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Hydrogen Cyanide, Hydrogen Fluoride and Diatomic Chlorine from a Portland Cement Plant

Holcim Inc.
Ste. Genevieve Facility
Bloomsdale, MO

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TEST DATES: January 10-11, 2024

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1. INTRODUCTION

The United States Environmental Protection Agency (US EPA) has directed the portland cement industry (SIC 3241) to conduct emissions testing as part of the US EPA Risk and Technology Review (RTR). This document provides the emission test results and supporting quality assurance/quality control (QA/QC) measures used to produce standardized data having known precision and accuracy. Collection of accurate, representative, and standardized data for facilities with low emissions is necessary especially in view of MACT standard setting procedures.

The process tested at Holcim's Ste. Genevieve facility is a preheater/precalciner pyro-processing system with two inline raw mills producing portland cement.

The air pollution control equipment at the Ste. Genevieve facility consists of three control devices. A selective noncatalytic reduction (SNCR) post combustion emissions control technology for reducing NOx by injecting ammonia into the kiln at a properly determined location. A dry sorbent injection system utilizing lime is used to control acid gas emissions. Exhaust from the kiln, both inline raw mills, clinker cooler, and coal mills directed through respective fabric filters for particulate removal, and directed into individual kiln/raw mills, clinker cooler, and coal mills stacks.

A more detailed description of the processes is provided in Section 2 of the RTR Sampling and Analytical Protocol reproduced in Appendix G.

The Holcim retained DEECO Inc. (DEECO) to conduct emission tests for hydrogen cyanide (HCN), hydrogen fluoride (HF), and diatomic chlorine (Cl_2). All sampling runs were be one hour long. Concurrent measurements to determine volumetric flow rate were made.

A summary of the test results is shown in Table 1.1.

TABLE 1.1 SUMMARY OF HYDROGEN CYANIDE, HYDROGEN FLUORIDE, AND DIATOMIC CHLORINE EMISSIONS; HOLCIM INC., STE. GENEVIEVE FACILITY BLOOMSDALE, MO; JANUARY 10-11, 2024

Test Parameters	Main Stack Raw Mills On	Main Stack Raw Mills Off
Hydrogen Cyanide (FTIR)		
parts-per-million, dry basis corrected to 7% O_2	5.4	5.6
pounds-per-hour	13.2	13.0
pounds-per-ton of clinker	0.021	0.022
Hydrogen Fluoride (Method 26A)		
parts-per-million, dry basis corrected to 7% O_2	<0.24	<0.24
pounds-per-hour	<0.439	<0.411
pounds-per-ton of clinker	<0.0007	<0.0007
Diatomic Chlorine (Method 26A)		
parts-per-million, dry basis corrected to 7% O_2	<0.05	<0.10
pounds-per-hour	<0.323	<0.582
pounds-per-ton of clinker	<0.0005	<0.0010

The sampling and analytical procedures followed are summarized in Table 1.2 and discussed in detail in Section 3.

Testing was performed on the main stack under two conditions, both Raw Mills On and both Raw Mills Off. The Raw Mills On runs were conducted on January 10, 2024 and the three Raw Mills Off runs were conducted on January 11, 2024.

Sampling was conducted by personnel from DEECO, Inc. of Raleigh, North Carolina. All questions regarding sampling and analytical data should be directed to Dr. Scott Steinsberger of DEECO at (800) 733-3261. The field sampling was completed by Dustin Carpenter, Lee Harris, and Scott Steinsberger of DEECO.

The remainder of this document summarizes the results, procedures and quality control measures followed for this program. Section 2 contains tabulated air emission results for each parameter of interest. Section 3 summarizes the air emission sampling and analytical procedures performed by DEECO, with a brief description and/or reference to the applicable methodologies. Section 4 discusses the basic quality control elements in place for this program to assure the collection of representative, accurate air emission data.

The appendices provided in this document contain all of the necessary information to verify the reported results. Included as Appendices are: Appendix A - Emission Summary Tables; Appendix B - Field Data and CEM/FTIR Data; Appendix C - Ion Chromatography Analytical Report Data; Appendix D - Plant Process Data; Appendix E - Calibration Documents; Appendix F - Test Participants; Appendix G - RTR Sampling and Analytical Protocol

TABLE 1.2 SUMMARY OF SAMPLING AND ANALYTICAL PROTOCOLS FOR HOLCIM INC., STE. GENEVIEVE FACILITY, BLOOMSDALE, MO

Location and Frequency	Test Parameter	Sampling Method	Sampling Procedure	Analysis Method	Analysis Procedure
Kiln Main Stack	Volumetric Flow Rate and cyclonic check	EPA Methods 1 and 2	Velocity and temperature traverses	EPA Methods 1 and 2	Manometer for differential pressure and thermocouple for temperature
	Oxygen and Carbon Dioxide and Stratification Check	EPA Method 3A	Continuous; extractive sample	EPA Method 3A	Paramagnetic for O_2 and NDIR for CO_2
	Moisture	EPA Method 4	Condensation	EPA Method 4	Gravimetric
	Hydrogen Fluoride and Diatomic Chlorine (Cl_2)	EPA Method 26A	Isokinetic integrated sample	EPA Method 26A	Ion chromatography
	Hydrogen Fluoride and Hydrogen Cyanide	EPA Method 320	Continuous; extractive sample	EPA Method 320	Fourier Transform Infrared (FTIR) Spectroscopy

2. SUMMARY OF RESULTS

Emissions sampling was conducted at Holcim's Ste. Genevieve facility located in Bloomsdale, MO Sampling was conducted for stack gas flow rate (EPA Methods 1 and 2), stack gas oxygen and carbon dioxide (EPA Method 3A), stack gas moisture (EPA Method 4), stack gas hydrogen fluoride and diatomic chlorine (EPA Method 26A) and stack gas hydrogen cyanide and hydrogen fluoride (EPA Method 320).

For this test series, a brand new Teflon heated sample line was used for the first time and appeared to be off gassing hydrogen fluoride. The initial hydrogen fluoride concentration on January 10 was over 10 ppm. The final hydrogen fluoride concentration on January 11 after the last run was 0.2 ppm. The elevated hydrogen fluoride concentrations occurred while sampling stack gas and would decrease when the sampling system was purge with nitrogen. Subsequent purging of the sample line over several days with moist air while heating eventually eliminated the hydrogen fluoride off gassing. The Method 26A samples were all non-detect for hydrogen fluoride. The FTIR hydrogen fluoride results are provided in Appendix B but not included in the summary tables. **Based on this evidence, the hydrogen fluoride data from the FTIR is considered to be invalid.**

Testing was conducted on the main stack under two conditions; Raw Mills On and Raw Mills Off and the results are summarized in Tables 2.1 and 2.2, respectively.

TABLE 2.1 HOLCIM INC., STE. GENEVIEVE FACILITY, BLOOMSDALE, MO; KILN MAIN STACK HYDROGEN CYANIDE, HYDROGEN FLUORIDE, AND DIATOMIC CHLORINE EMISSIONS; RAW MILLS ON; JANUARY 10, 2024

Test Parameter	Main Stack Raw Mills On Run 1	Main Stack Raw Mills On Run 2	Main Stack Raw Mills On Run 3	Main Stack Raw Mills On Average
Time	14:30-15:36	15:52-16:58	17:10-18:16	January 10, 2024
Flow Rate (dscfm)	685,150	673,650	679,000	679,300
Oxygen	8.9%	9.0%	9.1%	9.0%
Carbon Dioxide	22.1%	22.0%	22.0%	22.0%
Moisture	11.0%	10.9%	10.7%	10.9%
Hydrogen Cyanide (FTIR)				
ppm_{dry} at 7% O_2	5.2	5.5	5.5	5.4
pounds-per-hour	12.9	13.4	13.4	13.2
pounds-per-ton of clinker	0.020	0.021	0.021	0.021
Hydrogen Fluoride (Method 26A)				
ppm_{dry} at 7% O_2	<0.234	<0.239	<0.255	<0.243
pounds-per-hour	<0.431	<0.430	<0.458	<0.439
pounds-per-ton of clinker	<0.0007	<0.0007	<0.0007	<0.0007
Diatomic Chlorine (Method 26A)				
ppm_{dry} at 7% O_2	<0.049	<0.054	<0.050	<0.050
pounds-per-hour	<0.318	<0.339	<0.313	<0.323
pounds-per-ton of clinker	<0.0005	<0.0005	<0.0005	<0.0005

TABLE 2.2 HOLCIM INC., STE. GENEVIEVE FACILITY, BLOOMSDALE, MO; KILN MAIN STACK HYDROGEN CYANIDE, HYDROGEN FLUORIDE, AND DIATOMIC CHLORINE EMISSIONS; RAW MILLS OFF, JANUARY 11, 2024

Test Parameter	**Main Stack Raw Mills Off Run 1**	**Main Stack Raw Mills Off Run 2**	**Main Stack Raw Mills Off Run 3**	**Main Stack Raw Mills Off Average**
Time	08:35-09:41	09:53-10:59	11:09-12:15	January 11, 2024
Flow Rate (dscfm)	652,450	642,500	651,950	649,000
Oxygen	9.2%	9.2%	9.2%	9.2%
Carbon Dioxide	21.5%	21.6%	21.4%	21.5%
Moisture	10.6%	10.8%	10.7%	10.7%
Hydrogen Cyanide (FTIR)				
ppm_{dry} at 7% O_2	5.2	5.6	6.1	5.6
pounds-per-hour	12.0	12.8	14.1	13.0
pounds-per-ton of clinker	0.020	0.022	0.023	0.022
Hydrogen Fluoride (Method 26A)				
ppm_{dry} at 7% O_2	<0.259	<0.252	<0.216	<0.242
pounds-per-hour	<0.442	<0.425	<0.368	<0.411
pounds-per-ton of clinker	<0.0007	<0.0007	<0.0006	<0.0007
Diatomic Chlorine (Method 26A)				
ppm_{dry} at 7% O_2	<0.123	0.078	0.089	<0.096
pounds-per-hour	<0.743	0.464	0.540	<0.582
pounds-per-ton of clinker	<0.0012	0.0008	0.0009	<0.0010

3. SAMPLING AND ANALYTICAL PROCEDURES

Table 1.2 presents a summary of the overall sampling and analytical protocols used for the test program for the Kiln/Raw Mills Main stack at Holcim's Ste. Genevieve facility in Bloomsdale, MO. All sampling and analytical methods employed for this test program were performed in accordance with the procedures outlined in the Reference Test Methods contained in the Code of Federal Regulations, Title 40, Part 60, Appendix A (40 CFR 60, Appendix A) and 40 CFR 63, Appendix A.

3.1 Sampling Point Determination - EPA Method 1

The measurement site for the Kiln/Raw Mills Main stack is a vertically-oriented circular stack with an inside diameter of 218.9 inches. Four equidistant sampling ports are located at about located approximately 146.7' (approximately 8.0 duct diameters) above the closest disturbance and approximately 147.3' (approximately 8.1 duct diameters) from the stack outlet.

The number and location of the sampling or traverse points were determined according to the procedures outlined in EPA Method 1. The traverse point locations are provided in Appendix B. All points were at least 1.0 inches from the stack wall, per Method 1. The sampling location met the minimum specifications for selection of a measurement site as outlined in EPA Method 1. Cyclonic flow checks, as described in EPA Method 1 Section 2.4, using the Type-S pitot null procedure and angle measurements at the stack test location were conducted.

A twelve (12) point sampling traverse were made using 3 points in each of 4 sampling ports at the main stack. Each traverse was made at each sampling location using a type-S pitot tube in accordance with EPA Methods 2 procedures. The traverse point locations are provided in Appendix B. Gas temperatures were measured using calibrated Type K thermocouples and digital readout devices. All measurements were performed in accordance with the procedures in EPA Methods 2, and 26A.

A schematic of the main stack is provided in Figure 3-1.

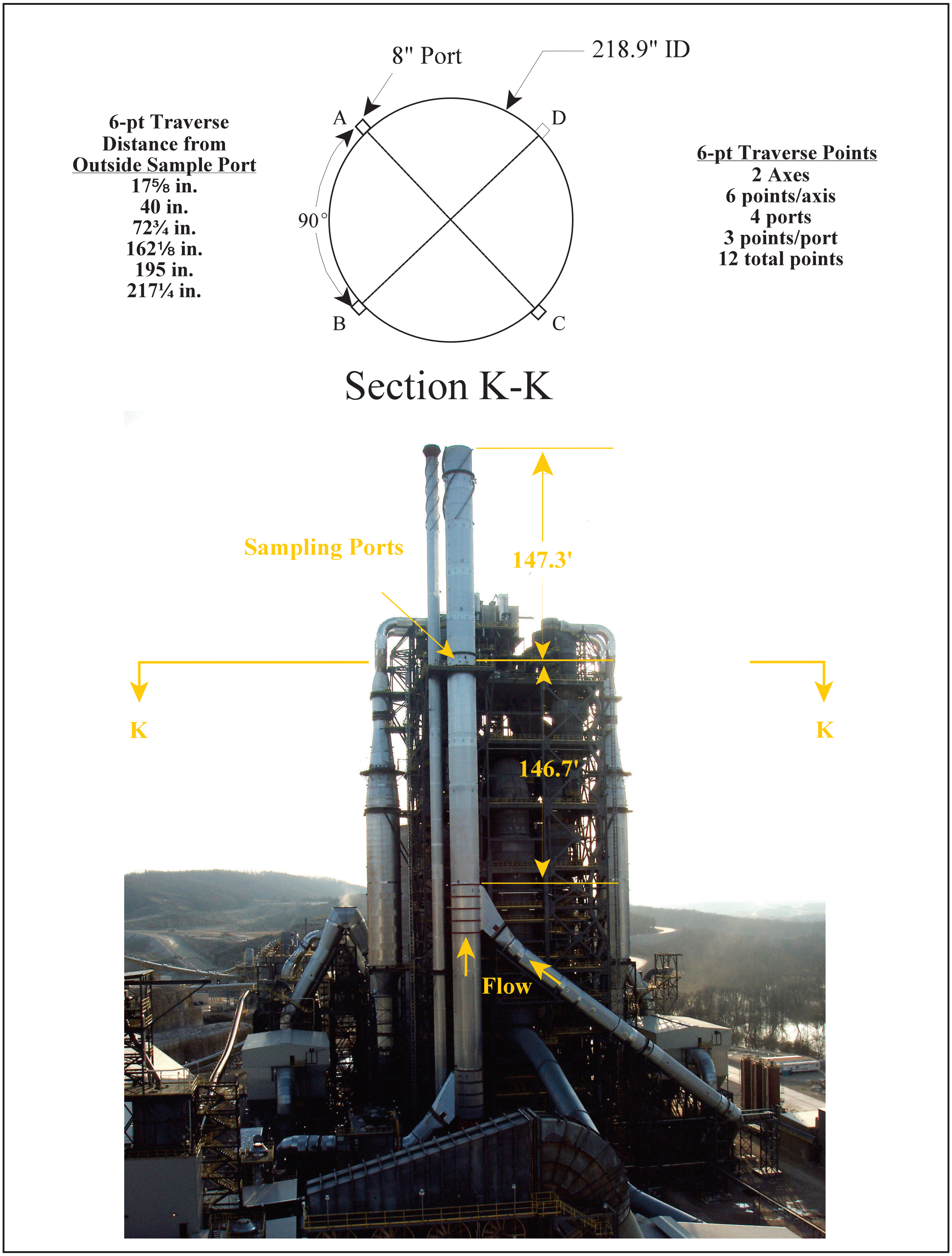


Figure 3.1 Schematic of the Main Stack Sampling Location

3.2 Flue Gas Velocity and Volumetric Flow Rate - EPA Method 2

The flue gas velocity and volumetric flow rate were determined according to the procedures outlined in EPA Method 2. Velocity measurements were using type S pitot tubes conforming to the calibration specifications outlined in EPA Method 2, Section 10.1. Each Type-S pitot tube, calibrated according to these standards, had an assigned coefficient. Differential pressures were measured with fluid manometers. Effluent gas temperatures were measured with chromel-alumel thermocouples equipped with digital readouts.

