	290,627	294,161	294,290	
Gas Volumetric Flow Rate, scfm	324,422	323,028	324,212	323,887	
Average %CO ₂ by volume, dry basis	20.6	20.8	21.0	20.8	
Average %O ₂ by volume, dry basis	9.0	8.8	8.7	8.8	
Isokinetic Variance	102.9	104.8	104.1	103.9	
Clinker Production, ton/hr	248.6	261.8	262.2	257.5	
Chloride (Cl₂) Emissions					
ug of sample collected	≤ 150.00	≤ 150.00	≤ 150.00	≤ 150.00	
ppm	≤ 0.04	≤ 0.04	≤ 0.04	≤ 0.04	
Hydrogen Fluoride (HF) Emissions					
ug of sample collected	≤ 150.00	≤ 150.00	≤ 150.00	≤ 150.00	
ppm	≤ 0.14	≤ 0.15	≤ 0.14	≤ 0.14	

CalPortland Company, Inc.
Oro Grande Cement Plant
Main Kiln Stack
Reference Method Test Data
Mill On

Test No.	Date	Start Time	End Time	O2 % (dry)	Moisture %	HCN ppmvw	HCN ppmvd @ 7% O2	HF ppmvw	HF ppmvd @ 7% O2
1	11/7/2023	14:15	15:14	9.0	8.5%	0.81	1.03	≤ 0.10	≤ 0.13
2	11/7/2023	15:40	16:39	8.8	8.8%	0.85	1.07	≤ 0.10	≤ 0.13
3	11/7/2023	17:10	18:09	8.7	8.7%	0.92	1.15	≤ 0.10	≤ 0.13
Average				8.9	8.6%	0.86	1.08	≤ 0.10	≤ 0.13

Test No.	Date	Start Time	End Time	Volumetric Flow, DSCFM	Clinker Production, ton/hr	HCN lb/hr	HCN lb/ton	HF lb/hr	HF lb/ton
1	11/7/2023	14:15	15:14	296,358	248.6	1.10	0.0044	≤ 0.10	≤ 0.0004
2	11/7/2023	15:40	16:39	293,593	261.8	1.15	0.0044	≤ 0.10	≤ 0.0004
3	11/7/2023	17:10	18:09	296,177	262.2	1.25	0.0048	≤ 0.10	≤ 0.0004
Average				295,376	257.6	1.17	0.0045	≤ 0.10	≤ 0.0004

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Test Method: 26A

Source Condition	Mill Off	Mill Off	Mill Off	
Date	11/7/23	11/7/23	11/7/23	
Start Time	7:00	8:40	10:15	
End Time	8:15	9:55	11:30	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Velocity, ft/sec	73.534	70.534	72.422	72.163
Gas Volumetric Flow Rate, acfm	631,533	605,766	621,981	619,760
Gas Volumetric Flow Rate, dscfm	356,001	341,833	350,140	349,325
Gas Volumetric Flow Rate, scfm	384,119	369,138	379,060	377,439
Average %CO ₂ by volume, dry basis	18.2	17.6	17.4	17.7
Average %O ₂ by volume, dry basis	10.5	10.8	10.9	10.7
Clinker Production, ton/hr	261.0	253.6	272.4	262.3
Chloride (Cl₂) Emissions				
ppm ≤	0.03	≤ 0.03	≤ 0.03	≤ 0.03
ppm@7%O ₂ ≤	0.04	≤ 0.05	≤ 0.05	≤ 0.04
lb/hr ≤	0.13	≤ 0.12	≤ 0.13	≤ 0.13
lb/ton of clinker ≤	0.0005	≤ 0.0005	≤ 0.0005	≤ 0.0005
Hydrogen Fluoride (HF) Emissions				
ppm ≤	0.11	≤ 0.12	≤ 0.11	≤ 0.11
ppm@7%O ₂ ≤	0.15	≤ 0.16	≤ 0.16	≤ 0.16
lb/hr ≤	0.13	≤ 0.12	≤ 0.12	≤ 0.12
lb/ton of clinker ≤	0.0005	≤ 0.0005	≤ 0.0005	≤ 0.0005

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Test Method: 26A

	Source Condition	Mill Off	Mill Off	Mill Off	
	Date	11/7/23	11/7/23	11/7/23	
	Start Time	7:00	8:40	10:15	
	End Time	8:15	9:55	11:30	
	Run 1A	Run 2A	Run 3A	Average	
Stack Conditions					
Average Gas Temperature, °F	319.1	318.6	318.5	318.7	
Flue Gas Moisture, percent by volume	6.8%	7.1%	7.7%	7.2%	
Average Flue Pressure, in. Hg	26.88	26.88	26.88	26.88	
Gas Sample Volume, dscf	62.182	60.130	60.242	60.851	
Average Gas Velocity, ft/sec	73.202	70.800	71.013	71.672	
Gas Volumetric Flow Rate, acfm	628,683	608,051	609,882	615,539	
Gas Volumetric Flow Rate, dscfm	356,923	344,210	342,838	347,990	
Gas Volumetric Flow Rate, scfm	382,796	370,471	371,626	374,964	
Average %CO ₂ by volume, dry basis	18.2	17.6	17.4	17.7	
Average %O ₂ by volume, dry basis	10.5	10.8	10.9	10.7	
Isokinetic Variance	101.6	101.8	102.4	101.9	
Chloride (Cl₂) Emissions					
ug of sample collected	≤ 150.00	≤ 150.00	≤ 150.00	≤ 150.00	
ppm	≤ 0.03	≤ 0.03	≤ 0.03	≤ 0.03	
Hydrogen Fluoride (HF) Emissions					
ug of sample collected	≤ 150.00	≤ 150.00	≤ 150.00	≤ 150.00	
ppm	≤ 0.10	≤ 0.11	≤ 0.11	≤ 0.10	

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Test Method: 26A

	Source Condition	Mill Off	Mill Off	Mill Off	
	Date	11/7/23	11/7/23	11/7/23	
	Start Time	7:00	8:40	10:15	
	End Time	8:15	9:55	11:30	
	Run 1B	Run 2B	Run 3B	Average	
Stack Conditions					
Average Gas Temperature, °F	320.8	318.3	318.3	319.1	
Flue Gas Moisture, percent by volume	7.9%	7.7%	7.5%	7.7%	
Average Flue Pressure, in. Hg	26.88	26.88	26.88	26.88	
Gas Sample Volume, dscf	51.833	49.519	52.037	51.130	
Average Gas Velocity, ft/sec	73.866	70.267	73.830	72.654	
Gas Volumetric Flow Rate, acfm	634,382	603,480	634,079	623,980	
Gas Volumetric Flow Rate, dscfm	355,079	339,456	357,442	350,659	
Gas Volumetric Flow Rate, scfm	385,441	367,804	386,494	379,913	
Average %CO ₂ by volume, dry basis	18.2	17.6	17.4	17.7	
Average %O ₂ by volume, dry basis	10.5	10.8	10.9	10.7	
Isokinetic Variance	101.4	101.3	101.1	101.3	
Chloride (Cl₂) Emissions					
ug of sample collected	≤ 150.00	≤ 150.00	≤ 150.00	≤ 150.00	
ppm	≤ 0.04	≤ 0.04	≤ 0.04	≤ 0.04	
Hydrogen Fluoride (HF) Emissions					
ug of sample collected	≤ 150.00	≤ 150.00	≤ 150.00	≤ 150.00	
ppm	≤ 0.12	≤ 0.13	≤ 0.12	≤ 0.12	

CalPortland Company, Inc. Oro Grande Cement Plant Main Kiln Stack Reference Method Test Data Mill Off									
Test No.	Date	Start Time	End Time	O2 % (dry)	Moisture %	HCN ppmvw	HCN ppmvd @ 7% O2	HF ppmvw	HF ppmvd @ 7% O2
1	11/7/2023	7:00	7:59	10.5	8.3%	1.17	1.70	≤ 0.10	≤ 0.15
2	11/7/2023	8:40	9:39	10.8	7.5%	1.12	1.67	≤ 0.10	≤ 0.15
3	11/7/2023	10:15	11:14	10.9	7.2%	1.12	1.68	≤ 0.10	≤ 0.15
Average				10.7	7.7%	1.14	1.68	≤ 0.10	≤ 0.15

Test No.	Date	Start Time	End Time	Volumetric Flow, DSCFM	Clinker Production, ton/hr	HCN lb/hr	HCN lb/ton	HF lb/hr	HF lb/ton
1	11/7/2023	7:00	7:59	356,001	261.0	1.91	0.0073	≤ 0.12	≤ 0.0005
2	11/7/2023	8:40	9:39	341,833	253.6	1.74	0.0069	≤ 0.12	≤ 0.0005
3	11/7/2023	10:15	11:14	350,140	272.4	1.79	0.0066	≤ 0.12	≤ 0.0004
Average				349,325	262.3	1.81	0.0069	≤ 0.12	≤ 0.0004

6.0 CERTIFICATION

Mostardi Platt is pleased to have been of service to CalPortland Company, Inc. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

As project manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results, and the test program was performed in accordance with the methods specified in this test report.

MOSTARDI PLATT



Richard J. Sollars II

Project Manager



Chet A. Gutwein

Quality Assurance

APPENDICES

Appendix A – Plant Operating Data

Date/Time	1161: 1161_CLINKER_PRODUCTION (TNHR) Raw Value
11/07/2023 14:15	232.70
11/07/2023 14:16	222.53
11/07/2023 14:17	216.47
11/07/2023 14:18	226.19
11/07/2023 14:19	239.15
11/07/2023 14:20	241.99
11/07/2023 14:21	241.82
11/07/2023 14:22	236.92
11/07/2023 14:23	242.98
11/07/2023 14:24	240.74
11/07/2023 14:25	262.57
11/07/2023 14:26	275.23
11/07/2023 14:27	284.63
11/07/2023 14:28	270.37
11/07/2023 14:29	264.41
11/07/2023 14:30	257.75
11/07/2023 14:31	253.03
11/07/2023 14:32	265.51
11/07/2023 14:33	259.19
11/07/2023 14:34	253.87
11/07/2023 14:35	251.21
11/07/2023 14:36	231.36
11/07/2023 14:37	239.13
11/07/2023 14:38	259.74
11/07/2023 14:39	259.80
11/07/2023 14:40	248.42
11/07/2023 14:41	250.74
11/07/2023 14:42	252.46
11/07/2023 14:43	238.46
11/07/2023 14:44	239.84
11/07/2023 14:45	245.32
11/07/2023 14:46	250.28
11/07/2023 14:47	269.74
11/07/2023 14:48	273.70
11/07/2023 14:49	280.67
11/07/2023 14:50	309.85
11/07/2023 14:51	279.69
11/07/2023 14:52	271.61
11/07/2023 14:53	257.61
11/07/2023 14:54	264.89
11/07/2023 14:55	273.65
11/07/2023 14:56	274.02
11/07/2023 14:57	272.09
11/07/2023 14:58	267.36
11/07/2023 14:59	264.08
11/07/2023 15:00	262.60
11/07/2023 15:01	262.25
11/07/2023 15:02	266.89
11/07/2023 15:03	267.87
11/07/2023 15:04	265.98
11/07/2023 15:05	270.08
11/07/2023 15:06	259.98
11/07/2023 15:07	247.45
11/07/2023 15:08	278.14
11/07/2023 15:09	279.84
11/07/2023 15:10	274.22
11/07/2023 15:11	272.33
11/07/2023 15:12	270.44
11/07/2023 15:13	272.90
11/07/2023 15:14	280.62
11/07/2023 15:15	283.92
11/07/2023 15:16	287.29
11/07/2023 15:17	285.17
11/07/2023 15:18	276.73
11/07/2023 15:19	273.60
11/07/2023 15:20	267.77
11/07/2023 15:21	266.01
11/07/2023 15:22	262.11
11/07/2023 15:23	261.47
11/07/2023 15:24	257.22
Average	260.95

Date/Time	1161_CLINKER_PRODUCTION (TNHR) Raw Value
11/07/2023 15:40	243.43
11/07/2023 15:41	246.77
11/07/2023 15:42	252.74
11/07/2023 15:43	258.38
11/07/2023 15:44	263.51
11/07/2023 15:45	266.06
11/07/2023 15:46	263.80
11/07/2023 15:47	262.31
11/07/2023 15:48	257.35
11/07/2023 15:49	259.31
11/07/2023 15:50	259.73
11/07/2023 15:51	257.96
11/07/2023 15:52	261.52
11/07/2023 15:53	263.14
11/07/2023 15:54	263.87
11/07/2023 15:55	261.14
11/07/2023 15:56	257.78
11/07/2023 15:57	245.86
11/07/2023 15:58	245.36
11/07/2023 15:59	252.13
11/07/2023 16:00	250.87
11/07/2023 16:01	255.79
11/07/2023 16:02	252.72
11/07/2023 16:03	248.28
11/07/2023 16:04	249.65
11/07/2023 16:05	252.61
11/07/2023 16:06	255.44
11/07/2023 16:07	239.17
11/07/2023 16:08	238.81
11/07/2023 16:09	242.97
11/07/2023 16:10	248.74
11/07/2023 16:11	249.49
11/07/2023 16:12	252.86
11/07/2023 16:13	255.18
11/07/2023 16:14	252.14
11/07/2023 16:15	249.14
11/07/2023 16:16	244.60
11/07/2023 16:17	252.27
11/07/2023 16:18	251.79
11/07/2023 16:19	250.96
11/07/2023 16:20	247.60
11/07/2023 16:21	249.10
11/07/2023 16:22	251.55
11/07/2023 16:23	252.97
11/07/2023 16:24	249.72
11/07/2023 16:25	246.79
11/07/2023 16:26	247.77
11/07/2023 16:27	255.81
11/07/2023 16:28	254.21
11/07/2023 16:29	251.84
11/07/2023 16:30	248.18
11/07/2023 16:31	245.84
11/07/2023 16:32	244.78
11/07/2023 16:33	245.69
11/07/2023 16:34	245.42
11/07/2023 16:35	251.45
11/07/2023 16:36	257.05
11/07/2023 16:37	254.61
11/07/2023 16:38	240.75
11/07/2023 16:39	255.18
11/07/2023 16:40	263.05
11/07/2023 16:41	267.84
11/07/2023 16:42	269.33
11/07/2023 16:43	269.98
11/07/2023 16:44	262.15
11/07/2023 16:45	255.75
11/07/2023 16:46	258.51
11/07/2023 16:47	259.24
11/07/2023 16:48	258.11
11/07/2023 16:49	254.14
Average	253.6

Date/Time	1161: 1161_CLINKER_PRODUCTION (TNHR) Raw Value
11/07/2023 17:10	255.70
11/07/2023 17:11	260.72
11/07/2023 17:12	274.19
11/07/2023 17:13	273.00
11/07/2023 17:14	272.47
11/07/2023 17:15	280.14
11/07/2023 17:16	281.53
11/07/2023 17:17	278.85
11/07/2023 17:18	281.00
11/07/2023 17:19	267.20
11/07/2023 17:20	266.71
11/07/2023 17:21	269.42
11/07/2023 17:22	285.04
11/07/2023 17:23	281.46
11/07/2023 17:24	292.19
11/07/2023 17:25	319.99
11/07/2023 17:26	303.31
11/07/2023 17:27	294.19
11/07/2023 17:28	297.97
11/07/2023 17:29	294.54
11/07/2023 17:30	298.06
11/07/2023 17:31	293.24
11/07/2023 17:32	294.90
11/07/2023 17:33	294.16
11/07/2023 17:34	287.35
11/07/2023 17:35	289.53
11/07/2023 17:36	287.10
11/07/2023 17:37	274.96
11/07/2023 17:38	257.97
11/07/2023 17:39	252.50
11/07/2023 17:40	257.69
11/07/2023 17:41	259.05
11/07/2023 17:42	259.84
11/07/2023 17:43	260.13
11/07/2023 17:44	261.32
11/07/2023 17:45	258.71
11/07/2023 17:46	275.55
11/07/2023 17:47	281.44
11/07/2023 17:48	276.89
11/07/2023 17:49	272.23
11/07/2023 17:50	266.70
11/07/2023 17:51	261.40
11/07/2023 17:52	261.28
11/07/2023 17:53	264.17
11/07/2023 17:54	267.01
11/07/2023 17:55	267.30
11/07/2023 17:56	265.46
11/07/2023 17:57	271.97
11/07/2023 17:58	272.70
11/07/2023 17:59	274.32
11/07/2023 18:00	272.17
11/07/2023 18:01	273.17
11/07/2023 18:02	273.59
11/07/2023 18:03	275.01
11/07/2023 18:04	271.97
11/07/2023 18:05	273.83
11/07/2023 18:06	273.28
11/07/2023 18:07	271.12
11/07/2023 18:08	247.14
11/07/2023 18:09	243.86
11/07/2023 18:10	254.58
11/07/2023 18:11	262.78
11/07/2023 18:12	266.13
11/07/2023 18:13	263.93
11/07/2023 18:14	262.85
11/07/2023 18:15	260.49
11/07/2023 18:16	258.05
11/07/2023 18:17	261.25
11/07/2023 18:18	255.38
11/07/2023 18:19	252.97
Average	272.40

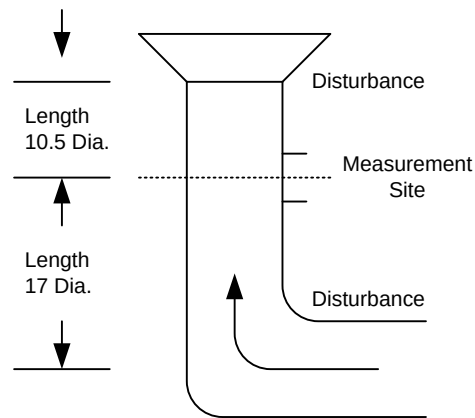
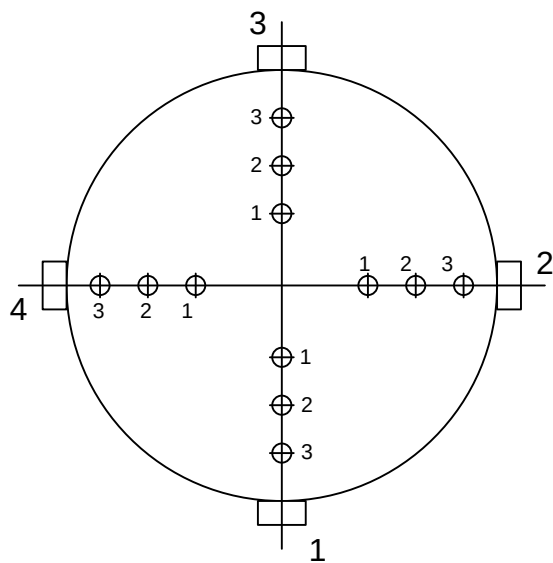
Date/Time	1161_CLINKER_PRODUCTION (TNHR) Raw Value
11/07/2023 07:00	227.68
11/07/2023 07:01	231.25
11/07/2023 07:02	213.67
11/07/2023 07:03	221.05
11/07/2023 07:04	216.46
11/07/2023 07:05	218.88
11/07/2023 07:06	233.30
11/07/2023 07:07	237.13
11/07/2023 07:08	230.22
11/07/2023 07:09	229.86
11/07/2023 07:10	235.99
11/07/2023 07:11	239.93
11/07/2023 07:12	239.94
11/07/2023 07:13	260.48
11/07/2023 07:14	272.71
11/07/2023 07:15	273.71
11/07/2023 07:16	264.88
11/07/2023 07:17	265.89
11/07/2023 07:18	283.31
11/07/2023 07:19	287.08
11/07/2023 07:20	301.05
11/07/2023 07:21	288.52
11/07/2023 07:22	277.36
11/07/2023 07:23	290.65
11/07/2023 07:24	302.25
11/07/2023 07:25	280.82
11/07/2023 07:26	277.66
11/07/2023 07:27	281.07
11/07/2023 07:28	283.65
11/07/2023 07:29	278.96
11/07/2023 07:30	264.58
11/07/2023 07:31	265.78
11/07/2023 07:32	238.43
11/07/2023 07:33	251.27
11/07/2023 07:34	272.02
11/07/2023 07:35	285.89
11/07/2023 07:36	300.27
11/07/2023 07:37	302.85
11/07/2023 07:38	301.23
11/07/2023 07:39	301.34
11/07/2023 07:40	301.18
11/07/2023 07:41	294.20
11/07/2023 07:42	289.21
11/07/2023 07:43	282.40
11/07/2023 07:44	275.10
11/07/2023 07:45	267.48
11/07/2023 07:46	262.81
11/07/2023 07:47	256.16
11/07/2023 07:48	252.49
11/07/2023 07:49	246.40
11/07/2023 07:50	239.41
11/07/2023 07:51	238.09
11/07/2023 07:52	225.28
11/07/2023 07:53	218.90
11/07/2023 07:54	214.29
11/07/2023 07:55	207.36
11/07/2023 07:56	217.90
11/07/2023 07:57	213.50
11/07/2023 07:58	203.11
11/07/2023 07:59	207.98
11/07/2023 08:00	210.23
11/07/2023 08:01	206.24
11/07/2023 08:02	193.31
11/07/2023 08:03	183.12
11/07/2023 08:04	194.27
11/07/2023 08:05	214.81
11/07/2023 08:06	215.58
11/07/2023 08:07	212.01
11/07/2023 08:08	219.05
11/07/2023 08:09	219.87
11/07/2023 08:10	230.78
11/07/2023 08:11	238.07
11/07/2023 08:12	225.66
11/07/2023 08:13	231.70
11/07/2023 08:14	230.95
11/07/2023 08:15	225.63
Average	248.60

	1161: 1161_CLINKER_PRODUCTION (TNHR) Raw Value
11/07/2023 08:40	278.18
11/07/2023 08:41	272.95
11/07/2023 08:42	266.50
11/07/2023 08:43	275.18
11/07/2023 08:44	278.38
11/07/2023 08:45	273.57
11/07/2023 08:46	295.03
11/07/2023 08:47	294.49
11/07/2023 08:48	295.58
11/07/2023 08:49	287.38
11/07/2023 08:50	297.26
11/07/2023 08:51	296.21
11/07/2023 08:52	296.84
11/07/2023 08:53	285.25
11/07/2023 08:54	278.00
11/07/2023 08:55	277.41
11/07/2023 08:56	280.96
11/07/2023 08:57	284.76
11/07/2023 08:58	278.64
11/07/2023 08:59	270.69
11/07/2023 09:00	271.71
11/07/2023 09:01	273.34
11/07/2023 09:02	269.04
11/07/2023 09:03	237.56
11/07/2023 09:04	249.84
11/07/2023 09:05	266.66
11/07/2023 09:06	265.01
11/07/2023 09:07	261.43
11/07/2023 09:08	267.25
11/07/2023 09:09	259.59
11/07/2023 09:10	261.43
11/07/2023 09:11	260.48
11/07/2023 09:12	257.74
11/07/2023 09:13	254.87
11/07/2023 09:14	250.27
11/07/2023 09:15	246.95
11/07/2023 09:16	243.94
11/07/2023 09:17	252.52
11/07/2023 09:18	248.29
11/07/2023 09:19	227.82
11/07/2023 09:20	226.60
11/07/2023 09:21	222.91
11/07/2023 09:22	222.07
11/07/2023 09:23	233.87
11/07/2023 09:24	242.39
11/07/2023 09:25	261.56
11/07/2023 09:26	247.50
11/07/2023 09:27	237.85
11/07/2023 09:28	245.42
11/07/2023 09:29	251.52
11/07/2023 09:30	272.74
11/07/2023 09:31	278.23
11/07/2023 09:32	272.22
11/07/2023 09:33	277.12
11/07/2023 09:34	271.09
11/07/2023 09:35	270.49
11/07/2023 09:36	263.37
11/07/2023 09:37	266.99
11/07/2023 09:38	259.45
11/07/2023 09:39	248.46
11/07/2023 09:40	240.56
11/07/2023 09:41	243.54
11/07/2023 09:42	244.92
11/07/2023 09:43	240.24
11/07/2023 09:44	236.10
11/07/2023 09:45	235.28
11/07/2023 09:46	241.95
11/07/2023 09:47	253.58
11/07/2023 09:48	268.01
11/07/2023 09:49	262.13
11/07/2023 09:50	259.21
11/07/2023 09:51	262.58
11/07/2023 09:52	266.35
11/07/2023 09:53	260.82
11/07/2023 09:54	259.86
11/07/2023 09:55	263.31
Average	261.83

	1161: 1161_CLINKER_PRODUCTION (TNHR) Raw Value
11/07/2023 10:15	230.50
11/07/2023 10:16	227.72
11/07/2023 10:17	214.48
11/07/2023 10:18	207.17
11/07/2023 10:19	212.46
11/07/2023 10:20	219.24
11/07/2023 10:21	219.89
11/07/2023 10:22	231.54
11/07/2023 10:23	236.32
11/07/2023 10:24	229.40
11/07/2023 10:25	229.41
11/07/2023 10:26	231.25
11/07/2023 10:27	249.53
11/07/2023 10:28	242.48
11/07/2023 10:29	230.86
11/07/2023 10:30	229.46
11/07/2023 10:31	223.50
11/07/2023 10:32	211.39
11/07/2023 10:33	207.19
11/07/2023 10:34	199.24
11/07/2023 10:35	225.22
11/07/2023 10:36	233.66
11/07/2023 10:37	241.97
11/07/2023 10:38	242.86
11/07/2023 10:39	240.05
11/07/2023 10:40	252.18
11/07/2023 10:41	269.86
11/07/2023 10:42	281.24
11/07/2023 10:43	280.46
11/07/2023 10:44	276.74
11/07/2023 10:45	281.42
11/07/2023 10:46	288.36
11/07/2023 10:47	300.36
11/07/2023 10:48	297.53
11/07/2023 10:49	289.68
11/07/2023 10:50	288.26
11/07/2023 10:51	294.24
11/07/2023 10:52	296.12
11/07/2023 10:53	294.56
11/07/2023 10:54	295.12
11/07/2023 10:55	295.50
11/07/2023 10:56	284.41
11/07/2023 10:57	282.18
11/07/2023 10:58	280.34
11/07/2023 10:59	277.83
11/07/2023 11:00	271.39
11/07/2023 11:01	266.55
11/07/2023 11:02	255.87
11/07/2023 11:03	254.17
11/07/2023 11:04	232.95
11/07/2023 11:05	232.87
11/07/2023 11:06	237.67
11/07/2023 11:07	236.38
11/07/2023 11:08	232.46
11/07/2023 11:09	238.14
11/07/2023 11:10	243.40
11/07/2023 11:11	241.42
11/07/2023 11:12	238.38
11/07/2023 11:13	235.73
11/07/2023 11:14	232.55
11/07/2023 11:15	238.03
11/07/2023 11:16	255.98
11/07/2023 11:17	257.90
11/07/2023 11:18	258.10
11/07/2023 11:19	278.97
11/07/2023 11:20	300.78
11/07/2023 11:21	294.99
11/07/2023 11:22	299.63
11/07/2023 11:23	315.58
11/07/2023 11:24	318.23
11/07/2023 11:25	336.85
11/07/2023 11:26	335.97
11/07/2023 11:27	331.59
11/07/2023 11:28	355.96
11/07/2023 11:29	360.22
11/07/2023 11:30	368.39
Average	262.24

Appendix B – Test Section Diagrams

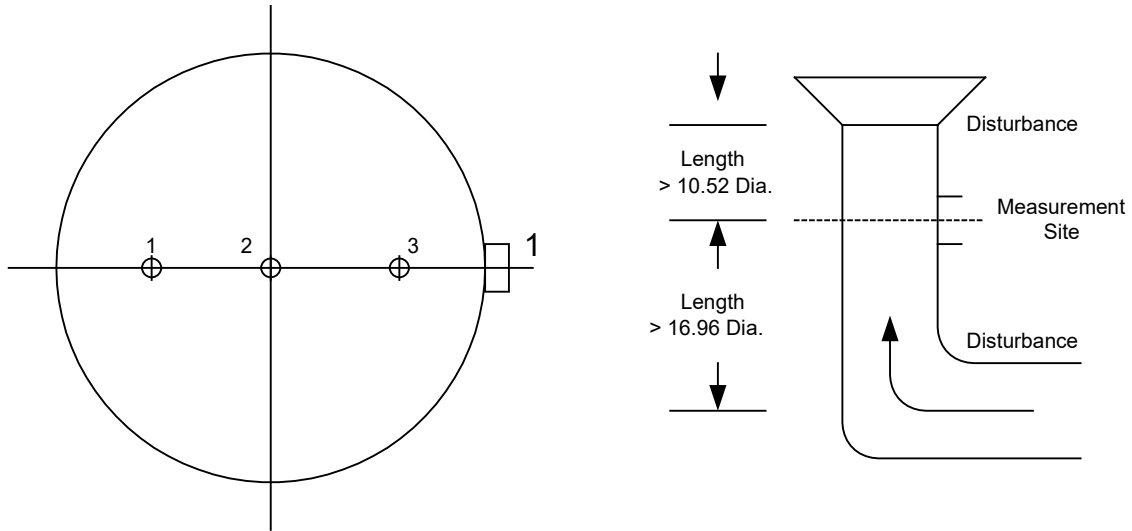
EQUAL AREA TRAVERSE FOR ROUND DUCTS



Client: CalPortland Company
Facility: Oro Grande Cement Plant
Test Location: Main Kiln
Date: 11/07/23
Diameter (Feet): 13.500
Port Length (In): 3.00
Ports Sampled: 4
Points/Port: 3

Point Markings		
	From inside wall (in.)	% of Diameter
1	7.13	4.40
2	23.65	14.60
3	47.95	29.60

GASEOUS TRAVERSE FOR ROUND DUCTS (Stratification)



Job: CalPortland Oro Grande

Distance from Inside Wall
To Traverse Point:

1. 83.3 % of diameter
2. 50.0 % of diameter
3. 16.7 % of diameter

Test Location: Main Kiln Stack

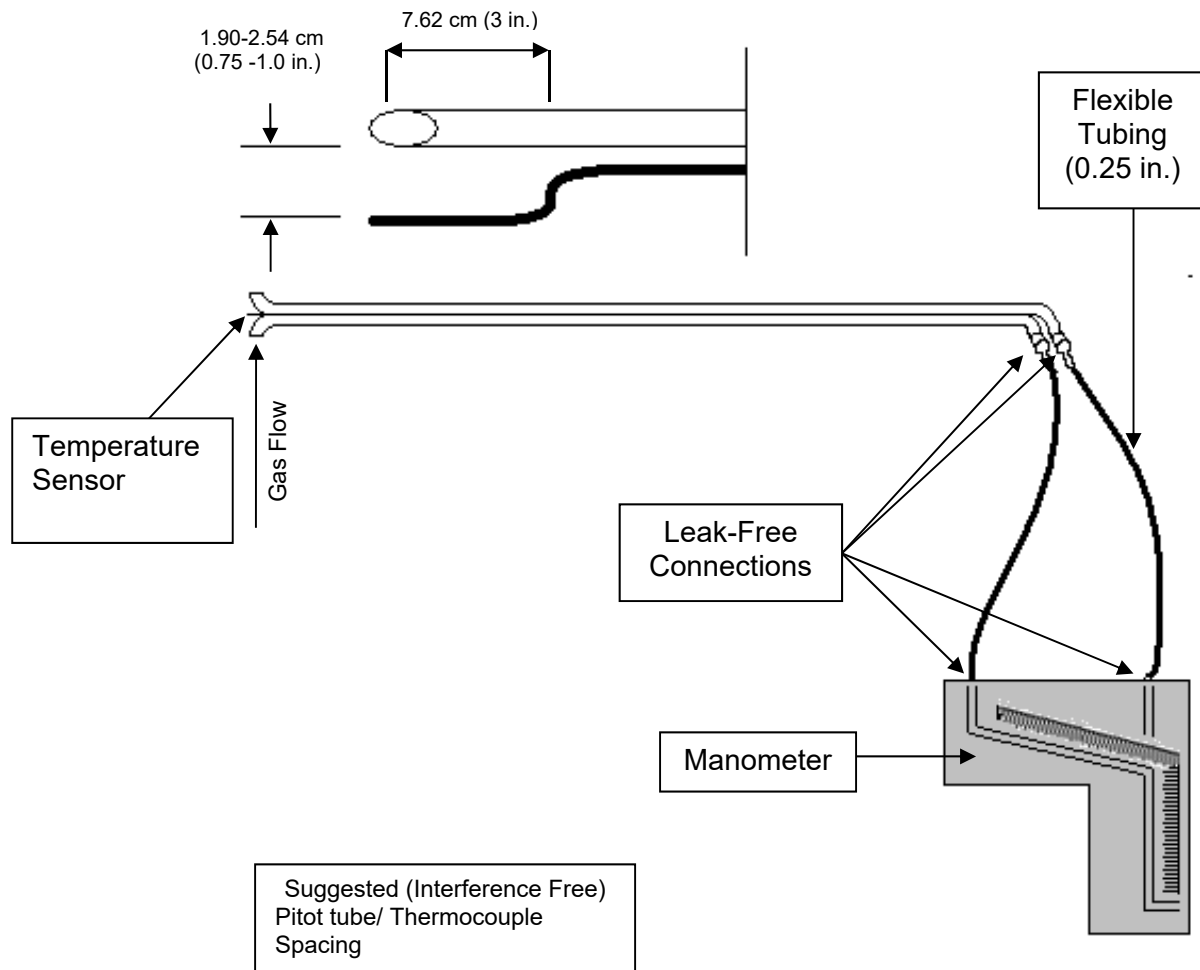
Stack Diameter: 13.5 Feet

Stack Area: 143.14 Square Feet

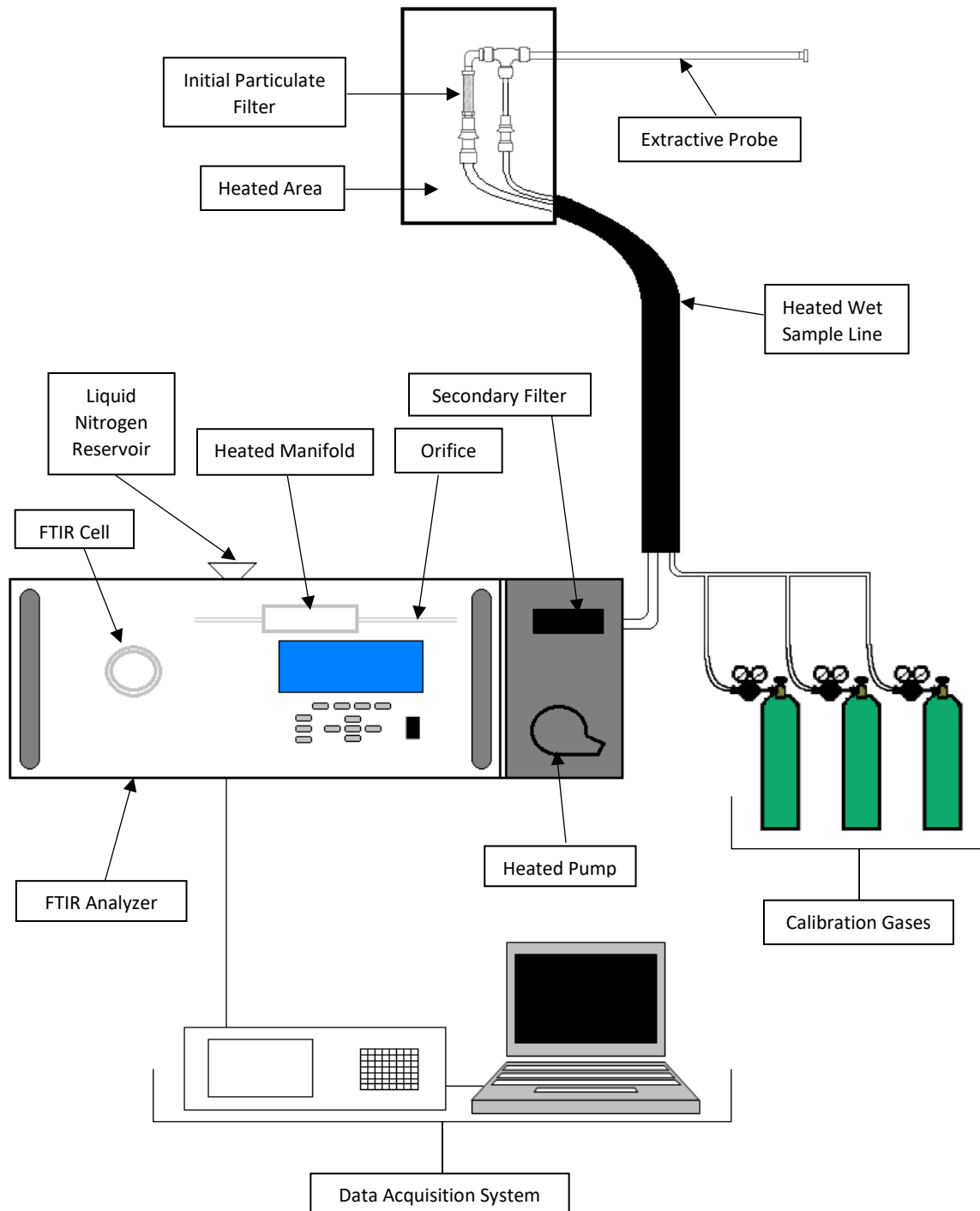
No. Sample Points: 3

Appendix C – Sample Train Diagrams

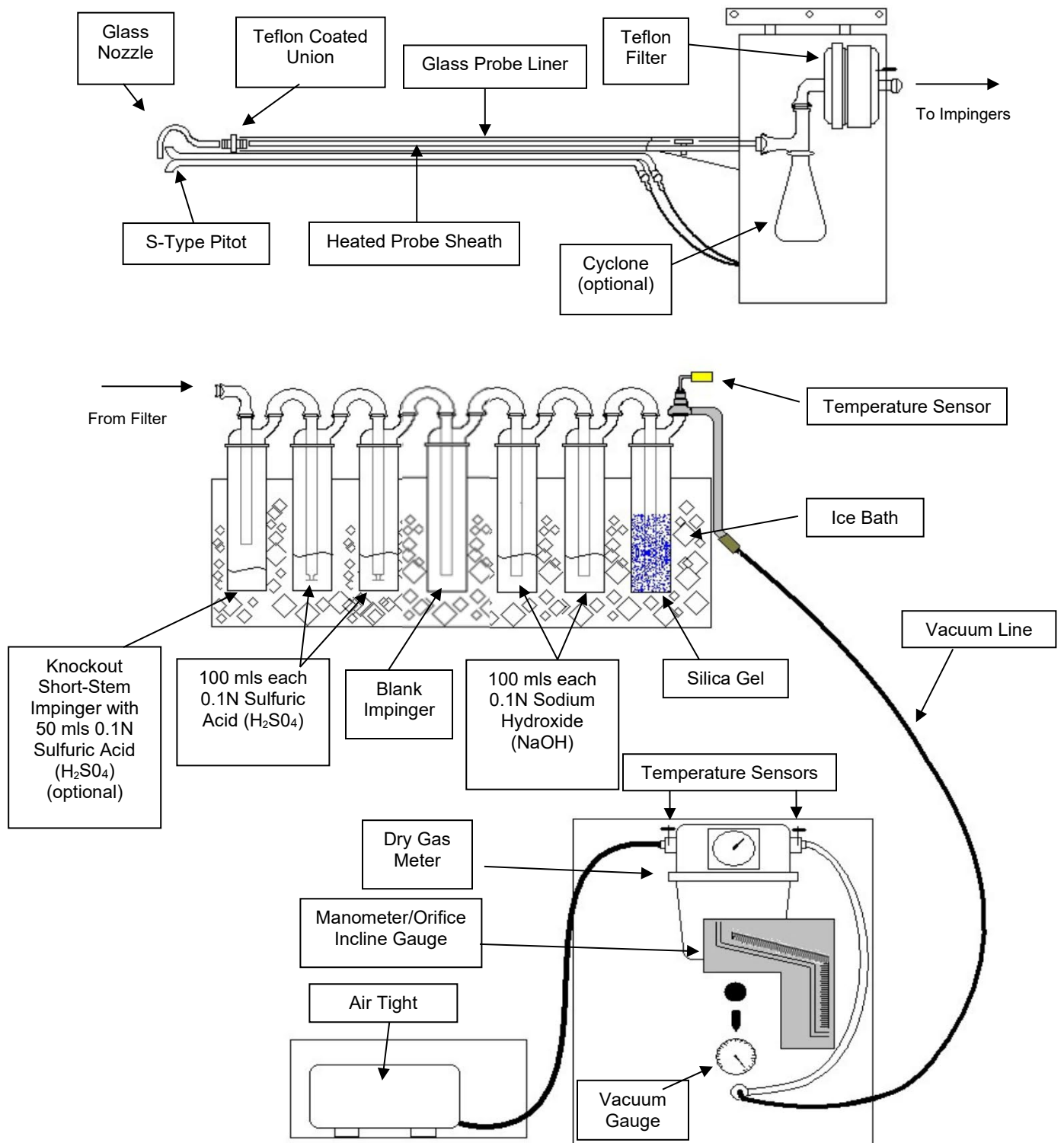
USEPA Method 2 – Type S Pitot Tube Manometer Assembly



USEPA Method 320 – Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy Sample Train Diagram



USEPA Method 26A – HF and Cl₂ Sample Train Diagram



Appendix D – Calculation Nomenclature and Formulas

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Run: 1
 Date: 11/7/2023
 Method: 26A
 Source Condition: Mill On

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$$\%CO_2 = \underline{20.6} \qquad \%O_2 = \underline{9.0} \qquad \%N_2 = \underline{70.4}$$

$$Md = \underline{31.656}$$

Wet Molecular Weight

$$Ms = Md \times (1 - Bws) + (18.0 \times Bws)$$

$$Md = \underline{31.656} \qquad Bws = \underline{0.078}$$

$$Ms = \underline{30.586}$$

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

$$Y = \underline{0.999} \qquad Vm = \underline{59.192} \qquad Pbar = \underline{26.9}$$

$$DH = \underline{2.5} \qquad Tm = \underline{84.8}$$

$$Vm(std) = \underline{51.957}$$

Volume of Water Vapor Condensed

$$Vw(std) = 0.0471 \times (\text{net H}_2\text{O gain})$$

$$\text{Net H}_2\text{O} = \underline{93.8}$$

$$Vw(std) = \underline{4.418}$$

Moisture Content

$$Bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

$$Vw(std) = \underline{4.418} \qquad Vm(std) = \underline{51.957}$$

$$Bws = \underline{0.078}$$

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Run: 1
 Date: 11/7/2023
 Method: 26A
 Source Condition: Mill On

Average Duct Velocity

$$V_s = 85.49 \times C_p \times \sqrt{\text{DP (avg)}} \times (T_s (\text{avg}) + 460 / (P_s \times M_s))^{1/2}$$

$C_p = \frac{0.820}{26.88}$	$T_s (\text{avg}) = \frac{307.9}{30.586}$	$\sqrt{\text{DP (avg)}} = \frac{0.889}{}$
$P_s = \frac{26.88}{}$	$M_s = \frac{30.586}{}$	
$V_s = \frac{60.258}{}$		

Volumetric Flow Rate (Actual Basis)

$$Q = V_s \times A \times 60$$

$V_s = \frac{60.258}{}$	$A = \frac{143.139}{}$
$Q = \frac{517,512}{}$	

Volumetric Flow Rate (Standard Basis)

$$Q_{std} = 17.647 \times Q \times \frac{P_s}{T_s (\text{avg}) + 460}$$

$Q = \frac{517,512}{}$	$P_s = \frac{26.88}{}$	$T_s (\text{avg}) = \frac{307.9}{}$
$Q_{std} = \frac{319,687}{}$		

Volumetric Flow Rate (Standard Dry Basis)

$$Q_{std}(\text{dry}) = Q_{std} \times (1 - B_{ws})$$

$Q_{std} = \frac{319,687}{}$	$B_{ws} = \frac{0.078}{}$
$Q_{std}(\text{dry}) = \frac{294,634}{}$	

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times (T_s + 460) \times V_m(\text{std})}{V_s \times \theta \times A_n \times P_s \times (1 - B_{ws})}$$

$T_s = \frac{307.9}{}$	$V_m(\text{std}) = \frac{51.957}{}$	$V_s = \frac{60.258}{}$
$A_n = \frac{0.0004095}{}$	$\theta = \frac{60}{}$	$P_s = \frac{26.88}{}$
$B_{ws} = \frac{0.078}{}$		
$\%ISO = \frac{102.8}{}$		

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Run: 1
 Date: 11/7/2023
 Method: 26A
 Source Condition: Mill On

Chloride (Cl₂) Concentration:

$$\begin{aligned}
 \text{mg/m}^3 &= \frac{\text{mg of Chloride (Cl}_2\text{)}}{\text{Vm(std)} \times 0.02832 \text{ m}^3/\text{ft}^3} \\
 \text{mg} &= \underline{0.15} \quad \text{Vm(std)} = \underline{51.957} \\
 \text{mg/m}^3 &= \underline{0.10}
 \end{aligned}$$

Chloride (Cl₂) Emission Rate:

$$\begin{aligned}
 \text{lb of Chloride (Cl}_2\text{)} &= \frac{\mu\text{g of sample} \times 10^6 \text{ grams}/\mu\text{g}}{453.6 \text{ grams/lb}} \\
 \text{Emission Rate lb/hr} &= \frac{\text{lb of Chloride (Cl}_2\text{)}}{\text{Vm(std)}} \times \text{dscfm} \times 60 \text{ min/hr} \\
 \text{lb of Chloride (Cl}_2\text{)} &= \underline{3.31\text{E-}10} \quad \text{dscfm} = \underline{294,634} \\
 \text{Emission Rate lb/hr} &= \underline{0.1125} \\
 \text{Emission Rate lb/ton} &= \frac{\text{lb/hr of Chloride (Cl}_2\text{)}}{\text{clinker production ton/hr}} \\
 \text{lb/hr of Chloride (Cl}_2\text{)} &= \underline{0.1125} \quad \text{clinker ton/hr} = \underline{248.6} \\
 \text{Emission Rate lb/ton} &= \underline{0.0005}
 \end{aligned}$$

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Test Location: Main Kiln Stack
Date: 11/7/23

Sample Calculations

$$(8.99 \% - 0.05 \%) \times \frac{\text{O2 \% (dry)} \quad 11.18 \%}{11.14 \% - 0.05 \%} = 9.02 \%$$

$$C_{\text{gas}} = (C - C_o) \times \frac{C_{\text{ma}}}{C_m - C_o}$$

where:

C_{gas} = Effluent gas concentration, dry basis, ppm or %

C = Average gas concentration indicated by gas analyzer, dry basis, ppm or %

C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm or %

C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm or %

C_{ma} = Actual concentration of the upscale calibration gas, ppm or %

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Project #: M234508
 Test Location: Main Kiln Stack
 Date: 11/7/23

FTIR Sample Calculations

Direct Recovery % of Calibration Transfer Standard

$$DR_{cts} = \frac{D_{cts}}{Cma} \times 100$$

$$Cma = \underline{101.4}$$

$$D_{cts} = \underline{101.8}$$

$$DR_{cts} = \underline{100.4\%}$$

Recovery % with Calibration Transfer Standard System Purge

$$R_{cts} = \frac{Sys_{cts}}{D_{cts}} \times 100$$

$$Sys_{cts} = \underline{101.6}$$

$$D_{cts} = \underline{101.8}$$

$$R_{cts} = \underline{100\%}$$

Direct Recovery % of Analyte Spike Gas

SF6

$$DR_{sf6} = \frac{D_{sf6}}{Cma} \times 100$$

$$Cma = \underline{5.0}$$

$$D_{sf6} = \underline{4.9}$$

$$DR_{sf6} = \underline{98\%}$$

HCN

$$DR_{asg} = \frac{D_{asg}}{Cma} \times 100$$

$$Cma = \underline{49.6}$$

$$D_{asg} = \underline{52.0}$$

$$DR_{asg} = \underline{104.9\%}$$

Dilution Factor for Analyte Spiking

$$DF = \frac{Spk_{sf6}}{D_{sf6}}$$

$$Spk_{sf6} = \underline{0.355}$$

$$D_{sf6} = \underline{4.907}$$

$$DF = \underline{0.072}$$

Recovery % for Analyte Spike With HCN

$$R_x = \frac{Spk_x}{(N_x \times (1-DF) + D_{asg} \times DF)}$$

$$Spk_x = \underline{4.4}$$

$$N_x = \underline{0.8}$$

$$DF = \underline{0.072}$$

$$D_{asg} = \underline{52.0}$$

$$R_x = \underline{97.5} \quad \%$$

where:

DR_{cts} = Recovery % of the calibration transfer standard directly to the analyzer

Cma = certified concentration of calibration gas, ppm

D_{cts} = Concentration of the calibration transfer standard gas directly to the analyzer, ppm

R_{cts} = Recovery % of the calibration transfer standard through the sampling system

Sys_{cts} = Concentration of the calibration transfer standard gas through the system, ppm

DF = Dilution Factor of analyte spike gas

Spk_{sf6} = SF6 concentration in effluent during spiking

Spk_x = Analyte concentration in effluent during spiking

D_{asg} = Concentration of the analyte spike gas directly to the analyzer, ppm

D_{sf6} = Concentration of the SF6 directly to the analyzer, ppm

R_x = Recovery % of the analyte spike gas

N_x = Native effluent (HCN) concentration prior to analyte spike

MOSTARDI PLATT

Volumetric Flow Nomenclature

- A = Cross-sectional area of stack or duct, ft²
- Bws = Water vapor in gas stream, proportion by volume
- Cp = Pitot tube coefficient, dimensionless
- Md = Dry molecular weight of gas, lb/lb-mole
- Ms = Molecular weight of gas, wet basis, lb/lb-mole
- Mw = Molecular weight of water, 18.0 lb/lb-mole
- Pbar = Barometric pressure at testing site, in. Hg
- Pg = Static pressure of gas, in. Hg (in. H₂O/13.6)
- DH = Static pressure of gas, in. H₂O
- Ps = Absolute pressure of gas, in. Hg = Pbar + Pg
- Pstd = Standard absolute pressure, 29.92 in. Hg
- Acfm = Actual volumetric gas flow rate
- Scfm = Volumetric gas flow rate, corrected to standard conditions
- Dscfm = Standard volumetric flow rate, corrected to dry conditions
- R = Ideal gas constant, 21.85 in. Hg-ft³/°R-lb-mole
- Ts = Average stack gas temperature, °F
- Tm = Average dry gas meter temperature, °F
- Tstd = Standard absolute temperature, 528°R
- vs = Gas velocity, ft/sec
- Vm(std) = Volume of gas sampled, corrected to standard conditions, scf
- Vw(std) = Volume of water vapor in gas sample, corrected to standard conditions, scf
- Vlc = Volume of liquid collected
- Y = Dry gas meter calibration factor
- Δp = Velocity head of gas, in. H₂O
- K1 = 17.647 °R/in. Hg
- %EA = Percent excess air
- %CO₂ = Percent carbon dioxide by volume, dry basis
- %O₂ = Percent oxygen by volume, dry basis
- %N₂ = Percent nitrogen by volume, dry basis
- 0.264 = Ratio of O₂ to N₂ in air, v/v
- 0.28 = Molecular weight of N₂ or CO, divided by 100
- 0.32 = Molecular weight of O₂ divided by 100
- 0.44 = Molecular weight of CO₂ divided by 100
- 13.6 = Specific gravity of mercury (Hg)

MOSTARDI PLATT

Volumetric Air Flow Calculations

$$Vm (std) = 17.647 \times Vm \times \left[\frac{\left(P_{bar} + \left[\frac{DH}{13.6} \right] \right)}{(460 + Tm)} \right] \times Y$$

$$Vw (std) = 0.0471 \times Vlc$$

$$Bws = \left[\frac{Vw (std)}{Vw (std) + Vm (std)} \right]$$

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + [0.28 \times (100 - \%CO_2 - \%O_2)]$$

$$Ms = Md \times (1 - Bws) + (18 \times Bws)$$

$$Vs = \sqrt{\frac{(Ts + 460)}{Ms \times Ps}} \times \sqrt{DP} \times Cp \times 85.49$$

$$Acfm = Vs \times Area (of\ stack\ or\ duct) \times 60$$

$$Scfm = Acfm \times 17.647 \times \left[\frac{Ps}{(460 + Ts)} \right]$$

$$Scfh = Scfm \times 60 \frac{min}{hr}$$

$$Dscfm = Scfm \times (1 - Bws)$$

MOSTARDI PLATT

Isokinetic Calculation Formulas

$$1. V_{w(std)} = V_{lc} \left(\frac{\rho_w}{M_w} \right) \left(\frac{RT_{std}}{P_{std}} \right) = K_2 V_{lc}$$

$$2. V_{m(std)} = V_m Y \left(\frac{T_{std}}{T_m} \right) \left(\frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{P_{std}} \right) = K_1 V_m Y \frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{T_m}$$

$$3. B_{ws} = \frac{V_{w(std)}}{(V_{m(std)} + V_{w(std)})}$$

$$4. M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2)$$

$$5. M_s = M_d(1 - B_{ws}) + 18.0(B_{ws})$$

$$6. C_a = \frac{m_a}{V_a \rho_a}$$

$$7. W_a = C_a V_{aw} \rho_a$$

$$8. C_{acf} = 15.43 K_i \left(\frac{m_n P_s}{V_{w(std)} + V_{m(std)} T_s} \right)$$

$$9. C_s = (15.43 \text{ grains/gram}) (m_n / V_{m(std)})$$

$$10. v_s = K_p C_p \sqrt{\frac{\Delta P T_s}{P_s M_s}}$$

$$11. Q_{acfm} = v_s A (60_{\text{sec/min}})$$

$$12. Q_{sd} = (3600_{\text{sec/hr}})(1 - B_{ws}) v_s \left(\frac{T_{std} P_s}{T_s P_{std}} \right) A$$

$$13. E \text{ (emission rate, lbs/hr)} = Q_{std} (C_s / 7000 \text{ grains/lb})$$

$$14. IKV = \frac{T_s V_{m(std)} P_{std}}{T_{std} v_s \theta A_n P_s 60(1 - B_{ws})} = K_4 \frac{T_s V_{m(std)}}{P_s v_s A_n \theta (1 - B_{ws})}$$

$$15. \%EA = \left(\frac{\%O_2 - (0.5 \%CO)}{0.264 \%N_2 - (\%O_2 - 0.5 \%CO)} \right) \times 100$$

MOSTARDI PLATT

Isokinetic Nomenclature

- A = Cross-sectional area of stack or duct, square feet
A_n = Cross-sectional area of nozzle, square feet
B_{ws} = Water vapor in gas stream, by volume
C_a = Acetone blank residue concentration, g/g
C_{act} = Concentration of particulate matter in gas stream at actual conditions, gr/acf
C_p = Pitot tube coefficient
C_s = Concentration of particulate matter in gas stream, dry basis, corrected to standard conditions, gr/dscf
IKV = Isokinetic sampling variance, must be 90.0 % ≤ IKV ≤ 110.0%
M_d = Dry molecular weight of gas, lb/lb-mole
M_s = Molecular weight of gas, wet basis, lb/lb-mole
M_w = Molecular weight of water, 18.0 lb/lb-mole
m_a = Mass of residue of acetone after evaporation, grams
P_{bar} = Barometric pressure at testing site, inches mercury
P_g = Static pressure of gas, inches mercury (inches water/13.6)
P_s = Absolute pressure of gas, inches mercury = P_{bar} + P_g
P_{std} = Standard absolute pressure, 29.92 inches mercury
Q_{acfm} = Actual volumetric gas flow rate, acfm
Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, dscfh
R = Ideal gas constant, 21.85 inches mercury cubic foot/°R-lb-mole
T_m = Dry gas meter temperature, °R
T_s = Gas temperature, °R
T_{std} = Absolute temperature, 528°R
V_a = Volume of acetone blank, ml
V_{aw} = Volume of acetone used in wash, ml
W_a = Weight of residue in acetone wash, grams
m_n = Total amount of particulate matter collected, grams
V_{1c} = Total volume of liquid collected in impingers and silica gel, ml
V_m = Volume of gas sample as measured by dry gas meter, dcf
V_{m(std)} = Volume of gas sample measured by dry gas meter, corrected to standard conditions, dscf
V_s = Gas velocity, ft/sec
V_{w(std)} = Volume of water vapor in gas sample, corrected to standard conditions, scf
Y = Dry gas meter calibration factor
ΔH = Average pressure differential across the orifice meter, inches water
Δp = Velocity head of gas, inches water
ρ_a = Density of acetone, 0.7855 g/ml (average)
ρ_w = Density of water, 0.002201 lb/ml
θ = Total sampling time, minutes
K₁ = 17.647 °R/in. Hg
K₂ = 0.04707 ft³/ml
K₄ = 0.09450/100 = 0.000945
K_p = Pitot tube constant, $85.49 \frac{ft}{sec} \left[\frac{(lb/lb-mole)(in. Hg)}{(°R)(in. H_2O)} \right]^{1/2}$
%EA = Percent excess air
%CO₂ = Percent carbon dioxide by volume, dry basis
%O₂ = Percent oxygen by volume, dry basis
%CO = Percent carbon monoxide by volume, dry basis
%N₂ = Percent nitrogen by volume, dry basis
0.264 = Ratio of O₂ to N₂ in air, v/v
28 = Molecular weight of N₂ or CO
32 = Molecular weight of O₂
44 = Molecular weight of CO₂
13.6 = Specific gravity of mercury (Hg)

MOSTARDI PLATT

Calculations for Hydrogen Fluoride By Method 26 or 26A

Concentration

$$\frac{\text{lbs HF}}{\text{dscf}} = \frac{\mu\text{g HF in sample}}{4.536 \times 10^8 \times \text{dscf}}$$

where:

$$4.536 \times 10^8 = \mu\text{g/lb}$$

dscf = Volume of gas sampled

$$\mu\text{g/lb HF} = \mu\text{g F} \times \frac{20.008}{19.000}$$

Parts Per Million

$$\text{ppm HF} = \frac{\text{lbs HF}}{\text{dscf}} \div \frac{20.008}{385 \times 10^6}$$

where:

385 = Volume of 1 lb mole of gas at 68°F and 29.92 in. Hg

106 = Conversion of ppm v/v

Emission Rate

$$\text{lbs HF /dscf} \times \text{dscfm} \times 60 \text{ min/hr} = \text{lbs/hr HF}$$

MOSTARDI PLATT

Pollutant Concentration Correction 7% for Percent Oxygen

$$C_{adj} = C_d \frac{20.9 - 7\%}{20.9 - \%O_2}$$

where:

C_{adj} = Pollutant concentration corrected to percent O_2

$20.9 - 7\%$ = Percent O_2 , the defined O_2 correction value, percent

20.9 = Percent O_2 in air

$\%O_2$ = Measured O_2 concentration dry basis, percent

C_d = Pollutant concentration measured, dry basis, ppm.

Appendix E- Laboratory Sample Analysis

Chain-of-Custody Form						
Project Number: M234508				Date Results Required:		
Client: CalPortland – Oro Grande				TAT Required:		
Plant/Test Location: Kiln Stack				Project Supervisor: Rich S		
Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume, mls
001	11/7/23	#1A 26A Mill off 0.1N H2SO4	1		M26A (HF)	
002	11/7/23	#1A 26A Mill off 0.1N NaOH	1		M26A (Cl ₂)	
003	11/7/23	#2A 26A Mill off 0.1N H2SO4	1		M26A (HF)	
004	11/7/23	#2A 26A Mill off 0.1N NaOH	1		M26A (Cl ₂)	
005	11/7/23	#3A 26A Mill off 0.1N H2SO4	1		M26A (HF)	
006	11/7/23	#3A 26A Mill off 0.1N NaOH	1		M26A (Cl ₂)	
007	11/7/23	#1B 26A Mill off 0.1N H2SO4	1		M26A (HF)	
008	11/7/23	#1B 26A Mill off 0.1N NaOH	1		M26A (Cl ₂)	
009	11/7/23	#2B 26A Mill off 0.1N H2SO4	1		M26A (HF)	
010	11/7/23	#2B 26A Mill off 0.1N NaOH	1		M26A (Cl ₂)	
011	11/7/23	#3B 26A Mill off 0.1N H2SO4	1		M26A (HF)	
012	11/7/23	#3B 26A Mill off 0.1N NaOH	1		M26A (Cl ₂)	
013	11/7/23	#1A 26A Mill on 0.1N H2SO4	1		M26A (HF)	
014	11/7/23	#1A 26A Mill on 0.1N NaOH	1		M26A (Cl ₂)	
015	11/7/23	#2A 26A Mill on 0.1N H2SO4	1		M26A (HF)	
016	11/7/23	#2A 26A Mill on 0.1N NaOH	1		M26A (Cl ₂)	
017	11/7/23	#3A 26A Mill on 0.1N H2SO4	1		M26A (HF)	
018	11/7/23	#3A 26A Mill on 0.1N NaOH	1		M26A (Cl ₂)	
019	11/7/23	#1B 26A Mill on 0.1N H2SO4	1		M26A (HF)	
020	11/7/23	#1B 26A Mill on 0.1N NaOH	1		M26A (Cl ₂)	
021	11/7/23	#2B 26A Mill on 0.1N H2SO4	1		M26A (HF)	
022	11/7/23	#2B 26A Mill on 0.1N NaOH	1		M26A (Cl ₂)	
023	11/7/23	#3B 26A Mill on 0.1N H2SO4	1		M26A (HF)	
024	11/7/23	#3B 26A Mill on 0.1N NaOH	1		M26A (Cl ₂)	

025	11/7/23	A Train Field Blank 0.1N H ₂ SO ₄	1		M26A (HF)	
026	11/7/23	A Train Field Blank 0.1N NaOH	1		M26A (Cl ₂)	
027	11/7/23	B Train Field Blank 0.1N H ₂ SO ₄	1		M26A (HF)	
028	11/7/23	B Train Field Blank 0.1N NaOH	1		M26A (Cl ₂)	
029	11/7/23	0.1N H ₂ SO ₄ Reagent Blank	1		M26A (HF)	
030	11/7/23	0.1N NaOH Reagent Blank	1		M26A (Cl ₂)	
031	11/7/23	DI Water Reagent Blank	1		M26A (HF and Cl ₂)	
Delivered to Lab by: Date/Time:			Received by: Date/Time:		Processed by: Date/Time:	

Laboratory Notes:

Kiln-Mill On

Client: CalPortland	Analysis Date: 11/28/2023
Facility: Oro Grande	Analysis Location: Elmhurst
Test Location: Kiln-Mill On	Analyst: JMG
Project Number: M234508	
Method: 26A	
Date Samples Received: 11/14/2023	

Train A

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A H2SO4 Blank	M26A H2SO4-R1	M26A H2SO4-R1 Dup	RDL	MDL
Sulfuric Acid Volume	ml	200	200	485	485		
Hydrofluoric Acid	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- H2SO4 R2	M26A- H2SO4 R3	Field Blank A		RDL	MDL
Sulfuric Acid Volume	ml	403	499	327			
Hydrofluoric Acid	ug	<150	<150	<150		150	15

Train B

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A H2SO4 Blank	M26A H2SO4-R1	M26A H2SO4-R1 Dup	RDL	MDL
Sulfuric Acid Volume	ml	200	200	426	426		
Hydrofluoric Acid	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- H2SO4 R2	M26A- H2SO4 R3	Field Blank B		RDL	MDL
Sulfuric Acid Volume	ml	493	432	327			
Hydrofluoric Acid	ug	<150	<150	341		150	15

Client:	CalPortland	Analysis Date:	11/28/2023									
Facility:	Oro Grande	Analysis Location:	Elmhurst									
Test Location:	Kiln-Mill On	Analyst:	JMG									
Project Number:	M234508											
Method:	26A											
Date Samples Received:	11/14/2023											
Standard ppm HF	Area	Response Factor	Calculated Value	Slope of Regression Curve								
1	0.2147	0.2147	0.95	0.2258								
2	0.4350	0.2175	1.93									
5	1.1398	0.2280	5.05	Response Factor Ave								
8	1.8510	0.2314	8.20	0.2257								
10	2.3697	0.2370	10.50									
Lot Number	Ricca 8209004											
	R²	0.9996										
Sample Number	Sample Date	Sample ID	Sample Area	PPM F	PPM X Dilution Factor	Dilution Factor	Total ml	mg F in soln	mg HF in soln	mg HF in soln avg	ug HF in soln	
031	11/7/2023	DI Reagent Blank	0.0024	0.0106	0.0106	1	200	0.0021	0.0022			
031	11/7/2023	DI Reagent Blank	0.0031	0.0137	0.0137	1	200	0.0027	0.0029	0.0026	2.565659136	
029	11/7/2023	H2SO4 Reagent Blank	0.0176	0.0779	0.0779	1	200	0.0156	0.0164			
029	11/7/2023	H2SO4 Reagent Blank	0.0167	0.0740	0.0740	1	200	0.0148	0.0156	0.0160	16.00038334	
013	11/7/2023	Test 1A H2SO4 Imp	0.0123	0.0545	0.0545	1	485	0.0264	0.0278			
013	11/7/2023	Test 1A H2SO4 Imp	0.0111	0.0492	0.0492	1	485	0.0238	0.0251	0.0265	26.47060503	
013	11/7/2023	Test 1A H2SO4 Imp	0.0144	0.0638	0.0638	1	485	0.0309	0.0326			
013	11/7/2023	Test 1A H2SO4 Imp	0.0115	0.0509	0.0509	1	485	0.0247	0.0260	0.0293	29.29866112	
015	11/7/2023	Test 2A H2SO4 Imp	0.0039	0.0173	0.0173	1	403	0.0070	0.0073			
015	11/7/2023	Test 2A H2SO4 Imp	0.0045	0.0199	0.0199	1	403	0.0080	0.0085	0.0079	7.89569937	
017	11/7/2023	Test 3A H2SO4 Imp	0.0153	0.0678	0.0678	1	499	0.0338	0.0356			
017	11/7/2023	Test 3A H2SO4 Imp	0.0137	0.0607	0.0607	1	499	0.0303	0.0319	0.0338	33.75241214	
025	11/7/2023	Train Blank A	0.0060	0.0266	0.0266	1	327	0.0087	0.0089			
025	11/7/2023	Train Blank A	0.0048	0.0213	0.0213	1	327	0.0070	0.0071	0.0080	8.041181557	
					Expected Value	% Difference						
		Run 1 H2SO4 Spike W/ 2ppm	0.2285	1.0120	0.9892							
Lot Number: Thermo 211-191JKS		Run 1 H2SO4 Spike W/ 2ppm	0.2181	0.9659	0.9892	0.02%						
CCV ppm F	Area	PPM F										
1 ppm ICV	0.2382	1.0550										
5 ppm CCV	1.159	5.1331										
5 ppm CCV	1.1494	5.0906										
5 ppm CCV	1.3442	5.9533										
Standard ppm F	Area	Difference										
1	0.2160	0.30%										
2	0.4482	1.47%										
5	1.1532	0.58%										
8	1.8747	0.63%										
10	2.2410	2.87%										

Client:	CalPortland	Analysis Date:	11/28/2023									
Facility:	Oro Grande	Analysis Location:	Elmhurst									
Test Location:	Kiln-Mill On	Analyst:	JMG									
Project Number:	M234508											
Method:	26A											
Date Samples Received:	11/14/2023											
Standard ppm HF	Area	Response Factor	Calculated Value	Slope of Regression Curve								
1	0.2147	0.2147	0.95	0.2258								
2	0.4350	0.2175	1.93									
5	1.1398	0.2280	5.05	Response Factor Ave								
8	1.8510	0.2314	8.20	0.2257								
10	2.3697	0.2370	10.50									
Lot Number	Ricca 8209004											
	R ²	0.9996										
Sample Number	Sample Date	Sample ID	Sample Area	PPM F	PPM X Dilution Factor	Dilution Factor	Total ml	mg F in soln	mg HF in soln	mg HF in soln avg	ug HF in soln	
031	11/7/2023	DI Reagent Blank	0.0024	0.0106	0.0106	1	200	0.0021	0.0022			
031	11/7/2023	DI Reagent Blank	0.0031	0.0137	0.0137	1	200	0.0027	0.0029	0.0026	2.565659136	
029	11/7/2023	H2SO4 Reagent Blank	0.0176	0.0779	0.0779	1	200	0.0156	0.0164			
029	11/7/2023	H2SO4 Reagent Blank	0.0167	0.0740	0.0740	1	200	0.0148	0.0156	0.0160	16.00038334	
019	11/7/2023	Test 1B H2SO4 Imp	0.0256	0.1134	0.1134	1	426	0.0483	0.0509			
019	11/7/2023	Test 1B H2SO4 Imp	0.0151	0.0669	0.0669	1	426	0.0285	0.0300	0.0404	40.4399193	
019	11/7/2023	Test 1B H2SO4 Imp	0.0203	0.0899	0.0899	1	426	0.0383	0.0403			
019	11/7/2023	Test 1B H2SO4 Imp	0.0235	0.1041	0.1041	1	426	0.0443	0.0467	0.0435	43.52010971	
021	11/7/2023	Test 2B H2SO4 Imp	0.0152	0.0673	0.0673	1	493	0.0332	0.0350			
021	11/7/2023	Test 2B H2SO4 Imp	0.0144	0.0638	0.0638	1	493	0.0314	0.0331	0.0340	34.03650058	
023	11/7/2023	Test 3B H2SO4 Imp	0.0181	0.0802	0.0802	1	432	0.0346	0.0365			
023	11/7/2023	Test 3B H2SO4 Imp	0.0157	0.0695	0.0695	1	432	0.0300	0.0316	0.0341	34.05702585	
027	11/7/2023	Train Blank B	0.2285	1.0120	1.0120	1	327	0.3309	0.3486			
027	11/7/2023	Train Blank B	0.2181	0.9659	0.9659	1	327	0.3159	0.3327	0.3406	340.6220382	
CCV ppm F	Area	PPM F										
1 ppm ICV	0.2382	1.0550										
5 ppm CCV	1.159	5.1331										
5 ppm CCV	1.1494	5.0906										
5 ppm CCV	1.1492	5.0897										
Standard ppm F	Area	Difference										
1	0.2160	0.30%										
2	0.4482	1.47%										
5	1.1532	0.58%										
8	1.8747	0.63%										
10	2.2410	2.87%										