3.3 Outlet Flue Gas Composition - EPA Method 3A

Outlet flue gas analysis for oxygen (O_2) and carbon dioxide (CO_2) concentrations, and the calculation of percent excess air and flue gas dry molecular weight was performed in accordance with EPA Method 3A.

To evaluate the sampling location and points for FTIR and O_2 sampling, a three-point O_2 concentration stratification test on a line passing through the centroidal area at (for stacks is greater than 2.4 meters) at 0.4, 1.2 and 2.0 meters from the stack or duct wall. The procedures in Section 8.1.2 of Method 7E were followed, but oxygen will be used as parameter as allowed by fourth sentence in Section 8.1.2. The plant O_2 CEMS was used as a control. A criteria of <5% variation from combined mean for each point was used as indication of non-stratification to allow single point sampling at the point closest to the mean.

Per EPA Method 3A for determining molecular weight, continuous extractive sampling will be obtain using the Method 320 sampling system described in Section 3.6.

A portion of the hot , wet gas sample was sent through a condensing system to remove the stack moisture. A portion of the moisture-free gas sample was sent to an O_2/CO_2 analyzer.

Calibration procedures were be performed in accordance with EPA methodology. Analyzers were calibrated before and after each test and a calibration check between each test run.

The pretest calibrations consisted of the following steps:

- Internal (direct) calibration of each analyzer to adjust calibration and check linearity.
- External (through the entire sampling system) calibration to check the system bias on zero and span gases.

The post test calibration consisted of an external system bias calibration check.

The analyzer calibrated using a certified zero and span (mid or high range) gas. Zero and span gases were directed to each analyzer through the appropriate plumbing, the calibration gas flow rates were adjusted to the correct flow rate and the analyzer was adjusted with the appropriate span pot.

After the analyzer was properly adjusted the linearity was checked using a low and high range calibration gas. The maximum allowable limit for linearity is 2% of the analyzer range and all analyzers were shown to be linear within these limits before proceding..

The external calibration bias check were performed by placing the CEM system in sampling mode and injecting a zero and span gas into the sample line at the probe exit. This check showed if there is any sampling system related bias, and also checks the integrity of the sample line.

3.3.1 Calibration Gases

DEECO useed EPA Protocol and/or ±2% NIST Traceable gases for calibration as required by the various reference methods employed in this test program. Calibration gases were selected from previous experience with similar sources and/or from information obtained from the facility engineer prior to sampling. In some cases if the gases that are selected are out of the optimum range of operation then no significant impact of data quality is expected due to the linear nature of the analyzers that were used.

No audit gases from a federal or a state agency were provided.

3.3.2 Sampling Procedures

At the completion of the pretest calibration routine, the CEM system was ready for operation. No further adjustments of sample flow rates, analyzer zero or span adjustments, or other critical CEM operating parameters were made until testing and post test calibration were complete.

Each sampling run was one hour. At the completion for each test run, calibration gases were used to check between test runs. A zero and the upscale calibration gas closest to the actual emission concentrations were used for the pretest and post test calibrations.

3.4 Flue Gas Moisture Content - EPA Method 4

The flue gas moisture content was determined in conjunction with the EPA Method 26A trains according to the sampling and analytical procedures outlined in EPA Method 4. (**NOTE:** In order to maintain isokinetic sampling, the sampling rate used may have been required to temporarily exceed the EPA Method 4-specified maximum sampling rate of 0.75 CFM, based on observed stack gas pitot readings.) The impingers were connected in series and contained reagents as described below. The impingers were contained in an ice bath in order to assure condensation of the moisture in the flue gas stream. Any moisture that is not condensed in the impingers was captured in the silica gel, therefore all moisture was weighed and entered into moisture content calculations.

3.5 Hydrogen Fluoride and Diatomic Chlorine - EPA Method 26A

Sampling and analytical procedures were those outlined in EPA Method 26A to determine primarily diatomic chlorine (Cl_2) emissions and hydrogen fluoride (HF) emissions at main stack outlet sampling locations. Duplicate simultaneous trains (a.k.a "paired trains") for each test run were used to determine precision.

Sample was collected through a heated glass probe, followed by a heated Teflon filter, where stack gas HF and Cl_2 were collected in a series of chilled impingers. The sampling train impingers contained 100 ml of 0.1N sulfuric acid in the first and second, an empty third impinger, 100 ml of 0.1N NaOH in the fourth and fifth and 200 grams of silica gel in the last impinger

Sampling was conducted isokinetically (±10%) with readings of flue gas parameters recorded at traverse points selected according to EPA Method 1. Leak-checks on the Method 26A sampling train were performed before and after each sampling run and optionally for any port change. The sampling train leak-checks and leakage rate (where applicable) were documented on the field test data sheet for each respective run. All leak checks were acceptable.

The glass button hook nozzle and probe liner was constructed of borosilicate glass. The filter holder will be constructed of borosilicate glass with a Teflon frit filter support and a sealing gasket. A PTFE-bonded glass fiber filter was used. The probe and filter housing were heated to above 248°F and not exceed an upper boundary of 273°F. Probe liners and filter holders were cleaned thoroughly prior to testing.

The Method 26A trains was operated isokinetically for a minimum of 60 minutes and collected a minimum of 1 dry, standard cubic meter (DSCM). Pretest preparations, preliminary determinations, and leak check procedures were those outlined in EPA Method 5.

After completion of sampling the train was leak checked and transferred to the sample recovery trailer. All leak checks were acceptable. The impingers were weighed to determine moisture gain in accordance with EPA Method 4.

Sample recovery involved quantitative recovery of the sulfuric acid impinger contents and the NaOH impinger contents into separate tare-weighed, precleaned polyethylene sample containers.

The nozzle, probe, filter and filter housing were not recovered.

The contents of sulfuric acid impingers, including the contents if any of the empty (2nd knockout or third) impinger were quantitatively transferred to the tare-weighed, precleaned polyethylene sample container, followed by three rinses with deionized (DI) water of the impingers and all connecting glassware (including the connecting glassware to the first impinger) placed in the same H_2SO_4 container. The container was labeled and weighed to determine the final sample volume.

The contents NaOH impingers were quantitatively transferred to a second tare-weighed, precleaned polyethylene sample container, followed by three rinses with DI water of the impingers and all connecting glassware placed in the same NaOH container. The container was labeled and weighed to determine the final sample volume.

Sample recovery from each train included:

1. Container No. 1 - Contents of H_2SO_4 impingers and knockout impinger and, and DI rinse of impingers and connecting glassware; and
2. Container No. 2 - Contents NaOH impingers, and DI rinse of impingers and connecting glassware.

Additional quality control consisted of collecting and analyzing a field blank train for every three test runs. The blank train was assembled from a used train, leak checked and sat for a period equal to the sampling time (i.e, 1-hr). The blank train data was to be used to determine the method detection limit for the test program target analytes (ie. The lowest number that could be detected), and compared to stack emissions.

Reagent blanks of 0.1 N H_2SO_4, 0.1N NaOH, and DI water were collected and archived for later analysis should there be any issues with the field blank train samples

The H_2SO_4 impinger solutions were analyzed using ion chromatography techniques for fluoride ions (F^-) (EPA SW-9057). Duplicate analyses performed on the samples and field blanks. Precision was demonstrated by duplicate injection of each sample, the results of each individual analysis being within 5% of their mean to be acceptable.

The NaOH impinger solutions was treated with sodium thiosulfate to ensure complete conversion of hypochlorous acid (HClO) to chloride ions (Cl^-). The resulting solution was analyzed using ion chromatography techniques for chloride ions (EPA SW-9057). Duplicate analyses was performed on the samples and field blanks. Precision was demonstrated by duplicate injection of each sample, the results of each individual analysis being within 5% of their mean to be acceptable

All EPA Method 26A HF/Cl_2 samples were analyzed by Element One of Wilmington NC. Refer to Section 1, Figure 1.1 of the RTR Sampling and Analytical Protocol for contact information.

For this test program, the relative deviation (RD) was to be calculated as described in EPA Method 30B between the Cl_2 concentrations measured with the paired trains. A criteria of a less than 10% relative deviation or 0.2 ppm absolute difference was required.

The absolute differences between the Cl_2 concentrations measured with the paired trains is summarized in Table 3.1. For each paired run, Cl_2 concentrations met the 0.2 ppm absolute difference criteria.

TABLE 3.1 PAIRED METHOD 26A SAMPLING TRAIN DIATOMIC CHLORINE CONCENTRATION COMPARISON RESULTS FOR THE KILN MAIN STACK; JANUARY 10-11, 2024

Run	Time	Train A Diatomic Chlorine Concentration (ppm,dry)	Train B Diatomic Chlorine Concentration (ppm,dry)	Absolute Difference (ppm,dry)
January 10, 2024; Main Stack; Raw Mills On				
Run 1	14:30-15:36	0.044	<0.039	0.005
Run 2	15:52-16:58	0.048	<0.043	0.005
Run 3	17:10-18:16	0.042	<0.041	0.001
January 11, 2024; Main Stack; Raw Mills Off				
Run 1	08:35-09:41	0.166	<0.039	0.127
Run 2	09:53-10:59	0.062	0.068	0.006
Run 3	11:09-12:15	0.065	0.085	0.020

3.6 Hydrogen Cyanide and Hydrogen Fluoride - EPA Method 320

EPA Method 320 was performed to determine emissions of concentrations of HCN and HF. Three, 1-hour sampling runs were conducted under each representative process and control system operating conditions.

The gas sample was extracted from the stack through a glass-lined probe and filter heated to 375° F. For external calibration checks and analyte spikes, the gases were introduced in front of the heated filter. Any excess calibration gas was diverted through the sample probes into the source. Outflow of gas from the heated filter enclosure was transported through a Teflon sample line heated to 375° F. For these sources approximately 300' of sample line was required. The heated sample line was connected directly to the FTIR sample cell. Using heat-traced Teflon tubing the exit of the FTIR cell was connected to a sample pump with a heated stainless steel pump head. The pump discharge was directed to a proprietary chiller-type gas conditioner to remove moisture prior to delivery sample gas to the O_2/CO_2 monitor.

The distribution of the gas sample to the monitors was accomplished using a panel equipped with valves and rotometers. The gas sample was then divided and directed to the O_2/CO_2 analyzer.

FTIR sample cell was maintained at 191°C and connected to a MKS Instruments Multigas 2030 Fourier Transform Infrared Spectrometer and Detector.

The FTIR spectrometer measured vapor phase organic or inorganic compounds which absorb energy in the mid-infrared spectral region, about 400 to 4000 cm^{-1} (25 to 2.5 µm). Continuous measurement were made by matching sample absorbance bands with bands in reference spectra, and comparing sample band intensities with reference band intensities.

The principle limitation to FTIR spectroscopy are the presence of interfering compounds that also absorb energy in the mid-infrared spectral region. In a cement kiln stack gas matrix, water vapor (H_2O) and carbon dioxide (CO_2) are the primary interferents that must be incorporated into the identification and quantitation method.

The FTIR software performs the computation for a single compound by subtracting all the other compounds (interferants and target) from the absorbance spectra and quantifies the single compound based on the remain absorbance. The FTIR software provides a Standard Error Calculation (SEC) value that is an indication of how well the identification and quantitation has been performed. A high SEC indicates that other interferants have not been accounted for in the analysis method, and a low SEC is indicative of greater confidence measurement.

The instrument is operated with a resolution of 0.5 cm^{-1} with 4x zero filling. Beer-Norton Medium apodization is used with amplitude phase correction.

For this RTR test program, following specific QA/QC activities for EPA Method 320 were performed and are summarized in Table 3.2

3.6.1 Laboratory QA/QC Activities Before Field Test Program

Before field testing occurs, the following QA/QC activities were conducted;

1) Seven consecutive samples of dry nitrogen through the sampling system was acquired and used to calculate the standard deviation for each of the test program target analytes multiplied by a factor of 3. These data were considered representative of detection limits (DL) for this test program and were below the 0.5 ppm required DL for both HCN and HF;

2) From these seven dry nitrogen samples, the results for the Signal-to-Noise Ratio (SNR) @ 2500 cm^{-1} was >2500, at 64 scans and the results for single beam intensity @ 2500 cm^{-1} was >0.9; and

3) The HCN calibration gases was analyzed directly and the FTIR responses agreed with tag value within 5%

3.6.2 QA/QCActivities During Field Test Program

During the field test program, following QA/QC activities were be performed and criterium met;

1) On each test day prior to any testing, an instrument background was collected using dry nitrogen directed to the gas cell. The background was collected with at least 128 scans;

2) The probe, filter, sample line and all sample system components in contact with effluent were be maintained at or above 375ºF or 191ºC (consistent with FTIR calibration temperature) to avoid any possible "cold spots;"

3) A system zero with all sampling system components at operating temperature was performed by injecting nitrogen at the sample probe and through sample filter and entire measurement system. After zero equilibration was been achieved, all measurement components will be quantified for at least 128 scans;
4) The sample probe was position at effluent measurement point and sampling was continue until equilibration of the measurement system has been achieved. At this point, the effluent concentrations was quantified with two consecutive 64-scan samples as the initial native concentration for the dynamic spike;
5) Analyte spiking was conducted for HCN before the first test run, and after each successive test run for a minimum of 4 spikes per test condition. These results will be used to determine accuracy and are summarized in Table 3.3;
6) The spike gas injections was maintained at 10% or less of total sample volume. The spike gas concentration and flow rate was be selected to approximately double the native effluent concentration. Spike recovery results were within ±20% of the expected value. An SF_6 tracer was used to calculate the exact spike gas dilution ratio of 10% or less;
7) After the dynamic spike, nitrogen was sent through the sampling system until all traces of spike gas are removed and lines are proven below DL for target analytes;

TABLE 3.2 FTIR PRETEST AND FIELD TEST QA/QC SUMMARY

Spectrum	HCN	SF6	HF	SNR 2500	sBeam @2500
Seven consecutive samples of dry nitrogen for detection limit					
SPC__000837.LAB	-0.051		-0.002	6223.51	1.42
SPC__000838.LAB	-0.032		-0.000	5809.30	1.42
SPC__000839.LAB	0.046		-0.017	3759.60	1.42
SPC__000840.LAB	-0.011		0.016	4373.66	1.42
SPC__000841.LAB	0.080		0.002	5347.95	1.42
SPC__000842.LAB	0.059		-0.012	5012.46	1.42
SPC__000843.LAB	-0.029		-0.006	4706.13	1.42
Standard Deviation X 3	**0.156**		**0.032**		
Averages				**5033.23**	**1.42**
HCN Standard (CC768222; 49.9 ppm HCN/5.0 ppm SF6)					
SPC__007625.LAB	49.43	4.85			
SPC__007626.LAB	49.16	4.86			
SPC__007627.LAB	49.30	4.86			
Averages	**49.30**	**4.86**			
Residuals for Post HCN analyte spike native scans					
SPC_007708.LAB					
Concentration	3.66		2.44		
MDC3	0.18		0.45		
MDC3%	NA		NA		
SPC_007709LAB					
Concentration	2.06		-0.03		
MDC3	0.11		0.22		
MDC3%	NA		NA		
Final SNR @ 2500 cm^{-1} and single beam intensity @ 2500 cm^{-1}					
SPC__008190.LAB				5053.0	1.24

8) The nitrogen purge was discontinued and the sampling system was allowed to equilibrate with stack gas before starting a test run. The first two consecutive 64-scan samples of a sample run was used for the final native concentration. Residual results for HCN and HF were verified to be less than 0.2-0.3 ppm for data acceptance, or less than 5% of the measured value, whichever was least restrictive.

9) The final SNR @ 2500 cm^{-1}, at 64 scans, and the results for single beam intensity @ 2500 cm^{-1} were verified to met the >2500 and >0.9 criterium; respectively.

TABLE 3.3 ETHYLENE CALIBRATION TRANSFER STANDARD (CTS) AND HYDROGEN CYANIDE ANALYTE SPIKING TEST RESULTS FOR THE KILN MAIN STACK; JANUARY 10-11, 2024

Run	Time	Average Native Hydrogen Cyanide Concentration (ppm,wet)	Spike plus Average Hydrogen Cyanide Native Concentration (ppm,wet)	Hydrogen Cyanide Spike Recovery	CTS Error
January 10, 2024; Main Stack Raw Mills On					
Pre Run 1	13:57-14:15	3.71	6.32	103.6%	-1.9%
Post Run 1	15:28-15:47	4.24	6.83	108.0%	
Post Run 2	16:52-17:09	4.26	6.73	108.1%	
Post Run 3	18:04-18:35	4.25	6.92	111.7%	-1.0%
January 11, 2023; Main Stack Raw Mills Off					
Pre Run 1	08:19-08:32	3.76	5.59	97.2%	-1.4%
Post Run 1	09:34-09:49	4.11	6.35	106.4%	
Post Run 2	10.53-11:06	4.51	6.63	97.1%	
Post Run 3	12:02-12:27	4.58	6.93	108.0%	-2.2%

4. QA/QC PROCEDURES AND RESULTS

The objective of a quality assurance/quality control (QA/QC) program is to assure that the precision and accuracy of all environmental data generated by DEECO for clients are commensurate with data quality objectives (DQO's). DQO's are based on a common understanding of the intended end use(s) of the data, the measurement process, and the availability of resources. Once DQO's are established, formally or informally, QC protocol can be defined for the measurements.

In this project, the final data user will be Holcim. The data quality objectives in this project are to generate scientifically sound data to be used for compliance purposes.

4.1 Sampling Equipment

All of the sampling equipment used was calibrated according to the procedures outlined in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, EPA-600/4-77-027b.

4.1.1 Manual Sampling Equipment Calibrations

For sampling Methods 1, 2, and 4 the procedures and equipment used to measure stack gas velocity and temperature measurements and the metering system used to maintain constant rate sampling conditions and to determine the sample gas volume were subjected to pretest and posttest calibrations and/or inspections as required by the appropriate EPA methods.

Barometer - Barometric pressure values were obtained from a calibrated barometer, verified by phone call to a local airport, and corrected for elevation to sample port level (0.01 inches Hg per 10 ft. elevation).

Pitot Tubes - Each pitot tube used in sampling meets the design specifications for type-S pitot tubes in EPA Method 2. Therefore, a maximum value baseline coefficient (C_p) of 0.84 is assigned to each pitot tube. Calibration by the manufacturer for pitot face-opening alignment included measuring the external tubing diameter (dimension D_t), the base-to-opening plane distance (dimensions P_a and P_b), and the face opening misalignment angles, with all terms as described in EPA Method 2. Pitot tubes were visually inspected for structural integrity at the completion of each test. Inspection sheets for pitot tubes are included in Appendix E.

Calibration Meter and Metering System - The secondary reference meter equipment arrangement for calibration is shown in Figure 5.7 of EPA Method 5. The prescribed procedures were followed. A wet test meter with a 1 ft^3/rev capacity and $\pm$ 1 percent accuracy is used as the primary calibrant. The dry gas meter's pump is run for a minimum of 5 minutes at a flow rate of 0.35 cfm to condition the interior surface of the wet test meter. Leak checks are performed and if satisfactory, triplicate runs at each of no less than five different flow rates are done. A calibration curve is prepared and the meter is recalibrated after 200 hours of operation or annually, whichever comes first.

The calibration set-up for the dry gas metering system using the secondary reference meter in lieu of the wet test meter is given in Figure 5.5 of EPA Method 5. A leak check of the metering system before calibration was performed as shown in Figure 5.4 of EPA Method 5. The metering systems's pump is operated for 5 minutes at an orifice manometer setting of 0.5 inches H_20 to heat up the pump and system to stabilize the meter inlet and outlet temperatures. Values for the orifice setting (delta H), wet test meter volume (V_w), corresponding dry test meter volume (V_d), dry test meter inlet and outlet gas temperatures (t_{di} and t_{dn}), and time are recorded for the initial calibration. Then the ratio of the wet test meter to the dry test meter (gamma) and the orifice pressure differential that equates to 0.75 cfm at standard conditions (delta H@) are calculated.

A post-test meter calibration was made on the dry gas meter used during the test to check its accuracy against the pre-test calibration. This was performed following EPA Method 5, Section 16.3 or a post-test calibration check was made using the average orifice setting obtained during each test run and setting the vacuum at the maximum value obtained during each test run. These test runs were made against DEECO's secondary reference dry gas meter which was calibrated against a wet test meter. The calibration data sheets for the dry gas meters are included in Appendix E.

Thermocouples and Digital Indicators - Thermocouples were calibrated by comparing them against an ASTM-3F mercury-in-glass thermometer at approximately 32°F (ice water), ambient temperature, and at approximately 220°F. Each thermocouple was calibrated against temperature ranges to which it is typically exposed during test conditions, and they agreed within 1.5 percent (expressed in °R) of the reference thermometer throughout the entire calibration range. Also, thermocouples were checked at ambient temperature at the test site to verify calibration. The calibration data sheets for the thermocouples are included in Appendix E.

Pretest and Posttest Leak Checks of Sampling Trains - Each Method 4 sampling train was subjected to pretest leak checks and posttest leak checks. For all sampling runs the posttest leak checks were acceptable (less than 4% of the sampling rate at the highest vacuum recorded during the test run).

4.2 Analytical QA/QC Results

Analytical measurements of precision and accuracy were made on stack gas samples, and are summarized in a separate report.

Appendix A

Emission Summary Tables

Company: Holcim; Ste. Genevieve MO
Source: Main Stack; Raw Mill On
Job ID: 24-3316
Train Type: EPA Method 26A

	1A 01/10/24 1430-1536	1B 01/10/24 1430-1536	2A 01/10/24 1552-1658	2B 01/10/24 1552-1658	3A 01/10/24 1710-1816	3B 01/10/24 1710-1816	Average
Initial Meter Volume, ft^3	759.749	578.879	816.866	635.415	873.091	691.589	
Final Meter Volume, ft^3	816.574	635.119	872.813	691.219	929.275	747.699	
Intra-Port Volume and/or Leak Check Correction, ft^3	0.000	0.000	0.000	0.000	0.000	0.000	
Total Sample Volume, cf	**56.825**	**56.240**	**55.947**	**55.804**	**56.184**	**56.110**	**56.185**
DGM Calibration Factor	0.967	0.973	0.967	0.973	0.967	0.973	0.970
Average DGM Temp, F	47.0	48.2	46.3	49.6	49.2	54.7	49.2
Average DGM delta H, "H2O	3.20	2.68	3.08	2.59	3.12	2.63	2.88
Barometric Pressure, "Hg	28.90	28.90	28.90	28.90	28.90	28.90	28.90
Corrected Sample Vol, dscf	**55.690**	**55.255**	**54.889**	**54.664**	**54.813**	**54.424**	**54.956**
Corrected Sample Vol, dscm	**1.577**	**1.565**	**1.554**	**1.548**	**1.552**	**1.541**	**1.556**
Sample Volume (at Stack Conditions), acf	**84.884**	**84.410**	**83.738**	**83.488**	**83.258**	**82.759**	**83.756**
Sample Volume (at Stack Conditions), acm	**2.404**	**2.390**	**2.371**	**2.364**	**2.358**	**2.343**	**2.372**
Oxygen, %	8.9	8.9	9.0	9.0	9.1	9.1	9.0
Carbon Dioxide, %	22.1	22.1	22.0	22.0	22.0	22.0	22.0
Nitrogen, %	69.0	69.0	69.0	69.0	68.9	68.9	69.0
Stack Gas Excess Air, %	95.5	95.5	97.7	97.7	100.1	100.1	97.8
Total Moisture Catch Weight, grams	144.4	146.3	141.3	142.3	136.1	136.3	138.2
Stack Gas Moisture, %	**10.9**	**11.1**	**10.8**	**10.9**	**10.5**	**10.6**	**10.8**
Stack Gas Dry Molecular Weight, lb/lbmole	31.89	31.89	31.88	31.88	31.88	31.88	31.89
Stack Gas Wet Molecular Weight, lb/lbmole	30.38	30.35	30.38	30.37	30.43	30.41	30.39
Average Stack Temp, F	234.3	234.3	235.7	235.7	235.0	235.0	235.0
Stack Static (Gauge) Pressure, "H2O	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Stack Gas Actual Pressure, "Hg	28.97	28.97	28.97	28.97	28.97	28.97	28.97
Average Sqrt delta P *	1.045	1.045	1.027	1.027	1.032	1.032	1.035
Pitot Tube Coefficient	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Stack Gas Velocity, ft/second	**66.65**	**66.69**	**65.57**	**65.58**	**65.80**	**65.82**	**66.02**
Nozzle Inside Diameter, inches	0.250	0.250	0.250	0.250	0.250	0.250	
Total Sample Time, min	60	60	60	60	60	60	60
Isokinetic Rate, %	**103.8**	**103.2**	**104.1**	**103.8**	**103.2**	**102.5**	**103.4**
Stack Dimensions	218.9 in. ID	218.9 in. ID	218.9 in. ID	218.9 in. ID	218.9 in. ID	218.9 in. ID	
Stack Area, sq ft	261.35	261.35	261.35	261.35	261.35	261.35	261.35
Actual Stack Gas Flow Rate, acfm	**1,045,100**	**1,045,800**	**1,028,200**	**1,028,400**	**1,031,800**	**1,032,100**	**1,035,200**
Actual Stack Gas Flow Rate, acmm	29,594	29,614	29,116	29,121	29,217	29,226	29,315
Stack Gas Flow Rate, dscfm	**685,700**	**684,600**	**674,000**	**673,300**	**679,300**	**678,700**	**679,300**
Stack Gas Flow Rate, dscmm	19,417	19,386	19,086	19,066	19,236	19,219	19,235

Company: Holcim; Ste. Genevieve MO
Source: Main Stack; Raw Mill On
Job ID: 24-3316
Train Type: EPA Method 26A

NOTE: Average INCLUDES Non-detect runs' results

"ND()" denotes values below detection limits

		1A	1B	2A	2B	3A	3B	
		01/10/24	01/10/24	01/10/24	01/10/24	01/10/24	01/10/24	
		1430-1536	1430-1536	1552-1658	1552-1658	1710-1816	1710-1816	Average
Hydrogen Fluoride	Catch Wt, mg	ND(0.264)	ND(0.263)	ND(0.266)	ND(0.262)	ND(0.281)	ND(0.276)	ND(0.269)
	Conc., mg/dscm	ND(0.167)	ND(0.168)	ND(0.171)	ND(0.169)	ND(0.181)	ND(0.179)	ND(0.173)
	Conc., mg/dscm @ 7% O2	ND(0.194)	ND(0.195)	ND(0.200)	ND(0.198)	ND(0.213)	ND(0.211)	ND(0.202)
	Conc., mg/dscm @ 12% CO2	ND(0.091)	ND(0.091)	ND(0.093)	ND(0.092)	ND(0.099)	ND(0.098)	ND(0.094)
	Conc., ppmvd	ND(0.201)	ND(0.202)	ND(0.206)	ND(0.204)	ND(0.218)	ND(0.215)	ND(0.208)
	Conc., ppmvd @ 7% O2	ND(0.233)	ND(0.234)	ND(0.240)	ND(0.238)	ND(0.256)	ND(0.254)	ND(0.243)
	Conc., ppmvd @ 12% CO2	ND(0.109)	ND(0.110)	ND(0.112)	ND(0.111)	ND(0.119)	ND(0.117)	ND(0.113)
	Emission Rate, lb/hr	ND(0.430)	ND(0.431)	ND(0.432)	ND(0.427)	ND(0.461)	ND(0.455)	ND(0.439)
	Clinker Rates (mtph and lbs/ton)	580.90	ND(0.0007)	575.80	ND(0.0007)	582.10	ND(0.0007)	ND(0.0007)
Chlorine	Catch Wt, mg	0.208	ND(0.181)	0.222	ND(0.194)	0.193	ND(0.188)	< 0.198
	Conc., mg/dscm	0.132	ND(0.116)	0.143	ND(0.125)	0.124	ND(0.122)	< 0.127
	Conc., mg/dscm @ 7% O2	0.153	ND(0.134)	0.167	ND(0.146)	0.146	ND(0.144)	< 0.148
	Conc., mg/dscm @ 12% CO2	0.072	ND(0.063)	0.078	ND(0.068)	0.068	ND(0.067)	< 0.069
	Conc., ppmvd	0.045	ND(0.039)	0.048	ND(0.043)	0.042	ND(0.041)	< 0.043
	Absolute Difference, ppmvd (<0.2 required)		0.01		0.01		0.00	
	Conc., ppmvd @ 7% O2	0.052	ND(0.045)	0.057	ND(0.050)	0.050	ND(0.049)	< 0.050
	Conc., ppmvd @ 12% CO2	0.024	ND(0.021)	0.026	ND(0.023)	0.023	ND(0.023)	< 0.023
	Emission Rate, lb/hr	0.339	ND(0.297)	0.361	ND(0.316)	0.316	ND(0.310)	< 0.323
	Clinker Rates (mtph and lbs/ton)	580.90	ND(0.0005)	575.80	ND(0.0005)	582.10	ND(0.0005)	< 0.0005