Kiln-Mill On

Client: CalPortland	Analysis Date: 11/28/2023
Facility: Oro Grande	Analysis Location: Elmhurst
Test Location: Kiln-Mill On	Analyst: JMG
Project Number: M234508	
Method: 26A	
Date Samples Received: 11/14/2023	

Train A

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A NaOH Blank	M26A NaOH-R1	M26A NaOH-R1 Dup	RDL	MDL
Sodium Hydroxide Volume	ml	200	200	377	377		
Chlorine	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- NaOH R2	M26A- NaOH R3	Train A Blank		RDL	MDL
Sodium Hydroxide Volume	ml	282	380	276			
Chlorine	ug	<150	<150	<150		150	15

Train B

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A NaOH Blank	M26A NaOH-R1	M26A NaOH-R1 Dup	RDL	MDL
Sodium Hydroxide Volume	ml	200	200	289	289		
Chlorine	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- NaOH R2	M26A- NaOH R3	Train B Blank		RDL	MDL
Sodium Hydroxide Volume	ml	353	274	276			
Chlorine	ug	<150	<150	<150		150	15

Client:	CalPortland	Analysis Date:	11/28/2023							
Facility:	Oro Grande	Analysis Location:	Elmhurst Lab							
Test Location:	Kiln-Mill On	Analyst:	JMG							
Project Number:	M234508									
Method:	26A									
Date Samples Received:	11/14/2023									
Standard ppm Cl	Area	Response Factor	Calculated Value	Slope of Regression Curve						
1	0.1492	0.1492	1.07	0.1399						
2	0.2799	0.1400	2.00							
5	0.6772	0.1354	4.84	Response Factor Ave						
8	1.0942	0.1368	7.82	0.1399						
10	1.3792	0.1379	9.86							
Lot Number	Ricca 8209004									
	R²	0.9998								
Sample Number	Sample Date	Sample ID	Sample Area	PPM Cl	PPM X Dilution Factor	Dilution Factor	Total ml	mg Cl in soln	ug Cl2 in soln	ug Cl2 in soln
031	11/7/2023	DI Reagent Blank	0.0007	0.0050	0.0050	1	200	0.0010		
031	11/7/2023	DI Reagent Blank	0.0011	0.0079	0.0079	1	200	0.0016	0.0013	1.286729432
030	11/7/2023	NaOH Reagent Blank	0.0338	0.2416	0.2416	1	200	0.0483		
030	11/7/2023	NaOH Reagent Blank	0.0328	0.2345	0.2345	1	200	0.0469	0.0476	47.60898899
014	11/7/2023	Test 1A NaOH Imp	0.0046	0.0329	0.0329	1	377	0.0124		
014	11/7/2023	Test 1A NaOH Imp	0.0045	0.0322	0.0322	1	377	0.0121	0.0123	12.26217406
014	11/7/2023	Test 1A NaOH Imp	0.0055	0.0393	0.0393	1	377	0.0148		
014	11/7/2023	Test 1A NaOH Imp	0.0057	0.0407	0.0407	1	377	0.0154	0.0151	15.09190654
016	11/7/2023	Test 2A NaOH Imp	0.0143	0.1022	0.1022	1	282	0.0288		
016	11/7/2023	Test 2A NaOH Imp	0.0116	0.0829	0.0829	1	282	0.0234	0.0261	26.10559563
018	11/7/2023	Test 3A NaOH Imp	0.0030	0.0214	0.0214	1	380	0.0081		
018	11/7/2023	Test 3A NaOH Imp	0.0012	0.0086	0.0086	1	380	0.0033	0.0057	5.704500482
026	11/7/2023	Train Blank	0.0206	0.1473	0.1473	1	276	0.0406		
026	11/7/2023	Train Blank	0.0215	0.1537	0.1537	1	276	0.0424	0.0415	41.53133697
		Run 1 H2SO4 Spike W/ 2ppm	0.1348	0.9636	Expected Value	% Difference				
		Run 1 H2SO4 Spike W/ 2ppm	0.1337	0.9558	1.0167	5.61%				
CCV ppm Cl	Area	PPM Cl								
5 ppm ICV	0.6693	4.7845								
5 ppm CCV	0.6698	4.7881								
Standard ppm Cl	Area	Difference								
1	0.1575	2.63%								
2	0.3007	3.46%								
5	0.7168	2.76%								
8	1.1230	1.28%								
10	1.4157	1.29%								

Client:	CalPortland	Analysis Date:	11/28/2023							
Facility:	Oro Grande	Analysis Location:	Elmhurst Lab							
Test Location:	Kiln-Mill On	Analyst:	JMG							
Project Number:	M234508									
Method:	26A									
Date Samples Received:	11/14/2023									
Standard ppm Cl	Area	Response Factor	Calculated Value	Slope of Regression Curve						
1	0.1492	0.1492	1.07	0.1399						
2	0.2799	0.1400	2.00							
5	0.6772	0.1354	4.84	Response Factor Ave						
8	1.0942	0.1368	7.82	0.1399						
10	1.3792	0.1379	9.86							
Lot Number	Ricca 8209004									
	R²	0.9998								
Sample Number	Sample Date	Sample ID	Sample Area	PPM Cl	PPM X Dilution Factor	Dilution Factor	Total ml	mg Cl in soln	mg Cl2 in soln avg	ug Cl2 in soln
031	11/7/2023	DI Reagent Blank	0.0007	0.0050	0.0050	1	200	0.0010		
031	11/7/2023	DI Reagent Blank	0.0011	0.0079	0.0079	1	200	0.0016	0.0013	1.286729432
030	11/7/2023	NaOH Reagent Blank	0.0338	0.2416	0.2416	1	200	0.0483		
030	11/7/2023	NaOH Reagent Blank	0.0328	0.2345	0.2345	1	200	0.0469	0.0476	47.60898899
020	11/7/2023	Test 1B NaOH Imp	0.0042	0.0300	0.0300	1	289	0.0087		
020	11/7/2023	Test 1B NaOH Imp	0.0044	0.0315	0.0315	1	289	0.0091	0.0089	8.883437029
020	11/7/2023	Test 1B NaOH Imp	0.0046	0.0329	0.0329	1	289	0.0095		
020	11/7/2023	Test 1B NaOH Imp	0.0059	0.0422	0.0422	1	289	0.0122	0.0108	10.84605684
022	11/7/2023	Test 2B NaOH Imp	0.0012	0.0086	0.0086	1	353	0.0030		
022	11/7/2023	Test 2B NaOH Imp	0.0018	0.0129	0.0129	1	353	0.0045	0.0038	3.785129079
024	11/7/2023	Test 3B NaOH Imp	0.0022	0.0157	0.0157	1	274	0.0043		
024	11/7/2023	Test 3B NaOH Imp	0.0019	0.0136	0.0136	1	274	0.0037	0.0040	4.015310678
028	11/7/2023	Train B Train Blank	0.0206	0.1473	0.1473	1	276	0.0406		
028	11/7/2023	Train B Train Blank	0.0215	0.1537	0.1537	1	276	0.0424	0.0415	41.53133697
CCV ppm Cl	Area	PPM Cl								
5 ppm ICV	0.6693	4.7845								
5 ppm CCV	0.6698	4.7881								
5 ppm CCV	0.6925	4.9503								
Standard ppm Cl	Area	Difference								
1	0.1575	2.63%								
2	0.3007	3.46%								
5	0.7168	2.76%								
8	1.1230	1.28%								
10	1.4157	1.29%								

Kiln-Mill Off

Client: CalPortland	Analysis Date: 11/28/2023
Facility: Oro Grande	Analysis Location: Elmhurst
Test Location: Kiln-Mill Off	Analyst: JMG
Project Number: M234508	
Method: 26A	
Date Samples Received: 11/14/2023	

Train A

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A H2SO4 Blank	M26A H2SO4-R1	M26A H2SO4-R1 Dup	RDL	MDL
Sulfuric Acid Volume	ml	200	200	425	425		
Hydrofluoric Acid	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- H2SO4 R2	M26A- H2SO4 R3	Field Blank A		RDL	MDL
Sulfuric Acid Volume	ml	323	496	327			
Hydrofluoric Acid	ug	<150	<150	<150		150	15

Train B

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A H2SO4 Blank	M26A H2SO4-R1	M26A H2SO4-R1 Dup	RDL	MDL
Sulfuric Acid Volume	ml	200	200	406	406		
Hydrofluoric Acid	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- H2SO4 R2	M26A- H2SO4 R3	M26A- H2SO4 R4		RDL	MDL
Sulfuric Acid Volume	ml	462	409	327			
Hydrofluoric Acid	ug	<150	<150	341		150	15

Client:	CalPortland	Analysis Date:	11/28/2023									
Facility:	Oro Grande	Analysis Location:	Elmhurst									
Test Location:	Kiln-Mill Off	Analyst:	JMG									
Project Number:	M234508											
Method:	26A											
Date Samples Received:	11/14/2023											
Standard ppm HF	Area	Response Factor	Calculated Value	Slope of Regression Curve								
1	0.2147	0.2147	0.95	0.2258								
2	0.4350	0.2175	1.93									
5	1.1398	0.2280	5.05	Response Factor Ave								
8	1.8510	0.2314	8.20	0.2257								
10	2.3697	0.2370	10.50									
Lot Number	Ricca 8209004											
	R ²	0.9996										
Sample Number	Sample Date	Sample ID	Sample Area	PPM F	PPM X Dilution Factor	Dilution Factor	Total ml	mg F in soln	mg HF in soln	mg HF in soln avg	ug HF in soln	
031	11/7/2023	DI Reagent Blank	0.0024	0.0106	0.0106	1	200	0.0021	0.0022			
031	11/7/2023	DI Reagent Blank	0.0031	0.0137	0.0137	1	200	0.0027	0.0029	0.0026	2.565659136	
029	11/7/2023	H2SO4 Reagent Blank	0.0176	0.0779	0.0779	1	200	0.0156	0.0164			
029	11/7/2023	H2SO4 Reagent Blank	0.0167	0.0740	0.0740	1	200	0.0148	0.0156	0.0160	16.00038334	
001	11/7/2023	Test 1A H2SO4 Imp	0.0237	0.1050	0.1050	1	425	0.0446	0.0470			
001	11/7/2023	Test 1A H2SO4 Imp	0.0215	0.0952	0.0952	1	425	0.0405	0.0426	0.0448	44.80573818	
001	11/7/2023	Test 1A H2SO4 Imp	0.0259	0.1147	0.1147	1	425	0.0488	0.0513			
001	11/7/2023	Test 1A H2SO4 Imp	0.0229	0.1014	0.1014	1	425	0.0431	0.0454	0.0484	48.3743368	
003	11/7/2023	Test 2A H2SO4 Imp	0.0400	0.1772	0.1772	1	323	0.0572	0.0603			
003	11/7/2023	Test 2A H2SO4 Imp	0.0387	0.1714	0.1714	1	323	0.0554	0.0583	0.0593	59.29028346	
005	11/7/2023	Test 3A H2SO4 Imp	0.0235	0.1041	0.1041	1	496	0.0516	0.0544			
005	11/7/2023	Test 3A H2SO4 Imp	0.0196	0.0868	0.0868	1	496	0.0431	0.0453	0.0499	49.86148613	
025	11/7/2023	Train Blank A	0.0060	0.0266	0.0266	1	327	0.0087	0.0089			
025	11/7/2023	Train Blank A	0.0048	0.0213	0.0213	1	327	0.0070	0.0071	0.0080	8.041181557	
					Expected Value	% Difference						
		Run 1 H2SO4 Spike W/ 2ppm	0.2348	1.0399	1.0133							
Lot Number: Thermo 211-191JKS		Run 1 H2SO4 Spike W/ 2ppm	0.2362	1.0461	1.0133	2.93%						
CCV ppm F	Area	PPM F										
1 ppm ICV	0.2382	1.0550										
5 ppm CCV	1.1492	5.0897										
5 ppm CCV	1.0961	4.8545										
5 ppm CCV	1.1546	5.1136										
5 ppm CCV		0.0000										
Standard ppm F	Area	Difference										
1	0.2160	0.30%										
2	0.4482	1.47%										
5	1.1532	0.58%										
8	1.8747	0.63%										
10	2.2410	2.87%										

Client:	CalPortland	Analysis Date:	11/28/2023										
Facility:	Oro Grande	Analysis Location:	Elmhurst										
Test Location:	Kiln-Mill Off	Analyst:	JMG										
Project Number:	M234508												
Method:	26A												
Date Samples Received:	11/14/2023												
Standard ppm HF	Area	Response Factor	Calculated Value	Slope of Regression Curve									
1	0.2147	0.2147	0.95	0.2258									
2	0.4350	0.2175	1.93										
5	1.1398	0.2280	5.05	Response Factor Ave									
8	1.8510	0.2314	8.20	0.2257									
10	2.3697	0.2370	10.50										
Lot Number	Ricca 8209004												
	R ²	0.9996											
Sample COC	Sample Date	Sample ID	Sample Area	PPM F	PPM X Dilution Factor	Dilution Factor	Total ml	mg F in soln	mg HF in soln	mg HF in soln avg	ug HF in soln		
031	11/7/2023	DI Reagent Blank	0.0024	0.0106	0.0106	1	200	0.0021	0.0022				
031	11/7/2023	DI Reagent Blank	0.0031	0.0137	0.0137	1	200	0.0027	0.0029	0.0026	2.565659136		
029	11/7/2023	H2SO4 Reagent Blank	0.0176	0.0779	0.0779	1	200	0.0156	0.0164				
029	11/7/2023	H2SO4 Reagent Blank	0.0167	0.0740	0.0740	1	200	0.0148	0.0156	0.0160	16.00038334		
007	11/7/2023	Test 1B H2SO4 Imp	0.0230	0.1019	0.1019	1	406	0.0414	0.0436				
007	11/7/2023	Test 1B H2SO4 Imp	0.0223	0.0988	0.0988	1	406	0.0401	0.0422	0.0429	42.89735427		
007	11/7/2023	Test 1B H2SO4 Imp	0.0217	0.0961	0.0961	1	406	0.0390	0.0411				
007	11/7/2023	Test 1B H2SO4 Imp	0.0238	0.1054	0.1054	1	406	0.0428	0.0451	0.0431	43.08674656		
009	11/7/2023	Test 2B H2SO4 Imp	0.0281	0.1245	0.1245	1	462	0.0575	0.0606				
009	11/7/2023	Test 2B H2SO4 Imp	0.0302	0.1338	0.1338	1	462	0.0618	0.0651	0.0628	62.8227296		
011	11/7/2023	Test 3B H2SO4 Imp	0.0444	0.1966	0.1966	1	409	0.0804	0.0847				
011	11/7/2023	Test 3B H2SO4 Imp	0.0474	0.2099	0.2099	1	409	0.0859	0.0904	0.0876	87.57341005		
027	11/7/2023	Train Blank B	0.2285	1.0120	1.0120	1	327	0.3309	0.3486				
027	11/7/2023	Train Blank B	0.2181	0.9659	0.9659	1	327	0.3159	0.3327	0.3406	340.6220382		
CCV ppm F	Area	PPM CI											
1 ppm ICV	0.2382	1.0550											
5 ppm CCV	1.1492	5.0897											
5 ppm CCV	1.0961	4.8545											
5 ppm CCV	1.1492	5.0897											
Standard ppm CI	Area	Difference											
1	0.2160	0.30%											
2	0.4482	1.47%											
5	1.1532	0.58%											
8	1.8747	0.63%											
10	2.2410	2.87%											

Kiln-Mill Off

Client: CalPortland	Analysis Date: 11/28/2023
Facility: Oro Grande	Analysis Location: Elmhurst
Test Location: Kiln-Mill Off	Analyst: JMG
Project Number: M234508	
Method: 26A	
Date Samples Received: 11/14/2023	

Train A

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A NaOH Blank	M26A NaOH-R1	M26A NaOH-R1 Dup	RDL	MDL
Sodium Hydroxide Volume	ml	200	200	327	327		
Chlorine	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- NaOH R2	M26A- NaOH R3	Train A Blank		RDL	MDL
Sodium Hydroxide Volume	ml	347	347	276			
Chlorine	ug	<150	<150	<150		150	15

Train B

Sampling Date		11/7/2023	11/7/2023	11/7/2023	11/7/2023		
	UNITS	M26A DI Blank	M26A NaOH Blank	M26A NaOH-R1	M26A NaOH-R1 Dup	RDL	MDL
Sodium Hydroxide Volume	ml	200	200	259	259		
Chlorine	ug	<150	<150	<150	<150	150	15

Sampling Date		11/7/2023	11/7/2023	11/7/2023			
	UNITS	M26A- NaOH R2	M26A- NaOH R3	Train B Blank		RDL	MDL
Sodium Hydroxide Volume	ml	315	311	276			
Chlorine	ug	<150	<150	<150		150	15

Client:	CalPortland	Analysis Date:	11/28/2023							
Facility:	Oro Grande	Analysis Location:	Elmhurst Lab							
Test Location:	Kiln-Mill Off	Analyst:	JMG							
Project Number:	M234508									
Method:	26A									
Date Samples Received:	11/14/2023									
Standard ppm Cl	Area	Response Factor	Calculated Value	Slope of Regression Curve						
1	0.1492	0.1492	1.07	0.1399						
2	0.2799	0.1400	2.00							
5	0.6772	0.1354	4.84	Response Factor Ave						
8	1.0942	0.1368	7.82	0.1399						
10	1.3792	0.1379	9.86							
Lot Number	Ricca 8209004									
	R²	0.9998								
Sample Number	Sample Date	Sample ID	Sample Area	PPM Cl	PPM X Dilution Factor	Dilution Factor	Total ml	mg Cl in soln	ug Cl2 in soln	ug Cl2 in soln
031	11/7/2023	DI Reagent Blank	0.0007	0.0050	0.0050	1	200	0.0010		
031	11/7/2023	DI Reagent Blank	0.0011	0.0079	0.0079	1	200	0.0016	0.0013	1.286729432
030	11/7/2023	NaOH Reagent Blank	0.0338	0.2416	0.2416	1	200	0.0483		
030	11/7/2023	NaOH Reagent Blank	0.0328	0.2345	0.2345	1	200	0.0469	0.0476	47.60898899
002	11/7/2023	Test 1A NaOH Imp	0.0033	0.0236	0.0236	1	327	0.0077		
002	11/7/2023	Test 1A NaOH Imp	0.0051	0.0365	0.0365	1	327	0.0119	0.0098	9.817745566
002	11/7/2023	Test 1A NaOH Imp	0.0057	0.0407	0.0407	1	327	0.0133		
002	11/7/2023	Test 1A NaOH Imp	0.0039	0.0279	0.0279	1	327	0.0091	0.0112	11.22028065
004	11/7/2023	Test 2A NaOH Imp	0.0220	0.1573	0.1573	1	347	0.0546		
004	11/7/2023	Test 2A NaOH Imp	0.0237	0.1694	0.1694	1	347	0.0588	0.0567	56.68007406
006	11/7/2023	Test 3A NaOH Imp	0.0048	0.0343	0.0343	1	347	0.0119		
006	11/7/2023	Test 3A NaOH Imp	0.0066	0.0472	0.0472	1	347	0.0164	0.0141	14.13901191
026	11/7/2023	Train Blank	0.0206	0.1473	0.1473	1	276	0.0406		
026	11/7/2023	Train Blank	0.0215	0.1537	0.1537	1	276	0.0424	0.0415	41.53133697
		Run 1 H2SO4 Spike W/ 2ppm	0.1443	1.0315	Expected Value	% Difference				
		Run 1 H2SO4 Spike W/ 2ppm	0.1453	1.0387	1.0154	1.94%				
CCV ppm Cl	Area	PPM Cl								
5 ppm ICV	0.6693	4.7845								
5 ppm CCV	0.6925	4.9503								
5 ppm CCV	0.6633	4.7416								
Standard ppm Cl	Area	Difference								
1	0.1575	2.63%								
2	0.3007	3.46%								
5	0.7168	2.76%								
8	1.1230	1.28%								
10	1.4157	1.29%								

Client:	CalPortland	Analysis Date:	11/28/2023							
Facility:	Oro Grande	Analysis Location:	Elmhurst Lab							
Test Location:	Kiln-Mill Off	Analyst:	JMG							
Project Number:	M234508									
Method:	26A									
Date Samples Received:	11/14/2023									
Standard ppm Cl	Area	Response Factor	Calculated Value	Slope of Regression Curve						
1	0.1492	0.1492	1.07	0.1399						
2	0.2799	0.1400	2.00							
5	0.6772	0.1354	4.84	Response Factor Ave						
8	1.0942	0.1368	7.82	0.1399						
10	1.3792	0.1379	9.86							
Lot Number	Ricca 8209004									
	R²	0.9998								
Sample Number	Sample Date	Sample ID	Sample Area	PPM Cl	PPM X Dilution Factor	Dilution Factor	Total ml	mg Cl in soln	mg Cl2 in soln avg	ug Cl2 in soln
031	11/7/2023	DI Reagent Blank	0.0007	0.0050	0.0050	1	200	0.0010		
031	11/7/2023	DI Reagent Blank	0.0011	0.0079	0.0079	1	200	0.0016	0.0013	1.286729432
030	11/7/2023	NaOH Reagent Blank	0.0338	0.2416	0.2416	1	200	0.0483		
030	11/7/2023	NaOH Reagent Blank	0.0328	0.2345	0.2345	1	200	0.0469	0.0476	47.60898899
008	11/7/2023	Test 1B NaOH Imp	0.0018	0.0129	0.0129	1	259	0.0033		
008	11/7/2023	Test 1B NaOH Imp	0.0034	0.0243	0.0243	1	259	0.0063	0.0048	4.813797775
008	11/7/2023	Test 1B NaOH Imp	0.0026	0.0186	0.0186	1	259	0.0048		
008	11/7/2023	Test 1B NaOH Imp	0.0024	0.0172	0.0172	1	259	0.0044	0.0046	4.628651707
010	11/7/2023	Test 2B NaOH Imp	0.0058	0.0415	0.0415	1	315	0.0131		
010	11/7/2023	Test 2B NaOH Imp	0.0059	0.0422	0.0422	1	315	0.0133	0.0132	13.17289256
012	11/7/2023	Test 3B NaOH Imp	0.0051	0.0365	0.0365	1	311	0.0113		
012	11/7/2023	Test 3B NaOH Imp	0.0048	0.0343	0.0343	1	311	0.0107	0.0110	11.00475347
028	11/7/2023	Train B Train Blank	0.0206	0.1473	0.1473	1	276	0.0406		
028	11/7/2023	Train B Train Blank	0.0215	0.1537	0.1537	1	276	0.0424	0.0415	41.53133697
CCV ppm Cl	Area	PPM Cl								
5 ppm ICV	0.6693	4.7845								
5 ppm CCV	0.6925	4.9503								
5 ppm CCV	0.6633	4.7416								
Standard ppm Cl	Area	Difference								
1	0.1575	2.63%								
2	0.3007	3.46%								
5	0.7168	2.76%								
8	1.1230	1.28%								
10	1.4157	1.29%								

Appendix F - Reference Method Test Data

Client:	CalPortland Company, Inc.		
Facility:	Oro Grande Cement Plant		
Test Location:	Main Kiln A		
Project #:	M234508		
Test Method:	26A		
Test Engineer:	DV		
Test Technician:	ER		
	<u>Run 1A</u>	<u>Run 2A</u>	<u>Run 3A</u>
Temp ID:	CM23	CM23	CM23
Meter ID:	CM23	CM23	CM23
Pitot ID:	S8-031A	S8-031A	S8-031A
Nozzle Diameter (Inches):	0.274	0.274	0.274
Meter Calibration Date:	10/26/2023	10/26/2023	10/26/2023
Meter Calibration Factor (Y):	0.999	0.999	0.999
Meter Orifice Setting (Delta H):	1.790	1.790	1.790
Nozzle Kit ID Number and Material:	Glass	Glass	Glass
Pitot Tube Coefficient:		0.820	
Probe Length (Feet):		5.0	
Probe Liner Material:		Glass	
Sample Plane:		Horizontal	
Port Length (Inches):		3.00	
Port Size (Diameter, Inches):		4.00	
Port Type:		Flange	
Duct Shape:		Circular	
Diameter (Feet):		13.5	
Duct Area (Square Feet):		143.139	
Upstream Diameters:		10.5	
Downstream Diameters:		17.0	
Number of Ports Sampled:		4	
Number of Points per Port:		3	
Minutes per Point:		5.00	
Minutes per Reading:		5.00	
Total Number of Traverse Points:		12	
Test Length (Minutes):		60	
Train Type:		Anderson Box	
Source Condition:		Mill On	
Diluent Model/Serial Number:		CAI700/221018	
Moisture Balance ID:		LV3	
# of Runs		3	

Run 1A - Method 26A

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Test Location: Main Kiln A
Source Condition: Mill On

Date: 11/7/23
Start Time: 14:15
End Time: 15:24

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH :	2.55	in. H ₂ O		Static Pressure	-0.80	in. H ₂ O
Meter Temperature, Tm:		84.8	°F		Flue Pressure (Ps):	26.88	in. Hg. abs.
	Sqrt ΔP :	0.889	in. H ₂ O		Carbon Dioxide:	20.60	%
Stack Temperature, Ts:		307.9	°F		Oxygen:	9.00	%
Meter Volume, Vm:		59.192	ft ³		Nitrogen:	70.40	%
Meter Volume, Vmstd:		51.957	dscf		Gas Weight dry, Md:	31.656	lb/lb mole
Meter Volume, Vwstd:		4.418	wscf		Gas Weight wet, Ms:	30.586	lb/lb mole
Isokinetic Variance:		102.8	%I		Excess Air:	93.891	%
					Gas Velocity, Vs:	60.258	fps
Test Length:		60.00	in mins.		Volumetric Flow:	517,512	acfm
Nozzle Diameter:		0.274	in inches		Volumetric Flow:	294,634	dscfm
Barometric Pressure:		26.94	in Hg		Volumetric Flow:	319,687	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	3499.6	ml	Silica Initial Wt.	871.4	grams
Final Impinger Content:	3574.8	ml	Silica Final Wt.	890.0	grams
Impinger Difference:	75.2	ml	Silica Difference:	18.6	grams
Total Water Gain:	93.8		Moisture, Bws:	0.078	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	14:15:00	0.85	2.73	74.755	309	84	83	259	255	65
1-2	14:20:00	0.79	2.54	79.855	309	84	83	256	255	64
1-3	14:25:00	0.75	2.41	84.764	309	84	83	253	253	64
	14:30:00			89.555						
2-1	14:35:00	0.83	2.67	89.555	306	85	83	254	255	64
2-2	14:40:00	0.75	2.41	94.610	306	85	83	253	255	63
2-3	14:45:00	0.77	2.48	99.408	306	85	83	253	255	63
	14:50:00			104.275						
3-1	14:51:00	0.85	2.73	104.275	307	87	83	255	255	65
3-2	14:56:00	0.75	2.41	109.395	307	87	83	254	255	66
3-3	15:01:00	0.77	2.48	114.200	307	87	83	255	255	65
	15:06:00			119.070						
4-1	15:09:00	0.87	2.80	119.070	309	89	85	258	256	64
4-2	15:14:00	0.77	2.48	124.260	310	88	85	258	256	64
4-3	15:19:00	0.75	2.41	129.135	310	89	85	255	256	64
	15:24:00			133.947						

Total	1:00:00			59.192		86.2	83.5			
Average			2.55		307.9	84.8				
Min			2.41		306.0	83.0				
Max			2.80		310.0	89.0				

Impinger Weight Sheet - Run 1A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Project #: M234508
 Date: 11/7/2023
 Test Method: 26A
 Weighed/Measured By: KLJ
 Balance ID: LV3

Scale Calibration Check Date: 11/7/2023

Scale Calibration Check (see QS-6.05C for procedure)

must be within $\pm 0.5g$ of certified mass

<u>Certified Weight, grams</u>	<u>Result, grams</u>
250	<u>250.0</u>
500	<u>500.0</u>
750	<u>750.0</u>

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	744.1	704.4	39.7
0.1N H2SO4	762.1	736.4	25.7
Empty	628.0	628.6	-0.6
0.1N NaOH	693.0	685.2	7.8
0.1N NaOH	747.6	745.0	2.6
Silica Gel	890.0	871.4	18.6

<u>3,574.8</u>	<u>3,499.6</u>	<u>75.2</u>
Liquid Final	Liquid Initial	Liquid Gain
<u>890.0</u>	<u>871.4</u>	<u>18.6</u>
Silica Final	Silica Initial	Silica Gain

Run 2A - Method 26A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Source Condition: Mill On

Date: 11/7/23
 Start Time: 15:40
 End Time: 16:49

DRY GAS METER CONDITIONS

ΔH : 2.58 in. H₂O
 Meter Temperature, Tm: 84.5 °F
 $\sqrt{\Delta P}$: 0.896 in. H₂O
 Stack Temperature, Ts: 312.7 °F
 Meter Volume, Vm: 59.477 ft³
 Meter Volume, Vmstd: 52.240 dscf
 Meter Volume, Vwstd: 4.263 wscf
 Isokinetic Variance: 102.7 %I
 Test Length: 60.00 in mins.
 Nozzle Diameter: 0.274 in inches
 Barometric Pressure: 26.94 in Hg

STACK CONDITIONS

Static Pressure: -0.80 in. H₂O
 Flue Pressure (Ps): 26.88 in. Hg. abs.
 Carbon Dioxide: 20.80 %
 Oxygen: 8.80 %
 Nitrogen: 70.4 %
 Gas Weight dry, Md: 31.680 lb/lb mole
 Gas Weight wet, Ms: 30.648 lb/lb mole
 Excess Air: 89.928 %
 Gas Velocity, Vs: 60.833 fps
 Volumetric Flow: 522,454 acfm
 Volumetric Flow: 296,558 dscfm
 Volumetric Flow: 320,756 scfm

MOISTURE DETERMINATION

Initial Impinger Content: 3505.9 ml
 Final Impinger Content: 3585.9 ml
 Impinger Difference: 80.0 ml
 Silica Initial Wt. 916.6 grams
 Silica Final Wt. 927.1 grams
 Silica Difference: 10.5 grams
 Total Water Gain: 90.5
 Moisture, Bws: 0.075

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	15:40:00	0.85	2.73	31.975	313	88	84	257	257	65
1-2	15:45:00	0.80	2.57	37.089	313	89	83	257	256	66
1-3	15:50:00	0.75	2.41	42.050	312	90	83	257	255	66
	15:55:00			46.859						
2-1	15:58:00	0.83	2.67	46.859	313	88	84	254	250	65
2-2	16:03:00	0.80	2.57	51.915	313	88	84	253	251	64
2-3	16:08:00	0.77	2.48	56.870	313	89	84	253	252	64
	16:13:00			61.740						
3-1	16:16:00	0.85	2.73	61.740	313	86	82	257	262	66
3-2	16:21:00	0.80	2.57	66.840	313	86	82	257	262	66
3-3	16:26:00	0.75	2.41	71.778	313	86	82	256	260	65
	16:31:00			76.560						
4-1	16:34:00	0.85	2.73	76.560	312	84	79	255	253	64
4-2	16:39:00	0.82	2.64	81.635	312	85	79	255	254	64
4-3	16:44:00	0.77	2.48	86.622	312	85	79	255	256	64
	16:49:00			91.452						

Total 1:00:00 59.477 87.0 82.1
 Average 2.58 312.7 84.5
 Min 2.41 312.0 79.0
 Max 2.73 313.0 90.0

Impinger Weight Sheet - Run 2A

Client:	CalPortland Company, Inc.	Scale Calibration Check Date:	11/7/2023
Facility:	Oro Grande Cement Plant	<u>Scale Calibration Check (see QS-6.05C for procedure)</u>	
Test Location:	Main Kiln A	must be within $\pm 0.5g$ of certified mass	
Project #:	M234508	<u>Certified Weight, grams</u>	<u>Result, grams</u>
Date:	11/7/2023	250	250.0
Test Method:	26A		
Weighed/Measured By:	KLJ	500	500.0
Balance ID:	LV3	750	750.0

IMPINGER		FINAL		INITIAL		GAIN	
CONTENTS		MLS / GRAMS		MLS / GRAMS		MLS / GRAMS	
0.1N H2SO4		654.2		609.0		45.2	
0.1N H2SO4		787.6		755.6		32.0	
Empty		645.9		644.9		1.0	
0.1N NaOH		751.2		750.0		1.2	
0.1N NaOH		747.0		746.4		0.6	
Silica Gel		927.1		916.6		10.5	

3,585.9	3,505.9	80.0
Liquid Final	Liquid Initial	Liquid Gain
927.1	916.6	10.5
Silica Final	Silica Initial	Silica Gain

Run 3A - Method 26A

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Test Location: Main Kiln A
Source Condition: Mill On

Date: 11/7/23
Start Time: 17:10
End Time: 18:19

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH :	2.60	In. H ₂ O	Static Pressure	-0.80	in. H ₂ O	
Meter Temperature, Tm:	71.6	°F		Flue Pressure (Ps):	26.88	in. Hg. abs.	
	Sqrt ΔP :	0.899	In. H ₂ O	Carbon Dioxide:	21.00	%	
Stack Temperature, Ts:	314.9	°F		Oxygen:	8.73	%	
Meter Volume, Vm:	61.027	ft ³		Nitrogen:	70.27	%	
Meter Volume, Vmstd:	54.911	dscf		Gas Weight dry, Md:	31.709	lb/lb mole	
Meter Volume, Vwstd:	4.197	wscf		Gas Weight wet, Ms:	30.736	lb/lb mole	
Isokinetic Variance:	107.4	%I		Excess Air:	88.889	%	
				Gas Velocity, Vs:	61.053	fps	
Test Length:	60.00	in mins.		Volumetric Flow:	524,345	acfm	
Nozzle Diameter:	0.274	in inches		Volumetric Flow:	298,193	dscfm	
Barometric Pressure:	26.94	in Hg		Volumetric Flow:	320,982	scfm	