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
Run 1

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C	H2O% (40) 191C	CO2% (40) 191C
SPC__007723.LAB	01/10/24	14:30:39.757	3.745	3.051	-0.017	2.847	11.095	18.488
SPC__007724.LAB	01/10/24	14:31:43.703	3.757	2.876	-0.013	2.775	11.079	18.511
SPC__007725.LAB	01/10/24	14:32:47.588	3.477	2.722	-0.016	2.810	11.115	18.448
SPC__007726.LAB	01/10/24	14:33:51.551	4.198	2.643	-0.017	2.774	11.050	18.540
SPC__007727.LAB	01/10/24	14:34:55.515	4.023	2.510	-0.018	2.871	11.023	18.555
SPC__007728.LAB	01/10/24	14:35:59.335	3.852	2.416	-0.018	2.905	10.964	18.515
SPC__007729.LAB	01/10/24	14:37:03.250	3.941	2.337	-0.017	2.845	11.009	18.586
SPC__007730.LAB	01/10/24	14:38:07.171	3.888	2.279	-0.016	2.850	11.012	18.584
SPC__007731.LAB	01/10/24	14:39:11.129	4.196	2.279	-0.020	2.843	11.091	18.605
SPC__007732.LAB	01/10/24	14:40:15.047	3.490	2.124	-0.014	2.824	10.989	18.606
SPC__007733.LAB	01/10/24	14:41:19.175	3.492	2.145	-0.016	2.893	10.941	18.507
SPC__007734.LAB	01/10/24	14:42:23.186	3.704	2.094	-0.013	2.867	10.987	18.428
SPC__007735.LAB	01/10/24	14:43:26.753	3.775	2.064	-0.019	2.821	10.978	18.442
SPC__007736.LAB	01/10/24	14:44:30.674	3.983	2.013	-0.017	2.765	11.019	18.488
SPC__007737.LAB	01/10/24	14:45:34.584	3.989	1.983	-0.020	2.804	10.958	18.535
SPC__007738.LAB	01/10/24	14:46:38.582	3.645	1.937	-0.018	2.916	11.066	18.485
SPC__007739.LAB	01/10/24	14:47:42.461	3.988	1.952	-0.020	2.900	11.145	18.561
SPC__007740.LAB	01/10/24	14:48:46.374	4.198	1.940	-0.017	2.870	11.210	18.530
SPC__007741.LAB	01/10/24	14:49:50.243	3.942	1.875	-0.015	2.879	11.221	18.405
SPC__007742.LAB	01/10/24	14:50:54.167	3.951	1.863	-0.014	2.754	11.159	18.544
SPC__007743.LAB	01/10/24	14:51:58.121	3.998	1.850	-0.016	2.897	11.190	18.623
SPC__007744.LAB	01/10/24	14:53:02.040	3.905	1.800	-0.018	2.823	11.029	18.571
SPC__007745.LAB	01/10/24	14:54:05.961	3.978	1.812	-0.022	2.916	10.978	18.599
SPC__007746.LAB	01/10/24	14:55:10.105	3.731	1.833	-0.020	2.884	10.890	18.547
SPC__007747.LAB	01/10/24	14:56:13.788	3.714	1.858	-0.015	2.933	10.911	18.535
SPC__007748.LAB	01/10/24	14:57:17.754	3.979	1.874	-0.018	2.774	10.971	18.656
SPC__007749.LAB	01/10/24	14:58:21.692	3.933	1.959	-0.019	2.862	11.008	18.487
SPC__007750.LAB	01/10/24	14:59:25.490	4.259	2.076	-0.017	2.873	11.112	18.637
SPC__007751.LAB	01/10/24	15:00:29.412	3.778	2.197	-0.017	2.841	11.137	18.559
SPC__007752.LAB	01/10/24	15:01:33.322	4.138	2.323	-0.016	2.848	11.197	18.583
SPC__007753.LAB	01/10/24	15:02:37.235	4.028	2.411	-0.015	2.839	11.195	18.494
SPC__007754.LAB	01/10/24	15:03:41.252	4.182	2.508	-0.024	2.848	11.134	18.525
SPC__007755.LAB	01/10/24	15:04:45.359	4.088	2.455	-0.018	2.899	10.818	18.544
SPC__007756.LAB	01/10/24	15:05:49.102	4.877	2.661	-0.018	2.798	10.930	18.606
SPC__007757.LAB	01/10/24	15:06:52.898	3.770	2.445	-0.017	2.797	11.100	18.587
SPC__007758.LAB	01/10/24	15:07:56.809	3.843	2.392	-0.019	2.794	11.080	18.504
SPC__007759.LAB	01/10/24	15:09:00.773	3.756	2.391	-0.015	2.875	11.028	18.520
SPC__007760.LAB	01/10/24	15:10:04.685	3.860	2.356	-0.020	2.918	10.999	18.436
SPC__007761.LAB	01/10/24	15:11:08.563	3.694	2.343	-0.016	2.887	11.120	18.506
SPC__007762.LAB	01/10/24	15:12:12.868	3.971	2.275	-0.018	2.856	11.113	18.581
SPC__007763.LAB	01/10/24	15:13:16.399	4.014	2.252	-0.017	2.717	11.031	18.419
SPC__007764.LAB	01/10/24	15:14:20.308	4.179	2.193	-0.018	2.807	10.875	18.490
SPC__007765.LAB	01/10/24	15:15:24.225	4.209	2.203	-0.019	2.843	10.906	18.575
SPC__007766.LAB	01/10/24	15:16:28.189	3.988	2.108	-0.015	2.959	10.951	18.408
SPC__007767.LAB	01/10/24	15:17:32.059	4.026	2.092	-0.021	2.758	11.015	18.567
SPC__007768.LAB	01/10/24	15:18:36.356	4.023	2.035	-0.020	2.853	10.991	18.563
SPC__007769.LAB	01/10/24	15:19:39.893	4.167	2.024	-0.019	2.851	10.957	18.613
SPC__007770.LAB	01/10/24	15:20:43.868	4.067	2.003	-0.019	2.773	11.133	18.606
SPC__007771.LAB	01/10/24	15:21:48.068	3.924	1.940	-0.017	2.920	11.112	18.568
SPC__007772.LAB	01/10/24	15:22:51.684	4.077	1.869	-0.018	2.876	11.027	18.526
SPC__007773.LAB	01/10/24	15:23:55.548	4.147	1.851	-0.017	2.928	10.870	18.531
SPC__007774.LAB	01/10/24	15:24:59.565	4.036	1.876	-0.018	2.913	10.984	18.555
SPC__007775.LAB	01/10/24	15:26:03.444	4.466	1.834	-0.019	2.849	11.094	18.774
SPC__007776.LAB	01/10/24	15:27:07.296	3.951	1.846	-0.018	2.989	11.090	18.717
SPC__007777.LAB	01/10/24	15:28:11.210	4.238	1.760	-0.020	2.912	10.929	18.693
SPC__007778.LAB	01/10/24	15:29:15.133	4.234	1.730	-0.018	2.844	10.867	18.692
SPC__007779.LAB	01/10/24	15:30:19.317	4.037	1.624	-0.019	2.858	10.918	18.583
Mills On Run 1		**(actual)**	**3.974**		**-0.018**	**2.853**	**11.032**	**18.550**
Oxygen	**8.9%**	**(ppm,dry @7% O2)**	**5.169**		**-0.023**	**3.711**	**11.0**	**M26A Moisture**
DSCFM	**685,150**	**(lbs/hr)**	**12.865**		**-0.308**	**9.588**		
Clinker (mtons/hr)	**580.9**	**(lbs/ton clinker)**	**0.02010**					

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
Run 2

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C	H2O% (40) 191C	CO2% (40) 191C
SPC__007799.LAB	01/10/24	15:53:00.726	3.923	2.000	-0.017	2.910	10.801	18.658
SPC__007800.LAB	01/10/24	15:54:04.637	4.329	1.730	-0.020	2.885	10.894	18.710
SPC__007801.LAB	01/10/24	15:55:08.755	4.193	1.640	-0.019	2.930	10.996	18.774
SPC__007802.LAB	01/10/24	15:56:12.818	3.947	1.509	-0.018	2.896	11.040	18.597
SPC__007803.LAB	01/10/24	15:57:16.426	3.907	1.386	-0.021	2.845	11.072	18.679
SPC__007804.LAB	01/10/24	15:58:20.293	4.052	1.379	-0.021	2.904	11.119	18.583
SPC__007805.LAB	01/10/24	15:59:24.208	3.961	1.322	-0.020	2.810	11.086	18.629
SPC__007806.LAB	01/10/24	16:00:28.323	3.749	1.288	-0.018	2.868	11.036	18.613
SPC__007807.LAB	01/10/24	16:01:32.036	3.771	1.252	-0.019	2.814	11.024	18.531
SPC__007808.LAB	01/10/24	16:02:35.954	3.801	1.265	-0.020	2.804	10.975	18.620
SPC__007809.LAB	01/10/24	16:03:39.980	3.778	1.243	-0.019	2.851	11.106	18.624
SPC__007810.LAB	01/10/24	16:04:43.777	3.853	1.148	-0.017	2.878	11.038	18.588
SPC__007811.LAB	01/10/24	16:05:48.059	4.193	1.096	-0.019	2.877	10.883	18.573
SPC__007812.LAB	01/10/24	16:06:51.654	4.164	1.078	-0.017	2.837	10.793	18.601
SPC__007813.LAB	01/10/24	16:07:55.622	4.299	1.132	-0.017	2.878	10.908	18.592
SPC__007814.LAB	01/10/24	16:08:59.480	4.107	1.119	-0.018	2.854	10.936	18.564
SPC__007815.LAB	01/10/24	16:10:03.360	4.361	1.053	-0.018	2.847	10.936	18.580
SPC__007816.LAB	01/10/24	16:11:07.463	4.363	1.111	-0.017	2.832	10.878	18.700
SPC__007817.LAB	01/10/24	16:12:11.393	4.899	1.241	-0.019	2.827	10.878	18.626
SPC__007818.LAB	01/10/24	16:13:15.208	3.860	1.083	-0.019	2.896	11.028	18.664
SPC__007819.LAB	01/10/24	16:14:19.151	4.027	1.059	-0.017	2.934	11.039	18.670
SPC__007820.LAB	01/10/24	16:15:23.036	4.246	1.037	-0.018	2.916	11.041	18.528
SPC__007821.LAB	01/10/24	16:16:27.246	4.178	0.999	-0.020	2.790	10.911	18.647
SPC__007822.LAB	01/10/24	16:17:30.962	4.119	1.165	-0.019	2.880	10.871	18.626
SPC__007823.LAB	01/10/24	16:18:34.719	4.136	0.999	-0.016	2.889	10.970	18.556
SPC__007824.LAB	01/10/24	16:19:38.583	4.372	0.978	-0.018	2.864	10.922	18.617
SPC__007825.LAB	01/10/24	16:20:42.541	4.374	0.964	-0.016	2.841	11.019	18.602
SPC__007826.LAB	01/10/24	16:21:46.422	4.440	0.961	-0.017	2.793	10.969	18.508
SPC__007827.LAB	01/10/24	16:22:50.434	4.375	0.956	-0.017	2.827	11.003	18.544
SPC__007828.LAB	01/10/24	16:23:54.285	4.108	0.939	-0.020	2.839	10.979	18.480
SPC__007829.LAB	01/10/24	16:24:58.156	4.281	0.923	-0.019	2.883	10.968	18.484
SPC__007830.LAB	01/10/24	16:26:02.065	4.790	1.079	-0.018	2.845	10.876	18.655
SPC__007831.LAB	01/10/24	16:27:06.044	4.089	0.974	-0.020	2.858	10.920	18.650
SPC__007832.LAB	01/10/24	16:28:09.897	4.210	0.911	-0.019	2.897	11.086	18.652
SPC__007833.LAB	01/10/24	16:29:13.855	4.327	0.945	-0.020	2.975	11.057	18.670
SPC__007834.LAB	01/10/24	16:30:17.774	4.208	0.896	-0.021	2.908	11.054	18.504
SPC__007835.LAB	01/10/24	16:31:21.648	4.450	0.889	-0.018	2.835	11.015	18.535
SPC__007836.LAB	01/10/24	16:32:25.562	4.385	0.869	-0.019	2.907	11.099	18.554
SPC__007837.LAB	01/10/24	16:33:29.852	4.332	0.847	-0.019	2.881	11.064	18.625
SPC__007838.LAB	01/10/24	16:34:33.392	4.384	0.867	-0.019	2.854	11.044	18.723
SPC__007839.LAB	01/10/24	16:35:37.449	4.432	0.809	-0.020	2.937	10.935	18.713
SPC__007840.LAB	01/10/24	16:36:41.260	4.110	0.824	-0.020	2.895	10.962	18.695
SPC__007841.LAB	01/10/24	16:37:45.134	4.468	0.813	-0.018	2.836	10.960	18.702
SPC__007842.LAB	01/10/24	16:38:49.326	4.072	0.816	-0.020	2.935	11.038	18.686
SPC__007843.LAB	01/10/24	16:39:53.166	4.287	0.770	-0.019	2.873	11.035	18.638
SPC__007844.LAB	01/10/24	16:40:56.959	4.354	0.828	-0.014	2.803	10.959	18.704
SPC__007845.LAB	01/10/24	16:42:00.838	4.419	0.718	-0.019	2.820	11.043	18.583
SPC__007846.LAB	01/10/24	16:43:04.765	4.471	0.735	-0.017	2.820	11.012	18.741
SPC__007847.LAB	01/10/24	16:44:08.617	4.599	0.764	-0.021	2.872	11.040	18.830
SPC__007848.LAB	01/10/24	16:45:12.713	4.198	0.705	-0.019	2.913	11.023	18.678
SPC__007849.LAB	01/10/24	16:46:16.483	3.988	0.712	-0.015	2.917	11.034	18.549
SPC__007850.LAB	01/10/24	16:47:20.538	4.414	0.721	-0.016	2.910	11.040	18.711
SPC__007851.LAB	01/10/24	16:48:24.466	4.231	0.702	-0.017	2.906	10.995	18.581
SPC__007852.LAB	01/10/24	16:49:28.174	4.184	0.699	-0.018	2.814	10.943	18.488
SPC__007853.LAB	01/10/24	16:50:32.090	4.215	0.685	-0.020	2.940	10.958	18.405
SPC__007854.LAB	01/10/24	16:51:36.000	4.239	0.697	-0.018	2.850	11.076	18.355
Mills On Run 2		**(actual)**	**4.215**		**-0.018**	**2.870**	**10.989**	**18.614**
Oxygen	**9.0%**	**(ppm,dry @7% O2)**	**5.522**		**-0.024**	**3.760**	**10.9**	**M26A Moisture**
DSCFM	**673,650**	**(lbs/hr)**	**13.402**		**-0.318**	**9.470**		
Clinker (mtons/hr)	**575.8**	**(lbs/ton clinker)**	**0.021**					

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
Run 3

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C	H2O% (40) 191C	CO2% (40) 191C
SPC__007871.LAB	01/10/24	17:10:33.987	4.004	1.061	-0.018	2.891	11.048	18.559
SPC__007872.LAB	01/10/24	17:11:37.898	4.128	0.963	-0.016	2.864	11.020	18.523
SPC__007873.LAB	01/10/24	17:12:41.812	3.969	0.894	-0.018	2.965	11.108	18.562
SPC__007874.LAB	01/10/24	17:13:45.731	3.844	0.889	-0.018	2.926	10.951	18.516
SPC__007875.LAB	01/10/24	17:14:49.637	3.811	0.847	-0.021	2.971	10.927	18.503
SPC__007876.LAB	01/10/24	17:15:53.552	4.265	0.814	-0.016	2.886	10.947	18.492
SPC__007877.LAB	01/10/24	17:16:57.857	4.068	0.779	-0.018	2.910	10.901	18.533
SPC__007878.LAB	01/10/24	17:18:01.524	4.299	0.759	-0.018	2.887	10.826	18.511
SPC__007879.LAB	01/10/24	17:19:05.289	4.118	0.740	-0.016	2.802	10.968	18.388
SPC__007880.LAB	01/10/24	17:20:09.210	3.985	0.721	-0.020	2.902	11.026	18.464
SPC__007881.LAB	01/10/24	17:21:13.115	3.962	0.727	-0.020	2.939	11.054	18.539
SPC__007882.LAB	01/10/24	17:22:17.393	4.433	0.689	-0.016	2.906	11.005	18.554
SPC__007883.LAB	01/10/24	17:23:21.036	4.328	0.683	-0.018	2.906	10.900	18.692
SPC__007884.LAB	01/10/24	17:24:24.899	4.213	0.673	-0.018	2.971	10.995	18.676
SPC__007885.LAB	01/10/24	17:25:28.766	4.459	0.668	-0.017	2.885	10.970	18.621
SPC__007886.LAB	01/10/24	17:26:32.730	4.249	0.660	-0.015	2.895	11.113	18.647
SPC__007887.LAB	01/10/24	17:27:36.598	4.210	0.642	-0.018	2.924	11.054	18.537
SPC__007888.LAB	01/10/24	17:28:40.509	4.180	0.637	-0.017	2.873	10.980	18.537
SPC__007889.LAB	01/10/24	17:29:44.430	4.113	0.605	-0.018	2.909	10.957	18.706
SPC__007890.LAB	01/10/24	17:30:48.339	4.432	0.642	-0.016	2.933	10.940	18.682
SPC__007891.LAB	01/10/24	17:31:52.255	4.237	0.661	-0.017	2.928	11.045	18.621
SPC__007892.LAB	01/10/24	17:32:56.175	4.609	0.608	-0.016	2.856	10.930	18.653
SPC__007893.LAB	01/10/24	17:34:00.363	4.430	0.603	-0.017	2.934	10.922	18.694
SPC__007894.LAB	01/10/24	17:35:03.998	4.217	0.610	-0.017	2.966	10.974	18.635
SPC__007895.LAB	01/10/24	17:36:07.955	4.219	0.600	-0.017	2.913	11.047	18.537
SPC__007896.LAB	01/10/24	17:37:11.821	3.997	0.591	-0.017	2.925	10.986	18.514
SPC__007897.LAB	01/10/24	17:38:15.739	4.301	0.585	-0.019	2.986	10.933	18.656
SPC__007898.LAB	01/10/24	17:39:19.698	4.359	0.576	-0.017	2.906	10.955	18.563
SPC__007899.LAB	01/10/24	17:40:23.670	4.273	0.556	-0.018	2.869	10.915	18.632
SPC__007900.LAB	01/10/24	17:41:27.571	4.315	0.549	-0.018	2.953	11.002	18.545
SPC__007901.LAB	01/10/24	17:42:31.397	4.169	0.565	-0.017	2.952	11.031	18.488
SPC__007902.LAB	01/10/24	17:43:35.305	4.093	0.549	-0.015	2.853	11.071	18.405
SPC__007903.LAB	01/10/24	17:44:39.507	4.209	0.513	-0.015	2.845	11.029	18.428
SPC__007904.LAB	01/10/24	17:45:43.196	3.892	0.535	-0.016	2.849	11.028	18.478
SPC__007905.LAB	01/10/24	17:46:47.047	4.334	0.516	-0.020	2.802	10.948	18.426
SPC__007906.LAB	01/10/24	17:47:51.248	4.002	0.522	-0.019	2.913	11.054	18.508
SPC__007907.LAB	01/10/24	17:48:54.879	4.138	0.533	-0.018	2.851	11.066	18.429
SPC__007908.LAB	01/10/24	17:49:58.787	4.204	0.484	-0.017	2.884	11.035	18.523
SPC__007909.LAB	01/10/24	17:51:02.745	3.981	0.500	-0.017	2.938	10.907	18.405
SPC__007910.LAB	01/10/24	17:52:06.616	4.180	0.509	-0.016	2.944	10.953	18.596
SPC__007911.LAB	01/10/24	17:53:10.521	4.185	0.500	-0.017	2.931	11.106	18.592
SPC__007912.LAB	01/10/24	17:54:14.437	4.065	0.484	-0.017	2.915	11.141	18.467
SPC__007913.LAB	01/10/24	17:55:18.395	4.157	0.502	-0.018	2.971	11.103	18.508
SPC__007914.LAB	01/10/24	17:56:22.304	4.166	0.493	-0.018	2.880	10.952	18.563
SPC__007915.LAB	01/10/24	17:57:26.178	4.340	0.480	-0.016	2.985	10.997	18.627
SPC__007916.LAB	01/10/24	17:58:30.094	4.250	0.482	-0.018	2.999	10.956	18.626
SPC__007917.LAB	01/10/24	17:59:34.386	4.101	0.469	-0.016	3.042	11.043	18.667
SPC__007918.LAB	01/10/24	18:00:37.956	4.198	0.470	-0.017	2.920	11.030	18.671
SPC__007919.LAB	01/10/24	18:01:41.834	4.165	0.476	-0.020	2.887	10.993	18.642
SPC__007920.LAB	01/10/24	18:02:45.796	4.194	0.483	-0.017	2.990	11.009	18.604
SPC__007921.LAB	01/10/24	18:03:49.738	4.341	0.481	-0.020	2.928	11.028	18.665
SPC__007922.LAB	01/10/24	18:04:53.906	4.374	0.462	-0.017	3.000	11.071	18.619
SPC__007923.LAB	01/10/24	18:05:57.516	4.222	0.473	-0.022	3.016	11.077	18.546
SPC__007924.LAB	01/10/24	18:07:01.382	4.193	0.462	-0.019	2.868	11.032	18.591
SPC__007925.LAB	01/10/24	18:08:05.310	3.770	0.468	-0.017	2.952	11.030	18.500
SPC__007926.LAB	01/10/24	18:09:09.320	4.016	0.503	-0.015	2.893	11.051	18.413
SPC__007927.LAB	01/10/24	18:10:13.464	4.045	0.448	-0.018	2.875	10.927	18.370
Mills On Run 3		**(actual)**	**4.176**		**-0.018**	**2.917**	**11.001**	**18.555**
Oxygen	**9.1%**	**(ppm,dry @7% O2)**	**5.508**		**-0.023**	**3.848**	**10.7**	**M26A Moisture**
DSCFM	**679,000**	**(lbs/hr)**	**13.360**		**-0.303**	**9.687**		
Clinker (mtons/hr)	**582.1**	**(lbs/ton clinker)**	**0.021**					

Company: Holcim; Ste. Genevieve MO
Source: Main Stack; Raw Mills Off
Job ID: 24-3316
Train Type: EPA Method 26A

	4A 01/11/24 835-941	4B 01/11/24 835-941	5A 01/11/24 953-1059	5B 01/11/24 953-1059	6A 01/11/24 1109-1215	6B 01/11/24 1109-1215	Average
Initial Meter Volume, ft^3	929.503	748.021	981.734	799.806	34.608	851.326	
Final Meter Volume, ft^3	981.535	799.574	1034.319	851.054	87.993	903.790	
Intra-Port Volume and/or Leak Check Correction, ft^3	0.000	0.000	0.000	0.000	0.000	0.000	
Total Sample Volume, cf	**52.032**	**51.553**	**52.585**	**51.248**	**53.385**	**52.464**	**52.211**
DGM Calibration Factor	0.967	0.973	0.967	0.973	0.967	0.973	0.970
Average DGM Temp, F	47.5	51.1	55.3	57.1	62.0	62.4	55.9
Average DGM delta H, "H2O	2.71	2.29	2.63	2.23	2.69	2.28	2.47
Barometric Pressure, "Hg	29.00	29.00	29.00	29.00	29.00	29.00	29.00
Corrected Sample Vol, dscf	**51.054**	**50.486**	**50.806**	**49.598**	**50.924**	**50.266**	**50.522**
Corrected Sample Vol, dscm	**1.446**	**1.430**	**1.439**	**1.404**	**1.442**	**1.423**	**1.431**
Sample Volume (at Stack Conditions), acf	**84.347**	**83.501**	**84.258**	**82.347**	**84.248**	**83.253**	**83.659**
Sample Volume (at Stack Conditions), acm	**2.388**	**2.364**	**2.386**	**2.332**	**2.386**	**2.357**	**2.369**
Oxygen, %	9.2	9.2	9.2	9.2	9.2	9.2	9.2
Carbon Dioxide, %	21.5	21.5	21.6	21.6	21.4	21.4	21.5
Nitrogen, %	69.3	69.3	69.2	69.2	69.4	69.4	69.3
Stack Gas Excess Air, %	101.2	101.2	101.4	101.4	100.9	100.9	101.2
Total Moisture Catch Weight, grams	127.1	126.3	129.7	127.6	127.8	128.2	127.9
Stack Gas Moisture, %	**10.5**	**10.6**	**10.7**	**10.8**	**10.6**	**10.7**	**10.7**
Stack Gas Dry Molecular Weight, lb/lbmole	31.81	31.81	31.82	31.82	31.79	31.79	31.81
Stack Gas Wet Molecular Weight, lb/lbmole	30.36	30.34	30.34	30.33	30.33	30.32	30.34
Average Stack Temp, F	298.8	298.8	300.0	300.0	299.0	299.0	299.3
Stack Static (Gauge) Pressure, "H2O	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Stack Gas Actual Pressure, "Hg	29.08	29.08	29.08	29.08	29.08	29.08	29.08
Average Sqrt delta P *	1.033	1.033	1.020	1.020	1.033	1.033	1.029
Pitot Tube Coefficient	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Stack Gas Velocity, ft/second	**68.77**	**68.79**	**67.98**	**67.99**	**68.81**	**68.83**	**68.53**
Nozzle Inside Diameter, inches	0.250	0.250	0.250	0.250	0.250	0.250	
Total Sample Time, min	60	60	60	60	60	60	60
Isokinetic Rate, %	**100.0**	**99.0**	**101.1**	**98.8**	**99.8**	**98.6**	**99.6**
Stack Dimensions	218.9 in. ID	218.9 in. ID	218.9 in. ID	218.9 in. ID	218.9 in. ID	218.9 in. ID	
Stack Area, sq ft	261.35	261.35	261.35	261.35	261.35	261.35	261.35
Actual Stack Gas Flow Rate, acfm	**1,078,400**	**1,078,700**	**1,066,000**	**1,066,200**	**1,079,000**	**1,079,300**	**1,074,600**
Actual Stack Gas Flow Rate, acmm	30,537	30,546	30,186	30,192	30,554	30,563	30,430
Stack Gas Flow Rate, dscfm	**652,700**	**652,200**	**642,800**	**642,200**	**652,200**	**651,700**	**649,000**
Stack Gas Flow Rate, dscmm	18,482	18,468	18,202	18,185	18,468	18,454	18,377

Company: Holcim; Ste. Genevieve MO
Source: Main Stack; Raw Mills Off
Job ID: 24-3316
Train Type: EPA Method 26A

NOTE: Average INCLUDES Non-detect runs' results

"ND()" denotes values below detection limits

		4A 01/11/24 835-941	4B 01/11/24 835-941	5A 01/11/24 953-1059	5B 01/11/24 953-1059	6A 01/11/24 1109-1215	6B 01/11/24 1109-1215	Average
Hydrogen Fluoride	Catch Wt, mg	ND(0.268)	ND(0.252)	ND(0.252)	ND(0.249)	ND(0.208)	ND(0.224)	ND(0.242)
	Conc., mg/dscm	ND(0.185)	ND(0.176)	ND(0.175)	ND(0.177)	ND(0.144)	ND(0.157)	ND(0.169)
	Conc., mg/dscm @ 7% O2	ND(0.220)	ND(0.209)	ND(0.208)	ND(0.211)	ND(0.171)	ND(0.187)	ND(0.201)
	Conc., mg/dscm @ 12% CO2	ND(0.103)	ND(0.098)	ND(0.097)	ND(0.099)	ND(0.081)	ND(0.088)	ND(0.094)
	Conc., ppmvd	ND(0.223)	ND(0.212)	ND(0.211)	ND(0.213)	ND(0.173)	ND(0.189)	ND(0.204)
	Conc., ppmvd @ 7% O2	ND(0.265)	ND(0.252)	ND(0.250)	ND(0.253)	ND(0.206)	ND(0.225)	ND(0.242)
	Conc., ppmvd @ 12% CO2	ND(0.124)	ND(0.118)	ND(0.117)	ND(0.118)	ND(0.097)	ND(0.106)	ND(0.114)
	Emission Rate, lb/hr	ND(0.453)	ND(0.430)	ND(0.422)	ND(0.427)	ND(0.352)	ND(0.384)	ND(0.411)
	Clinker Rates (mtph and lbs/ton)	540.80	ND(0.0007)	533.30	ND(0.0007)	548.20	ND(0.0006)	ND(0.0007)
Chlorine	Catch Wt, mg	0.713	ND(0.164)	0.265	0.283	0.276	0.357	< 0.343
	Conc., mg/dscm	0.493	ND(0.115)	0.184	0.202	0.191	0.251	< 0.239
	Conc., mg/dscm @ 7% O2	0.586	ND(0.136)	0.219	0.239	0.227	0.298	< 0.284
	Conc., mg/dscm @ 12% CO2	0.275	ND(0.064)	0.102	0.112	0.107	0.141	< 0.134
	Conc., ppmvd	0.167	ND(0.039)	0.062	0.068	0.065	0.085	< 0.081
	Absolute Difference, ppmvd (<0.2 required)		0.13		0.01		0.02	
	Conc., ppmvd @ 7% O2	0.199	ND(0.046)	0.074	0.081	0.077	0.101	< 0.096
	Conc., ppmvd @ 12% CO2	0.093	ND(0.022)	0.035	0.038	0.036	0.048	< 0.045
	Emission Rate, lb/hr	1.205	ND(0.280)	0.443	0.485	0.468	0.612	< 0.582
	Clinker Rates (mtph and lbs/ton)	540.80	ND(0.0012)	533.30	0.0008	548.20	0.0009	< 0.0010

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Run 1

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C	H2O% (40) 191C	CO2% (40) 191C
SPC__007992.LAB	01/11/24	08:36:28.446	3.389	1.328	-0.018	2.717	10.533	18.681
SPC__007993.LAB	01/11/24	08:37:32.493	3.840	1.368	-0.016	2.787	10.544	18.727
SPC__007994.LAB	01/11/24	08:38:36.274	3.406	1.322	-0.019	2.690	10.597	18.684
SPC__007995.LAB	01/11/24	08:39:40.146	3.224	1.283	-0.016	2.648	10.592	18.748
SPC__007996.LAB	01/11/24	08:40:44.055	3.701	1.266	-0.016	2.636	10.578	18.611
SPC__007997.LAB	01/11/24	08:41:47.967	3.917	1.271	-0.018	2.684	10.593	18.803
SPC__007998.LAB	01/11/24	08:42:51.925	3.806	1.260	-0.017	2.732	10.589	18.705
SPC__007999.LAB	01/11/24	08:43:55.788	3.640	1.197	-0.020	2.756	10.590	18.729
SPC__008000.LAB	01/11/24	08:44:59.744	4.013	1.184	-0.017	2.677	10.582	18.748
SPC__008001.LAB	01/11/24	08:46:03.616	3.508	1.197	-0.019	2.718	10.585	18.690
SPC__008002.LAB	01/11/24	08:47:07.569	3.574	1.166	-0.017	2.634	10.551	18.650
SPC__008003.LAB	01/11/24	08:48:11.433	3.670	1.118	-0.015	2.653	10.541	18.586
SPC__008004.LAB	01/11/24	08:49:15.347	3.957	1.100	-0.018	2.690	10.536	18.470
SPC__008005.LAB	01/11/24	08:50:19.296	3.918	1.075	-0.018	2.592	10.544	18.527
SPC__008006.LAB	01/11/24	08:51:23.212	3.949	1.047	-0.016	2.587	10.531	18.407
SPC__008007.LAB	01/11/24	08:52:27.082	3.350	1.072	-0.016	2.587	10.514	18.365
SPC__008008.LAB	01/11/24	08:53:31.030	3.770	1.013	-0.015	2.602	10.509	18.325
SPC__008009.LAB	01/11/24	08:54:34.957	3.826	0.983	-0.014	2.665	10.516	18.444
SPC__008010.LAB	01/11/24	08:55:38.851	4.425	1.004	-0.019	2.646	10.551	18.436
SPC__008011.LAB	01/11/24	08:56:42.721	3.353	0.986	-0.015	2.628	10.534	18.369
SPC__008012.LAB	01/11/24	08:57:46.676	3.701	0.952	-0.016	2.689	10.557	18.515
SPC__008013.LAB	01/11/24	08:58:50.730	3.759	0.933	-0.017	2.659	10.564	18.606
SPC__008014.LAB	01/11/24	08:59:54.455	4.400	0.915	-0.016	2.735	10.637	18.622
SPC__008015.LAB	01/11/24	09:00:58.362	3.976	0.931	-0.017	2.701	10.593	18.553
SPC__008016.LAB	01/11/24	09:02:02.280	4.112	0.915	-0.017	2.620	10.555	18.504
SPC__008017.LAB	01/11/24	09:03:06.227	4.190	0.913	-0.015	2.647	10.598	18.706
SPC__008018.LAB	01/11/24	09:04:10.096	4.302	0.894	-0.017	2.593	10.608	18.599
SPC__008019.LAB	01/11/24	09:05:14.049	4.211	0.870	-0.018	2.668	10.637	18.673
SPC__008020.LAB	01/11/24	09:06:17.922	3.775	0.841	-0.018	2.670	10.610	18.678
SPC__008021.LAB	01/11/24	09:07:21.834	4.140	0.861	-0.017	2.701	10.609	18.582
SPC__008022.LAB	01/11/24	09:08:25.752	4.277	0.855	-0.018	2.705	10.627	18.596
SPC__008023.LAB	01/11/24	09:09:29.655	4.198	0.830	-0.017	2.648	10.674	18.624
SPC__008024.LAB	01/11/24	09:10:33.875	3.772	0.830	-0.018	2.685	10.674	18.659
SPC__008025.LAB	01/11/24	09:11:37.479	4.031	0.807	-0.016	2.678	10.675	18.551
SPC__008026.LAB	01/11/24	09:12:41.426	3.832	0.803	-0.016	2.616	10.679	18.455
SPC__008027.LAB	01/11/24	09:13:45.293	3.937	0.788	-0.018	2.672	10.691	18.532
SPC__008028.LAB	01/11/24	09:14:49.213	4.349	0.786	-0.018	2.651	10.807	18.502
SPC__008029.LAB	01/11/24	09:15:53.120	3.721	0.610	-0.016	2.694	10.718	18.656
SPC__008030.LAB	01/11/24	09:16:57.177	3.880	0.736	-0.018	2.726	10.690	18.539
SPC__008031.LAB	01/11/24	09:18:00.979	4.043	0.748	-0.015	2.637	10.739	18.591
SPC__008032.LAB	01/11/24	09:19:04.898	4.291	0.741	-0.017	2.667	10.722	18.653
SPC__008033.LAB	01/11/24	09:20:08.805	3.934	0.734	-0.015	2.719	10.711	18.516
SPC__008034.LAB	01/11/24	09:21:12.792	3.813	0.712	-0.016	2.670	10.695	18.534
SPC__008035.LAB	01/11/24	09:22:16.580	3.848	0.705	-0.015	2.635	10.660	18.448
SPC__008036.LAB	01/11/24	09:23:20.540	4.035	0.690	-0.016	2.592	10.666	18.478
SPC__008037.LAB	01/11/24	09:24:24.795	3.981	0.698	-0.014	2.603	10.649	18.453
SPC__008038.LAB	01/11/24	09:25:28.619	4.245	0.684	-0.018	2.616	10.631	18.350
SPC__008039.LAB	01/11/24	09:26:32.227	4.066	0.711	-0.017	2.616	10.645	18.515
SPC__008040.LAB	01/11/24	09:27:36.526	4.154	0.691	-0.015	2.617	10.725	18.611
SPC__008041.LAB	01/11/24	09:28:40.090	4.081	0.679	-0.015	2.726	10.734	18.507
SPC__008042.LAB	01/11/24	09:29:43.958	3.775	0.647	-0.018	2.705	10.685	18.500
SPC__008043.LAB	01/11/24	09:30:47.872	3.889	0.675	-0.018	2.674	10.657	18.398
SPC__008044.LAB	01/11/24	09:31:51.776	4.230	0.613	-0.017	2.596	10.681	18.454
SPC__008045.LAB	01/11/24	09:32:55.780	4.054	0.657	-0.018	2.607	10.661	18.506
SPC__008046.LAB	01/11/24	09:33:59.641	4.355	0.652	-0.017	2.621	10.624	18.388
SPC__008047.LAB	01/11/24	09:35:03.851	4.072	0.635	-0.016	2.646	10.665	18.365
Mills Off Run 1		**(actual)**	**3.923**		**-0.017**	**2.661**	**10.622**	**18.556**
Oxygen	**9.2%**	**(ppm,dry @7% O2)**	**5.213**		**-0.022**	**3.537**	**10.6**	**M26A Moisture**
DSCFM	**652,450**	**(lbs/hr)**	**12.046**		**-0.278**	**8.483**		
Clinker (mtons/hr)	**540.8**	**(lbs/ton clinker)**	**0.020**					