MOISTURE DETERMINATION

Initial Impinger Content:	3507.2	ml	Silica Initial Wt.	889.7	grams
Final Impinger Content:	3581.6	ml	Silica Final Wt.	904.4	grams
Impinger Difference:	74.4	ml	Silica Difference:	14.7	grams
Total Water Gain:	89.1		Moisture, Bws:	0.071	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	17:10:00	0.85	2.73	91.772	315	72	71	253	255	64
1-2	17:15:00	0.83	2.67	96.744	315	71	71	254	255	64
1-3	17:20:00	0.79	2.54	101.648	314	72	71	254	255	64
	17:25:00			106.445						
2-1	17:28:00	0.86	2.77	106.445	315	73	70	255	255	65
2-2	17:33:00	0.80	2.57	111.449	315	73	70	255	255	65
2-3	17:38:00	0.75	2.41	116.265	315	73	70	255	255	65
	17:43:00			120.936						
3-1	17:46:00	0.85	2.73	120.936	315	75	69	256	254	64
3-2	17:51:00	0.82	2.64	125.915	315	74	69	256	254	64
3-3	17:56:00	0.76	2.44	130.792	315	73	69	256	254	64
	18:01:00			135.488						
4-1	18:04:00	0.84	2.70	135.488	315	75	70	255	255	59
4-2	18:09:00	0.81	2.60	140.435	315	74	69	255	255	59
4-3	18:14:00	0.75	2.41	146.736	315	75	69	255	255	59
	18:19:00			152.799						

Total	1:00:00			61.027		73.3	69.8			
Average			2.60		314.9	71.6				
Min			2.41		314.0	69.0				
Max			2.77		315.0	75.0				

Impinger Weight Sheet - Run 3A

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln A Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	739.4	710.5	28.9
0.1N H2SO4	770.0	740.9	29.1
Empty	632.5	626.8	5.7
0.1N NaOH	687.0	686.3	0.7
0.1N NaOH	752.7	742.7	10.0
Silica Gel	904.4	889.7	14.7

<u>3,581.6</u> Liquid Final	<u>3,507.2</u> Liquid Initial	<u>74.4</u> Liquid Gain
<u>904.4</u> Silica Final	<u>889.7</u> Silica Initial	<u>14.7</u> Silica Gain

Client:	CalPortland Company, Inc.		
Facility:	Oro Grande Cement Plant		
Test Location:	Main Kiln		
Project #:	M234508		
Test Method:	26A		
Test Engineer:	RB		
Test Technician:	ER		
	<u>Run 1B</u>	<u>Run 2B</u>	<u>Run 3B</u>
Temp ID:	CM18	CM18	CM18
Meter ID:	CM18	CM18	CM18
Pitot ID:	S8-032A	S8-032A	S8-032A
Nozzle Diameter (Inches):	0.251	0.251	0.251
Meter Calibration Date:	10/17/2023	10/17/2023	10/17/2023
Meter Calibration Factor (Y):	0.987	0.987	0.987
Meter Orifice Setting (Delta H):	1.533	1.533	1.533
Nozzle Kit ID Number and Material:	glass	glass	glass
Pitot Tube Coefficient:		0.822	
Probe Length (Feet):		5.0	
Probe Liner Material:		Glass	
Sample Plane:		Horizontal	
Port Length (Inches):		3.00	
Port Size (Diameter, Inches):		4.00	
Port Type:		Flange	
Duct Shape:		Circular	
Diameter (Feet):		13.5	
Duct Area (Square Feet):		143.139	
Upstream Diameters:		10.5	
Downstream Diameters:		17.0	
Number of Ports Sampled:		4	
Number of Points per Port:		3	
Minutes per Point:		5.00	
Minutes per Reading:		5.00	
Total Number of Traverse Points:		12	
Test Length (Minutes):		60	
Train Type:		Anderson Box	
Source Condition:		Mill On	
Diluent Model/Serial Number:		CAI700/221018	
Moisture Balance ID:		LV3	
# of Runs		3	

Run 1B - Method 26A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Source Condition: Mill On

Date: 11/7/23
 Start Time: 14:15
 End Time: 15:24

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH :	1.56	in. H ₂ O	Static Pressure	-0.80	in. H ₂ O	
Meter Temperature, Tm:	79.7	°F		Flue Pressure (Ps):	26.88	in. Hg. abs.	
Sqrt ΔP :	0.902	in. H ₂ O		Carbon Dioxide:	20.60	%	
Stack Temperature, Ts:	311.0	°F		Oxygen:	9.00	%	
Meter Volume, Vm:	50.544	ft ³		Nitrogen:	70.40	%	
Meter Volume, Vmstd:	44.134	dscf		Gas Weight dry, Md:	31.656	lb/lb mole	
Meter Volume, Vwstd:	3.900	wscf		Gas Weight wet, Ms:	30.547	lb/lb mole	
Isokinetic Variance:	102.9	%I		Excess Air:	93.891	%	
				Gas Velocity, Vs:	61.395	fps	
Test Length:	60.00	in mins.		Volumetric Flow:	527,285	acfm	
Nozzle Diameter:	0.251	in inches		Volumetric Flow:	298,082	dscfm	
Barometric Pressure:	26.94	in Hg		Volumetric Flow:	324,422	scfm	

MOISTURE DETERMINATION

Initial Impinger Content:	3611.8	ml	Silica Initial Wt.	858.4	grams
Final Impinger Content:	3688.7	ml	Silica Final Wt.	864.3	grams
Impinger Difference:	76.9	ml	Silica Difference:	5.9	grams
Total Water Gain:	82.8		Moisture, Bws:	0.081	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	14:15:00	0.85	1.63	91.832	309	79	80	255	254	56
1-2	14:20:00	0.80	1.53	96.130	310	79	80	255	255	57
1-3	14:25:00	0.75	1.44	100.310	310	78	80	254	256	57
	14:30:00			104.356						
2-1	14:33:00	0.83	1.59	104.356	309	79	80	255	256	59
2-2	14:38:00	0.80	1.53	108.626	310	80	80	255	254	60
2-3	14:43:00	0.85	1.63	112.810	311	80	80	255	256	60
	14:48:00			117.119						
3-1	14:51:00	0.75	1.44	117.110	311	80	80	255	255	61
3-2	14:56:00	0.80	1.53	121.148	311	80	80	255	256	61
3-3	15:01:00	0.83	1.59	125.349	311	80	80	256	255	62
	15:06:00			129.588						
4-1	15:09:00	0.85	1.63	129.588	313	80	79	255	256	59
4-2	15:14:00	0.80	1.53	133.898	313	80	79	255	255	59
4-3	15:19:00	0.85	1.63	138.070	314	80	79	255	255	60
	15:24:00			142.367						

Total	1:00:00			50.544		79.6	79.8			
Average			1.56		311.0	79.7				
Min			1.44		309.0	78.0				
Max			1.63		314.0	80.0				

Impinger Weight Sheet - Run 1B

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	790.0	745.0	45.0
0.1N H2SO4	759.0	737.5	21.5
Empty	655.3	648.5	6.8
0.1N NaOH	740.0	736.4	3.6
0.1N NaOH	744.4	744.4	0.0
Silica Gel	864.3	858.4	5.9

<u>3,688.7</u> Liquid Final	<u>3,611.8</u> Liquid Initial	<u>76.9</u> Liquid Gain
<u>864.3</u> Silica Final	<u>858.4</u> Silica Initial	<u>5.9</u> Silica Gain

Run 2B - Method 26A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Source Condition: Mill On

Date: 11/7/23
 Start Time: 15:40
 End Time: 16:49

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH :	1.54	In. H ₂ O	Static Pressure	-0.80	in. H ₂ O	
Meter Temperature, Tm:	73.6	°F		Flue Pressure (Ps):	26.88	in. Hg. abs.	
Sqrt ΔP :	0.896	In. H ₂ O		Carbon Dioxide:	20.80	%	
Stack Temperature, Ts:	313.4	°F		Oxygen:	8.80	%	
Meter Volume, Vm:	49.663	ft ³		Nitrogen:	70.4	%	
Meter Volume, Vmstd:	43.853	dscf		Gas Weight dry, Md:	31.680	lb/lb mole	
Meter Volume, Vwstd:	4.889	wscf		Gas Weight wet, Ms:	30.308	lb/lb mole	
Isokinetic Variance:	104.8	%I		Excess Air:	89.928	%	
				Gas Velocity, Vs:	61.323	fps	
Test Length:	60.00	in mins.		Volumetric Flow:	526,665	acfm	
Nozzle Diameter:	0.251	in inches		Volumetric Flow:	290,627	dscfm	
Barometric Pressure:	26.94	in Hg		Volumetric Flow:	323,028	scfm	

MOISTURE DETERMINATION

Initial Impinger Content:	3549.3	ml	Silica Initial Wt.	836.4	grams
Final Impinger Content:	3623.5	ml	Silica Final Wt.	866.0	grams
Impinger Difference:	74.2	ml	Silica Difference:	29.6	grams
Total Water Gain:	103.8		Moisture, Bws:	0.100	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	15:40:00	0.80	1.53	42.580	313	75	73	255	255	51
1-2	15:45:00	0.85	1.63	46.724	313	74	75	255	255	52
1-3	15:50:00	0.80	1.53	50.988	313	75	75	256	255	52
	15:55:00			55.130						
2-1	15:58:00	0.75	1.44	55.130	313	75	73	255	256	54
2-2	16:03:00	0.80	1.53	59.122	314	75	74	255	255	55
2-3	16:08:00	0.85	1.63	63.277	314	75	73	255	256	55
	16:13:00			67.535						
3-1	16:16:00	0.77	1.48	67.535	314	75	73	255	255	55
3-2	16:21:00	0.83	1.59	71.598	313	75	73	255	255	54
3-3	16:26:00	0.80	1.53	75.808	313	74	72	255	255	55
	16:31:00			79.934						
4-1	16:34:00	0.83	1.59	79.934	313	74	72	255	255	52
4-2	16:39:00	0.75	1.44	84.147	314	73	71	255	256	52
4-3	16:44:00	0.80	1.53	88.111	314	73	70	255	255	51
	16:49:00			92.243						

Total	1:00:00			49.663		74.4	72.8			
Average			1.54		313.4	73.6				
Min			1.44		313.0	70.0				
Max			1.63		314.0	75.0				

Impinger Weight Sheet - Run 2B

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: 11/7/2023 Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	788.1	747.0	41.1
0.1N H2SO4	770.4	745.9	24.5
Empty	662.7	654.8	7.9
0.1N NaOH	702.3	701.6	0.7
0.1N NaOH	700.0	700.0	0.0
Silica Gel	866.0	836.4	29.6

<u>3,623.5</u> Liquid Final	<u>3,549.3</u> Liquid Initial	<u>74.2</u> Liquid Gain
<u>866.0</u> Silica Final	<u>836.4</u> Silica Initial	<u>29.6</u> Silica Gain

Run 3B - Method 26A

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Test Location: Main Kiln
Source Condition: Mill On

Date: 11/7/23
Start Time: 17:10
End Time: 18:19

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH :	1.56	In. H ₂ O	Static Pressure	-0.80	in. H ₂ O	
Meter Temperature, Tm:	67.1	°F		Flue Pressure (Ps):	26.88	in. Hg. abs.	
	Sqrt ΔP :	0.902	In. H ₂ O	Carbon Dioxide:	21.00	%	
Stack Temperature, Ts:	314.8	°F		Oxygen:	8.73	%	
Meter Volume, Vm:	49.301	ft ³		Nitrogen:	70.27	%	
Meter Volume, Vmstd:	44.076	dscf		Gas Weight dry, Md:	31.709	lb/lb mole	
Meter Volume, Vwstd:	4.503	wscf		Gas Weight wet, Ms:	30.439	lb/lb mole	
Isokinetic Variance:	104.1	%I		Excess Air:	88.889	%	
				Gas Velocity, Vs:	61.661	fps	
Test Length:	60.00	in mins.		Volumetric Flow:	529,564	acfm	
Nozzle Diameter:	0.251	in inches		Volumetric Flow:	294,161	dscfm	
Barometric Pressure:	26.94	in Hg		Volumetric Flow:	324,212	scfm	

MOISTURE DETERMINATION

Initial Impinger Content:	3599.8	ml	Silica Initial Wt.	864.3	grams
Final Impinger Content:	3683.6	ml	Silica Final Wt.	876.1	grams
Impinger Difference:	83.8	ml	Silica Difference:	11.8	grams
Total Water Gain:	95.6		Moisture, Bws:	0.093	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	17:10:00	0.80	1.53	94.115	312	68	67	255	255	50
1-2	17:15:00	0.85	1.63	98.211	314	68	67	255	255	54
1-3	17:20:00	0.80	1.53	102.410	315	69	67	255	255	56
	17:25:00			106.499						
2-1	17:28:00	0.78	1.50	106.499	315	68	65	255	255	56
2-2	17:33:00	0.85	1.63	110.528	316	68	66	255	255	52
2-3	17:38:00	0.80	1.53	114.725	316	68	66	257	255	54
	17:43:00			118.777						
3-1	17:46:00	0.85	1.63	118.777	315	68	65	256	260	56
3-2	17:51:00	0.80	1.53	122.983	315	69	65	255	256	55
3-3	17:56:00	0.83	1.59	127.050	315	69	65	255	255	54
	18:01:00			131.187						
4-1	18:04:00	0.85	1.63	131.187	315	69	65	255	257	53
4-2	18:09:00	0.80	1.53	135.377	315	69	65	255	256	52
4-3	18:14:00	0.75	1.44	139.471	315	69	65	255	255	52
	18:19:00			143.416						

Total	1:00:00			49.301		68.5	65.7			
Average			1.56		314.8	67.1				
Min			1.44		312.0	65.0				
Max			1.63		316.0	69.0				

Impinger Weight Sheet - Run 3B

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	787.2	746.0	41.2
0.1N H2SO4	766.9	734.9	32.0
Empty	653.5	646.8	6.7
0.1N NaOH	737.7	735.2	2.5
0.1N NaOH	738.3	736.9	1.4
Silica Gel	876.1	864.3	11.8

<u>3,683.6</u> Liquid Final	<u>3,599.8</u> Liquid Initial	<u>83.8</u> Liquid Gain
<u>876.1</u> Silica Final	<u>864.3</u> Silica Initial	<u>11.8</u> Silica Gain

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Test Location: Main Kiln Stack
Date: 11/7/23

Run 1

Spectrum	Time	H2O %	FTIR Data			Cell Temp	Pressure	Analyzer Data
			CO2 % (wet)	HCN ppmvw	HF ppmvw			O2 % (dry)
MILLON_R1_000971.LAB	14:15	8.47	18.61	0.77	0.10	190.52	0.91	9.16
MILLON_R1_000972.LAB	14:16	8.49	18.63	0.77	0.10	190.51	0.91	9.14
MILLON_R1_000973.LAB	14:17	8.46	18.66	0.79	0.10	190.57	0.91	9.12
MILLON_R1_000974.LAB	14:18	8.47	18.70	0.81	0.10	190.69	0.91	9.10
MILLON_R1_000975.LAB	14:19	8.45	18.62	0.85	0.10	190.65	0.91	9.12
MILLON_R1_000976.LAB	14:20	8.44	18.62	0.79	0.10	190.55	0.91	9.10
MILLON_R1_000977.LAB	14:21	8.46	18.56	0.85	0.10	190.72	0.91	9.12
MILLON_R1_000978.LAB	14:22	8.44	18.61	0.81	0.10	190.83	0.91	9.14
MILLON_R1_000979.LAB	14:23	8.44	18.65	0.77	0.10	190.83	0.91	9.13
MILLON_R1_000980.LAB	14:24	8.44	18.69	0.85	0.10	190.76	0.91	9.11
MILLON_R1_000981.LAB	14:25	8.43	18.67	0.75	0.10	190.61	0.91	9.11
MILLON_R1_000982.LAB	14:26	8.44	18.76	0.79	0.10	190.56	0.91	9.07
MILLON_R1_000983.LAB	14:27	8.46	18.70	0.85	0.10	190.59	0.91	9.07
MILLON_R1_000984.LAB	14:28	8.48	18.76	0.86	0.10	190.57	0.91	9.04
MILLON_R1_000985.LAB	14:29	8.47	18.78	0.79	0.10	190.54	0.91	9.05
MILLON_R1_000986.LAB	14:30	8.48	18.84	0.81	0.10	190.54	0.91	9.01
MILLON_R1_000987.LAB	14:31	8.49	18.79	0.82	0.10	190.69	0.91	9.05
MILLON_R1_000988.LAB	14:32	8.50	18.73	0.74	0.10	190.74	0.91	9.05
MILLON_R1_000989.LAB	14:33	8.51	18.85	0.81	0.10	190.85	0.91	9.02
MILLON_R1_000990.LAB	14:34	8.51	18.82	0.78	0.10	190.77	0.91	8.99
MILLON_R1_000991.LAB	14:35	8.50	18.81	0.80	0.10	190.60	0.91	9.03
MILLON_R1_000992.LAB	14:36	8.47	18.81	0.81	0.10	190.52	0.91	9.00
MILLON_R1_000993.LAB	14:37	8.48	18.87	0.81	0.10	190.47	0.91	9.01
MILLON_R1_000994.LAB	14:38	8.47	18.79	0.82	0.10	190.44	0.91	9.00
MILLON_R1_000995.LAB	14:39	8.49	18.92	0.79	0.10	190.44	0.91	9.00
MILLON_R1_000996.LAB	14:40	8.45	18.79	0.81	0.10	190.43	0.91	8.96
MILLON_R1_000997.LAB	14:41	8.46	18.91	0.83	0.10	190.45	0.91	9.02
MILLON_R1_000998.LAB	14:42	8.45	18.84	0.80	0.10	190.44	0.91	8.95
MILLON_R1_000999.LAB	14:43	8.45	18.85	0.77	0.10	190.43	0.91	9.00
MILLON_R1_001000.LAB	14:44	8.45	18.78	0.82	0.10	190.64	0.91	8.98
MILLON_R1_001001.LAB	14:45	8.47	18.97	0.83	0.10	190.92	0.91	9.01
MILLON_R1_001002.LAB	14:46	8.45	18.91	0.80	0.10	190.91	0.91	8.95
MILLON_R1_001003.LAB	14:47	8.44	18.85	0.75	0.10	190.86	0.91	8.97
MILLON_R1_001004.LAB	14:48	8.43	18.83	0.84	0.10	190.88	0.91	8.98
MILLON_R1_001005.LAB	14:49	8.37	18.96	0.84	0.10	190.75	0.91	8.97
MILLON_R1_001006.LAB	14:50	8.37	18.95	0.79	0.10	190.74	0.91	8.94
MILLON_R1_001007.LAB	14:51	8.32	18.96	0.81	0.10	190.71	0.91	8.95
MILLON_R1_001008.LAB	14:52	8.32	18.91	0.86	0.10	190.79	0.91	8.93
MILLON_R1_001009.LAB	14:53	8.34	19.00	0.76	0.10	190.71	0.91	8.95
MILLON_R1_001010.LAB	14:54	8.38	18.96	0.76	0.10	190.54	0.91	8.90
MILLON_R1_001011.LAB	14:55	8.39	19.00	0.81	0.10	190.54	0.91	8.88
MILLON_R1_001012.LAB	14:56	8.39	19.00	0.82	0.10	190.57	0.91	8.90
MILLON_R1_001013.LAB	14:57	8.41	18.92	0.79	0.10	190.54	0.91	8.91
MILLON_R1_001014.LAB	14:58	8.44	18.92	0.81	0.10	190.54	0.91	8.91
MILLON_R1_001015.LAB	14:59	8.45	18.93	0.82	0.10	190.58	0.91	8.95
MILLON_R1_001016.LAB	15:00	8.48	18.96	0.83	0.10	190.72	0.91	8.92
MILLON_R1_001017.LAB	15:01	8.46	18.86	0.84	0.10	190.87	0.91	8.93
MILLON_R1_001018.LAB	15:02	8.46	18.95	0.84	0.10	190.85	0.91	8.92
MILLON_R1_001019.LAB	15:03	8.46	18.88	0.79	0.10	190.77	0.91	8.98
MILLON_R1_001020.LAB	15:04	8.46	19.04	0.78	0.10	190.63	0.91	8.95
MILLON_R1_001021.LAB	15:05	8.45	18.97	0.80	0.10	190.67	0.91	8.95
MILLON_R1_001022.LAB	15:06	8.46	19.03	0.78	0.10	190.81	0.91	8.88
MILLON_R1_001023.LAB	15:07	8.46	18.85	0.82	0.10	190.86	0.91	8.92
MILLON_R1_001024.LAB	15:08	8.46	18.93	0.82	0.10	190.75	0.91	8.89
MILLON_R1_001025.LAB	15:09	8.45	18.87	0.84	0.10	190.69	0.91	8.94
MILLON_R1_001026.LAB	15:10	8.47	18.91	0.86	0.10	190.80	0.91	8.91
MILLON_R1_001027.LAB	15:11	8.50	18.90	0.89	0.10	190.97	0.91	8.93
MILLON_R1_001028.LAB	15:12	8.50	18.94	0.83	0.10	190.98	0.91	8.92
MILLON_R1_001029.LAB	15:13	8.53	18.91	0.84	0.10	190.88	0.91	8.91
MILLON_R1_001030.LAB	15:14	8.55	18.95	0.76	0.10	190.73	0.91	8.90
Average		8.45	18.84	0.81	0.10	190.68	0.91	8.99

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Project #: M234508
 Test Location: Main Kiln Stack
 Date: 11/7/23

Run 2

Spectrum	Time	H2O %	FTIR Data			Cell Temp	Pressure	Analyzer Data
			CO2 % (wet)	HCN ppmvw	HF ppmvw			O2 % (dry)
MILLON_R2_001086.LAB	15:40	8.63	19.1	0.75	0.10	190.5	0.91	8.78
MILLON_R2_001087.LAB	15:41	8.63	19.0	0.77	0.10	190.5	0.91	8.84
MILLON_R2_001088.LAB	15:42	8.68	19.0	0.80	0.10	190.6	0.91	8.85
MILLON_R2_001089.LAB	15:43	8.61	19.0	0.82	0.10	190.8	0.91	8.83
MILLON_R2_001090.LAB	15:44	8.71	19.1	0.82	0.10	190.6	0.91	8.79
MILLON_R2_001091.LAB	15:45	8.64	19.0	0.84	0.10	190.5	0.91	8.82
MILLON_R2_001092.LAB	15:46	8.75	19.0	0.84	0.10	190.7	0.91	8.83
MILLON_R2_001093.LAB	15:47	8.68	19.0	0.80	0.10	190.7	0.91	8.80
MILLON_R2_001094.LAB	15:48	8.69	19.0	0.81	0.10	190.7	0.91	8.79
MILLON_R2_001095.LAB	15:49	8.68	19.0	0.83	0.10	190.8	0.91	8.81
MILLON_R2_001096.LAB	15:50	8.67	19.1	0.88	0.10	190.9	0.91	8.79
MILLON_R2_001097.LAB	15:51	8.69	19.0	0.83	0.10	190.9	0.91	8.80
MILLON_R2_001098.LAB	15:52	8.68	19.0	0.85	0.10	190.6	0.91	8.79
MILLON_R2_001099.LAB	15:53	8.68	19.0	0.87	0.10	190.4	0.91	8.80
MILLON_R2_001100.LAB	15:54	8.68	19.0	0.82	0.10	190.5	0.91	8.77
MILLON_R2_001101.LAB	15:55	8.71	19.1	0.79	0.10	190.7	0.91	8.78
MILLON_R2_001102.LAB	15:56	8.72	19.1	0.87	0.10	190.7	0.91	8.73
MILLON_R2_001103.LAB	15:57	8.74	19.1	0.81	0.10	190.7	0.91	8.72
MILLON_R2_001104.LAB	15:58	8.73	19.0	0.84	0.10	190.7	0.91	8.72
MILLON_R2_001105.LAB	15:59	8.76	19.0	0.83	0.10	190.6	0.91	8.76
MILLON_R2_001106.LAB	16:00	8.79	19.0	0.78	0.10	190.6	0.91	8.76
MILLON_R2_001107.LAB	16:01	8.79	19.1	0.82	0.10	190.7	0.91	8.79
MILLON_R2_001108.LAB	16:02	8.84	19.0	0.85	0.10	190.6	0.91	8.76
MILLON_R2_001109.LAB	16:03	8.83	19.0	0.85	0.10	190.5	0.91	8.76
MILLON_R2_001110.LAB	16:04	8.81	19.0	0.81	0.10	190.5	0.91	8.78
MILLON_R2_001111.LAB	16:05	8.81	19.0	0.85	0.10	190.7	0.91	8.81
MILLON_R2_001112.LAB	16:06	8.82	19.0	0.83	0.10	190.8	0.91	8.79
MILLON_R2_001113.LAB	16:07	8.81	19.0	0.79	0.10	190.7	0.91	8.81
MILLON_R2_001114.LAB	16:08	8.81	19.0	0.83	0.10	190.6	0.91	8.79
MILLON_R2_001115.LAB	16:09	8.84	19.0	0.93	0.10	190.6	0.91	8.83
MILLON_R2_001116.LAB	16:10	8.84	19.0	0.90	0.10	190.6	0.91	8.78
MILLON_R2_001117.LAB	16:11	8.90	19.0	0.87	0.10	190.6	0.91	8.81
MILLON_R2_001118.LAB	16:12	8.91	19.1	0.87	0.10	190.6	0.91	8.77
MILLON_R2_001119.LAB	16:13	8.94	19.0	0.91	0.10	190.6	0.91	8.75
MILLON_R2_001120.LAB	16:14	8.93	19.0	0.88	0.10	190.8	0.91	8.75
MILLON_R2_001121.LAB	16:15	8.95	19.1	0.87	0.10	190.9	0.91	8.81
MILLON_R2_001122.LAB	16:16	8.94	19.0	0.84	0.10	190.9	0.91	8.77
MILLON_R2_001123.LAB	16:17	8.92	19.0	0.85	0.10	190.9	0.91	8.75
MILLON_R2_001124.LAB	16:18	8.90	19.0	0.88	0.10	190.8	0.91	8.76
MILLON_R2_001125.LAB	16:19	8.89	19.1	0.85	0.10	190.8	0.91	8.76
MILLON_R2_001126.LAB	16:20	8.86	19.1	0.84	0.10	190.7	0.91	8.79
MILLON_R2_001127.LAB	16:21	8.86	19.0	0.85	0.10	190.8	0.91	8.80
MILLON_R2_001128.LAB	16:22	8.85	19.0	0.87	0.10	190.8	0.91	8.81
MILLON_R2_001129.LAB	16:25	8.83	18.9	0.83	0.10	190.8	0.91	8.78
MILLON_R2_001130.LAB	16:26	8.82	19.0	0.87	0.10	190.9	0.91	8.79
MILLON_R2_001131.LAB	16:27	8.82	18.9	0.80	0.10	190.8	0.91	8.82
MILLON_R2_001132.LAB	16:28	8.83	18.8	0.91	0.10	190.8	0.91	8.80
MILLON_R2_001133.LAB	16:29	8.86	18.9	0.86	0.10	190.8	0.91	8.86
MILLON_R2_001134.LAB	16:30	8.87	19.0	0.86	0.10	190.8	0.91	8.89
MILLON_R2_001135.LAB	16:31	8.85	18.9	0.88	0.10	190.8	0.91	8.87
MILLON_R2_001136.LAB	16:32	8.87	18.9	0.90	0.10	190.9	0.91	8.80
MILLON_R2_001137.LAB	16:33	8.84	18.9	0.94	0.10	190.9	0.91	8.82
MILLON_R2_001138.LAB	16:34	8.82	18.9	0.84	0.10	190.8	0.91	8.84
MILLON_R2_001139.LAB	16:35	8.76	19.0	0.86	0.10	190.6	0.91	8.83
MILLON_R2_001140.LAB	16:36	8.70	19.0	0.90	0.10	190.6	0.91	8.81
MILLON_R2_001141.LAB	16:37	8.69	19.0	0.86	0.10	190.5	0.91	8.84
MILLON_R2_001142.LAB	16:38	8.64	19.0	0.83	0.10	190.5	0.91	8.83
MILLON_R2_001143.LAB	16:39	8.72	19.1	0.85	0.10	190.7	0.91	8.81
MILLON_R2_001144.LAB	16:40	8.66	19.1	0.87	0.10	190.6	0.91	8.81
MILLON_R2_001145.LAB	16:41	8.74	19.1	0.84	0.10	190.6	0.91	8.83
Average		8.78	19.02	0.85	0.10	190.69	0.91	8.80

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Project #: M234508
 Test Location: Main Kiln Stack
 Date: 11/7/23

Run 3

Spectrum	Time	H2O %	FTIR Data			Cell Temp	Pressure	Analyzer Data
			CO2 % (wet)	HCN ppmvw	HF ppmvw			O2 % (dry)
MILLON_R3_001214.LAB	17:10	8.69	19.2	0.80	0.10	190.9	0.91	8.78
MILLON_R3_001215.LAB	17:11	8.67	19.1	0.88	0.10	191.0	0.91	8.79
MILLON_R3_001216.LAB	17:12	8.69	19.1	0.91	0.10	190.9	0.91	8.78
MILLON_R3_001217.LAB	17:13	8.61	19.0	0.91	0.10	190.8	0.91	8.80
MILLON_R3_001218.LAB	17:14	8.67	19.0	0.83	0.10	190.8	0.91	8.80
MILLON_R3_001219.LAB	17:15	8.67	19.0	0.88	0.10	190.7	0.91	8.82
MILLON_R3_001220.LAB	17:16	8.60	19.1	0.88	0.10	190.6	0.91	8.78
MILLON_R3_001221.LAB	17:17	8.64	19.1	0.85	0.10	190.7	0.91	8.79
MILLON_R3_001222.LAB	17:18	8.62	19.2	0.94	0.10	190.7	0.91	8.77
MILLON_R3_001223.LAB	17:19	8.65	19.1	0.83	0.10	190.6	0.91	8.77
MILLON_R3_001224.LAB	17:20	8.61	19.2	0.87	0.10	190.6	0.91	8.78
MILLON_R3_001225.LAB	17:21	8.60	19.1	0.85	0.10	190.7	0.91	8.80
MILLON_R3_001226.LAB	17:22	8.60	19.2	0.87	0.10	190.7	0.91	8.77
MILLON_R3_001227.LAB	17:23	8.61	19.2	0.87	0.10	190.7	0.91	8.74
MILLON_R3_001228.LAB	17:24	8.62	19.2	0.90	0.10	190.6	0.91	8.74
MILLON_R3_001229.LAB	17:25	8.63	19.1	0.88	0.10	190.6	0.91	8.74
MILLON_R3_001230.LAB	17:26	8.65	19.2	0.86	0.10	190.7	0.91	8.74
MILLON_R3_001231.LAB	17:27	8.67	19.1	0.85	0.10	190.7	0.91	8.73
MILLON_R3_001232.LAB	17:28	8.61	19.1	0.85	0.10	190.5	0.91	8.77
MILLON_R3_001233.LAB	17:29	8.70	19.2	0.90	0.10	190.6	0.91	8.77
MILLON_R3_001234.LAB	17:30	8.61	19.2	0.95	0.10	190.5	0.91	8.72
MILLON_R3_001235.LAB	17:31	8.69	19.2	0.95	0.10	190.5	0.91	8.70
MILLON_R3_001236.LAB	17:32	8.62	19.2	0.92	0.10	190.6	0.91	8.71
MILLON_R3_001237.LAB	17:33	8.68	19.3	0.95	0.10	190.6	0.91	8.72
MILLON_R3_001238.LAB	17:34	8.62	19.2	0.88	0.10	190.6	0.91	8.70
MILLON_R3_001239.LAB	17:35	8.69	19.2	0.90	0.10	190.7	0.91	8.72
MILLON_R3_001240.LAB	17:36	8.62	19.2	0.85	0.10	190.6	0.91	8.73
MILLON_R3_001241.LAB	17:37	8.71	19.2	0.96	0.10	190.7	0.91	8.74
MILLON_R3_001242.LAB	17:38	8.66	19.2	0.98	0.10	190.7	0.91	8.70
MILLON_R3_001243.LAB	17:39	8.67	19.3	0.88	0.10	190.7	0.91	8.71
MILLON_R3_001244.LAB	17:40	8.68	19.2	0.93	0.10	190.7	0.91	8.67
MILLON_R3_001245.LAB	17:41	8.65	19.3	0.99	0.10	190.7	0.91	8.69
MILLON_R3_001246.LAB	17:42	8.72	19.2	0.88	0.10	190.7	0.91	8.66
MILLON_R3_001247.LAB	17:43	8.61	19.2	0.94	0.10	190.7	0.91	8.73
MILLON_R3_001248.LAB	17:44	8.72	19.1	0.92	0.10	190.7	0.91	8.75
MILLON_R3_001249.LAB	17:45	8.61	19.2	0.95	0.10	190.7	0.91	8.72
MILLON_R3_001250.LAB	17:46	8.67	19.1	0.95	0.10	190.7	0.91	8.72
MILLON_R3_001251.LAB	17:47	8.60	19.1	0.94	0.10	190.7	0.91	8.74
MILLON_R3_001252.LAB	17:48	8.68	19.1	0.90	0.10	190.7	0.91	8.75
MILLON_R3_001253.LAB	17:49	8.60	19.2	0.92	0.10	190.7	0.91	8.73
MILLON_R3_001254.LAB	17:50	8.68	19.2	0.92	0.10	190.7	0.91	8.75
MILLON_R3_001255.LAB	17:51	8.62	19.2	0.96	0.10	190.7	0.91	8.72
MILLON_R3_001256.LAB	17:52	8.68	19.3	0.93	0.10	190.7	0.91	8.68
MILLON_R3_001257.LAB	17:53	8.61	19.3	0.92	0.10	190.7	0.91	8.68
MILLON_R3_001258.LAB	17:54	8.71	19.2	0.98	0.10	190.7	0.91	8.63
MILLON_R3_001259.LAB	17:55	8.64	19.2	0.96	0.10	190.7	0.91	8.65
MILLON_R3_001260.LAB	17:56	8.72	19.3	0.96	0.10	190.7	0.91	8.67
MILLON_R3_001261.LAB	17:57	8.68	19.2	0.92	0.10	190.7	0.91	8.66
MILLON_R3_001262.LAB	17:58	8.68	19.2	0.96	0.10	190.7	0.91	8.64
MILLON_R3_001263.LAB	17:59	8.71	19.2	0.98	0.10	190.7	0.91	8.66
MILLON_R3_001264.LAB	18:00	8.70	19.2	0.94	0.10	190.7	0.91	8.65
MILLON_R3_001265.LAB	18:01	8.71	19.2	0.99	0.10	190.7	0.91	8.68
MILLON_R3_001266.LAB	18:02	8.70	19.3	0.91	0.10	190.7	0.91	8.70
MILLON_R3_001267.LAB	18:03	8.70	19.2	0.99	0.10	190.7	0.91	8.62
MILLON_R3_001268.LAB	18:04	8.69	19.3	0.95	0.10	190.7	0.91	8.65
MILLON_R3_001269.LAB	18:05	8.70	19.1	0.95	0.10	190.8	0.91	8.66
MILLON_R3_001270.LAB	18:06	8.66	19.2	0.91	0.10	190.7	0.91	8.61
MILLON_R3_001271.LAB	18:07	8.73	19.2	0.95	0.10	190.7	0.91	8.67
MILLON_R3_001272.LAB	18:08	8.69	19.3	1.02	0.10	190.8	0.91	8.71
MILLON_R3_001273.LAB	18:09	8.71	19.2	0.99	0.10	190.8	0.91	8.69
Average		8.66	19.18	0.92	0.10	190.70	0.91	8.72