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Run 2

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C	H2O% (40) 191C	CO2% (40) 191C
SPC__008064.LAB	01/11/24	09:54:01.988	4.167	0.628	-0.018	2.625	10.726	18.585
SPC__008065.LAB	01/11/24	09:55:05.811	4.473	0.592	-0.018	2.581	10.696	18.557
SPC__008066.LAB	01/11/24	09:56:09.721	4.346	0.583	-0.018	2.641	10.696	18.501
SPC__008067.LAB	01/11/24	09:57:14.014	4.040	0.589	-0.016	2.561	10.742	18.591
SPC__008068.LAB	01/11/24	09:58:17.583	4.177	0.569	-0.016	2.588	10.698	18.510
SPC__008069.LAB	01/11/24	09:59:21.447	4.219	0.595	-0.017	2.612	10.696	18.411
SPC__008070.LAB	01/11/24	10:00:25.361	4.189	0.579	-0.018	2.645	10.718	18.568
SPC__008071.LAB	01/11/24	10:01:29.329	4.369	0.575	-0.015	2.672	10.705	18.511
SPC__008072.LAB	01/11/24	10:02:33.175	4.092	0.529	-0.015	2.688	10.728	18.569
SPC__008073.LAB	01/11/24	10:03:37.270	4.042	0.367	-0.014	2.661	10.807	18.660
SPC__008074.LAB	01/11/24	10:04:40.991	4.085	0.528	-0.016	2.702	10.737	18.565
SPC__008075.LAB	01/11/24	10:05:44.901	4.033	0.342	-0.019	2.679	10.736	18.605
SPC__008076.LAB	01/11/24	10:06:48.851	4.580	0.547	-0.019	2.691	10.751	18.638
SPC__008077.LAB	01/11/24	10:07:52.719	4.495	0.513	-0.017	2.657	10.751	18.633
SPC__008078.LAB	01/11/24	10:08:56.628	4.460	0.489	-0.017	2.695	10.756	18.574
SPC__008079.LAB	01/11/24	10:10:00.607	4.030	0.339	-0.020	2.594	10.707	18.668
SPC__008080.LAB	01/11/24	10:11:04.478	4.174	0.525	-0.016	2.635	10.830	18.450
SPC__008081.LAB	01/11/24	10:12:08.353	4.017	0.335	-0.017	2.665	10.732	18.537
SPC__008082.LAB	01/11/24	10:13:12.264	4.316	0.340	-0.018	2.721	10.744	18.657
SPC__008083.LAB	01/11/24	10:14:16.214	3.957	0.493	-0.014	2.648	10.713	18.502
SPC__008084.LAB	01/11/24	10:15:20.078	4.544	0.480	-0.018	2.634	10.732	18.565
SPC__008085.LAB	01/11/24	10:16:24.110	4.307	0.474	-0.015	2.675	10.717	18.605
SPC__008086.LAB	01/11/24	10:17:27.940	4.204	0.506	-0.015	2.644	10.748	18.495
SPC__008087.LAB	01/11/24	10:18:31.902	3.974	0.301	-0.018	2.633	10.761	18.566
SPC__008088.LAB	01/11/24	10:19:35.824	4.111	0.482	-0.018	2.666	10.713	18.449
SPC__008089.LAB	01/11/24	10:20:39.623	4.458	0.456	-0.018	2.668	10.784	18.450
SPC__008090.LAB	01/11/24	10:21:43.532	4.113	0.273	-0.020	2.642	10.721	18.529
SPC__008091.LAB	01/11/24	10:22:47.447	4.074	0.325	-0.016	2.627	10.730	18.531
SPC__008092.LAB	01/11/24	10:23:51.352	4.292	0.490	-0.018	2.589	10.772	18.556
SPC__008093.LAB	01/11/24	10:24:55.463	4.004	0.326	-0.016	2.698	10.781	18.697
SPC__008094.LAB	01/11/24	10:25:59.204	4.307	0.276	-0.018	2.706	10.855	18.637
SPC__008095.LAB	01/11/24	10:27:03.416	3.870	0.297	-0.016	2.712	10.768	18.507
SPC__008096.LAB	01/11/24	10:28:07.078	4.203	0.341	-0.017	2.716	10.781	18.562
SPC__008097.LAB	01/11/24	10:29:10.892	4.080	0.300	-0.016	2.678	10.785	18.550
SPC__008098.LAB	01/11/24	10:30:14.914	4.324	0.318	-0.018	2.673	10.786	18.648
SPC__008099.LAB	01/11/24	10:31:18.749	4.067	0.325	-0.017	2.654	10.803	18.813
SPC__008100.LAB	01/11/24	10:32:22.618	3.811	0.266	-0.020	2.760	10.789	18.717
SPC__008101.LAB	01/11/24	10:33:26.522	4.089	0.254	-0.018	2.708	10.814	18.768
SPC__008102.LAB	01/11/24	10:34:30.429	4.075	0.268	-0.017	2.729	10.801	18.700
SPC__008103.LAB	01/11/24	10:35:34.529	4.006	0.304	-0.019	2.659	10.773	18.620
SPC__008104.LAB	01/11/24	10:36:38.247	4.157	0.276	-0.018	2.629	10.734	18.607
SPC__008105.LAB	01/11/24	10:37:42.198	4.372	0.435	-0.017	2.672	10.759	18.517
SPC__008106.LAB	01/11/24	10:38:46.324	4.307	0.276	-0.018	2.636	10.700	18.412
SPC__008107.LAB	01/11/24	10:39:50.319	4.195	0.443	-0.018	2.638	10.719	18.567
SPC__008108.LAB	01/11/24	10:40:53.884	4.066	0.280	-0.017	2.707	10.741	18.621
SPC__008109.LAB	01/11/24	10:41:57.797	4.350	0.453	-0.017	2.722	10.718	18.533
SPC__008110.LAB	01/11/24	10:43:01.701	4.462	0.428	-0.020	2.618	10.720	18.564
SPC__008111.LAB	01/11/24	10:44:05.608	4.866	0.425	-0.014	2.701	10.711	18.536
SPC__008112.LAB	01/11/24	10:45:09.614	4.707	0.442	-0.016	2.691	10.723	18.590
SPC__008113.LAB	01/11/24	10:46:13.421	3.996	0.420	-0.018	2.742	10.695	18.555
SPC__008114.LAB	01/11/24	10:47:17.332	4.086	0.422	-0.016	2.763	10.735	18.405
SPC__008115.LAB	01/11/24	10:48:21.624	4.339	0.393	-0.018	2.655	10.719	18.285
SPC__008116.LAB	01/11/24	10:49:25.204	4.498	0.425	-0.016	2.590	10.685	18.520
SPC__008117.LAB	01/11/24	10:50:29.063	4.393	0.421	-0.014	2.611	10.670	18.366
SPC__008118.LAB	01/11/24	10:51:32.978	4.483	0.426	-0.017	2.643	10.659	18.398
SPC__008119.LAB	01/11/24	10:52:36.882	4.657	0.434	-0.014	2.553	10.690	18.422
Mills Off Run 2		**(actual)**	**4.234**		**-0.017**	**2.661**	**10.740**	**18.556**
Oxygen	**9.2%**	**(ppm,dry @7% O2)**	**5.636**		**-0.023**	**3.542**	**10.8**	**M26A Moisture**
DSCFM	**642,500**	**(lbs/hr)**	**12.826**		**-0.279**	**8.366**		
Clinker (mtons/hr)	**533.8**	**(lbs/ton clinker)**	**0.022**					

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Run 3

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C	H2O% (40) 191C	CO2% (40) 191C
SPC__008135.LAB	01/11/24	11:10:14.387	4.716	0.514	-0.014	2.662	10.728	18.691
SPC__008136.LAB	01/11/24	11:11:18.290	4.500	0.502	-0.018	2.631	10.743	18.507
SPC__008137.LAB	01/11/24	11:12:22.198	4.549	0.486	-0.015	2.613	10.736	18.665
SPC__008138.LAB	01/11/24	11:13:26.113	4.670	0.476	-0.018	2.666	10.715	18.541
SPC__008139.LAB	01/11/24	11:14:30.061	4.225	0.482	-0.014	2.664	10.689	18.499
SPC__008140.LAB	01/11/24	11:15:34.009	4.556	0.485	-0.016	2.729	10.701	18.534
SPC__008141.LAB	01/11/24	11:16:37.840	4.625	0.454	-0.016	2.627	10.703	18.639
SPC__008142.LAB	01/11/24	11:17:41.847	4.549	0.461	-0.015	2.650	10.705	18.633
SPC__008143.LAB	01/11/24	11:18:45.717	4.535	0.482	-0.017	2.593	10.741	18.675
SPC__008144.LAB	01/11/24	11:19:49.566	4.924	0.485	-0.015	2.647	10.719	18.620
SPC__008145.LAB	01/11/24	11:20:53.474	5.055	0.475	-0.018	2.585	10.753	18.631
SPC__008146.LAB	01/11/24	11:21:57.430	5.050	0.504	-0.019	2.564	10.704	18.691
SPC__008147.LAB	01/11/24	11:23:01.300	4.441	0.498	-0.016	2.556	10.713	18.633
SPC__008148.LAB	01/11/24	11:24:05.204	4.432	0.512	-0.015	2.687	10.689	18.603
SPC__008149.LAB	01/11/24	11:25:09.157	4.593	0.486	-0.018	2.600	10.713	18.513
SPC__008150.LAB	01/11/24	11:26:13.025	4.834	0.475	-0.016	2.548	10.715	18.638
SPC__008151.LAB	01/11/24	11:27:17.274	3.992	0.476	-0.015	2.606	10.706	18.479
SPC__008152.LAB	01/11/24	11:28:20.843	4.445	0.498	-0.018	2.606	10.732	18.617
SPC__008153.LAB	01/11/24	11:29:24.940	4.484	0.470	-0.018	2.616	10.750	18.658
SPC__008154.LAB	01/11/24	11:30:28.663	4.607	0.502	-0.014	2.649	10.685	18.653
SPC__008155.LAB	01/11/24	11:31:32.570	4.773	0.450	-0.016	2.662	10.697	18.593
SPC__008156.LAB	01/11/24	11:32:36.483	4.788	0.456	-0.020	2.592	10.757	18.668
SPC__008157.LAB	01/11/24	11:33:40.600	4.683	0.455	-0.018	2.647	10.713	18.717
SPC__008158.LAB	01/11/24	11:34:44.303	4.538	0.435	-0.016	2.632	10.744	18.509
SPC__008159.LAB	01/11/24	11:35:48.215	4.303	0.442	-0.016	2.599	10.669	18.563
SPC__008160.LAB	01/11/24	11:36:52.128	4.491	0.410	-0.017	2.611	10.685	18.676
SPC__008161.LAB	01/11/24	11:37:56.033	4.501	0.393	-0.019	2.677	10.672	18.522
SPC__008162.LAB	01/11/24	11:38:59.978	4.347	0.417	-0.016	2.643	10.704	18.592
SPC__008163.LAB	01/11/24	11:40:03.849	4.313	0.417	-0.017	2.560	10.612	18.494
SPC__008164.LAB	01/11/24	11:41:07.806	4.844	0.411	-0.016	2.631	10.630	18.385
SPC__008165.LAB	01/11/24	11:42:11.672	4.919	0.428	-0.016	2.625	10.653	18.510
SPC__008166.LAB	01/11/24	11:43:15.776	4.718	0.391	-0.018	2.603	10.637	18.593
SPC__008167.LAB	01/11/24	11:44:19.597	4.558	0.387	-0.018	2.592	10.731	18.560
SPC__008168.LAB	01/11/24	11:45:23.483	4.762	0.379	-0.015	2.620	10.679	18.475
SPC__008169.LAB	01/11/24	11:46:27.355	4.358	0.361	-0.016	2.557	10.689	18.430
SPC__008170.LAB	01/11/24	11:47:31.222	4.602	0.374	-0.015	2.584	10.626	18.416
SPC__008171.LAB	01/11/24	11:48:35.182	4.870	0.390	-0.016	2.652	10.628	18.484
SPC__008172.LAB	01/11/24	11:49:39.089	4.418	0.376	-0.015	2.664	10.683	18.582
SPC__008173.LAB	01/11/24	11:50:42.963	4.552	0.373	-0.013	2.613	10.658	18.462
SPC__008174.LAB	01/11/24	11:51:47.258	4.448	0.336	-0.017	2.606	10.682	18.414
SPC__008175.LAB	01/11/24	11:52:50.778	4.817	0.348	-0.016	2.599	10.696	18.443
SPC__008176.LAB	01/11/24	11:53:54.733	4.652	0.359	-0.016	2.704	10.676	18.519
SPC__008177.LAB	01/11/24	11:54:58.639	4.388	0.384	-0.016	2.690	10.695	18.509
SPC__008178.LAB	01/11/24	11:56:02.641	4.246	0.361	-0.016	2.607	10.725	18.367
SPC__008179.LAB	01/11/24	11:57:06.461	4.562	0.365	-0.017	2.656	10.692	18.380
SPC__008180.LAB	01/11/24	11:58:10.428	4.470	0.368	-0.017	2.558	10.716	18.457
SPC__008181.LAB	01/11/24	11:59:14.354	4.740	0.348	-0.017	2.603	10.717	18.469
SPC__008182.LAB	01/11/24	12:00:18.272	4.727	0.377	-0.015	2.651	10.690	18.436
SPC__008183.LAB	01/11/24	12:01:22.314	4.831	0.377	-0.014	2.590	10.692	18.341
SPC__008184.LAB	01/11/24	12:02:25.969	4.896	0.362	-0.015	2.585	10.801	18.057
SPC__008185.LAB	01/11/24	12:03:29.878	4.864	0.195	-0.013	2.589	10.969	18.149
SPC__008186.LAB	01/11/24	12:04:33.829	4.510	0.209	-0.017	2.635	11.148	18.352
SPC__008187.LAB	01/11/24	12:05:37.740	4.502	0.227	-0.016	2.791	11.271	18.506
SPC__008188.LAB	01/11/24	12:06:41.653	4.212	0.204	-0.016	2.754	11.284	18.388
SPC__008189.LAB	01/11/24	12:07:45.526	4.156	0.222	-0.017	2.707	11.257	18.310
SPC__008190.LAB	01/11/24	12:08:49.431	4.213	0.218	-0.017	2.570	11.257	18.253
Mills Off Run 3		**(actual)**	**4.578**		**-0.016**	**2.628**	**10.753**	**18.513**
Oxygen	**9.2%**	**(ppm,dry @7% O2)**	**6.087**		**-0.022**	**3.494**	**10.7**	**M26A Moisture**
DSCFM	**651,950**	**(lbs/hr)**	**14.055**		**-0.269**	**8.374**		
Clinker (mtons/hr)	**548.2**	**(lbs/ton clinker)**	**0.023**					

Appendix B

Field Data
and
CEM/FTIR Data

EPA Method 1
Traverse Point Location for Circular Ducts

Plant	Holcim		
City	Saint Genevieve	State	MO
Location	Kiln/Raw Mill Stack		
Stack ID (inches)	218.90		
Nipple Length	8.00		

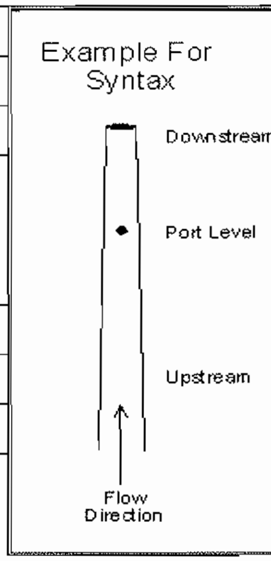
Nearest Upstream Disturbance (Bend, ID FAN, etc)

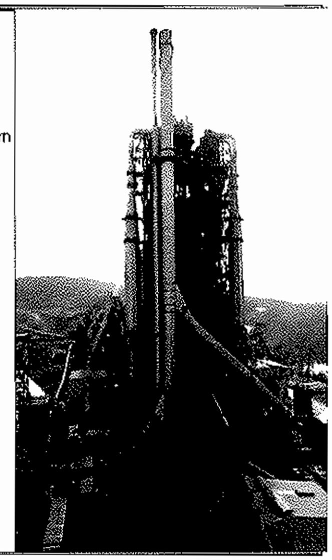
Distance (inches)	1760.4	Type of Disturbance	Duct Breaching

Nearest Downstream Disturbance (Bend, or Stack Outlet)

Distance (inches)	1767.6	Type of Disturbance	Stack Outlet

Sampler	MH	Date	11/15/09





Stack Schematic (Draw by hand after printing)

(Mark with an "x")

Particulate Traverse? [x] Yes [ ] No

Number of Traverse Points Required: 6

Traverse Point Number	Fraction of Stack Internal Diam.	Stack ID (Inches)	Diameter Frac. x Stack ID	Nipple Length (Inches)	Traverse Point Distance from outside Nipple
1	0.044	218.89764	9.63	8	17 5/8 in.
2	0.146	218.89764	31.96	8	40 in.
3	0.296	218.89764	64.79	8	72 3/4 in.
4	0.704	218.89764	154.10	8	162 1/8 in.
5	0.854	218.89764	186.94	8	195 in.
6	0.956	218.89764	209.27	8	217 1/4 in.

Cyclonic Flow Check Data Sheet

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim Ste Genevieve	1/10/24	Main Stack	Cyclonic Flow Check	

OPERATOR	Barometric Pressure (Pb (In. Hg)	STATIC PRESS (in. H2O)	AMBIENT TEMP (deg. F)	STACK ID (In.)	PITOT Cp	DGM BOX No.	DGM delta H@	DGM CAL FACTOR (gamma)		PROBE ID NO
DC/MW	28.9	1.0	45	218	~~0.84~~ 0.95	MK-25	NA	NA		6E

EPA Method 2 Data

Run Time (24 hr)	Traverse Port Point ID	Pitot Delta P READING " H2O	STACK TEMP deg F	Absolute Angle at null (0) Delta P READING " H2O
1330	A 1	1.1	235	5
	2	1.1	235	10
	3	0.9	234	5
	B 1	1.2	235	5
	2	1.2	235	10
	3	1.0	235	5
	C 1	1.2	236	5
	2	1.1	235	10
	3	1.0	235	5
	D 1	1.3	236	0
	2	1.1	235	10
	3	0.9	234	5
Pitot Leak Check		LCG		
Averages				

Average of Absolute Angle Readings must be < 20 degrees

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; STe	1/10/24	Main Stack	Method 26A	- ON OFF -M26A-1A

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
DGC	28.9	.95	45	NA	218.5	.84	6' effective/glass	.250 .250 .250	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS25	1.95	.967	6F	6F	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	10	20	2.9

PITOT LEAK CHECK ----> [x] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	1430 0	1430	759.749	1.2	3.5	256	235	45	260	56	12
2	5		764.77	1.1	3.2	255	233	44	261	50	10
3	10		769.51	.9	2.6	251	234	44	258	48	9
	1445 15	1445	773.950	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg
FINAL ______ ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	1447	773.950	1.3	3.8	256	235	45	258	48	12
2	20		779.03	1.2	3.5	256	235	46	260	47	10
3	25		784.01	0.89	2.6	256	233	46	260	45	9
	30	1502	788.349	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg
FINAL ______ ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	1504	788.349	1.2	3.5	256	236	47	251	45	10
2	35		793.20	1.2	3.5	257	234	48	252	44	10
3	40		798.10	0.91	2.6	251	235	49	254	44	9
	45	1519	802.438	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg
FINAL ______ ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	1521	802.438	1.3	3.8	254	235	50	253	41	12
2	50		807.46	1.1	3.2	255	234	50	250	40	11
3	55		812.28	0.88	2.6	255	232	50	252	41	9
	60	1536	816.574	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

✓

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste. Gen
Sample Location Main Stack
Run No. 1A 56 On-M26A- 1A
Filter Number(s) Not Applicable

Sample Date 1/10/24
Recovery Date 1/10/24
Recovered by SLS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		820.3	812.7	616.3	763.3	776.8	1009.4	g
Initial weight		772.1	766.9	598.9	748.3	773.3	994.9	g
Net weight		48.2	45.8	17.4	15.0	3.5	14.5	g

Description of impinger water Clear

50 % spent
B/W Sil gel color
Total moisture = 144.4 grams

RECOVERED SAMPLE

FV

H_2SO_4 Impingers and knockout contents and water rinse
container no. 56 -M26A-H2SO4- 1A

Liquid level marked/sealed ✓ 502.1

NaOH Impingers contents and water rinse
container no. 56 -M26A-NaOH 1A

Liquid level marked/sealed ✓ 371.2

Samples stored and locked
Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; St Genevieve	1 / 10 /24	Main Stack	Method 26A	1 - ON OFF -M26A-1B

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
LC Harris	28.90	.95	45	NA	218.9	0.84	6 ft effective 7 ft glass	.249 .250 .251	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS-B	1.65	0.973	6F	6F	CEM	.001 CU. FT @ 12 "Hg	.001 CU. FT @ 12 "Hg	10	20	2.45

PITOT LEAK CHECK ----> [X] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	1430	578.879	1.2	2.9	256	235	45	260	55	7
2	5		583.82	1.1	2.7	255	233	45	261	54	7
3	10		588.42	0.9	2.2	251	234	46	258	54	6
	15	1445	592.672	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

B-1	15	1447	592.672	1.3	3.2	254	235	47	258	53	8
2	20		597.71	1.2	2.9	255	235	48	260	52	7
3	25		602.54	0.89	2.2	257	233	48	260	52	6
	30	1502	606.948	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

C-1	30	1504	606.948	1.2	2.9	251	236	48	251	55	7
2	35		611.75	1.2	2.9	252	234	49	252	57	7
3	40		616.72	0.91	2.2	254	235	50	254	58	6
	45	1519	620.910	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

D-1	45	1521	620.910	1.3	3.2	250	235	50	253	56	9
2	50		625.96	1.1	2.7	253	234	51	250	57	8
3	55		630.72	0.88	2.2	251	232	51	252	59	7
	60	1536	635.119	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste. Gen
Sample Location Main Stack
Run No. 1B SG On -M26A- 1B
Filter Number(s) Not Applicable

Sample Date 1 / 10 /24
Recovery Date 1 / 10 /24
Recovered by SCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		805.6	800.8	630.9	754.4	737.8	1001.2	g
Initial weight		760.5	746.5	613.9	741.9	733.1	988.4	g
Net weight		45.1	54.3	16.9	12.5	4.7	12.8	g

Description of impinger water Clear

50 % spent
B/W Sil gel color
Total moisture = 146.3 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. SG -M26A-H2SO4- 1B

Liquid level marked/sealed ✓

FV
499.7

NaOH Impingers contents and water rinse
container no. SG -M26A-NaOH 1B

Liquid level marked/sealed ✓

361.1

Samples stored and locked
Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; ste gen	1 / 10 /24	Main Stack	Method 26A	- ON OFF -M26A- 2A

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
VBC	28.9	.95	45	NA	218.9	0.84	6' effective glass	2.50 .250 .250	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS-25	1.95	.967	6F	6F	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	10	20	2.9

PITOT LEAK CHECK ----> [] PASSED [] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	1552	816.866	1.2	3.5	254	237	45	251	50	11
2	5		821.87	1.1	3.2	256	237	44	254	48	10
3	10		826.63	.92	2.7	251	235	43	250	45	9
	15	1607	831.114	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg
FINAL ______ ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	1609	831.114	1.2	3.5	253	236	45	257	47	11
2	20		836.02	1.2	3.5	258	234	46	258	44	11
3	25		840.95	.90	2.6	256	234	46	255	43	9
	30	1624	845.145	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg
FINAL ______ ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	1626	845.145	1.0	2.9	255	237	47	255	43	10
2	35		849.63	1.1	3.2	255	236	48	255	43	10
3	40		854.28	.91	2.6	255	233	48	251	43	9
	45	1641	858.687	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg
FINAL ______ ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	1643	858.687	1.2	3.5	256	238	48	255	45	11
2	50		863.77	1.1	3.2	255	236	48	255	44	10
3	55		868.47	0.88	2.6	255	235	48	255	44	9
	60	1658	872.813	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY
AND INTEGRITY DATA SHEET

Plant Holcim Ste. Gen
Sample Location Main Stack
Run No. 2A SG On -M26A- 2A
Filter Number(s) Not Applicable

Sample Date 1 / 10 /24
Recovery Date 1 /10 /24
Recovered by GCG

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		838.6	799.9	675.3	759.7	750.4	968.3	g
Initial weight		764.5	757.6	667.0	756.3	750.0	955.5	g
Net weight		74.1	42.3	8.3	3.4	0.4	12.8	g

Description of impinger water Clear

30 % spent
B/W Sil gel color
Total moisture = 141.3 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. SG -M26A-H2SO4- 2A

Liquid level marked/sealed ✓ 504.6

NaOH Impingers contents and water rinse
container no. SG -M26A-NaOH 2A

Liquid level marked/sealed ✓ 369.9

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; St. Genevieve	1 / 10 /24	Main stack	Method 26A	2 - ON OFF -M26A-2B

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
Lee Harris	28.90	.95	45	NA	218.9	0.84	6ft effective 7 ft glass	.249 .250, .251	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	45-16	1.65	0.973	6F	6F	CEM	.001 CU. FT @ 13 "Hg	.001 CU. FT @ 15 "Hg	10	20	2.45

PITOT LEAK CHECK ----> [x] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	1552	635.415	1.2	2.9	251	237	45	251	54	11
2	5		640.39	1.1	2.7	253	237	46	254	57	10
3	10		645.17	0.92	2.3	254	235	47	250	56	9
	15	1607	649.516	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	1609	649.516	1.2	2.9	256	236	48	257	54	11
2	20		654.31	1.2	2.9	253	234	48	258	65	11
3	25		659.13	0.90	2.2	257	234	49	255	54	10
	30	1624	663.473	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	1626	663.473	1.0	2.5	252	237	49	255	52	10
2	35		667.98	1.1	2.7	250	236	51	255	50	11
3	40		672.54	0.91	2.2	255	233	52	251	51	10
	45	1641	676.915	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	1643	676.915	1.2	2.9	254	238	52	255	52	12
2	50		681.74	1.1	2.7	253	240	53	255	56	11
3	55		686.51	0.98	2.2	257	235	55	255	57	10
	60	1658	691.219	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

✓

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Gen
Sample Location Main Stack
Run No. 2B 56 -M26A- 2B
Filter Number(s) Not Applicable

Sample Date 1 / 10 /24
Recovery Date 1/10 /24
Recovered by SCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		832.7	791.6	622.8	754.3	749.5	986.1	g
Initial weight		753.2	752.1	615.9	751.1	748.8	973.6	g
Net weight		79.5	39.5	6.9	3.2	0.7	12.5	g

Description of impinger water Clear

25 % spent
B/W Sil gel color
Total moisture = 142.3 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. 56 -M26A-H2SO4- 2B

Liquid level marked/sealed ✓ 497.3

NaOH Impingers contents and water rinse
container no. 56 -M26A-NaOH 2B

Liquid level marked/sealed ✓ 398.0

Samples stored and locked
Remarks

JM

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; Ste Gen	1/20/24		Method 26A	- ON OFF -M26A- 3A

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
DGC	28.9	.95	38	NA	218.9	.84	6' effective/glass	.250 .250 .250	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS-25	1.95	.967	6F	6F	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 11 "Hg	10	20	2.9

PITOT LEAK CHECK ----> [x] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	1710	873.091	1.3	3.8	257	237	49	261	45	12
2	5		878.43	1.1	3.2	260	235	50	258	43	11
3	10		883.11	.92	2.7	255	234	50	260	42	9
	15	1725	887.495	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ FINAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg; ______ CU.FT @ ______ INCHES Hg

B-1	15	1727	887.495	1.1	3.2	256	236	50	256	43	11
2	20		892.25	1.0	2.9	255	235	50	255	40	11
3	25		896.416	0.90	2.6	255	233	50	250	40	9
	30	1742	900.867	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ FINAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg; ______ CU.FT @ ______ INCHES Hg