Client:	CalPortland Company, Inc.		
Facility:	Oro Grande Cement Plant		
Test Location:	Main Kiln		
Project #:	M234508		
Test Method:	26A		
Test Engineer:	DV		
Test Technician:	ER		
	<u>Run 1A</u>	<u>Run 2A</u>	<u>Run 3A</u>
Temp ID:	CM23	CM23	CM23
Meter ID:	CM23	CM23	CM23
Pitot ID:	S8-031A	S8-031A	S8-031A
Nozzle Diameter (Inches):	0.274	0.274	0.274
Meter Calibration Date:	10/26/2023	10/26/2023	10/26/2023
Meter Calibration Factor (Y):	0.999	0.999	0.999
Meter Orifice Setting (Delta H):	1.790	1.790	1.790
Nozzle Kit ID Number and Material:	Glass	Glass	Glass
Pitot Tube Coefficient:		0.820	
Probe Length (Feet):		5.0	
Probe Liner Material:		Glass	
Sample Plane:		Horizontal	
Port Length (Inches):		3.00	
Port Size (Diameter, Inches):		4.00	
Port Type:		Flange	
Duct Shape:		Circular	
Diameter (Feet):		13.5	
Duct Area (Square Feet):		143.139	
Upstream Diameters:		10.5	
Downstream Diameters:		17.0	
Number of Ports Sampled:		4	
Number of Points per Port:		3	
Minutes per Point:		5.00	
Minutes per Reading:		5.00	
Total Number of Traverse Points:		12	
Test Length (Minutes):		60	
Train Type:		Anderson Box	
Source Condition:		Mill Off	
Diluent Model/Serial Number:		CAI700/221018	
Moisture Balance ID:		LV3	
# of Runs		3	

Run 1A - Method 26A

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Test Location: Main Kiln
Source Condition: Mill Off

Date: 11/7/23
Start Time: 7:00
End Time: 8:15

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH :	3.71	in. H ₂ O	Static Pressure	-0.80	in. H ₂ O	
Meter Temperature, Tm:	63.8	°F		Flue Pressure (Ps):	26.88	in. Hg. abs.	
Sqrt ΔP :	1.070	in. H ₂ O		Carbon Dioxide:	18.20	%	
Stack Temperature, Ts:	319.1	°F		Oxygen:	10.50	%	
Meter Volume, Vm:	67.886	ft ³		Nitrogen:	71.30	%	
Meter Volume, Vmstd:	62.182	dscf		Gas Weight dry, Md:	31.332	lb/lb mole	
Meter Volume, Vwstd:	4.507	wscf		Gas Weight wet, Ms:	30.431	lb/lb mole	
Isokinetic Variance:	101.6	%I		Excess Air:	---	%	
Test Length:	60.00	in mins.		Gas Velocity, Vs:	73.202	fps	
Nozzle Diameter:	0.274	in inches		Volumetric Flow:	628,683	acfm	
Barometric Pressure:	26.94	in Hg		Volumetric Flow:	356,923	dscfm	
				Volumetric Flow:	382,796	scfm	

MOISTURE DETERMINATION

Initial Impinger Content:	3500.6	ml	Silica Initial Wt.	891.2	grams
Final Impinger Content:	3584.1	ml	Silica Final Wt.	903.4	grams
Impinger Difference:	83.5	ml	Silica Difference:	12.2	grams
Total Water Gain:	95.7		Moisture, Bws:	0.068	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	7:00:00	1.25	4.02	71.901	318	60	55	252	256	65
1-2	7:05:00	1.00	3.22	77.755	317	63	56	256	253	61
1-3	7:10:00	0.98	3.15	83.008	317	64	55	253	253	61
	7:15:00			88.102						
2-1	7:20:00	1.25	4.02	88.102	319	69	60	255	255	64
2-2	7:25:00	1.02	3.28	94.031	318	69	60	257	255	64
2-3	7:30:00	0.99	3.18	99.345	318	69	60	257	255	64
	7:35:00			104.691						
3-1	7:40:00	1.50	4.82	104.691	320	69	60	256	254	63
3-2	7:45:00	1.20	3.86	111.178	320	70	61	256	255	63
3-3	7:50:00	0.95	3.06	116.975	320	70	61	258	255	64
	7:55:00			122.171						
4-1	8:00:00	1.50	4.82	122.171	321	70	64	257	255	64
4-2	8:05:00	1.22	3.92	128.695	321	70	62	255	255	63
4-3	8:10:00	0.97	3.12	134.549	320	70	63	253	256	66
	8:15:00			139.787						

Total	1:00:00			67.886		67.8	59.8			
Average			3.71		319.1	63.8				
Min			3.06		317.0	55.0				
Max			4.82		321.0	70.0				

Impinger Weight Sheet - Run 1A

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	635.8	607.0	28.8
0.1N H2SO4	790.5	755.5	35.0
Empty	656.1	645.0	11.1
0.1N NaOH	756.8	751.4	5.4
0.1N NaOH	744.9	741.7	3.2
Silica Gel	903.4	891.2	12.2

<u>3,584.1</u> Liquid Final	<u>3,500.6</u> Liquid Initial	<u>83.5</u> Liquid Gain
<u>903.4</u> Silica Final	<u>891.2</u> Silica Initial	<u>12.2</u> Silica Gain

Run 2A - Method 26A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Source Condition: Mill Off

Date: 11/7/23
 Start Time: 8:40
 End Time: 9:55

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH :	3.37	In. H ₂ O		Static Pressure	-0.80	in. H ₂ O
Meter Temperature, Tm:	81.3	°F			Flue Pressure (Ps):	26.88	in. Hg. abs.
Sqrt ΔP :	1.033	In. H ₂ O			Carbon Dioxide:	17.60	%
Stack Temperature, Ts:	318.6	°F			Oxygen:	10.80	%
Meter Volume, Vm:	67.901	ft ³			Nitrogen:	71.6	%
Meter Volume, Vmstd:	60.130	dscf			Gas Weight dry, Md:	31.248	lb/lb mole
Meter Volume, Vwstd:	4.588	wscf			Gas Weight wet, Ms:	30.309	lb/lb mole
Isokinetic Variance:	101.8	%I			Excess Air:	---	%
					Gas Velocity, Vs:	70.800	fps
Test Length:	60.00	in mins.			Volumetric Flow:	608,051	acfm
Nozzle Diameter:	0.274	in inches			Volumetric Flow:	344,210	dscfm
Barometric Pressure:	26.94	in Hg			Volumetric Flow:	370,471	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	3511.7	ml	Silica Initial Wt.	868.6	grams
Final Impinger Content:	3587.7	ml	Silica Final Wt.	890.0	grams
Impinger Difference:	76.0	ml	Silica Difference:	21.4	grams
Total Water Gain:	97.4		Moisture, Bws:	0.071	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	8:40:00	1.00	2.88	35.821	319	80	69	255	255	63
1-2	8:45:00	1.20	3.30	41.230	319	80	70	258	253	63
1-3	8:50:00	0.98	3.00	47.158	319	82	71	255	253	64
	8:55:00			52.528						
2-1	9:00:00	1.02	2.90	52.528	319	85	74	253	251	63
2-2	9:05:00	1.22	4.09	58.050	319	85	74	255	253	65
2-3	9:10:00	0.99	3.22	64.069	318	85	74	255	255	64
	9:15:00			69.505						
3-1	9:20:00	1.00	3.30	69.505	318	89	81	256	255	65
3-2	9:25:00	1.20	4.00	75.022	318	89	81	256	254	65
3-3	9:30:00	0.98	3.32	81.069	318	89	81	255	254	64
	9:35:00			86.528						
4-1	9:40:00	1.05	3.00	86.528	319	89	81	253	250	64
4-2	9:45:00	1.25	4.25	92.177	319	89	81	253	255	64
4-3	9:50:00	0.95	3.22	98.344	318	90	81	254	256	63
	9:55:00			103.722						

Total	1:00:00			67.901		86.0	76.5			
Average			3.37		318.6	81.3				
Min			2.88		318.0	69.0				
Max			4.25		319.0	90.0				

Impinger Weight Sheet - Run 2A

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	720.0	691.2	28.8
0.1N H2SO4	771.9	737.7	34.2
Empty	633.2	627.5	5.7
0.1N NaOH	692.5	688.4	4.1
0.1N NaOH	770.1	766.9	3.2
Silica Gel	890.0	868.6	21.4

<u>3,587.7</u> Liquid Final	<u>3,511.7</u> Liquid Initial	<u>76.0</u> Liquid Gain
<u>890.0</u> Silica Final	<u>868.6</u> Silica Initial	<u>21.4</u> Silica Gain

Run 3A - Method 26A

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Test Location: Main Kiln
Source Condition: Mill Off

Date: 11/7/23
Start Time: 10:15
End Time: 11:30

DRY GAS METER CONDITIONS				STACK CONDITIONS			
	ΔH:	3.59	In. H ₂ O		Static Pressure	-0.80	in. H ₂ O
Meter Temperature, Tm:	88.4	°F			Flue Pressure (Ps):	26.88	in. Hg. abs.
Sqrt ΔP:	1.034	In. H ₂ O			Carbon Dioxide:	17.40	%
Stack Temperature, Ts:	318.5	°F			Oxygen:	10.90	%
Meter Volume, Vm:	68.887	ft ³			Nitrogen:	71.7	%
Meter Volume, Vmstd:	60.242	dscf			Gas Weight dry, Md:	31.220	lb/lb mole
Meter Volume, Vwstd:	5.059	wscf			Gas Weight wet, Ms:	30.196	lb/lb mole
Isokinetic Variance:	102.4	%I			Excess Air:	---	%
					Gas Velocity, Vs:	71.013	fps
Test Length:	60.00	in mins.			Volumetric Flow:	609,882	acfm
Nozzle Diameter:	0.274	in inches			Volumetric Flow:	342,838	dscfm
Barometric Pressure:	26.94	in Hg			Volumetric Flow:	371,626	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	3512.5	ml	Silica Initial Wt.	891.2	grams
Final Impinger Content:	3594.7	ml	Silica Final Wt.	916.4	grams
Impinger Difference:	82.2	ml	Silica Difference:	25.2	grams
Total Water Gain:	107.4		Moisture, Bws:	0.077	

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	10:15:00	1.03	3.40	5.664	319	90	83	256	258	65
1-2	10:20:00	1.22	4.00	11.277	319	89	83	250	255	65
1-3	10:25:00	0.99	3.20	17.374	319	89	83	255	255	64
	10:30:00			22.875						
2-1	10:35:00	1.01	3.40	22.875	318	93	86	254	252	66
2-2	10:40:00	1.20	4.00	28.469	318	92	86	256	254	65
2-3	10:45:00	0.98	3.22	34.550	318	92	86	256	255	66
	10:50:00			40.055						
3-1	10:55:00	1.00	3.40	40.055	318	92	86	255	255	66
3-2	11:00:00	1.25	4.26	45.618	318	91	86	254	254	64
3-3	11:05:00	0.98	3.41	51.820	318	92	86	255	255	64
	11:10:00			57.322						
4-1	11:15:00	1.06	3.61	57.322	319	93	86	258	256	63
4-2	11:20:00	1.20	4.00	63.050	319	94	85	255	256	65
4-3	11:25:00	0.95	3.22	69.136	319	93	86	256	258	64
	11:30:00			74.551						

Total	1:00:00			68.887		91.7	85.2			
Average			3.59		318.5	88.4				
Min			3.20		318.0	83.0				
Max			4.26		319.0	94.0				

Impinger Weight Sheet - Run 3A

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	652.9	609.0	43.9
0.1N H2SO4	788.5	760.9	27.6
Empty	653.3	645.8	7.5
0.1N NaOH	750.0	748.5	1.5
0.1N NaOH	750.0	748.3	1.7
Silica Gel	916.4	891.2	25.2

<u>3,594.7</u> Liquid Final	<u>3,512.5</u> Liquid Initial	<u>82.2</u> Liquid Gain
<u>916.4</u> Silica Final	<u>891.2</u> Silica Initial	<u>25.2</u> Silica Gain

Client:	CalPortland Company, Inc.		
Facility:	Oro Grande Cement Plant		
Test Location:	Main Kiln		
Project #:	M234508		
Test Method:	26A		
Test Engineer:	RB		
Test Technician:	ER		
	<u>Run 1B</u>	<u>Run 2B</u>	<u>Run 3B</u>
Temp ID:	CM18	CM18	CM18
Meter ID:	CM18	CM18	CM18
Pitot ID:	S8-032A	S8-032A	S8-032A
Nozzle Diameter (Inches):	0.251	0.251	0.251
Meter Calibration Date:	10/17/2023	10/17/2023	10/17/2023
Meter Calibration Factor (Y):	0.987	0.987	0.987
Meter Orifice Setting (Delta H):	1.533	1.533	1.533
Nozzle Kit ID Number and Material:	Glass	Glass	Glass
Pitot Tube Coefficient:		0.822	
Probe Length (Feet):		5.0	
Probe Liner Material:		Glass	
Sample Plane:		Horizontal	
Port Length (Inches):		3.00	
Port Size (Diameter, Inches):		4.00	
Port Type:		Flange	
Duct Shape:		Circular	
Diameter (Feet):		13.5	
Duct Area (Square Feet):		143.139	
Upstream Diameters:		10.5	
Downstream Diameters:		17.0	
Number of Ports Sampled:		4	
Number of Points per Port:		3	
Minutes per Point:		5.00	
Minutes per Reading:		5.00	
Total Number of Traverse Points:		12	
Test Length (Minutes):		60	
Train Type:		Anderson Box	
Source Condition:		Mill Off	
Diluent Model/Serial Number:		CAI700/221018	
Moisture Balance ID:		LV3	
# of Runs		3	

Run 1B - Method 26A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Source Condition: Mill Off

Date: 11/7/23
 Start Time: 7:00
 End Time: 8:15

DRY GAS METER CONDITIONS

ΔH: 2.23 in. H₂O
 Meter Temperature, T_m: 58.8 °F
 Sqrt ΔP: 1.073 in. H₂O
 Stack Temperature, T_s: 320.8 °F
 Meter Volume, V_m: 56.965 ft³
 Meter Volume, V_{mstd}: 51.833 dscf
 Meter Volume, V_{wstd}: 4.432 wscf
 Isokinetic Variance: 101.4 %I
 Test Length: 60.00 in mins.
 Nozzle Diameter: 0.251 in inches
 Barometric Pressure: 26.94 in Hg

STACK CONDITIONS

Static Pressure -0.80 in. H₂O
 Flue Pressure (Ps): 26.88 in. Hg. abs.
 Carbon Dioxide: 18.20 %
 Oxygen: 10.50 %
 Nitrogen: 71.30 %
 Gas Weight dry, M_d: 31.332 lb/lb mole
 Gas Weight wet, M_s: 30.282 lb/lb mole
 Excess Air: --- %
 Gas Velocity, V_s: 73.866 fps
 Volumetric Flow: 634,382 acfm
 Volumetric Flow: 355,079 dscfm
 Volumetric Flow: 385,441 scfm

MOISTURE DETERMINATION

Initial Impinger Content: 3536.0 ml Silica Initial Wt. 877.0 grams
 Final Impinger Content: 3615.9 ml Silica Final Wt. 891.2 grams
 Impinger Difference: 79.9 ml Silica Difference: 14.2 grams

Total Water Gain: 94.1 Moisture, Bws: 0.079

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	7:00:00	1.50	2.88	14.149	318	58	55	256	255	54
1-2	7:05:00	1.10	2.11	19.540	318	58	55	255	256	54
1-3	7:10:00	0.96	1.84	24.170	318	58	55	255	256	54
	7:15:00			28.500						
2-1	7:20:00	1.40	2.69	28.500	319	59	56	260	259	57
2-2	7:25:00	0.99	1.90	33.720	319	59	56	259	256	58
2-3	7:30:00	0.95	1.82	38.110	319	60	57	259	255	58
	7:35:00			42.430						
3-1	7:40:00	1.50	2.88	42.430	320	61	58	256	254	59
3-2	7:45:00	1.20	2.31	47.850	320	61	58	256	255	59
3-3	7:50:00	0.98	1.88	52.700	321	62	59	254	255	60
	7:55:00			57.100						
4-1	8:00:00	1.40	2.69	57.100	322	62	59	255	259	60
4-2	8:05:00	1.00	1.92	62.340	322	63	60	254	259	61
4-3	8:10:00	0.96	1.84	66.780	333	63	60	255	255	62
	8:15:00			71.114						

Total 1:00:00 56.965 60.3 57.3
 Average 2.23 320.8 58.8
 Min 1.82 318.0 55.0
 Max 2.88 333.0 63.0

Impinger Weight Sheet - Run 1B

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	770.0	742.2	27.8
0.1N H2SO4	779.3	743.4	35.9
Empty	665.0	655.0	10.0
0.1N NaOH	699.4	695.4	4.0
0.1N NaOH	702.2	700.0	2.2
Silica Gel	891.2	877.0	14.2

<u>3,615.9</u> Liquid Final	<u>3,536.0</u> Liquid Initial	<u>79.9</u> Liquid Gain
<u>891.2</u> Silica Final	<u>877.0</u> Silica Initial	<u>14.2</u> Silica Gain

Run 2B - Method 26A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Source Condition: Mill Off

Date: 11/7/23
 Start Time: 8:40
 End Time: 9:55

DRY GAS METER CONDITIONS

ΔH: 2.01 in. H₂O
 Meter Temperature, Tm: 79.5 °F
 Sqrt ΔP: 1.022 in. H₂O
 Stack Temperature, Ts: 318.3 °F
 Meter Volume, Vm: 56.625 ft³
 Meter Volume, Vmstd: 49.519 dscf
 Meter Volume, Vwstd: 4.135 wscf
 Isokinetic Variance: 101.3 %I
 Test Length: 60.00 in mins.
 Nozzle Diameter: 0.251 in inches
 Barometric Pressure: 26.94 in Hg

STACK CONDITIONS

Static Pressure -0.80 in. H₂O
 Flue Pressure (Ps): 26.88 in. Hg. abs.
 Carbon Dioxide: 17.60 %
 Oxygen: 10.80 %
 Nitrogen: 71.6 %
 Gas Weight dry, Md: 31.248 lb/lb mole
 Gas Weight wet, Ms: 30.227 lb/lb mole
 Excess Air: --- %
 Gas Velocity, Vs: 70.267 fps
 Volumetric Flow: 603,480 acfm
 Volumetric Flow: 339,456 dscfm
 Volumetric Flow: 367,804 scfm

MOISTURE DETERMINATION

Initial Impinger Content: 3600.6 ml Silica Initial Wt. 884.9 grams
 Final Impinger Content: 3681.8 ml Silica Final Wt. 891.5 grams
 Impinger Difference: 81.2 ml Silica Difference: 6.6 grams

Total Water Gain: 87.8 Moisture, Bws: 0.077

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	8:40:00	1.00	1.92	73.115	318	73	70	256	254	60
1-2	8:45:00	0.98	1.88	77.672	319	76	72	256	253	60
1-3	8:50:00	0.96	1.84	82.172	319	77	73	256	252	64
	8:55:00			86.674						
2-1	9:00:00	1.00	1.92	86.674	319	80	76	255	250	60
2-2	9:05:00	1.05	2.02	91.284	319	80	77	255	255	59
2-3	9:10:00	1.00	1.92	95.980	318	81	78	255	256	61
	9:15:00			100.617						
3-1	9:20:00	1.10	2.11	100.617	318	83	79	255	255	60
3-2	9:25:00	1.00	1.92	105.461	318	84	81	255	255	59
3-3	9:30:00	1.15	2.21	110.123	318	84	81	255	255	62
	9:35:00			115.100						
4-1	9:40:00	1.00	1.92	115.100	318	84	82	255	255	61
4-2	9:45:00	1.20	2.31	119.756	318	85	83	255	256	60
4-3	9:50:00	1.10	2.11	124.834	318	85	84	255	255	58
	9:55:00			129.740						

Total 1:00:00 56.625 81.0 78.0
 Average 2.01 318.3 79.5
 Min 1.84 318.0 70.0
 Max 2.31 319.0 85.0

Impinger Weight Sheet - Run 2B

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	793.1	741.3	51.8
0.1N H2SO4	765.7	740.8	24.9
Empty	645.1	643.2	1.9
0.1N NaOH	730.1	729.6	0.5
0.1N NaOH	747.8	745.7	2.1
Silica Gel	891.5	884.9	6.6

<u>3,681.8</u> Liquid Final	<u>3,600.6</u> Liquid Initial	<u>81.2</u> Liquid Gain
<u>891.5</u> Silica Final	<u>884.9</u> Silica Initial	<u>6.6</u> Silica Gain

Run 3B - Method 26A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln
 Source Condition: Mill Off

Date: 11/7/23
 Start Time: 10:15
 End Time: 11:30

DRY GAS METER CONDITIONS

ΔH: 2.22 in. H₂O
 Meter Temperature, Tm: 83.1 °F
 Sqrt ΔP: 1.074 in. H₂O
 Stack Temperature, Ts: 318.3 °F
 Meter Volume, Vm: 59.870 ft³
 Meter Volume, Vmstd: 52.037 dscf
 Meter Volume, Vwstd: 4.230 wscf
 Isokinetic Variance: 101.1 %I

 Test Length: 60.00 in mins.
 Nozzle Diameter: 0.251 in inches
 Barometric Pressure: 26.94 in Hg

STACK CONDITIONS

Static Pressure -0.80 in. H₂O
 Flue Pressure (Ps): 26.88 in. Hg. abs.
 Carbon Dioxide: 17.40 %
 Oxygen: 10.90 %
 Nitrogen: 71.7 %
 Gas Weight dry, Md: 31.220 lb/lb mole
 Gas Weight wet, Ms: 30.226 lb/lb mole
 Excess Air: --- %
 Gas Velocity, Vs: 73.830 fps
 Volumetric Flow: 634,079 acfm
 Volumetric Flow: 357,442 dscfm
 Volumetric Flow: 386,494 scfm

MOISTURE DETERMINATION

Initial Impinger Content: 3534.7 ml Silica Initial Wt. 871.3 grams
 Final Impinger Content: 3606.1 ml Silica Final Wt. 889.7 grams
 Impinger Difference: 71.4 ml Silica Difference: 18.4 grams

Total Water Gain: 89.8 Moisture, Bws: 0.075

Port- Point No.	Clock Time	Velocity Head Δp in. H ₂ O	Orifice ΔH in. H ₂ O	Actual Meter Vol. ft ³	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	10:15:00	1.10	2.11	31.740	319	84	84	255	255	57
1-2	10:20:00	1.20	2.31	36.628	318	83	84	255	256	56
1-3	10:25:00	1.00	1.92	41.722	319	82	84	256	255	54
	10:30:00			46.365						
2-1	10:35:00	1.20	2.31	46.365	319	83	83	255	257	51
2-2	10:40:00	1.10	2.11	51.441	318	83	83	255	257	60
2-3	10:45:00	1.05	2.02	56.243	318	83	83	255	257	55
	10:50:00			61.094						
3-1	10:55:00	1.10	2.11	61.094	318	83	83	255	255	54
3-2	11:00:00	1.20	2.31	65.976	318	83	83	255	256	56
3-3	11:05:00	1.30	2.50	71.065	318	83	83	255	255	56
	11:10:00			76.342						
4-1	11:15:00	1.20	2.31	76.342	318	83	83	255	255	55
4-2	11:20:00	1.30	2.50	81.421	318	83	83	255	260	56
4-3	11:25:00	1.10	2.11	86.738	318	83	83	255	256	57
	11:30:00			91.610						

Total 1:00:00 59.870 83.0 83.3
 Average 2.22 318.3 83.1
 Min 1.92 318.0 82.0
 Max 2.50 319.0 84.0

Impinger Weight Sheet - Run 3B

Client: CalPortland Company, Inc. Facility: Oro Grande Cement Plant Test Location: Main Kiln Project #: M234508 Date: 11/7/2023 Test Method: 26A Weighed/Measured By: KLJ Balance ID: LV3	Scale Calibration Check Date: <u>11/7/2023</u> Scale Calibration Check (see QS-6.05C for procedure) must be within $\pm 0.5g$ of certified mass <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><u>Certified Weight, grams</u></th> <th style="text-align: left; border-bottom: 1px solid black;"><u>Result, grams</u></th> </tr> <tr> <td style="text-align: center;">250</td> <td style="text-align: center; border-bottom: 1px solid black;">250.0</td> </tr> <tr> <td style="text-align: center;">500</td> <td style="text-align: center; border-bottom: 1px solid black;">500.0</td> </tr> <tr> <td style="text-align: center;">750</td> <td style="text-align: center; border-bottom: 1px solid black;">750.0</td> </tr> </table>	<u>Certified Weight, grams</u>	<u>Result, grams</u>	250	250.0	500	500.0	750	750.0
<u>Certified Weight, grams</u>	<u>Result, grams</u>								
250	250.0								
500	500.0								
750	750.0								

IMPINGER	FINAL	INITIAL	GAIN
CONTENTS	MLS / GRAMS	MLS / GRAMS	MLS / GRAMS
0.1N H2SO4	784.5	750.9	33.6
0.1N H2SO4	769.0	739.4	29.6
Empty	651.3	648.8	2.5
0.1N NaOH	694.2	690.2	4.0
0.1N NaOH	707.1	705.4	1.7
Silica Gel	889.7	871.3	18.4

<u>3,606.1</u> Liquid Final	<u>3,534.7</u> Liquid Initial	<u>71.4</u> Liquid Gain
<u>889.7</u> Silica Final	<u>871.3</u> Silica Initial	<u>18.4</u> Silica Gain

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Project #: M234508
 Test Location: Main Kiln Stack
 Date: 11/7/23

Run 1

Spectrum	Time	H2O %	FTIR Data			Cell Temp	Pressure	Analyzer Data
			CO2 % (wet)	HCN ppmvw	HF ppmvw			O2 % (dry)
RUN1_000218.LAB	7:00	8.13	16.23	1.17	0.10	191.23	0.91	10.77
RUN1_000219.LAB	7:01	8.13	16.33	1.10	0.10	191.18	0.91	10.73
RUN1_000220.LAB	7:02	8.14	16.34	1.15	0.10	191.04	0.91	10.71
RUN1_000221.LAB	7:03	8.16	16.43	1.20	0.10	190.79	0.91	10.67
RUN1_000222.LAB	7:04	8.18	16.43	1.11	0.10	191.09	0.91	10.66
RUN1_000223.LAB	7:05	8.20	16.51	1.16	0.10	191.43	0.91	10.61
RUN1_000224.LAB	7:06	8.21	16.53	1.10	0.10	191.33	0.91	10.62
RUN1_000225.LAB	7:07	8.22	16.69	1.11	0.10	190.62	0.91	10.54
RUN1_000226.LAB	7:08	8.19	16.71	1.10	0.10	190.28	0.91	10.50
RUN1_000227.LAB	7:09	8.23	16.75	1.11	0.10	190.38	0.91	10.45
RUN1_000228.LAB	7:10	8.26	16.76	1.05	0.10	190.44	0.91	10.44
RUN1_000229.LAB	7:11	8.31	16.75	1.10	0.10	190.90	0.91	10.45
RUN1_000230.LAB	7:12	8.37	16.77	1.18	0.10	191.25	0.91	10.42
RUN1_000231.LAB	7:13	8.36	16.81	1.22	0.10	190.96	0.91	10.40
RUN1_000232.LAB	7:14	8.32	16.92	1.12	0.10	190.31	0.91	10.37
RUN1_000233.LAB	7:15	8.34	16.88	1.10	0.10	190.41	0.91	10.33
RUN1_000234.LAB	7:16	8.30	16.79	1.12	0.10	190.76	0.91	10.36
RUN1_000235.LAB	7:17	8.32	16.83	1.12	0.10	191.11	0.91	10.40
RUN1_000236.LAB	7:18	8.34	16.84	1.07	0.10	191.14	0.91	10.40
RUN1_000237.LAB	7:19	8.31	16.83	1.13	0.10	191.09	0.91	10.39
RUN1_000238.LAB	7:20	8.28	16.80	1.13	0.10	191.06	0.91	10.38
RUN1_000239.LAB	7:21	8.27	16.75	1.13	0.10	190.85	0.91	10.40
RUN1_000240.LAB	7:22	8.23	16.83	1.13	0.10	190.61	0.92	10.41
RUN1_000241.LAB	7:23	8.19	16.80	1.10	0.10	190.26	0.92	10.40
RUN1_000242.LAB	7:24	8.17	16.74	1.14	0.10	190.41	0.92	10.40
RUN1_000243.LAB	7:25	8.19	16.76	1.12	0.10	190.72	0.92	10.43
RUN1_000244.LAB	7:26	8.20	16.80	1.13	0.10	190.36	0.92	10.39
RUN1_000245.LAB	7:27	8.22	16.79	1.14	0.10	190.45	0.92	10.38
RUN1_000246.LAB	7:28	8.25	16.77	1.10	0.10	190.50	0.92	10.39
RUN1_000247.LAB	7:29	8.27	16.73	1.12	0.10	190.67	0.92	10.39
RUN1_000248.LAB	7:30	8.28	16.79	1.10	0.10	190.72	0.92	10.40
RUN1_000249.LAB	7:31	8.29	16.79	1.12	0.10	190.32	0.92	10.39
RUN1_000250.LAB	7:32	8.28	16.88	1.19	0.10	190.17	0.92	10.38
RUN1_000251.LAB	7:33	8.27	16.80	1.17	0.10	190.25	0.92	10.34
RUN1_000252.LAB	7:34	8.28	16.84	1.21	0.10	190.49	0.92	10.36
RUN1_000253.LAB	7:35	8.26	16.81	1.20	0.10	190.46	0.92	10.34
RUN1_000254.LAB	7:36	8.29	16.80	1.18	0.10	190.33	0.92	10.35
RUN1_000255.LAB	7:37	8.34	16.78	1.24	0.10	190.32	0.92	10.36
RUN1_000256.LAB	7:38	8.35	16.69	1.15	0.10	190.31	0.92	10.35
RUN1_000257.LAB	7:39	8.40	16.81	1.26	0.10	190.55	0.92	10.35
RUN1_000258.LAB	7:40	8.39	16.70	1.19	0.10	190.60	0.92	10.39
RUN1_000259.LAB	7:41	8.41	16.64	1.23	0.10	190.44	0.92	10.34
RUN1_000260.LAB	7:42	8.41	16.64	1.22	0.10	190.42	0.92	10.37
RUN1_000261.LAB	7:43	8.44	16.61	1.25	0.10	190.69	0.92	10.39
RUN1_000262.LAB	7:44	8.44	16.60	1.24	0.10	190.87	0.92	10.40
RUN1_000263.LAB	7:45	8.39	16.54	1.24	0.10	191.01	0.92	10.39
RUN1_000264.LAB	7:46	8.37	16.49	1.24	0.10	191.14	0.92	10.41
RUN1_000265.LAB	7:47	8.36	16.57	1.19	0.10	190.92	0.92	10.44
RUN1_000266.LAB	7:48	8.31	16.47	1.22	0.10	190.69	0.92	10.49
RUN1_000267.LAB	7:49	8.34	16.54	1.22	0.10	190.96	0.92	10.48
RUN1_000268.LAB	7:50	8.35	16.50	1.24	0.10	191.02	0.92	10.52
RUN1_000269.LAB	7:51	8.32	16.61	1.24	0.10	190.54	0.92	10.51
RUN1_000270.LAB	7:52	8.29	16.61	1.26	0.10	190.23	0.92	10.50
RUN1_000271.LAB	7:53	8.28	16.61	1.13	0.10	190.30	0.92	10.46
RUN1_000272.LAB	7:54	8.29	16.57	1.19	0.10	190.32	0.92	10.45
RUN1_000273.LAB	7:55	8.32	16.51	1.24	0.10	190.28	0.92	10.46
RUN1_000274.LAB	7:56	8.35	16.50	1.23	0.10	190.31	0.92	10.48
RUN1_000275.LAB	7:57	8.36	16.52	1.24	0.10	190.24	0.92	10.47
RUN1_000276.LAB	7:58	8.37	16.55	1.26	0.10	190.32	0.92	10.48
RUN1_000277.LAB	7:59	8.38	16.54	1.27	0.10	190.28	0.92	10.47
Average		8.29	16.67	1.17	0.10	190.65	0.91	10.45

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Test Location: Main Kiln Stack
Date: 11/7/23

Run 2

Spectrum	Time	H2O %	FTIR Data			Cell Temp	Pressure	Analyzer Data
			CO2 % (wet)	HCN ppmvw	HF ppmvw			O2 % (dry)
RUN2_000370.LAB	8:40	7.82	16.1	1.20	0.10	190.8	0.91	10.77
RUN2_000371.LAB	8:41	7.77	16.2	1.20	0.10	190.8	0.91	10.76
RUN2_000372.LAB	8:42	7.72	16.2	1.14	0.10	190.8	0.91	10.71
RUN2_000373.LAB	8:43	7.68	16.4	1.13	0.10	190.6	0.91	10.66
RUN2_000374.LAB	8:44	7.66	16.4	1.08	0.10	190.6	0.91	10.66
RUN2_000375.LAB	8:45	7.65	16.4	1.12	0.10	190.7	0.91	10.63
RUN2_000376.LAB	8:46	7.67	16.4	1.08	0.10	190.7	0.91	10.63
RUN2_000377.LAB	8:47	7.65	16.3	1.14	0.10	190.8	0.91	10.63
RUN2_000378.LAB	8:48	7.67	16.2	1.07	0.10	190.9	0.91	10.65
RUN2_000379.LAB	8:49	7.67	16.4	1.09	0.10	190.9	0.91	10.68
RUN2_000380.LAB	8:50	7.68	16.3	1.15	0.10	190.9	0.91	10.66
RUN2_000381.LAB	8:51	7.67	16.4	1.18	0.10	190.9	0.91	10.65
RUN2_000382.LAB	8:52	7.62	16.4	1.14	0.10	191.0	0.91	10.62
RUN2_000383.LAB	8:53	7.59	16.4	1.11	0.10	190.9	0.91	10.66
RUN2_000384.LAB	8:54	7.57	16.4	1.12	0.10	190.9	0.91	10.64
RUN2_000385.LAB	8:55	7.57	16.4	1.10	0.10	190.9	0.91	10.65
RUN2_000386.LAB	8:56	7.52	16.3	1.13	0.10	190.9	0.91	10.63
RUN2_000387.LAB	8:57	7.48	16.3	1.14	0.10	190.8	0.91	10.72
RUN2_000388.LAB	8:58	7.46	16.3	1.11	0.10	190.7	0.91	10.76
RUN2_000389.LAB	8:59	7.44	16.2	1.14	0.10	190.8	0.91	10.76
RUN2_000390.LAB	9:00	7.45	16.1	1.15	0.10	190.8	0.91	10.78
RUN2_000391.LAB	9:01	7.42	16.1	1.15	0.10	190.9	0.91	10.81
RUN2_000392.LAB	9:02	7.44	16.2	1.13	0.10	190.9	0.91	10.85
RUN2_000393.LAB	9:03	7.47	16.1	1.14	0.10	190.8	0.91	10.80
RUN2_000394.LAB	9:04	7.43	16.1	1.10	0.10	190.7	0.91	10.79
RUN2_000395.LAB	9:05	7.41	16.1	1.09	0.10	190.6	0.91	10.86
RUN2_000396.LAB	9:06	7.38	16.2	1.12	0.10	190.6	0.91	10.83
RUN2_000397.LAB	9:07	7.36	16.1	1.10	0.10	190.8	0.91	10.84
RUN2_000398.LAB	9:08	7.33	16.1	1.06	0.10	190.8	0.91	10.87
RUN2_000399.LAB	9:09	7.35	16.2	1.11	0.10	190.8	0.91	10.87
RUN2_000400.LAB	9:10	7.36	16.2	1.15	0.10	190.8	0.91	10.89
RUN2_000401.LAB	9:11	7.37	16.2	1.11	0.10	190.7	0.91	10.84
RUN2_000402.LAB	9:12	7.36	16.2	1.13	0.10	190.7	0.91	10.81
RUN2_000403.LAB	9:13	7.38	16.2	1.11	0.10	190.7	0.91	10.83
RUN2_000404.LAB	9:14	7.38	16.2	1.08	0.10	190.7	0.91	10.82
RUN2_000405.LAB	9:15	7.38	16.3	1.10	0.10	190.6	0.91	10.81
RUN2_000406.LAB	9:16	7.38	16.3	1.10	0.10	190.6	0.91	10.84
RUN2_000407.LAB	9:17	7.39	16.3	1.12	0.10	190.5	0.91	10.80
RUN2_000408.LAB	9:18	7.41	16.4	1.11	0.10	190.4	0.91	10.77
RUN2_000409.LAB	9:19	7.42	16.3	1.07	0.10	190.3	0.91	10.73
RUN2_000410.LAB	9:20	7.41	16.2	1.08	0.10	190.4	0.91	10.71
RUN2_000411.LAB	9:21	7.46	16.2	1.09	0.10	190.5	0.91	10.73
RUN2_000412.LAB	9:22	7.46	16.2	1.15	0.10	190.7	0.91	10.77
RUN2_000413.LAB	9:25	7.42	16.2	1.08	0.10	190.5	0.91	10.77
RUN2_000414.LAB	9:26	7.41	16.2	1.08	0.10	190.5	0.91	10.74
RUN2_000415.LAB	9:27	7.43	16.2	1.17	0.10	190.4	0.91	10.77
RUN2_000416.LAB	9:28	7.43	16.2	1.14	0.10	190.4	0.91	10.79
RUN2_000417.LAB	9:29	7.43	16.3	1.09	0.10	190.4	0.91	10.77
RUN2_000418.LAB	9:30	7.43	16.3	1.12	0.10	190.4	0.91	10.77
RUN2_000419.LAB	9:31	7.44	16.3	1.09	0.10	190.5	0.91	10.72
RUN2_000420.LAB	9:32	7.41	16.2	1.11	0.10	190.5	0.91	10.72
RUN2_000421.LAB	9:33	7.41	16.4	1.17	0.10	190.5	0.91	10.71
RUN2_000422.LAB	9:34	7.41	16.3	1.10	0.10	190.5	0.91	10.74
RUN2_000423.LAB	9:35	7.44	16.3	1.15	0.10	190.5	0.91	10.76
RUN2_000424.LAB	9:36	7.47	16.3	1.12	0.10	190.7	0.91	10.72
RUN2_000425.LAB	9:37	7.47	16.4	1.18	0.10	190.9	0.91	10.73
RUN2_000426.LAB	9:38	7.47	16.4	1.13	0.10	191.1	0.91	10.72
RUN2_000427.LAB	9:39	7.42	16.4	1.17	0.10	191.0	0.91	10.69
RUN2_000428.LAB	9:40	7.40	16.4	1.16	0.10	190.9	0.91	10.68
RUN2_000429.LAB	9:41	7.39	16.4	1.10	0.10	190.7	0.91	10.66
Average		7.48	16.27	1.12	0.10	190.71	0.91	10.74

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Test Location: Main Kiln Stack
Date: 11/7/23

Run 3

Spectrum	Time	H2O %	FTIR Data			Cell Temp	Pressure	Analyzer Data
			CO2 % (wet)	HCN ppmvw	HF ppmvw			O2 % (dry)
RUN3_000511.LAB	10:15	7.28	16.2	1.17	0.10	190.7	0.91	10.76
RUN3_000512.LAB	10:16	7.26	16.2	1.17	0.10	190.8	0.91	10.80
RUN3_000513.LAB	10:17	7.26	16.3	1.12	0.10	191.0	0.91	10.77
RUN3_000514.LAB	10:18	7.26	16.1	1.16	0.10	191.1	0.91	10.80
RUN3_000515.LAB	10:19	7.25	16.1	1.15	0.10	191.0	0.91	10.82
RUN3_000516.LAB	10:20	7.25	16.1	1.17	0.10	190.9	0.91	10.81
RUN3_000517.LAB	10:21	7.25	16.2	1.14	0.10	191.0	0.91	10.82
RUN3_000518.LAB	10:22	7.22	16.1	1.18	0.10	191.1	0.91	10.81
RUN3_000519.LAB	10:23	7.26	16.3	1.16	0.10	191.1	0.91	10.81
RUN3_000520.LAB	10:24	7.23	16.2	1.19	0.10	190.8	0.91	10.79
RUN3_000521.LAB	10:25	7.24	16.3	1.15	0.10	190.7	0.91	10.79
RUN3_000522.LAB	10:26	7.25	16.3	1.20	0.10	190.6	0.91	10.76
RUN3_000523.LAB	10:27	7.23	16.2	1.16	0.10	190.6	0.91	10.76
RUN3_000524.LAB	10:28	7.26	16.2	1.09	0.10	190.8	0.91	10.79
RUN3_000525.LAB	10:29	7.26	16.2	1.18	0.10	190.9	0.91	10.79
RUN3_000526.LAB	10:30	7.29	16.2	1.10	0.10	190.8	0.91	10.82
RUN3_000527.LAB	10:31	7.32	16.2	1.12	0.10	190.6	0.91	10.82
RUN3_000528.LAB	10:32	7.39	16.0	1.15	0.10	190.7	0.91	10.83
RUN3_000529.LAB	10:33	7.39	16.1	1.16	0.10	190.8	0.91	10.88
RUN3_000530.LAB	10:34	7.41	16.1	1.16	0.10	190.9	0.91	10.87
RUN3_000531.LAB	10:35	7.34	16.1	1.15	0.10	190.7	0.91	10.87
RUN3_000532.LAB	10:36	7.29	16.1	1.14	0.10	190.7	0.91	10.86
RUN3_000533.LAB	10:37	7.35	16.1	1.12	0.10	190.7	0.91	10.87
RUN3_000534.LAB	10:38	7.33	16.1	1.14	0.10	190.9	0.91	10.86
RUN3_000535.LAB	10:39	7.32	16.0	1.18	0.10	190.9	0.91	10.83
RUN3_000536.LAB	10:40	7.32	16.1	1.18	0.10	190.8	0.91	10.88
RUN3_000537.LAB	10:41	7.27	16.1	1.14	0.10	190.7	0.91	10.87
RUN3_000538.LAB	10:42	7.24	16.2	1.16	0.10	190.7	0.91	10.85
RUN3_000539.LAB	10:43	7.23	16.1	1.11	0.10	190.8	0.91	10.84
RUN3_000540.LAB	10:44	7.23	16.1	1.13	0.10	191.0	0.91	10.84
RUN3_000541.LAB	10:45	7.22	15.9	1.07	0.10	191.0	0.91	10.90
RUN3_000542.LAB	10:46	7.22	15.9	1.12	0.10	190.8	0.91	10.89
RUN3_000543.LAB	10:47	7.22	16.0	1.10	0.10	190.7	0.91	10.93
RUN3_000544.LAB	10:48	7.16	16.1	1.12	0.10	190.6	0.91	10.91
RUN3_000545.LAB	10:49	7.14	16.0	1.05	0.10	190.5	0.91	10.88
RUN3_000546.LAB	10:50	7.14	16.1	1.09	0.10	190.6	0.91	10.89
RUN3_000547.LAB	10:51	7.10	16.1	1.13	0.10	190.6	0.91	10.90
RUN3_000548.LAB	10:52	7.09	16.2	1.07	0.10	190.6	0.91	10.89
RUN3_000549.LAB	10:53	7.07	16.2	1.11	0.10	190.6	0.91	10.90
RUN3_000550.LAB	10:54	7.11	16.3	1.12	0.10	190.7	0.91	10.88
RUN3_000551.LAB	10:55	7.10	16.3	1.07	0.10	190.9	0.91	10.87
RUN3_000552.LAB	10:56	7.14	16.2	1.12	0.10	190.8	0.91	10.80
RUN3_000553.LAB	10:57	7.14	16.2	1.12	0.10	190.7	0.91	10.85
RUN3_000554.LAB	10:58	7.14	16.1	1.09	0.10	190.8	0.91	10.83
RUN3_000555.LAB	10:59	7.16	16.2	1.15	0.10	190.9	0.91	10.88
RUN3_000556.LAB	11:00	7.18	16.2	1.08	0.10	190.9	0.91	10.90
RUN3_000557.LAB	11:01	7.19	16.3	1.16	0.10	190.9	0.91	10.88
RUN3_000558.LAB	11:02	7.18	16.2	1.14	0.10	191.2	0.91	10.85
RUN3_000559.LAB	11:03	7.16	16.2	1.08	0.10	191.2	0.91	10.84
RUN3_000560.LAB	11:04	7.13	16.2	1.05	0.10	191.1	0.91	10.84
RUN3_000561.LAB	11:05	7.13	16.2	1.04	0.10	191.0	0.91	10.88
RUN3_000562.LAB	11:06	7.13	16.3	1.06	0.10	190.9	0.91	10.88
RUN3_000563.LAB	11:07	7.14	16.4	1.15	0.10	190.9	0.91	10.90
RUN3_000564.LAB	11:08	7.11	16.3	1.09	0.10	191.0	0.91	10.87
RUN3_000565.LAB	11:09	7.10	16.3	1.11	0.10	191.2	0.91	10.83
RUN3_000566.LAB	11:10	7.10	16.3	1.11	0.10	191.1	0.91	10.82
RUN3_000567.LAB	11:11	7.08	16.3	1.09	0.10	190.9	0.91	10.86
RUN3_000568.LAB	11:12	7.05	16.2	1.09	0.10	190.8	0.91	10.84
RUN3_000569.LAB	11:13	7.06	16.2	1.13	0.10	190.7	0.91	10.85
RUN3_000570.LAB	11:14	7.08	16.3	1.05	0.10	190.5	0.91	10.87
Average		7.21	16.16	1.12	0.10	190.83	0.91	10.85

Method 1 and 2 Cyclonic Flow Check Data

Project Number: M234508
Client: CalPortland Cement Company, Inc.
Facility: Oro Grande Cement Plant
Location: Main Kiln
Pitot ID: S8-031A
Pitot Coefficient: 0.820
Probe Length: 5

Source Condition: Mill Off
Run No.: 1
Date: 11/7/2023
Start Time: 6:30
End Time: 6:50
RM Testers: DB/RV
Port Length: 3.00

Port	Point	DP (in. H ₂ O)	Sqrt. DP	Temp (°F)	Yaw Angle (°)	DP (in. H ₂ O) at Null Point Angle	Velocity (V)	Port	Point	DP (in. H ₂ O)	Sqrt. DP	Temp (°F)	Yaw Angle (°)	DP (in. H ₂ O) at Null Point Angle	Velocity (V)
A	1	1.20	1.0954	317.0	1.0	0.00	75.02	C	1	1.40	1.1832	320.0	2.0	0.00	81.19
A	2	1.00	1.0000	317.0	2.0	0.00	68.49	C	2	1.30	1.1402	320.0	2.0	0.00	78.24
A	3	0.92	0.9592	317.0	3.0	0.00	65.69	C	3	0.90	0.9487	320.0	4.0	0.00	65.10
B	1	1.10	1.0488	317.0	3.0	0.00	71.83	D	1	1.50	1.2247	321.0	1.0	0.00	84.09
B	2	1.10	1.0488	319.0	4.0	0.00	71.92	D	2	1.20	1.0954	321.0	3.0	0.00	75.22
B	3	0.96	0.9798	319.0	1.0	0.00	67.19	D	3	0.98	0.9899	321.0	2.0	0.00	67.97

Average Yaw Angle 2.3 °

Stratification Test Results Summary
CalPortland Company, Inc.
Oro Grande Cement Plant
Main Kiln Stack
November 7, 2023

Number of Ports Sampled: 1
Number of Points per Port: 3
Total Number of Traverse Points: 3

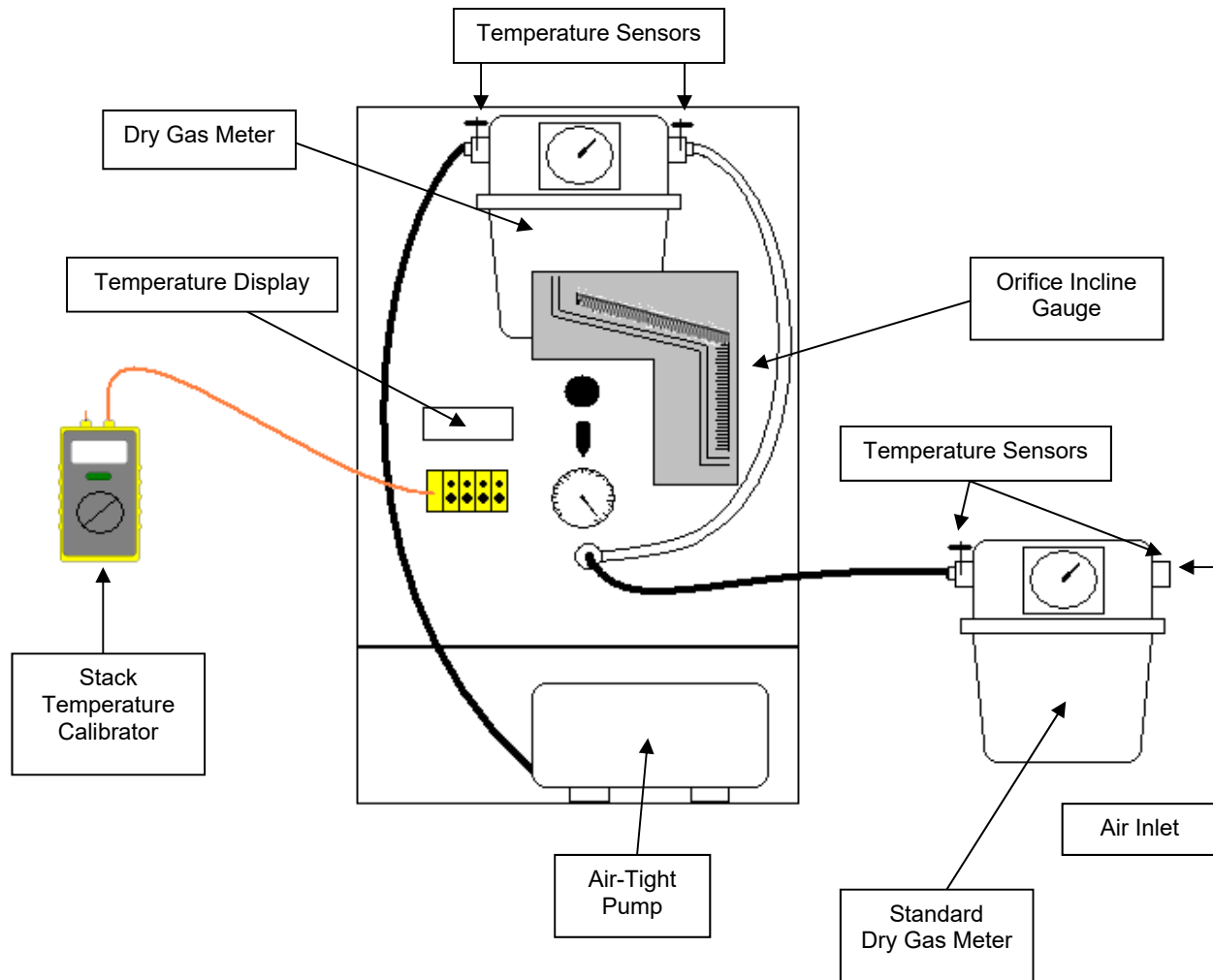
Port No.	Point No.	Time	O ₂ %	Actual % Difference O ₂ %	Mean Difference O ₂ %
1	1	8:32	10.77	0.00	0.00
	2	8:36	10.77	0.00	0.00
	3	8:40	10.77	0.00	0.00
Average			10.77		

One point traverse (<5% difference) 
Three point traverse (0.4, 1.2, and 2.0 meters), <10% difference 
Twelve point traverse (Method 1 points) >10% difference 

One point traverse (<0.3% mean difference) 
Three point traverse (0.4, 1.2, and 2.0 meters), < 0.5% mean difference for O₂ 
Twelve point traverse (Method 1 points) >0.5% mean difference for O₂ 

Appendix G - Calibration Data

Dry Gas Meter/Control Module Calibration Diagram



Meter Box Calibration

Dry Gas Meter Calibration Data

Dry Gas Meter No. CM18
 Standard Meter No. 18654530
 Standard Meter (Y) 0.99730

Date: October 17, 2023
 Calibrated By: IB
 Barometric Pressure: 27.90

Run Number	Orifice Setting in H ₂ O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final		63.100	78.370	70	71	71					
Initial		57.720	72.920	70	70	70					
Difference	1 0.20	5.380	5.450	70	71	71	71	18	0	0.985	1.361
Final		68.591	83.944	71	72	72					
Initial		63.100	78.370	70	71	71					
Difference	2 0.50	5.491	5.574	71	72	72	72	12	3	0.983	1.464
Final		74.004	89.414	72	73	73					
Initial		68.591	83.944	71	72	72					
Difference	3 0.70	5.413	5.470	72	73	73	73	10	1	0.987	1.460
Final		79.380	94.860	72	74	74					
Initial		74.004	89.414	72	73	73					
Difference	4 0.90	5.376	5.446	72	74	74	74	9	0	0.985	1.536
Final		84.655	100.184	72	74	74					
Initial		79.380	94.860	72	74	74					
Difference	5 1.20	5.275	5.324	72	74	74	74	8	0	0.989	1.679
Final		57.720	72.920	70	70	70					
Initial		52.640	67.840	69	69	69					
Difference	6 2.00	5.080	5.080	70	70	70	70	6	0	0.992	1.696

Average **0.987** **1.533**

Stack Temperature Sensor Calibration

Meter Box # : CM 18 Name : IB

Ambient Temperature : 73.4 °F Date : October 17, 2023

Calibrator Model # : CL940A

Serial # : 526

Date Of Certification : December 28, 2022

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

Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	-1	0.2
250	248	0.3
600	597	0.3
1200	1199	0.1

$$\frac{(\text{Ref. Temp., } ^\circ\text{F} + 460) - (\text{Test Therm. Temp., } ^\circ\text{F} + 460)}{\text{Ref. Temp., } ^\circ\text{F} + 460} * 100 \leq 1.5 \%$$

Ref. Temp., °F + 460

Meter Box Calibration

Dry Gas Meter Calibration Data

Dry Gas Meter No. CM18
 Standard Meter No. 18654530
 Standard Meter (Y) 0.99730

Date: December 7, 2023
 Calibrated By: DV
 Barometric Pressure: 28.16

Run Number	Orifice Setting in H ₂ O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final		37.180	61.955	65	69	68					
Initial		32.123	56.846	65	68	66					
Difference	1 0.20	5.057	5.109	65	69	67	68	18	21	0.992	1.564
Final		32.123	56.846	65	68	66					
Initial		26.765	51.410	64	67	65					
Difference	2 0.50	5.358	5.436	65	68	66	67	12	12	0.985	1.541
Final		26.765	51.410	64	67	65					
Initial		21.369	46.097	63	65	64					
Difference	3 0.70	5.396	5.313	64	66	65	65	10	2	1.014	1.436
Final		21.369	46.097	63	65	64					
Initial		15.896	40.585	63	64	63					
Difference	4 0.90	5.473	5.512	63	65	64	64	9	0	0.990	1.445
Final		42.896	67.822	65	70	68					
Initial		37.449	62.323	65	69	68					
Difference	5 1.20	5.447	5.499	65	70	68	69	8	17	0.992	1.645
Final		10.794	35.460	63	63	63					
Initial		5.348	30.047	62	63	63					
Difference	6 2.00	5.446	5.413	63	63	63	63	6	4	0.999	1.473

Average **0.995** **1.517**

Stack Temperature Sensor Calibration			
Temperature ID :	100770	Name :	DV
Ambient Temperature, °F :	67.8	Date :	12/7/2023

Temperature Calibrator			
Model # :	CL940A	Certification Date:	December 28, 2022
Serial # :	526	Expiration Date:	December 29, 2023

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

Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	-1	0.2
250	248	0.3
600	597	0.3
1200	1199	0.1

$$\frac{(\text{Ref. Temp., } ^\circ\text{F} + 460) - (\text{Test Therm. Temp., } ^\circ\text{F} + 460)}{\text{Ref. Temp., } ^\circ\text{F} + 460} * 100 \leq 1.5 \%$$

Ref. Temp., °F + 460

Meter Box Calibration

Dry Gas Meter Calibration Data

Dry Gas Meter No. CM23
Standard Meter No. 18654530
Standard Meter (Y) 0.99730

Date: October 26, 2023
Calibrated By: ER
Barometric Pressure: 28.01

Run Number	Orifice Setting in H ₂ O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final		80.713	50.815	70	73	73					
Initial		75.708	45.760	70	71	71					
Difference	1 0.20	5.005	5.055	70	72	72	72	18	25	0.991	1.635
Final		85.747	55.885	70	75	75					
Initial		80.713	50.815	70	73	73					
Difference	2 0.50	5.034	5.070	70	74	74	74	12	15	0.996	1.781
Final		90.789	60.960	70	75	75					
Initial		85.747	55.885	70	75	75					
Difference	3 0.70	5.042	5.075	70	75	75	75	10	25	0.998	1.794
Final		95.885	65.984	70	75	75					
Initial		90.789	60.960	70	75	75					
Difference	4 0.90	5.096	5.024	70	75	75	75	9	15	1.019	1.780
Final		100.892	71.025								
Initial		95.885	65.984	70	75	75					
Difference	5 1.20	5.007	5.041	70	75	75	75	8	15	0.997	1.956
Final		75.708	45.760	70	71	71					
Initial		70.675	40.735	70	71	71					
Difference	6 2.00	5.033	5.025	70	71	71	71	6	8	0.996	1.797

Average **0.999** **1.790**

Stack Temperature Sensor Calibration			
Temperature ID :	100769	Name :	ER
Ambient Temperature, °F :	71.9	Date :	10/26/2023

Temperature Calibrator			
Model # :	CL23A	Certification Date:	May 1,2023
Serial # :	T-285668	Expiration Date:	May 2,2024

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

Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	0	0.0
250	251	0.1
600	601	0.1
1200	1205	0.3

$$\frac{(\text{Ref. Temp., } ^\circ\text{F} + 460) - (\text{Test Therm. Temp., } ^\circ\text{F} + 460)}{\text{Ref. Temp., } ^\circ\text{F} + 460} * 100 \leq 1.5 \%$$

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Test Location: Main Kiln A
 Test Method: 26A
 Meter ID: CM23

Alternative Method 5 Post Test Calibration - ALT-009

	Run Time (min):	Vm (dscf):	Tm (oR):	Pbar ("Hg):	DHavg ("H2O):	Md:	Orifice DH@:	Meter Y1:	Ycp:	Calibration Status:
Test Run 1	60	51.96	544.83	26.94	2.55	31.656	1.79	0.9990	1.055	Pass
Test Run 2	60	52.24	544.54	26.94	2.58	31.68	1.79	0.9990	1.056	
Test Run 3	60	54.91	531.58	26.94	2.60	31.7092	1.79	0.9990	0.996	
								0.9990	1.036	



Airflow Sciences Corporation

Probe Calibration for Method 2

Wind Tunnel Facility: Airflow Sciences Corporation
 Wind Tunnel Location: Livonia, MI
 Probe Type: S-Type Pitot
 Probe ID: S8-031-A
 Probe Calibration Date: 07/10/17
 Test Point Location: center
 Ambient Temperature (°F): 77.8
 Barometric Pressure ("Hg): 29.23

Repetition	Nominal Low Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (°)	
1	60	0.81	77.8	1.18	0	0.82
2	60	0.80	77.8	1.18	0	0.82
3	60	0.81	77.8	1.18	0	0.82
Average ($C_{p(avg-low)}$)						0.82

Repetition	Nominal High Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (deg)	
1	90	1.81	77.8	2.63	0	0.82
2	90	1.81	77.8	2.62	0	0.82
3	90	1.81	77.8	2.63	0	0.82
Average ($C_{p(avg-high)}$)						0.82

$$\% \text{ Difference} = \frac{C_{p(avg-low)} - C_{p(avg-high)}}{C_{p(avg-low)}} \times 100\% = \underline{-0.49\%} \quad \text{Pass}$$

Note: (1) The percent difference between the low and high velocity setting C_p values shall be within +/- 3 %.
 (2) If calibrating a 3-D probe for this method, the pitch angle setting must be 0°.

$C_p = 0.820$



Airflow Sciences Corporation

Probe Calibration for Method 2

Wind Tunnel Facility: Airflow Sciences Corporation
 Wind Tunnel Location: Livonia, MI
 Probe Type: S-Type Pitot
 Probe ID: S8-031-B
 Probe Calibration Date: 07/10/17
 Test Point Location: center
 Ambient Temperature (°F): 77.5
 Barometric Pressure ("Hg): 29.23

Repetition	Nominal Low Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (°)	
1	60	0.81	77.5	1.19	0	0.82
2	60	0.81	77.5	1.19	0	0.82
3	60	0.81	77.5	1.19	0	0.82
Average ($C_{p(avg-low)}$)						0.82

Repetition	Nominal High Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (deg)	
1	90	1.81	77.5	2.65	0	0.82
2	90	1.81	77.5	2.64	0	0.82
3	90	1.81	77.5	2.64	0	0.82
Average ($C_{p(avg-high)}$)						0.82

$$\% \text{ Difference} = \frac{C_{p(avg-low)} - C_{p(avg-high)}}{C_{p(avg-low)}} \times 100\% = \underline{-0.55\%} \quad \text{Pass}$$

Note: (1) The percent difference between the low and high velocity setting C_p values shall be within +/- 3 %.
 (2) If calibrating a 3-D probe for this method, the pitch angle setting must be 0°.

$C_p = 0.818$



Airflow Sciences Corporation

Probe Calibration for Method 2

Data Collection and Analysis

Date: 6/8/2017
Temperature (°F): 72.2
Pressure ("Hg): 29.33
Personnel: wgj
Probe: S8-031-A

Wind Tunnel Target DP [I.W.C.]	Wind Tunnel Actual DP [I.W.C.]	S-Probe DP [I.W.C.]	C_p	$C_{p(avg)}$	$C_p - C_{p(avg)}$	σ_{max}	
0.81	0.81	1.19	0.818	0.818	0.000	0.001	Pass
0.81	0.81	1.19	0.818		0.000		
0.81	0.81	1.19	0.817		-0.001		
1.81	1.82	2.63	0.823	0.822	0.001	0.001	Pass
1.81	1.82	2.64	0.822		0.000		
1.81	1.81	2.64	0.820		-0.001		



Airflow Sciences Corporation

Probe Calibration for Method 2

Data Collection and Analysis

Date: 6/8/2017
Temperature (°F): 72.0
Pressure ("Hg): 29.33
Personnel: wgj
Probe: S8-031-B

Wind Tunnel Target DP [I.W.C]	Wind Tunnel Actual DP [I.W.C]	S-Probe DP [I.W.C.]	C_p	$C_{p(avg)}$	$C_p - C_{p(avg)}$	σ_{max}	
0.81	0.81	1.19	0.817	0.816	0.000	0.001	Pass
0.81	0.81	1.19	0.817		0.000		
0.81	0.81	1.19	0.816		-0.001		
1.81	1.82	2.65	0.820	0.820	0.000	0.000	Pass
1.81	1.82	2.65	0.820		0.000		
1.81	1.82	2.64	0.820		0.000		



Airflow Sciences Corporation

Probe Calibration for Method 2

Wind Tunnel Facility: Airflow Sciences Corporation
 Wind Tunnel Location: Livonia, MI
 Probe Type: S-Type Pitot
 Probe ID: S8-031-A
 Probe Calibration Date: 06/08/17
 Test Point Location: center
 Ambient Temperature (°F): 72.2
 Barometric Pressure ("Hg): 29.33

Repetition	Nominal Low Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (°)	
1	60	0.81	72.2	1.19	0	0.82
2	60	0.81	72.2	1.19	0	0.82
3	60	0.81	72.2	1.19	0	0.82
Average ($C_{p(avg-low)}$)						0.82

Repetition	Nominal High Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (deg)	
1	90	1.82	72.2	2.63	0	0.82
2	90	1.82	72.2	2.64	0	0.82
3	90	1.81	72.2	2.64	0	0.82
Average ($C_{p(avg-high)}$)						0.82

$$\% \text{ Difference} = \frac{C_{p(avg-low)} - C_{p(avg-high)}}{C_{p(avg-low)}} \times 100\% = \underline{-0.51\%} \quad \text{Pass}$$

Note: (1) The percent difference between the low and high velocity setting C_p values shall be within +/- 3 %.

(2) If calibrating a 3-D probe for this method, the pitch angle setting must be 0°.

$C_p = 0.820$



Airflow Sciences Corporation

Probe Calibration for Method 2

Wind Tunnel Facility: Airflow Sciences Corporation
 Wind Tunnel Location: Livonia, MI
 Probe Type: S-Type Pitot
 Probe ID: S8-031-B
 Probe Calibration Date: 06/08/17
 Test Point Location: center
 Ambient Temperature (°F): 72.0
 Barometric Pressure ("Hg): 29.33

Repetition	Nominal Low Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (°)	
1	60	0.81	72.0	1.19	0	0.82
2	60	0.81	72.0	1.19	0	0.82
3	60	0.81	72.0	1.19	0	0.82
Average ($C_{p(avg-low)}$)						0.82

Repetition	Nominal High Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (deg)	
1	90	1.82	72.0	2.65	0	0.82
2	90	1.82	72.0	2.65	0	0.82
3	90	1.82	72.0	2.64	0	0.82
Average ($C_{p(avg-high)}$)						0.82

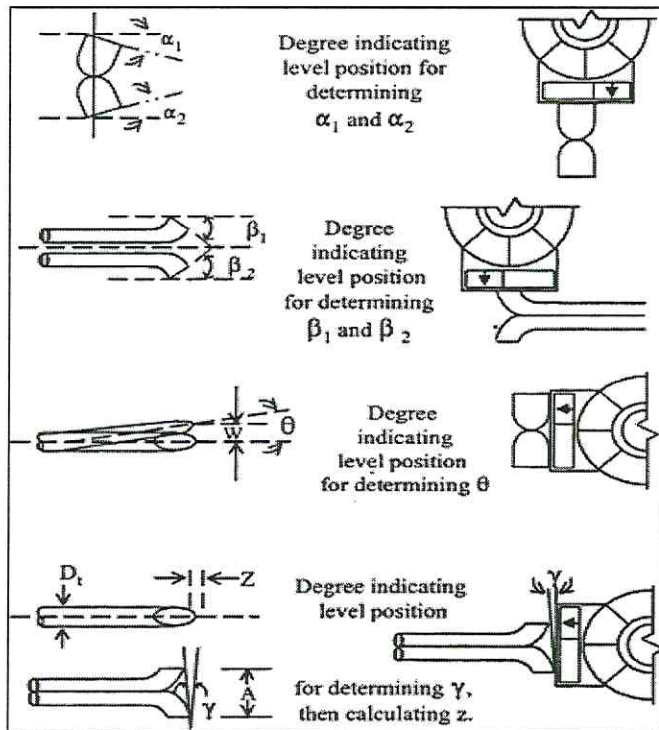
$$\% \text{ Difference} = \frac{C_{p(avg-low)} - C_{p(avg-high)}}{C_{p(avg-low)}} \times 100\% = \underline{-0.45\%} \quad \text{Pass}$$

Note: (1) The percent difference between the low and high velocity setting C_p values shall be within +/- 3 %.
 (2) If calibrating a 3-D probe for this method, the pitch angle setting must be 0°.

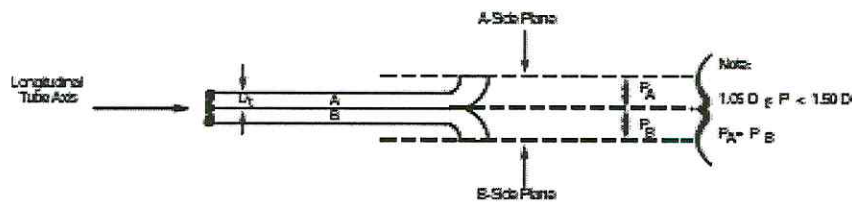
$C_p = 0.818$



Airflow Sciences Corporation Probe Inspection for Method 2



α_1	0.8 (°)	Pass
α_2	0.3 (°)	Pass
β_1	0.3 (°)	Pass
β_2	1.1 (°)	Pass
D_t	0.375 (")	Pass
P_a	0.459 (")	Pass
P_b	0.459 (")	Pass
z	<0.02 (")	Pass
w	0.005 (")	Pass



Certification

I certify that Type S probe ID **S8-031** meets or exceeds all specifications, criteria, and applicable design features.

Certified by: Craig Rood

Date: 6/8/2017



Airflow Sciences Corporation

Probe Calibration for Method 2

Data Collection and Analysis

Date: 8/31/2017
Temperature (°F): 73.7
Pressure ("Hg): 29.43
Personnel: wgj
Probe: S8-032-A

Wind Tunnel Target DP [I.W.C]	Wind Tunnel Actual DP [I.W.C]	S-Probe DP [I.W.C.]	C _p	C _{p(avg)}	C _p -C _{p(avg)}	σ _{max}	
0.81	0.81	1.18	0.820	0.821	0.000	0.000	Pass
0.81	0.81	1.18	0.821		0.000		
0.81	0.81	1.18	0.821		0.000		
1.81	1.82	2.62	0.825	0.824	0.000	0.000	Pass
1.81	1.82	2.63	0.824		0.000		
1.81	1.82	2.63	0.824		0.000		



Airflow Sciences Corporation

Probe Calibration for Method 2

Data Collection and Analysis

Date: 8/31/2017
Temperature (°F): 74.5
Pressure ("Hg): 29.43
Personnel: wgj
Probe: S8-032-B

Wind Tunnel Target DP [I.W.C]	Wind Tunnel Actual DP [I.W.C]	S-Probe DP [I.W.C.]	C _p	C _{p(avg)}	C _p -C _{p(avg)}	$\sigma_{\max}$	
0.81	0.81	1.19	0.819	0.819	0.000	0.000	Pass
0.81	0.81	1.19	0.819		0.000		
0.81	0.81	1.19	0.820		0.000		
1.81	1.81	2.63	0.823	0.823	0.000	0.000	Pass
1.81	1.82	2.63	0.823		0.000		
1.81	1.82	2.63	0.823		0.000		



Airflow Sciences Corporation

Probe Calibration for Method 2

Wind Tunnel Facility: Airflow Sciences Corporation
 Wind Tunnel Location: Livonia, MI
 Probe Type: S-Type Pitot
 Probe ID: S8-032-A
 Probe Calibration Date: 08/31/17
 Test Point Location: center
 Ambient Temperature (°F): 73.7
 Barometric Pressure ("Hg): 29.43

Repetition	Nominal Low Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (°)	
1	60	0.81	73.7	1.18	0	0.82
2	60	0.81	73.7	1.18	0	0.82
3	60	0.81	73.7	1.18	0	0.82
Average ($C_{p(avg-low)}$)						0.82

Repetition	Nominal High Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (deg)	
1	90	1.82	73.7	2.62	0	0.82
2	90	1.82	73.7	2.63	0	0.82
3	90	1.82	73.7	2.63	0	0.82
Average ($C_{p(avg-high)}$)						0.82

$$\% \text{ Difference} = \frac{C_{p(avg-low)} - C_{p(avg-high)}}{C_{p(avg-low)}} \times 100\% = \underline{-0.46\%} \quad \text{Pass}$$

Note: (1) The percent difference between the low and high velocity setting C_p values shall be within +/- 3 %.
 (2) If calibrating a 3-D probe for this method, the pitch angle setting must be 0°.

$C_p = 0.822$



Airflow Sciences Corporation

Probe Calibration for Method 2

Wind Tunnel Facility: Airflow Sciences Corporation
 Wind Tunnel Location: Livonia, MI
 Probe Type: S-Type Pitot
 Probe ID: S8-032-B
 Probe Calibration Date: 08/31/17
 Test Point Location: center
 Ambient Temperature (°F): 74.5
 Barometric Pressure ("Hg): 29.43

Repetition	Nominal Low Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (°)	
1	60	0.81	74.5	1.19	0	0.82
2	60	0.81	74.5	1.19	0	0.82
3	60	0.81	74.5	1.19	0	0.82
Average ($C_{p(avg-low)}$)						0.82

Repetition	Nominal High Velocity Setting (ft/s)	Calibration Pitot		Tested Probe		Calculated C_p
		DP _{std} ("H ₂ O)	Temperature (°F)	DP ("H ₂ O)	Yaw Angle (deg)	
1	90	1.81	74.5	2.63	0	0.82
2	90	1.82	74.5	2.63	0	0.82
3	90	1.82	74.5	2.63	0	0.82
Average ($C_{p(avg-high)}$)						0.82

$$\% \text{ Difference} = \frac{C_{p(avg-low)} - C_{p(avg-high)}}{C_{p(avg-low)}} \times 100\% = \underline{-0.43\%} \quad \text{Pass}$$

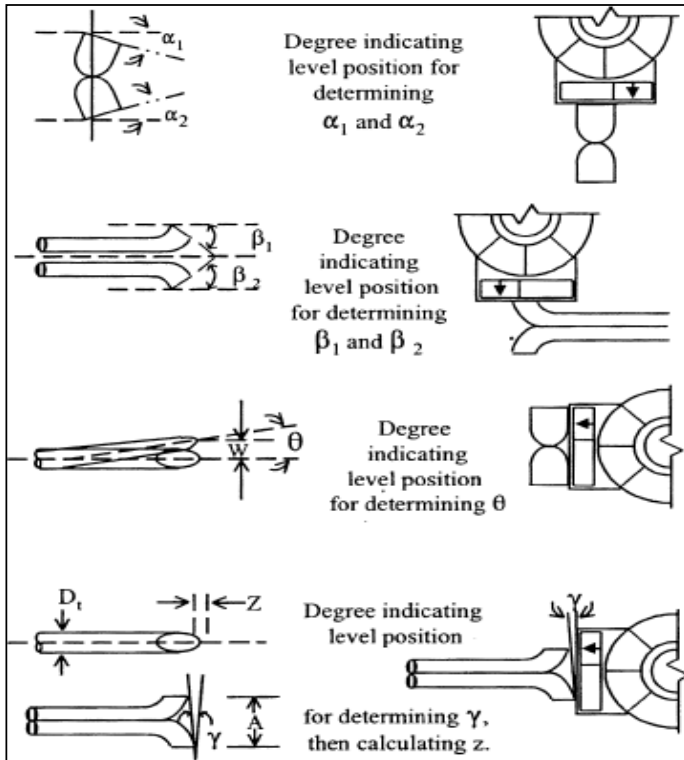
Note: (1) The percent difference between the low and high velocity setting C_p values shall be within +/- 3 %.
 (2) If calibrating a 3-D probe for this method, the pitch angle setting must be 0°.

$C_p = 0.821$

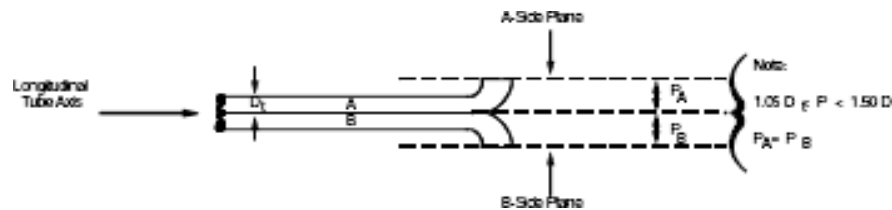


Airflow Sciences Corporation

Probe Inspection for Method 2



α_1	1.1 (°)	Pass
α_2	1.8 (°)	Pass
β_1	1.0 (°)	Pass
β_2	1.5 (°)	Pass
D_t	0.375 (")	Pass
P_a	0.481 (")	Pass
P_b	0.481 (")	Pass
z	<0.02 (")	Pass
w	0.008 (")	Pass



Certification

I certify that Type S probe ID **S8-032** meets or exceeds all specifications, criteria, and applicable design features.

Certified by: wgj

Date: 8/31/2017

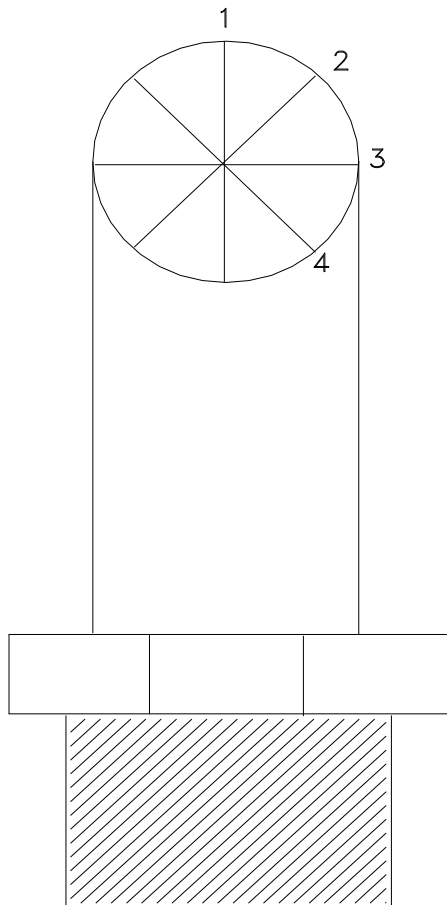
Nozzle Calibration

Date: 2/13/2021

Nozzle ID No.: 95

Analyst: RGO

Material/Type: Glass



0.274 1

0.274 2

0.275 3

0.273 4

Average
<u>0.274</u>

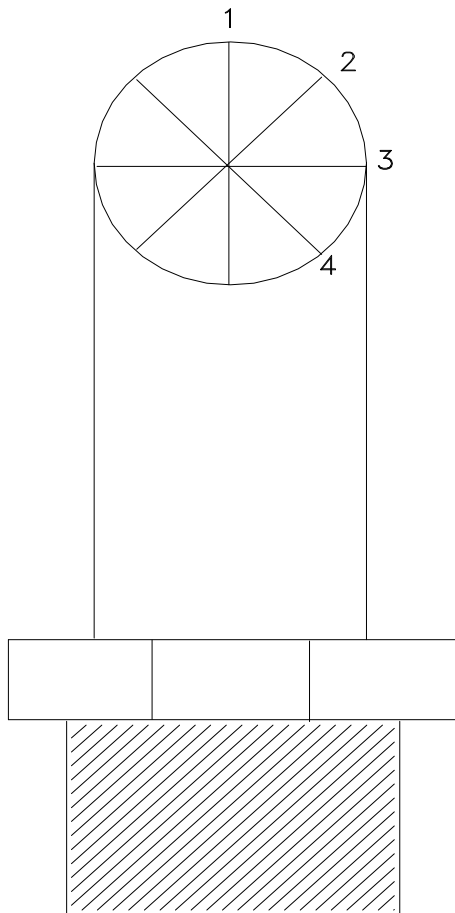
Nozzle Calibration

Date: 7/14/2023

Nozzle ID No.: 954

Analyst: RB

Material/Type: Glass



0.251 1

0.251 2

0.251 3

0.250 4

Valid Data

Average
<u>0.251</u>

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
Operating Condition Mill On

Sample System:	FTIR		
Probe Length:	8.0	ft	
Probe Type:	FTIR		
Sample Plane:	Vertical		
Port Length:	3	in.	
Port Size (diameter):	6	in.	
Port Type:	Flange		
Duct Shape:	Circular		
Diameter:	13.5	ft	
Duct Area:	143.14	Sq. Ft.	
Upstream Diameters:	10.52		Minimum Upstream Distance 6.8 Feet
Downstream Diameters:	16.96		Minimum Downstream Distance 27.0 Feet
Number of Ports Sampled:	1		Ideal Upstream Distance 27.0 Feet
Number of Points per Port:	1		Ideal Downstream Distance 108.0 Feet
Total Number of Traverse Points:	1		

Calibration Gases

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date	Mid cylinder % of high cylinder	Final Bottle Pressure, PSI
O2 % (dry)	Zero	Zero Nitrogen	0.0	-0.01	0.05%	N/A		1500
	Mid	EB0075029	11.18	11.15	0.14%	9/7/2031	50.54%	1800
	High	CC308342	22.12	22.03	0.41%	5/25/2031		1800

Type	Compound	Cylinder ID	Cylinder Value	Expiration Date	Final Bottle Pressure, PSI
Zero Gas	Nitrogen	Zero Nitrogen	0.0	N/A	1700
Calibration Transfer Standard	Ethylene	AAL072815	101.4	9/5/2031	1800
Analyte Spike Gas	HCN	CC768241	49.55	3/11/2024	1900
	SF6		5.001		

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/in	Analyzer Span	RM Gas Span
O2 % (dry)	CAL700	221018	25	22.12
HF ppmvw	MKS 2030	110161896	10	N/A
HCN ppmvw	MKS 2030	110161896	200	N/A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Project #: M234508
 Diluent: O2 %

Test Location: Main Kiln Stack
 Date: 11/7/23
 Operator: R. Sollars
 O2 % Correction: 7

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	11.18	11.14	11.14	0.06	0.04	0.05	11.14	8.99	9.0	0.05	0.00	-0.23	-0.09
2	11.18	11.14	11.15	0.04	0.05	0.05	11.15	8.80	8.8	0.00	0.05	-0.27	0.05
3	11.18	11.15	11.15	0.05	0.05	0.05	11.15	8.72	8.7	0.00	0.00	-0.27	0.00

Concentration of Cal Gas C = Average value of test Co=Average Pre and Post Zero
 erage Pre and Post Span Cgas = Corrected gas value of test

Calibration Corrected and Calculated Data

Run #	Run Date	Start Time	End Time	Moisture %	O2 % (dry)	CO2 % (wet)	CO2 % (dry)	HCN ppmvw	HCN ppmvd @ 7% O2	HF ppmvw	HF ppmvd @ 7% O2
1	11/7/23	14:15	15:14	8.45%	9.02	18.84	20.58	0.81	1.03	0.10	0.13
2	11/7/23	15:40	16:39	8.78%	8.82	19.02	20.85	0.85	1.07	0.10	0.13
3	11/7/23	17:10	18:09	8.66%	8.73	19.18	21.00	0.92	1.15	0.10	0.13

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Test Location: Main Kiln Stack
Date: 11/7/23
Project #: M234508

Linearity Cal/Pre 1 Cal		
<u>Time</u>	<u>O2 % (dry)</u>	
6:05	0.00	
6:06	-0.01	iz
6:07	5.77	
6:08	21.32	
6:09	21.99	
6:10	22.03	ih
6:11	15.57	
6:12	11.15	
6:13	11.15	im
6:14	14.92	
6:15	20.85	
6:16	13.17	
6:17	0.10	
6:18	0.06	
6:19	10.62	
6:20	11.16	
6:21	11.16	
11:33	10.24	
11:34	10.24	
11:35	5.82	
11:36	0.08	
11:37	0.06	z
11:38	9.49	
11:39	11.13	
11:40	11.14	m

Client: CalPortland Company, Inc.

Facility: Oro Grande Cement Plant

Project #: M234508

Test Location: Main Kiln Stack

Date: 11/7/23

Post 1/Pre 2			Post 2/Pre 3		
<u>Time</u>	<u>O2 % (dry)</u>		<u>Time</u>	<u>O2 % (dry)</u>	
15:28	2.41		16:53	8.16	
15:29	0.06		16:54	3.53	
15:30	0.05		16:55	0.08	
15:31	7.73		16:56	4.97	
15:32	11.13		16:57	11.13	
15:33	11.14	m	16:58	11.15	m
15:34	5.39		16:59	11.14	
15:35	0.06		17:00	2.25	
15:36	0.04	z	17:01	0.06	
			17:02	0.05	z

Post 3		
<u>Time</u>	<u>O2 % (dry)</u>	
18:22	7.97	
18:23	7.24	
18:24	0.78	
18:25	0.06	
18:26	9.56	
18:27	11.14	
18:28	11.15	m
18:29	5.84	
18:30	0.06	
18:31	0.05	z

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
Operating Condition Mill Off

Sample System:	FTIR		
Probe Length:	8.0	ft	
Probe Type:	FTIR		
Sample Plane:	Vertical		
Port Length:	3	in.	
Port Size (diameter):	6	in.	
Port Type:	Flange		
Duct Shape:	Circular		
Diameter:	13.5	ft	
Duct Area:	143.14	Sq. Ft.	
Upstream Diameters:	10.52	Minimum Upstream Distance	6.8 Feet
Downstream Diameters:	16.96	Minimum Downstream Distance	27.0 Feet
Number of Ports Sampled:	1	Ideal Upstream Distance	27.0 Feet
Number of Points per Port:	1	Ideal Downstream Distance	108.0 Feet
Total Number of Traverse Points:	1		

Calibration Gases

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date	Mid cylinder % of high cylinder	Final Bottle Pressure, PSI
O2 % (dry)	Zero	Zero Nitrogen	0.0	-0.01	0.05%	N/A		1500
	Mid	EB0075029	11.18	11.15	0.14%	9/7/2031	50.54%	1800
	High	CC308342	22.12	22.03	0.41%	5/25/2031		1800

Type	Compound	Cylinder ID	Cylinder Value	Expiration Date	Final Bottle Pressure, PSI
Zero Gas	Nitrogen	Zero Nitrogen	0.0	N/A	1700
Calibration Transfer Standard	Ethylene	AAL072815	101.4	9/5/2031	1800
Analyte Spike Gas	HCN	CC768241	49.55	3/11/2024	1900
	SF6		5.001		

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/in	Analyzer Span	RM Gas Span
O2 % (dry)	CAL 700	221018	25	22.12
HF ppmvw	MKS 2030	110161896	10	N/A
HCN ppmvw	MKS 2030	110161896	200	N/A

Client: CalPortland Company, Inc.
 Facility: Oro Grande Cement Plant
 Project #: M234508
 Diluent: O2 %

Test Location: Main Kiln Stack
 Date: 11/7/23
 Operator: R. Sollars
 O2 % Correction: 7

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	11.18	11.16	11.13	0.06	0.06	0.06	11.15	10.45	10.5	0.09	-0.14	-0.32	0.00
2	11.18	11.13	11.14	0.06	0.06	0.06	11.14	10.74	10.8	0.05	0.05	-0.32	0.00
3	11.18	11.14	11.14	0.06	0.06	0.06	11.14	10.85	10.9	0.05	0.00	-0.32	0.00

Concentration of Cal Gas C = Average value of test Co=Average Pre and Post Zero
 erage Pre and Post Span Cgas = Corrected gas value of test

Calibration Corrected and Calculated Data

Run #	Run Date	Start Time	End Time	Moisture %	O2 % (dry)	CO2 % (wet)	CO2 % (dry)	HCN ppmvw	HCN ppmvd @ 7% O2	HF ppmvw	HF ppmvd @ 7% O2
1	11/7/23	7:00	7:59	8.29%	10.47	16.67	18.18	1.17	1.70	0.10	0.15
2	11/7/23	8:40	9:39	7.48%	10.79	16.27	17.59	1.12	1.67	0.10	0.15
3	11/7/23	10:15	11:14	7.21%	10.88	16.16	17.42	1.12	1.68	0.10	0.15

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Test Location: Main Kiln Stack
Date: 11/7/23
Project #: M234508

Linearity Cal/Pre 1 Cal		
<u>Time</u>	<u>O2 % (dry)</u>	
6:05	0.00	
6:06	-0.01	iz
6:07	5.77	
6:08	21.32	
6:09	21.99	
6:10	22.03	ih
6:11	15.57	
6:12	11.15	
6:13	11.15	im
6:14	14.92	
6:15	20.85	
6:16	13.17	
6:17	0.10	
6:18	0.06	z
6:19	10.62	
6:20	11.16	
6:21	11.16	m

Client: CalPortland Company, Inc.

Facility: Oro Grande Cement Plant

Project #: M234508

Test Location: Main Kiln Stack

Date: 11/7/23

Post 1/Pre 2			Post 2/Pre 3		
<u>Time</u>	<u>O2 % (dry)</u>		<u>Time</u>	<u>O2 % (dry)</u>	
8:17	9.67		9:54	9.81	
8:18	2.32		9:55	9.97	
8:19	0.07		9:56	9.99	
8:20	8.36		9:57	4.50	
8:21	11.12		9:58	0.07	
8:22	11.13	m	9:59	4.45	
8:23	4.39		10:00	11.12	
8:24	0.08		10:01	11.14	m
8:25	0.06	z	10:02	4.99	
			10:03	0.07	
			10:04	0.06	z

Post 3		
<u>Time</u>	<u>O2 % (dry)</u>	
11:33	10.24	
11:34	10.24	
11:35	5.82	
11:36	0.08	
11:37	0.06	z
11:38	9.49	
11:39	11.13	
11:40	11.14	m

Appendix H - FTIR QA/QC

Method 320 FTIR Detector Multi-Gas Determination QA/QC

FTIR data was collected using an MKS MultiGas 2030 FTIR spectrometer.

The FTIR was equipped with a temperature-controlled, 5.11 meter multi-pass gas cell maintained at 191°C. Gas flows and sampling system pressures were monitored using a rotameter and pressure transducer. All data was collected at 0.5 cm⁻¹ resolution. Each spectrum was derived from the coaddition of 64 scans, with a new data point generated approximately every one minute. Analyzer data for each run is presented in the Reference Method Test Data appendix.

SAMPLING SYSTEM PARAMETERS				
MKS Serial #	Sampling Line	Probe Assembly	Particulate Filter Media	Operating Temperatures
110161896	100' 3/8" dia., heated Teflon	Heated 12', 3/8" dia. SS	0.01µ heated borosilicate glass fiber	191°C

QA/QC procedures followed US EPA Method 320 guidelines. See below for QA/QC procedure details and list of calibration gas standards. All calibration gases were introduced to the analyzer and the sampling system using an instrument grade stainless steel rotameter. All QA/QC procedures were within the acceptance criteria allowance of the applicable EPA methodology. Detailed FTIR QA/QC data follow the narrative portion of this appendix.

FTIR QA/QC Procedures						
QA/QC Specification	Purpose	Calibration Gas Analyte	Delivery	Frequency	Acceptance Criteria	Result
M320: Zero	Verify that the FTIR is free of contaminants & zero the FTIR	Nitrogen (zero)	Direct to FTIR	pre/post test	< MDL or Noise	Pass
M320: Calibration Transfer Standard (CTS) Direct	Verify FTIR stability, confirm optical path length	Ethylene	Direct to FTIR	pretest	+/- 5% cert. value	Pass
M320: Analyte Direct	Verify FTIR calibration	HCN, SF ₆	Direct to FTIR	Pretest	+/- 5% cert. value	Pass
M320: CTS Response	Verify system stability, recovery, response time	Ethylene	Sampling System	Daily, pre/post test	+/- 5% of Direct Measurement	Pass
M320: Zero Response	Verify system is free of contaminants, system bias	Nitrogen (zero)	Sampling System	pretest	Bias correct data	Pass
M320: Analyte Spike	Verify system ability to deliver and quantify analyte of interest in the presence of other effluent gases	HCN, SF ₆	Dynamic Addition to Sampling System, 1:10 effluent	Throughout testing – daily	+/- 20% theoretical recovery	Pass

Note: The determined concentrations from direct analyses were used in all system/spike recovery calculations.

CALIBRATION GAS STANDARDS				
Components	Concentration (ppm)	Vendor	Cylinder #	Standard Type
Ethylene	101.4	Airgas	AAL072815	Primary +/- 1%
HCN/SF ₆	49.55/5.001	Airgas	CC768241	Certified Standard-Spec +/- 5%
Nitrogen	Zero Gas	Airgas	Zero Nitrogen	UHP Grade

Analyte Spiking

HCN spiking was performed prior to testing to verify the ability of the sampling system to quantitatively deliver a sample containing HCN from the base of the probe to the FTIR. Analyte spiking assures the ability of the FTIR sampling system to recover acid gases in the presence of effluent gas.

As part of the spiking procedure, samples were measured to determine native HCN concentrations to be used in the spike recovery calculations. The analyte spiking gases contained a low concentration of sulfur hexafluoride (SF₆). The determined SF₆ concentration in the spiked sample was used to calculate the dilution factor of the spike and thus used to calculate the concentration of the spiked HCN. The spike target dilution ratio was 1:10 or less.

The following equation illustrates the percent recovery calculation.

$$DF = \frac{SF_6(spik)}{SF_6(direct)} \quad (\text{Sec. 9.2.3 (3) USEPA Method 320})$$

$$CS = DF * Spike(dir) + Unspike(1 - DF) \quad (\text{Sec. 9.2.3 (4) USEPA Method 320})$$

DF = Dilution factor of the spike gas

SF_{6(dir)} = SF₆ concentration measured directly in undiluted spike gas

SF_{6(spik)} = Diluted SF₆ concentration measured in a spiked sample

Spike_{dir} = Concentration of the analyte in the spike standard measure by the FTIR directly

CS = Expected concentration of the spiked samples

Unspike = Native concentration of analytes in unspiked samples

Post Collection Data Validation

As part of the data validation procedure, reference spectra are manually fit to that of the sample spectra and a concentration is determined. The reference spectra are scaled to match the peak amplitude of the sample, thus providing a scale factor. The scale factor multiplied by the reference spectra concentration is used to determine the concentration value for the sample spectra. Sample pressure and temperature corrections are then applied to compute the final sample concentration. The manually calculated results are then compared with the software-generated results. The data is then validated if the two concentrations are within ± 20% agreement. If there is a difference greater than ± 20% the spectra are reviewed for possible spectra interferences or any other possible causes leading to incorrectly quantified data.

Detection Limit

The detection limit of each analyte was calculated following Annex A2 of ASTM D6348-12 procedure using spectra that contained similar amounts of moisture.

FTIR DETECTION LIMITS			
Analyte	Detection Limit (ppmv wet)	Detection Limit (%v)	Detection Limit (%v wet)
Hydrogen Cyanide	0.2	—	—
Hydrogen Fluoride	0.1		
Water	—	0.1	N/A
Carbon Dioxide	—	N/A	0.1

Copies of gas cylinder certifications are appended. All concentration data were recorded on a wet, volume basis. HCN spiking was performed prior to testing to confirm the measurement system's ability to deliver and quantify HCN. The sample and data collection followed the procedures outlined in Methods 320.

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill On

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

System Leak Check: 0.0 mL/min

Nitrogen (Zero) Direct to FTIR

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
N2_DIR_000002.LAB	11/7/23	5:52:19	0.0	0.0	0.0	192.5	0.91	-0.2	-0.4	0.002
N2_DIR_000003BKG.LAB	11/7/23	5:54:37	0.0	0.0	0.0	192.1	0.91	0.0	0.0	0.000
N2_DIR_000004.LAB	11/7/23	5:54:50	0.0	0.0	0.0	191.7	0.91	-0.1	-0.1	0.001
N2_DIR_000005.LAB	11/7/23	5:54:58	0.0	0.0	0.0	191.7	0.91	0.0	0.0	-0.001
N2_DIR_000006.LAB	11/7/23	5:55:06	0.0	0.0	0.0	191.7	0.91	0.2	0.1	0.000
N2_DIR_000007.LAB	11/7/23	5:55:14	0.0	0.0	0.0	191.7	0.91	0.0	-0.3	-0.001
N2_DIR_000008.LAB	11/7/23	5:55:22	0.0	0.0	0.0	191.7	0.91	0.0	-0.1	-0.004
N2_DIR_000009.LAB	11/7/23	5:55:30	0.0	0.0	-0.1	191.7	0.91	0.0	0.1	0.004
N2_DIR_000010.LAB	11/7/23	5:55:37	0.0	0.0	0.0	191.7	0.91	0.2	-0.1	-0.001

Calibration Transfer Standard (CTS), Direct to FTIR

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
CTS_DIR_000022.LAB	11/7/23	5:57:52	0.0	0.0	-0.1	190.8	0.91	101.7	0.1	-0.022	100.3%
CTS_DIR_000023.LAB	11/7/23	5:58:00	0.0	0.0	0.0	190.7	0.91	101.7	0.1	-0.032	100.3%
CTS_DIR_000024.LAB	11/7/23	5:58:08	0.0	0.0	0.1	190.6	0.91	101.8	0.2	-0.031	100.4%
CTS_DIR_000025.LAB	11/7/23	5:58:16	0.0	0.0	0.1	190.6	0.91	101.9	0.1	-0.031	100.5%
CTS_DIR_000026.LAB	11/7/23	5:58:24	0.0	0.0	0.0	190.6	0.91	101.9	0.1	-0.033	100.4%
CTS_DIR_000027.LAB	11/7/23	5:58:32	0.0	0.0	0.0	190.4	0.91	101.9	-0.2	-0.030	100.5%
CTS_DIR_000028.LAB	11/7/23	5:58:40	0.0	0.0	0.0	190.4	0.91	101.7	0.0	-0.031	100.3%
Average								101.8			100.4%

Analyte Spike Gas (HCN) Direct to FTIR

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % HCN
49.6HCN_DIR_000035.LAB	11/7/23	6:00:42	0.0	0.0	-0.1	190.1	0.91	0.1	52.4	4.924	105.7%
49.6HCN_DIR_000036.LAB	11/7/23	6:00:50	0.0	0.0	0.0	190.2	0.91	-0.2	51.7	4.901	104.4%
49.6HCN_DIR_000037.LAB	11/7/23	6:00:58	0.0	0.0	0.0	190.2	0.91	0.0	52.0	4.909	104.9%
49.6HCN_DIR_000038.LAB	11/7/23	6:01:06	0.0	0.0	-0.1	190.3	0.91	0.0	51.9	4.906	104.7%
49.6HCN_DIR_000039.LAB	11/7/23	6:01:14	0.0	0.0	-0.1	190.3	0.91	-0.1	52.1	4.908	105.2%
49.6HCN_DIR_000040.LAB	11/7/23	6:01:22	0.0	0.0	0.0	190.3	0.91	0.0	52.0	4.908	104.9%
49.6HCN_DIR_000041.LAB	11/7/23	6:01:29	0.0	0.0	0.0	190.3	0.91	0.0	51.9	4.899	104.8%
49.6HCN_DIR_000042.LAB	11/7/23	6:01:37	0.0	0.0	0.0	190.3	0.91	0.0	51.9	4.904	104.7%
Average									52.0	4.907	104.9%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
CTS_RT_000059.LAB	11/7/23	6:16:56	0.1	0.0	0.0	190.3	0.91	101.5	0.1	-0.028	100.1%
CTS_RT_000060.LAB	11/7/23	6:17:04	0.0	0.0	0.1	190.3	0.91	101.8	0.2	-0.027	100.4%
CTS_RT_000061.LAB	11/7/23	6:17:12	0.0	0.0	0.1	190.4	0.91	101.6	0.2	-0.025	99.8%
CTS_RT_000062.LAB	11/7/23	6:17:20	0.0	0.0	0.1	190.4	0.91	101.7	0.1	-0.035	99.9%
CTS_RT_000063.LAB	11/7/23	6:17:28	0.0	0.0	0.1	190.4	0.91	101.7	0.3	-0.042	99.9%
CTS_RT_000064.LAB	11/7/23	6:17:35	0.0	0.0	0.0	190.4	0.91	101.7	0.2	-0.029	100.0%
CTS_RT_000065.LAB	11/7/23	6:17:43	0.0	0.0	0.1	190.4	0.91	101.7	0.1	-0.027	99.9%
CTS_RT_000066.LAB	11/7/23	6:17:51	0.0	0.0	0.0	190.4	0.91	101.6	0.3	-0.034	99.8%

Response Time Test

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Response Time (sec)
CTS_RT_000055.LAB	11/7/23	6:16:25	1.2	0.0	0.0	190.5	0.91	0.3	0.1	0.004	-
CTS_RT_000056.LAB	11/7/23	6:16:33	0.7	0.0	0.0	190.5	0.91	40.7	0.6	-0.027	15.574
CTS_RT_000057.LAB	11/7/23	6:16:40	0.1	0.0	0.1	190.4	0.91	100.9	0.1	-0.034	23.574
CTS_RT_000058.LAB	11/7/23	6:16:48	0.1	0.0	0.1	190.4	0.91	101.5	0.1	-0.027	
CTS_RT_000059.LAB	11/7/23	6:16:56	0.1	0.0	0.0	190.3	0.91	101.5	0.1	-0.028	
CTS_RT_000060.LAB	11/7/23	6:17:04	0.0	0.0	0.1	190.3	0.91	101.8	0.2	-0.027	
CTS_RT_000061.LAB	11/7/23	6:17:12	0.0	0.0	0.1	190.4	0.91	101.6	0.2	-0.025	
CTS_RT_000062.LAB	11/7/23	6:17:20	0.0	0.0	0.1	190.4	0.91	101.7	0.1	-0.035	
CTS_RT_000063.LAB	11/7/23	6:17:28	0.0	0.0	0.1	190.4	0.91	101.7	0.3	-0.042	

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill On

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

Pre 1 Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
AMBIENT_STACK_000931.LAB	11/7/23	14:00:25	7.2	16.9	-0.1	190.7	0.91	1.3	0.8	-0.006
AMBIENT_STACK_000932.LAB	11/7/23	14:01:27	7.4	17.1	-0.1	190.7	0.91	1.4	0.8	-0.008
AMBIENT_STACK_000933.LAB	11/7/23	14:02:30	7.6	17.3	-0.1	190.7	0.91	1.3	0.8	-0.008
									0.8	-0.007

Pre 1 Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
PRE1_SPK_000935.LAB	11/7/23	14:04:27	7.3	16.5	-0.1	190.6	0.91	1.2	4.4	0.355	0.072	97.5%
PRE1_SPK_000936.LAB	11/7/23	14:04:34	7.3	16.5	-0.1	190.6	0.91	1.3	4.3	0.343	0.070	98.0%
PRE1_SPK_000937.LAB	11/7/23	14:04:42	7.3	16.5	-0.1	190.6	0.91	1.3	4.2	0.347	0.071	96.5%
PRE1_SPK_000938.LAB	11/7/23	14:04:50	7.2	16.5	-0.1	190.6	0.91	1.2	4.1	0.357	0.073	90.9%
PRE1_SPK_000939.LAB	11/7/23	14:04:58	7.3	16.4	-0.1	190.6	0.91	1.2	4.2	0.354	0.072	93.7%
PRE1_SPK_000940.LAB	11/7/23	14:05:06	7.3	16.5	-0.1	190.6	0.91	1.3	4.2	0.347	0.071	95.8%
PRE1_SPK_000941.LAB	11/7/23	14:05:14	7.3	16.4	-0.1	190.6	0.91	1.2	4.1	0.348	0.071	92.3%
PRE1_SPK_000942.LAB	11/7/23	14:05:22	7.3	16.5	-0.1	190.7	0.91	1.2	4.2	0.341	0.069	96.1%

Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
MILLON_R1_001035.LAB	11/7/23	15:22:11	8.6	19.0	-0.1	190.7	0.91	1.3	0.7	-0.009
MILLON_R1_001036.LAB	11/7/23	15:23:13	8.6	18.9	-0.1	190.9	0.91	1.4	0.9	-0.009
MILLON_R1_001037.LAB	11/7/23	15:24:16	8.6	18.9	-0.1	190.8	0.91	1.4	0.8	-0.010
									0.8	-0.009

Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
POST1_SPK_001041.LAB	11/7/23	15:26:08	8.0	17.6	-0.1	190.5	0.91	1.4	4.0	0.313	0.064	97.1%
POST1_SPK_001042.LAB	11/7/23	15:26:15	8.0	17.6	-0.1	190.5	0.91	1.4	3.8	0.314	0.064	92.9%
POST1_SPK_001043.LAB	11/7/23	15:26:23	8.0	17.6	-0.2	190.5	0.91	1.4	3.9	0.312	0.064	95.4%
POST1_SPK_001044.LAB	11/7/23	15:26:31	8.0	17.6	-0.1	190.5	0.91	1.4	3.8	0.310	0.063	94.0%
POST1_SPK_001045.LAB	11/7/23	15:26:39	8.1	17.6	-0.1	190.5	0.91	1.2	4.0	0.319	0.065	96.9%
POST1_SPK_001046.LAB	11/7/23	15:26:47	8.0	17.6	-0.1	190.5	0.91	1.3	4.0	0.319	0.065	95.9%
POST1_SPK_001047.LAB	11/7/23	15:26:55	8.0	17.6	-0.1	190.5	0.91	1.2	3.7	0.310	0.063	92.7%
POST1_SPK_001048.LAB	11/7/23	15:27:02	8.0	17.6	-0.1	190.4	0.91	1.2	4.0	0.314	0.064	96.7%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
POST1_CTS_001053.LAB	11/7/23	15:29:24	0.0	0.0	0.0	190.8	0.91	101.6	-0.2	-0.018	99.8%
POST1_CTS_001054.LAB	11/7/23	15:29:32	0.0	0.0	0.0	190.8	0.91	101.5	-0.1	-0.029	99.7%
POST1_CTS_001055.LAB	11/7/23	15:29:40	0.0	0.1	0.0	190.8	0.91	101.6	-0.1	-0.028	99.8%
POST1_CTS_001056.LAB	11/7/23	15:29:48	0.0	0.0	0.1	190.8	0.91	101.0	-0.1	-0.031	99.2%
POST1_CTS_001057.LAB	11/7/23	15:29:56	0.0	0.0	0.0	190.8	0.91	101.8	-0.1	-0.027	100.0%
POST1_CTS_001058.LAB	11/7/23	15:30:03	0.0	0.0	0.0	190.8	0.91	101.4	-0.1	-0.035	99.6%
POST1_CTS_001059.LAB	11/7/23	15:30:11	0.0	0.0	0.0	190.9	0.91	101.7	0.0	-0.034	99.9%
POST1_CTS_001060.LAB	11/7/23	15:30:19	0.0	0.0	0.0	190.9	0.91	101.4	0.0	-0.033	99.6%

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill On

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
MILLON_R2_001149.LAB	11/7/23	16:46:49	8.7	19.2	-0.1	190.7	0.91	1.3	0.8	-0.009
MILLON_R2_001150.LAB	11/7/23	16:47:52	8.7	19.1	-0.1	190.7	0.91	1.3	1.0	-0.009
MILLON_R2_001151.LAB	11/7/23	16:48:55	8.7	19.1	-0.1	190.8	0.91	1.3	0.9	-0.009
									0.9	-0.009

Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
POST2_SPK_001159.LAB	11/7/23	16:51:29	8.1	17.4	-0.1	190.7	0.91	1.3	4.6	0.375	0.076	96.2%
POST2_SPK_001160.LAB	11/7/23	16:51:36	8.2	17.5	-0.1	190.7	0.91	1.3	4.4	0.361	0.073	95.1%
POST2_SPK_001161.LAB	11/7/23	16:51:44	8.2	17.5	-0.1	190.8	0.91	1.2	4.4	0.353	0.072	97.2%
POST2_SPK_001162.LAB	11/7/23	16:51:52	8.1	17.5	-0.1	190.8	0.91	1.2	4.3	0.356	0.073	93.4%
POST2_SPK_001163.LAB	11/7/23	16:52:00	8.2	17.5	-0.1	190.7	0.91	1.1	4.4	0.356	0.073	95.4%
POST2_SPK_001164.LAB	11/7/23	16:52:08	8.2	17.5	-0.1	190.8	0.91	1.2	4.3	0.350	0.071	95.1%
POST2_SPK_001165.LAB	11/7/23	16:52:16	8.2	17.5	-0.1	190.7	0.91	1.3	4.4	0.351	0.071	97.4%
POST2_SPK_001166.LAB	11/7/23	16:52:24	8.2	17.4	-0.1	190.7	0.91	1.4	4.5	0.355	0.072	98.7%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
POST2_CTS_001179.LAB	11/7/23	16:55:00	0.1	0.1	0.0	190.5	0.91	101.0	0.3	-0.028	99.2%
POST2_CTS_001180.LAB	11/7/23	16:55:08	0.1	0.1	0.0	190.5	0.91	100.7	-0.2	-0.028	98.9%
POST2_CTS_001181.LAB	11/7/23	16:55:15	0.1	0.0	0.0	190.5	0.91	101.2	-0.1	-0.031	99.4%
POST2_CTS_001182.LAB	11/7/23	16:55:23	0.0	0.0	0.0	190.5	0.91	101.6	0.0	-0.029	99.8%
POST2_CTS_001183.LAB	11/7/23	16:55:31	0.0	0.0	0.0	190.5	0.91	101.3	0.1	-0.028	99.6%
POST2_CTS_001184.LAB	11/7/23	16:55:39	0.0	0.0	0.0	190.6	0.91	101.2	0.3	-0.021	99.5%
POST2_CTS_001185.LAB	11/7/23	16:55:47	0.0	0.0	0.0	190.5	0.91	101.2	0.2	-0.039	99.4%
POST2_CTS_001186.LAB	11/7/23	16:55:55	0.0	0.0	0.0	190.5	0.91	101.3	0.2	-0.027	99.5%

Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
MILLON_R3_001277.LAB	11/7/23	18:16:24	8.8	19.3	-0.1	190.8	0.91	1.4	1.0	-0.011
MILLON_R3_001278.LAB	11/7/23	18:17:27	8.8	19.2	-0.2	190.8	0.91	1.4	1.0	-0.011
MILLON_R3_001279.LAB	11/7/23	18:18:30	8.8	19.2	-0.1	190.8	0.91	1.4	0.9	-0.010
									1.0	-0.011

Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
POST3_SPK_001285.LAB	11/7/23	18:21:27	8.1	17.7	-0.1	190.8	0.91	1.5	4.7	0.374	0.076	96.1%
POST3_SPK_001286.LAB	11/7/23	18:21:35	8.1	17.7	-0.1	190.7	0.91	1.4	4.6	0.369	0.075	96.9%
POST3_SPK_001287.LAB	11/7/23	18:21:43	8.2	17.6	-0.1	190.7	0.91	1.3	4.6	0.366	0.075	96.1%
POST3_SPK_001288.LAB	11/7/23	18:21:51	8.1	17.6	-0.1	190.7	0.91	1.3	4.6	0.364	0.074	97.1%
POST3_SPK_001289.LAB	11/7/23	18:21:59	8.1	17.7	-0.1	190.7	0.91	1.5	4.5	0.370	0.075	94.2%
POST3_SPK_001290.LAB	11/7/23	18:22:07	8.1	17.7	-0.1	190.7	0.91	1.2	4.6	0.357	0.073	98.5%
POST3_SPK_001291.LAB	11/7/23	18:22:14	8.1	17.7	-0.1	190.7	0.91	1.4	4.6	0.360	0.073	98.2%
POST3_SPK_001292.LAB	11/7/23	18:22:22	8.2	17.7	-0.1	190.7	0.91	1.3	4.5	0.368	0.075	93.1%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
POST3_CTS_001299.LAB	11/7/23	18:24:17	0.1	0.1	0.0	190.7	0.91	101.2	0.3	-0.022	99.4%
POST3_CTS_001300.LAB	11/7/23	18:24:25	0.1	0.1	0.0	190.7	0.91	101.2	0.2	-0.022	99.4%
POST3_CTS_001301.LAB	11/7/23	18:24:33	0.1	0.1	0.0	190.7	0.91	101.3	0.1	-0.030	99.5%
POST3_CTS_001302.LAB	11/7/23	18:24:41	0.1	0.0	0.0	190.7	0.91	100.9	0.1	-0.032	99.2%
POST3_CTS_001303.LAB	11/7/23	18:24:49	0.0	0.0	0.0	190.8	0.91	101.1	0.1	-0.025	99.3%
POST3_CTS_001304.LAB	11/7/23	18:24:56	0.0	0.0	0.0	190.7	0.91	101.5	0.2	-0.019	99.7%
POST3_CTS_001305.LAB	11/7/23	18:25:04	0.0	0.0	0.0	190.7	0.91	101.3	0.1	-0.030	99.5%
POST3_CTS_001306.LAB	11/7/23	18:25:12	0.0	0.0	0.0	190.8	0.91	101.0	0.0	-0.027	99.3%

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill On

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

Post Test CTS, Direct Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
CTS_DIR_001330.LAB	11/7/23	18:34:31	0.0	0.0	0.0	190.8	0.91	101.3	0.1	-0.027	99.5%
CTS_DIR_001331.LAB	11/7/23	18:34:39	0.0	0.0	0.0	190.9	0.91	101.2	0.1	-0.041	99.4%
CTS_DIR_001332.LAB	11/7/23	18:34:47	0.0	0.0	0.0	190.8	0.91	101.0	0.1	-0.032	99.2%
CTS_DIR_001333.LAB	11/7/23	18:34:55	0.0	0.0	0.0	190.8	0.91	101.0	0.2	-0.033	99.2%
CTS_DIR_001334.LAB	11/7/23	18:35:03	0.0	0.0	0.0	190.8	0.91	101.0	0.0	-0.030	99.2%
CTS_DIR_001335.LAB	11/7/23	18:35:11	0.0	0.0	0.0	190.8	0.91	100.9	0.0	-0.022	99.1%
CTS_DIR_001336.LAB	11/7/23	18:35:19	0.0	0.0	0.0	190.8	0.91	100.8	0.0	-0.032	99.0%
CTS_DIR_001337.LAB	11/7/23	18:35:27	0.0	0.0	0.0	190.9	0.91	101.2	0.2	-0.030	99.4%
Average								101.0			

Post Test N2, Direct Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
N2_DIR_001342.LAB	11/7/23	18:40:13	0.0	0.0	0.0	190.7	0.91	-0.2	0.1	-0.005
N2_DIR_001343.LAB	11/7/23	18:42:19	0.0	0.0	0.0	190.7	0.91	-0.2	0.0	-0.005
N2_DIR_001344.LAB	11/7/23	18:44:25	0.0	0.0	0.0	190.7	0.91	-0.2	0.1	-0.008

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill Off

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

System Leak Check: 0.0 mL/min

Nitrogen (Zero) Direct to FTIR

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
N2_DIR_000002.LAB	11/7/23	5:52:19	0.0	0.0	0.0	192.5	0.91	-0.2	-0.4	0.002
N2_DIR_000003BKG.LAB	11/7/23	5:54:37	0.0	0.0	0.0	192.1	0.91	0.0	0.0	0.000
N2_DIR_000004.LAB	11/7/23	5:54:50	0.0	0.0	0.0	191.7	0.91	-0.1	-0.1	0.001
N2_DIR_000005.LAB	11/7/23	5:54:58	0.0	0.0	0.0	191.7	0.91	0.0	0.0	-0.001
N2_DIR_000006.LAB	11/7/23	5:55:06	0.0	0.0	0.0	191.7	0.91	0.2	0.1	0.000
N2_DIR_000007.LAB	11/7/23	5:55:14	0.0	0.0	0.0	191.7	0.91	0.0	-0.3	-0.001
N2_DIR_000008.LAB	11/7/23	5:55:22	0.0	0.0	0.0	191.7	0.91	0.0	-0.1	-0.004
N2_DIR_000009.LAB	11/7/23	5:55:30	0.0	0.0	-0.1	191.7	0.91	0.0	0.1	0.004
N2_DIR_000010.LAB	11/7/23	5:55:37	0.0	0.0	0.0	191.7	0.91	0.2	-0.1	-0.001

Calibration Transfer Standard (CTS), Direct to FTIR

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
CTS_DIR_000022.LAB	11/7/23	5:57:52	0.0	0.0	-0.1	190.8	0.91	101.7	0.1	-0.022	100.3%
CTS_DIR_000023.LAB	11/7/23	5:58:00	0.0	0.0	0.0	190.7	0.91	101.7	0.1	-0.032	100.3%
CTS_DIR_000024.LAB	11/7/23	5:58:08	0.0	0.0	0.1	190.6	0.91	101.8	0.2	-0.031	100.4%
CTS_DIR_000025.LAB	11/7/23	5:58:16	0.0	0.0	0.1	190.6	0.91	101.9	0.1	-0.031	100.5%
CTS_DIR_000026.LAB	11/7/23	5:58:24	0.0	0.0	0.0	190.6	0.91	101.9	0.1	-0.033	100.4%
CTS_DIR_000027.LAB	11/7/23	5:58:32	0.0	0.0	0.0	190.4	0.91	101.9	-0.2	-0.030	100.5%
CTS_DIR_000028.LAB	11/7/23	5:58:40	0.0	0.0	0.0	190.4	0.91	101.7	0.0	-0.031	100.3%
Average								101.8			100.4%

Analyte Spike Gas (HCN) Direct to FTIR

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % HCN
49.6HCN_DIR_000035.LAB	11/7/23	6:00:42	0.0	0.0	-0.1	190.1	0.91	0.1	52.4	4.924	105.7%
49.6HCN_DIR_000036.LAB	11/7/23	6:00:50	0.0	0.0	0.0	190.2	0.91	-0.2	51.7	4.901	104.4%
49.6HCN_DIR_000037.LAB	11/7/23	6:00:58	0.0	0.0	0.0	190.2	0.91	0.0	52.0	4.909	104.9%
49.6HCN_DIR_000038.LAB	11/7/23	6:01:06	0.0	0.0	-0.1	190.3	0.91	0.0	51.9	4.906	104.7%
49.6HCN_DIR_000039.LAB	11/7/23	6:01:14	0.0	0.0	-0.1	190.3	0.91	-0.1	52.1	4.908	105.2%
49.6HCN_DIR_000040.LAB	11/7/23	6:01:22	0.0	0.0	0.0	190.3	0.91	0.0	52.0	4.908	104.9%
49.6HCN_DIR_000041.LAB	11/7/23	6:01:29	0.0	0.0	0.0	190.3	0.91	0.0	51.9	4.899	104.8%
49.6HCN_DIR_000042.LAB	11/7/23	6:01:37	0.0	0.0	0.0	190.3	0.91	0.0	51.9	4.904	104.7%
Average									52.0	4.907	104.9%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
CTS_RT_000059.LAB	11/7/23	6:16:56	0.1	0.0	0.0	190.3	0.91	101.5	0.1	-0.028	100.1%
CTS_RT_000060.LAB	11/7/23	6:17:04	0.0	0.0	0.1	190.3	0.91	101.8	0.2	-0.027	100.4%
CTS_RT_000061.LAB	11/7/23	6:17:12	0.0	0.0	0.1	190.4	0.91	101.6	0.2	-0.025	99.8%
CTS_RT_000062.LAB	11/7/23	6:17:20	0.0	0.0	0.1	190.4	0.91	101.7	0.1	-0.035	99.9%
CTS_RT_000063.LAB	11/7/23	6:17:28	0.0	0.0	0.1	190.4	0.91	101.7	0.3	-0.042	99.9%
CTS_RT_000064.LAB	11/7/23	6:17:35	0.0	0.0	0.0	190.4	0.91	101.7	0.2	-0.029	100.0%
CTS_RT_000065.LAB	11/7/23	6:17:43	0.0	0.0	0.1	190.4	0.91	101.7	0.1	-0.027	99.9%
CTS_RT_000066.LAB	11/7/23	6:17:51	0.0	0.0	0.0	190.4	0.91	101.6	0.3	-0.034	99.8%

Response Time Test

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Response Time (sec)
CTS_RT_000055.LAB	11/7/23	6:16:25	1.2	0.0	0.0	190.5	0.91	0.3	0.1	0.004	-
CTS_RT_000056.LAB	11/7/23	6:16:33	0.7	0.0	0.0	190.5	0.91	40.7	0.6	-0.027	15.574
CTS_RT_000057.LAB	11/7/23	6:16:40	0.1	0.0	0.1	190.4	0.91	100.9	0.1	-0.034	23.574
CTS_RT_000058.LAB	11/7/23	6:16:48	0.1	0.0	0.1	190.4	0.91	101.5	0.1	-0.027	
CTS_RT_000059.LAB	11/7/23	6:16:56	0.1	0.0	0.0	190.3	0.91	101.5	0.1	-0.028	
CTS_RT_000060.LAB	11/7/23	6:17:04	0.0	0.0	0.1	190.3	0.91	101.8	0.2	-0.027	
CTS_RT_000061.LAB	11/7/23	6:17:12	0.0	0.0	0.1	190.4	0.91	101.6	0.2	-0.025	
CTS_RT_000062.LAB	11/7/23	6:17:20	0.0	0.0	0.1	190.4	0.91	101.7	0.1	-0.035	
CTS_RT_000063.LAB	11/7/23	6:17:28	0.0	0.0	0.1	190.4	0.91	101.7	0.3	-0.042	

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill Off

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

Pre 1 Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
AMBIENT_STACK_000138.LAB	11/7/23	6:31:25	8.9	17.4	-0.1	190.4	0.91	1.9	1.1	-0.008
AMBIENT_STACK_000139.LAB	11/7/23	6:31:33	8.9	17.3	-0.1	190.4	0.91	1.7	1.0	-0.010
AMBIENT_STACK_000140.LAB	11/7/23	6:31:40	8.8	17.2	-0.1	190.4	0.91	1.8	1.1	-0.001
									1.1	-0.006

Pre 1 Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
PRE1_SPK_000150.LAB	11/7/23	6:33:50	7.9	15.5	-0.1	190.6	0.91	1.6	4.8	0.391	0.080	94.8%
PRE1_SPK_000151.LAB	11/7/23	6:33:57	7.9	15.3	-0.1	190.6	0.91	1.6	5.3	0.418	0.085	97.9%
PRE1_SPK_000152.LAB	11/7/23	6:34:05	7.8	15.3	-0.1	190.6	0.91	1.2	5.2	0.425	0.087	96.0%
PRE1_SPK_000153.LAB	11/7/23	6:34:13	7.8	15.3	-0.1	190.7	0.91	1.3	5.2	0.427	0.087	94.7%
PRE1_SPK_000154.LAB	11/7/23	6:34:21	7.8	15.3	-0.1	190.6	0.91	1.4	5.2	0.424	0.086	96.2%
PRE1_SPK_000155.LAB	11/7/23	6:34:29	7.8	15.3	-0.1	190.7	0.91	1.4	5.4	0.428	0.087	97.9%
PRE1_SPK_000156.LAB	11/7/23	6:34:37	7.8	15.2	-0.1	190.7	0.91	1.5	5.3	0.435	0.089	94.6%
PRE1_SPK_000157.LAB	11/7/23	6:34:45	7.8	15.2	-0.1	190.7	0.91	1.3	5.3	0.428	0.087	96.9%

Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
RUN1_000286.LAB	11/7/23	8:11:57	8.4	16.4	-0.1	190.8	0.92	1.6	1.2	-0.011
RUN1_000287.LAB	11/7/23	8:13:00	8.4	16.3	-0.1	190.5	0.92	1.6	1.2	-0.013
RUN1_000288.LAB	11/7/23	8:14:03	8.3	16.3	-0.1	190.2	0.92	1.6	1.3	-0.009
									1.2	-0.011

Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
POST1_SPK_000295.LAB	11/7/23	8:16:11	7.7	15.3	-0.1	190.5	0.92	1.6	4.8	0.360	0.073	96.4%
POST1_SPK_000296.LAB	11/7/23	8:16:19	7.7	15.2	0.0	190.5	0.91	1.3	4.8	0.362	0.074	95.6%
POST1_SPK_000297.LAB	11/7/23	8:16:27	7.7	15.2	-0.1	190.5	0.92	1.4	4.7	0.365	0.074	93.0%
POST1_SPK_000298.LAB	11/7/23	8:16:35	7.7	15.2	-0.1	190.6	0.92	1.3	4.8	0.369	0.075	95.0%
POST1_SPK_000299.LAB	11/7/23	8:16:43	7.7	15.2	-0.1	190.6	0.92	1.6	4.9	0.365	0.074	97.6%
POST1_SPK_000300.LAB	11/7/23	8:16:50	7.8	15.1	-0.1	190.7	0.91	1.5	4.8	0.364	0.074	96.0%
POST1_SPK_000301.LAB	11/7/23	8:16:58	7.8	15.1	-0.1	190.7	0.92	1.5	4.8	0.367	0.075	95.3%
POST1_SPK_000302.LAB	11/7/23	8:17:06	7.8	15.1	-0.1	190.6	0.92	1.6	4.7	0.361	0.074	94.2%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
POST1_CTS_000307.LAB	11/7/23	8:18:27	0.1	0.1	0.0	190.6	0.92	101.3	0.5	-0.027	99.5%
POST1_CTS_000308.LAB	11/7/23	8:18:35	0.1	0.1	0.0	190.7	0.92	101.4	0.4	-0.026	99.6%
POST1_CTS_000309.LAB	11/7/23	8:18:43	0.1	0.1	0.0	190.7	0.92	101.7	0.5	-0.029	99.9%
POST1_CTS_000310.LAB	11/7/23	8:18:51	0.1	0.1	0.1	190.7	0.92	101.7	0.5	-0.029	99.9%
POST1_CTS_000311.LAB	11/7/23	8:18:59	0.1	0.0	0.0	190.7	0.92	101.4	0.4	-0.024	99.6%
POST1_CTS_000312.LAB	11/7/23	8:19:07	0.1	0.1	0.0	190.7	0.92	101.6	0.5	-0.034	99.8%
POST1_CTS_000313.LAB	11/7/23	8:19:15	0.0	0.0	0.0	190.7	0.92	101.7	0.3	-0.024	99.9%
POST1_CTS_000314.LAB	11/7/23	8:19:22	0.0	0.0	0.0	190.8	0.92	101.9	0.2	-0.023	100.1%

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill Off

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
RUN2_000436.LAB	11/7/23	9:50:00	7.5	16.3	-0.1	190.7	0.91	1.6	1.1	-0.010
RUN2_000437.LAB	11/7/23	9:51:03	7.5	16.2	-0.1	190.6	0.91	1.5	1.1	-0.007
RUN2_000438.LAB	11/7/23	9:52:05	7.5	16.2	-0.1	190.7	0.91	1.6	1.1	-0.012
									1.1	-0.010

Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
POST2_SPK_000452.LAB	11/7/23	9:55:09	7.0	15.2	-0.1	190.6	0.91	1.4	4.5	0.318	0.065	102.5%
POST2_SPK_000453.LAB	11/7/23	9:55:16	7.0	15.2	-0.1	190.6	0.91	1.7	4.4	0.325	0.066	99.1%
POST2_SPK_000454.LAB	11/7/23	9:55:24	7.0	15.2	-0.1	190.6	0.91	1.4	4.4	0.324	0.066	98.3%
POST2_SPK_000455.LAB	11/7/23	9:55:32	7.0	15.2	-0.1	190.7	0.91	1.4	4.3	0.337	0.069	92.7%
POST2_SPK_000456.LAB	11/7/23	9:55:40	7.0	15.2	-0.1	190.7	0.91	1.5	4.5	0.321	0.065	101.1%
POST2_SPK_000457.LAB	11/7/23	9:55:48	7.0	15.2	-0.1	190.7	0.91	1.3	4.3	0.329	0.067	96.2%
POST2_SPK_000458.LAB	11/7/23	9:55:56	7.0	15.2	-0.1	190.8	0.91	1.3	4.5	0.323	0.066	101.2%
POST2_SPK_000459.LAB	11/7/23	9:56:03	7.0	15.2	-0.1	190.8	0.91	1.3	4.4	0.326	0.066	99.0%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
POST2_CTS_000465.LAB	11/7/23	9:57:50	0.1	0.1	0.0	191.2	0.92	101.4	0.5	-0.024	99.6%
POST2_CTS_000466.LAB	11/7/23	9:57:58	0.1	0.1	0.0	191.2	0.91	101.1	0.4	-0.022	99.3%
POST2_CTS_000467.LAB	11/7/23	9:58:05	0.1	0.1	0.0	191.2	0.91	101.9	0.3	-0.026	100.1%
POST2_CTS_000468.LAB	11/7/23	9:58:13	0.0	0.1	0.0	191.2	0.91	101.5	0.4	-0.030	99.8%
POST2_CTS_000469.LAB	11/7/23	9:58:21	0.1	0.1	0.0	191.2	0.91	101.6	0.5	-0.026	99.8%
POST2_CTS_000470.LAB	11/7/23	9:58:29	0.1	0.1	0.1	191.2	0.92	101.4	0.4	-0.026	99.6%
POST2_CTS_000471.LAB	11/7/23	9:58:37	0.0	0.1	0.0	191.2	0.92	101.5	0.5	-0.024	99.7%
POST2_CTS_000472.LAB	11/7/23	9:58:44	0.0	0.1	0.0	191.2	0.91	101.7	0.5	-0.040	100.0%

Native Effluent Prior to Analyte Spike

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
RUN3_000580.LAB	11/7/23	11:28:07	7.0	16.0	-0.1	190.7	0.91	1.5	1.0	-0.006
RUN3_000581.LAB	11/7/23	11:29:10	7.0	15.9	-0.1	190.7	0.91	1.5	1.1	-0.007
RUN3_000582.LAB	11/7/23	11:30:13	7.0	16.0	-0.1	190.7	0.91	1.5	1.1	-0.007
									1.1	-0.007

Effluent Spike Using Analyte

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Dilution Factor	Recovery % HCN
POST3_SPK_000586.LAB	11/7/23	11:32:44	6.4	14.7	-0.1	190.5	0.91	1.2	5.1	0.386	0.079	99.4%
POST3_SPK_000587.LAB	11/7/23	11:32:52	6.4	14.7	-0.1	190.5	0.91	1.1	5.1	0.379	0.077	101.8%
POST3_SPK_000588.LAB	11/7/23	11:33:00	6.4	14.7	-0.1	190.5	0.91	1.4	5.0	0.377	0.077	100.5%
POST3_SPK_000589.LAB	11/7/23	11:33:08	6.4	14.7	-0.1	190.5	0.91	1.3	5.0	0.379	0.077	99.6%
POST3_SPK_000590.LAB	11/7/23	11:33:16	6.4	14.7	-0.1	190.5	0.91	1.5	4.9	0.380	0.078	96.8%
POST3_SPK_000591.LAB	11/7/23	11:33:24	6.4	14.7	-0.1	190.5	0.91	1.2	4.9	0.378	0.077	98.3%
POST3_SPK_000592.LAB	11/7/23	11:33:31	6.4	14.9	-0.1	190.5	0.91	1.4	4.9	0.379	0.077	97.7%
POST3_SPK_000593.LAB	11/7/23	11:33:40	6.4	14.8	-0.1	190.5	0.91	1.4	4.8	0.375	0.076	95.8%

CTS, System Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
POST3_CTS_000603.LAB	11/7/23	11:35:53	0.1	0.1	0.0	190.3	0.91	101.6	0.5	-0.021	99.8%
POST3_CTS_000604.LAB	11/7/23	11:36:01	0.1	0.1	0.0	190.3	0.91	101.5	0.3	-0.030	99.7%
POST3_CTS_000605.LAB	11/7/23	11:36:09	0.1	0.1	0.0	190.3	0.91	101.4	0.4	-0.021	99.6%
POST3_CTS_000606.LAB	11/7/23	11:36:17	0.0	0.1	0.0	190.3	0.91	101.6	0.3	-0.021	99.8%
POST3_CTS_000607.LAB	11/7/23	11:36:25	0.0	0.1	0.0	190.3	0.91	101.4	0.4	-0.018	99.6%
POST3_CTS_000608.LAB	11/7/23	11:36:33	0.0	0.0	0.0	190.4	0.91	101.9	0.2	-0.023	100.1%
POST3_CTS_000609.LAB	11/7/23	11:36:40	0.0	0.1	0.0	190.3	0.91	101.9	0.5	-0.026	100.1%
POST3_CTS_000610.LAB	11/7/23	11:36:48	0.0	0.0	0.0	190.4	0.91	101.8	0.3	-0.018	100.0%

Client: CalPortland Company, Inc.
Facility: Oro Grande Cement Plant
Project #: M234508
Operating Condition: Mill Off

Test Location: Main Kiln Stack
Date: 11/7/2023
Operator: R. Sollars
FTIR s/n: 110161896

Post Test CTS, Direct Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet	Recovery % Ethylene
CTS_DIR_000663.LAB	11/7/23	11:51:02	0.0	0.0	0.0	190.3	0.91	101.6	0.3	-0.028	99.9%
CTS_DIR_000664.LAB	11/7/23	11:51:10	0.0	0.0	0.0	190.3	0.91	101.3	0.4	-0.025	99.5%
CTS_DIR_000665.LAB	11/7/23	11:51:18	0.0	0.0	0.0	190.4	0.91	101.2	0.3	-0.027	99.4%
CTS_DIR_000666.LAB	11/7/23	11:51:26	0.0	0.0	0.0	190.4	0.91	101.4	0.4	-0.025	99.6%
CTS_DIR_000667.LAB	11/7/23	11:51:34	0.0	0.0	0.0	190.5	0.91	101.0	0.2	-0.024	99.2%
CTS_DIR_000668.LAB	11/7/23	11:51:42	0.0	0.0	0.0	190.6	0.91	101.3	0.4	-0.021	99.5%
CTS_DIR_000669.LAB	11/7/23	11:51:50	0.0	0.0	0.0	190.6	0.91	101.3	0.3	-0.032	99.5%
CTS_DIR_000670.LAB	11/7/23	11:51:57	0.0	0.0	0.0	190.6	0.91	101.0	0.3	-0.028	99.3%
Average								101.3			

Post Test N2, Direct Purge

Spectrum	Date	Time	H2O% %v	CO2 %v wet	HF ppmv wet	FTIR Gas Cell Temperature deg C	FTIR Gas Cell Pressure atm	Ethylene ppmv wet	HCN ppmv wet	SF6 ppmv wet
N2_DIR_000674.LAB	11/7/23	11:55:51	0.0	0.0	0.0	190.6	0.91	0.3	0.4	0.000
N2_DIR_000675.LAB	11/7/23	11:57:57	0.0	0.0	0.0	190.8	0.91	0.4	0.4	0.000
N2_DIR_000676.LAB	11/7/23	12:00:02	0.0	0.0	0.0	190.5	0.91	0.3	0.4	0.000

Time	DL summary - zero gas		Time	DL summary - in stack	
	HF ppm (10) 191C	HCN (100) 191C		HF ppm (10) 191C	HCN (100) 191C
5:55:06 AM	-0.20	-0.21	7:48:54 AM	1.02	0.80
5:55:14 AM	0.18	-0.06	7:49:57 AM	0.99	0.79
5:55:22 AM	0.21	0.25	7:51:00 AM	0.97	0.75
5:55:30 AM	-0.04	0.04	7:52:03 AM	0.96	0.78
5:55:37 AM	-0.27	0.04	7:53:06 AM	0.87	0.82
5:55:45 AM	-0.44	0.09	7:54:09 AM	0.91	0.81
5:55:54 AM	-0.09	-0.21	7:55:11 AM	0.91	0.82
Standard Deviation	0.22	0.15	Standard Deviation	0.05	0.02
3x = DL	0.66	0.46	3x = DL	0.14	0.06

Appendix I - Gas Cylinder Certifications

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E03NI56E15A1055	Reference Number:	48-402752988-1
Cylinder Number:	CC308342	Cylinder Volume:	162.0 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32023	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	May 25, 2023

Expiration Date: May 25, 2031

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	22.00 %	22.58 %	G1	+/- 0.6% NIST Traceable	05/25/2023
OXYGEN	22.00 %	22.12 %	G1	+/- 1.1% NIST Traceable	05/25/2023
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061520	CC354777	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	08010228	K016648	23.20 % OXYGEN/NITROGEN	+/- 0.2%	Jun 01, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS 6E CO2	NDIR	Apr 26, 2023
SIEMENS OXYMAT 6	PARAMAGNETIC	May 22, 2023

Triad Data Available Upon Request



Signature on file

Grade of Product: EPA PROTOCOL STANDARD

Reference Number: 48-402834276-1
Cylinder Volume: 152.0 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 590
Certification Date: Sep 07, 2023

Expiration Date: Sep 07, 2031

Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	11.00 %	11.15 %	G1	+/- 0.6% NIST Traceable	09/07/2023
OXYGEN	11.00 %	11.18 %	G1	+/- 1.4% NIST Traceable	09/07/2023
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08010611	K005428	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 30, 2024
NTRM	98051002	SG9150866BAL	12.05 % OXYGEN/NITROGEN	+/- 0.7%	Dec 14, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS 6E CO2	NDIR	Aug 21, 2023
SIEMENS OXYMAT 6	PARAMAGNETIC	Aug 18, 2023

Triad Data Available Upon Request



Signature on file

Project No. M28308A
Main Kiln Stack

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CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X02NI99C15A1268	Reference Number:	48-402834277-1
Cylinder Number:	AAL072815	Cylinder Volume:	144.0 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Sep 05, 2023	Valve Outlet:	350
Lot Number:	48-402834277-1		

Expiration Date: Sep 05, 2031

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
ETHYLENE	100.0 PPM	101.4 PPM	+/- 2%
NITROGEN	Balance		



Signature on file

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	MOSTARDI PLATT	Reference Number:	160-402841635-1
Part Number:	X03NI99C15AC0W8	Cylinder Volume:	144.4 CF
Cylinder Number:	CC768241	Cylinder Pressure:	2015 PSIG
Laboratory:	124 - Plumsteadville - PA	Valve Outlet:	350SS
Analysis Date:	Sep 11, 2023		
Lot Number:	160-402841635-1		

Expiration Date: Mar 11, 2024

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
SULFUR HEXAFLUORIDE	5.000 PPM	5.001 PPM	+/- 1.3%
HYDROGEN CYANIDE	50.00 PPM	49.55 PPM	+/- 5%
NITROGEN	Balance		



Signature on file

END OF THE REPORT