C-1	30	1744	900.867	1.2	3.5	256	237	50	253	39	11
2	35		905.75	1.2	3.5	256	236	49	252	38	11
3	40	910.72	910.72	0.89	2.6	256	236	48	255	40	9
	45	1759	915.147	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ______ FINAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg; ______ CU.FT @ ______ INCHES Hg

D-1	45	1801	915.147	1.2	3.5	255	235	48	256	41	11
2	50		920.05	1.1	3.2	255	234	48	254	41	11
3	55		924.924	0.93	2.7	255	232	48	251	42	9
	60	1816	929.275	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

✓

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Gen
Sample Location Main Stack
Run No. 3A 5G -M26A- 3A
Filter Number(s) Not Applicable

Sample Date 1 / 10 /24
Recovery Date 1 / 10 /24
Recovered by GCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight	/	810.2	847.4	660.1	751.3	742.7	992.4	g
Initial weight	/	751.0	806.8	647.1	747.5	742.8	972.8	g
Net weight	/	59.2	40.6	13.0	3.8	-0.1	19.6	g

Description of impinger water Clear

50 % spent
BW Sil gel color
Total moisture = 136.1 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. 5G-M26A-H2SO4- 3A

Liquid level marked/sealed ✓ 533.8

NaOH Impingers contents and water rinse
container no. 5G -M26A-NaOH 3A

Liquid level marked/sealed ✓ 373.8

Samples stored and locked
Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; St. Genevieve	1 / 10 /24	Main Stack	Method 26A	3 - ON OFF -M26A-3B

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
Lee Harris	28.90	.45	38	NA	218.9	0.84	6 84 effect vc - 1 ft glass	.249 .250 .251	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS-18	1.65	0.973	6F	6F	CEM	.001 CU. FT @ 11 "Hg	.001 CU. FT @ 10 "Hg	10	20	2.45

PITOT LEAK CHECK ----> ☒ PASSED ☐ FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	1710	691.589	1.3	3.3	254	237	50	261	43	7
2	5		696.89	1.1	2.7	255	235	50	258	51	6
3	10		701.61	0.92	2.3	255	234	52	260	55	6
	15	1725	706.006	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	1727	706.006	1.1	2.7	257	236	51	258	55	6
2	20		710.74	1.0	2.5	252	235	54	255	57	6
3	25		715.25	0.90	2.2	250	233	54	250	58	5
	30	1742	719.591	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	1744	719.591	1.2	2.9	253	237	55	253	57	6
2	35		724.52	1.2	2.9	255	236	57	252	54	6
3	40		729.94	0.89	2.2	250	236	58	255	55	5
	45	1759	733.627	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	1801	733.627	1.2	2.9	256	235	58	256	56	6
2	50		738.41	1.1	2.7	251	234	58	254	58	6
3	55		743.06	0.93	2.3	253	232	59	251	61	5
	60	1816	747.691	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Gen
Sample Location Main Stack
Run No. 3B -M26A-
Filter Number(s) Not Applicable

Sample Date / /24
Recovery Date / /24
Recovered by

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		803.0	797.5	658.7	740.5	754.9	976.2	g
Initial weight		740.0	754.1	647.4	737.6	755.3	960.1	g
Net weight								g

Description of impinger water
90 % spent
B/W Sil gel color
Total moisture = grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. -M26A-H2SO4-
Liquid level marked/sealed 524.5

NaOH Impingers contents and water rinse
container no. -M26A-NaOH
Liquid level marked/sealed 375.6

Samples stored and locked
Remarks

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Genevieve MO
Sample Location Main Stack
Run No. SG ON -M26A- FB
Filter Number(s) Not Applicable

Sample Date 11 10 /24
Recovery Date 11 11 /24
Recovered by SCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		770.3	751.4	660.1	765.6	754.0	968.1	g
Initial weight	/	770.5	751.8	660.0	765.6	754.3	968.2	g
Net weight								g

Description of impinger water Clear 30 % spent

B/W Sil gel color

Total moisture = ______ grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. SG-M26A-H2SO4- ON FB
Liquid level marked/sealed ✓ 403.0

NaOH Impingers contents and water rinse
container no. SG -M26A-NaOH ON FB
Liquid level marked/sealed ✓ 339.7

Samples stored and locked
Remarks From Train 2A

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; Ste Gen	1/11/24	Main Stack	Method 26A	- ON ~~OFF~~ -M26A-4A

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
DGC	29	1.1	39	NA	218.9	.84	6' effective/glass	.250 .250 .250	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS-25	1.95	.967	6E	6E	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	11	18	2.5 2.51

PITOT LEAK CHECK----> [ ] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	835	929.503	1.2	3.0	255	~~245~~ 299	45	254	60	10
2	5		934.08	1.2	3.0	255	~~246~~ 299	46	258	55	10
3	10		938.57	1.1	2.8	255	~~246~~ 300	46	259	53	9
	15	850	943.037	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL ______ FINAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	852	943.037	1.1	2.8	255	297	47	256	54	9
2	20		947.39	1.1	2.8	255	299	47	256	52	9
3	25		951.69	.80	2.0	255	299	47	253	51	7
	30	907	955.494	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL ______ FINAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	909	955.498	1.3	3.3	255	300	47	256	50	10
2	35		960.23	.99	2.5	255	299	48	256	50	8
3	40		964.45	.95	2.4	255	300	48	256	48	8
	45	924	968.685	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL ______ FINAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	926	968.685	1.2	3.0	254	298	49	252	45	10
2	50		973.19	1.0	2.5	250	299	50	~~255~~	47	
3	55		977.42	.97	2.4	253	297	50	256	48	
	60	941	981.535	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Genevieve MO
Sample Location SCS
Run No. SG Off -M26A- 4B4A
Filter Number(s) Not Applicable

Sample Date 11/11/24
Recovery Date 11/11/24
Recovered by GCJ

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		849.9	782.2	601.3	743.8	753.8	1020.4	g
Initial weight		768.7	755.6	598.9	739.8	752.1	1009.2	g
Net weight		81.7	26.6	2.4	4.0	1.7	11.2	g

Description of impinger water Clear

60 % spent
B/W Sil gel color
Total moisture = 127.1 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. SG -M26A-H2SO4- 4A

Liquid level marked/sealed ✓ 509.5

NaOH Impingers contents and water rinse
container no. SG -M26A-NaOH 4A

Liquid level marked/sealed ✓ 337.5

Samples stored and locked
Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; St Genevieve	1/11/24	Main Stack	Method 26A	4 - ON OFF -M26A- 4B

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
Lee Harris	29.0	1.1	39	NA	218.9	0.84	6 ft effective 7ft glass	.249 .250 .251	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	M5-18	1.65	0.973	6F	6F	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	11	18	2.13

PITOT LEAK CHECK ----> [X] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	0835	748.021	1.2	2.6	253	299	45	254	55	7
2	5		752.66	1.2	2.6	257	299	47	258	53	7
3	10		757.20	1.1	2.3	254	300	48	259	50	6
	15	0850	761.549	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	0852	761.549	1.1	2.3	254	297	49	256	50	6
2	20		765.87	1.1	2.3	255	299	50	256	49	6
3	25		770.15	0.80	1.7	252	299	51	253	50	5
	30	0907	773.851	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	0909	773.851	1.3	2.8	259	300	52	256	50	8
2	35		778.58	0.99	2.1	255	299	54	256	51	6
3	40		782.71	0.95	2.0	257	300	54	256	51	6
	45	0924	786.730	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	0926	786.730	1.2	2.6	257	298	55	252	52	7
2	50		791.32	1.0	2.1	258	299	53	255	53	6
3	55		795.46	0.97	2.1	254	297	55	256	54	6
	60	0941	799.574	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste. Genevieve
Sample Location Main Stack
Run No. SG Off -M26A- 4B
Filter Number(s) Not Applicable

Sample Date 11/11/24
Recovery Date 11/11/24
Recovered by SCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		822.4	767.7	616.1	753.8	741.5	1002.1	g
Initial weight		744.1	739.8	612.4	749.6	740.4	1001.0	g
Net weight		78.3	27.9	3.7	4.2	1.1	1.1	g

Description of impinger water Clear

90 % spent
B/W Sil gel color
Total moisture = 126.3 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. SG -M26A-H2SO4- 4B

Liquid level marked/sealed ✓ 478.6

NaOH Impingers contents and water rinse
container no. SG -M26A-NaOH 4B

Liquid level marked/sealed ✓ 327.3

Samples stored and locked

Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; STE Gen	1 / 11 /24	Main Stack	Method 26A	- ON / OFF -M26A- 5A

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
D G L	29.0	1.1	45		218.9	.84	10ft effective 7ft Glass	-250 -250 .250	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS-25	1.95	.967	EF	EF	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	11	18	2.51

PITOT LEAK CHECK ----> [ ] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	953	981.734	1.2	3.0	254	300	50	254	55	10
2	5		986.32	1.0	2.5	255	301	51	255	52	8
3	10		990.54	.92	2.3	255	298	51	254	50	7
	15	1008	994.599	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	1010	994.599	1.1	2.8	256	299	52	256	52	9
2	20		998.99	1.0	2.5	259	300	53	253	55	9
3	25		1003.24	0.94	2.4	255	299	54	254	56	8
	30	1025	1007.467	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; / CU.FT @ / INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	1027	1007.467	1.3	3.2	255	300	55	254	55	11
2	35		1012.23	.98	2.5	255	302	56	255	53	9
3	40		1016.97	.94	2.4	255	299	57	250	52	8
	45	1042	1021.281	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL ______ FINAL ______ LEAK RATE: ______ CU.FT @ ______ INCHES Hg; ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	1044	1021.281	1.2	3.0	255	302	60	255	57	10
2	50		1025.88	1.0	2.5	256	300	62	255	57	9
3	55		1030.25	.95	2.4	254	300	63	255	55	8
	60	1059	1034.319	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Genevieve MO
Sample Location Main Stack
Run No. 56 Off -M26A- 5A
Filter Number(s) Not Applicable

Sample Date 11/1/24
Recovery Date 11/1/24
Recovered by SCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		847.2	779.4	670.0	772.1	749.0	983.0	g
Initial weight		771.3	750.9	663.4	769.6	747.8	968.0	g
Net weight		75.9	28.9	6.6	2.5	1.2	15.0	g

Description of impinger water Clear

66 % spent
B/W Sil gel color
Total moisture = 129.7 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. 56-M26A-H2SO4- 5A

Liquid level marked/sealed ✓ 479.0

NaOH Impingers contents and water rinse
container no. 56 -M26A-NaOH 5A

Liquid level marked/sealed ✓ 368.8

Samples stored and locked
Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; St. Genevive.	1 / 11 /24	Main stack	Method 26A	5 - ON OFF -M26A-5B

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
Lee Harris	29.0	1.1	45	NA	218.9	0.84	6ft effective 7 ft glass	.249 . 250 .251	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	M5-18	1.65	0.973	6F	6F	CEM	.001 CU. FT @ 11 "Hg	.001 CU. FT @ 10 "Hg	11	18	2.13

PITOT LEAK CHECK ----> [x] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	0953	799.806	1.2	2.6	251	300	51	254	56	10
2	5		804.46	1.0	2.1	254	301	53	255	53	8
3	10		808.67	0.92	2.0	255	298	54	255	53	8
	15	1008	812.676	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; CU.FT @ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	1010	812.670	1.1	2.3	252	299	56	256	58	8
2	20		816.98	1.0	2.1	255	300	56	253	60	8
3	25		821.14	0.94	2.0	253	299	57	254	63	8
	30	1025	825.298	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; CU.FT @ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	1027	825.298	1.3	2.8	252	300	58	254	63	11
2	35		830.06	0.98	2.1	252	302	58	255	61	9
3	40		834.25	0.94	2.0	255	299	60	250	59	8
	45	1042	838.285	End of Port							

INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT) INITIAL / FINAL / LEAK RATE: / CU.FT @ / INCHES Hg; CU.FT @ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	1044	838.285	1.2	2.6	260	302	60	255	57	10
2	50		842.87	1.0	2.1	258	300	61	255		9
3	55	~~1059~~	847.16	0.95	2.0	254	300	61	255		
	60	1059	851.054	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Genevieve MO
Sample Location Main Stack
Run No. 5G Off -M26A- 5B
Filter Number(s) Not Applicable

Sample Date 1/11/24
Recovery Date 1/11/24
Recovered by GC

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		828.1	781.5	624.1	740.6	752.2	1001.4	g
Initial weight		753.8	752.8	619.3	737.8	750.7	985.9	g
Net weight		74.3	28.7	4.8	2.8	1.5	15.5	g

Description of impinger water Clear 50 % spent
B/W Sil gel color
Total moisture = 127.6 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. 5G -M26A-H2SO4- 5B

Liquid level marked/sealed ✓ 472.3

NaOH Impingers contents and water rinse
container no. 5G -M26A-NaOH 5B

Liquid level marked/sealed ✓ 413.8

Samples stored and locked
Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY		DATE		SAMPLING LOCATION			SAMPLE TYPE		RUN NUMBER	
Holcim; Ste Gen		1/11/24		Main Stack			Method 26A		- ON ~~OFF~~ -M26A-6A	
OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)		PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
DGL	29.0	1.1	45	N/A	218.9		.84	6 ft effective 7 ft glass	.250 .250 .250	.250
ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	M529	1.95	.987	6F	6F	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ "Hg	11	18	2.51

PITOT LEAK CHECK ----> [ ] PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	1109	34.608	1.2	3.0	254	300	58	254	56	6
2	5		39.37	1.1	2.8	255	300	58	250	53	5
3	10		43.81	.99	2.5	257	298	60	253	50	4
	15	1124	48.456	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ________ FINAL ________ LEAK RATE: ______ CU.FT @ ______ INCHES Hg ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
B-1	15	1126	48.456	1.1	2.8	255	300	62	260	51	5
2	20		52.94	1.0	2.5	255	300	62	258	48	4
3	25		57.19	.92	2.3	255	300	62	260	47	4
	30	1141	61.272	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ________ FINAL ________ LEAK RATE: ______ CU.FT @ ______ INCHES Hg ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
C-1	30	1143	61.272	1.2	3.0	255	297	63	254	50	6
2	35		65.96	1.0	2.5	255	299	63	255	50	4
3	40		70.19	.96	2.4	255	298	64	259	51	4
	45	1158	74.325	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL ________ FINAL ________ LEAK RATE: ______ CU.FT @ ______ INCHES Hg ______ CU.FT @ ______ INCHES Hg

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
D-1	45	1200	74.325	1.3	3.3	255	299	64	255	53	6
2	50		79.17	1.1	2.8	255	299	64	255	53	5
3	55		83.85	.97	2.4	255	299	64	255	52	4
	60	1215	87.993	End of Port							

	TOTAL TIME		DGM VOLUME	AVE SQRT delta P	AVE delta H		AVE. TEMP.	AVE. TEMP.
	60 Min.							

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Genevieve MO
Sample Location Main Stack
Run No. 56 Off -M26A- 6A
Filter Number(s) Not Applicable

Sample Date 11 11 /24
Recovery Date 11 11 /24
Recovered by GCG

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		827.6	765.6	676.8	745.4	739.3	1009.2	g
Initial weight		750.8	739.1	671.8	743.4	738.7	992.3	g
Net weight		76.8	26.5	5.0	2.0	0.6	16.9	g

Description of impinger water Clear

30 % spent
B/W Sil gel color
Total moisture = 127.8 grams

RECOVERED SAMPLE

H$_2$SO$_4$ Impingers and knockout contents and water rinse
container no. 56 -M26A-H2SO4- 6A

Liquid level marked/sealed ✓ 395.9

NaOH Impingers contents and water rinse
container no. 56 -M26A-NaOH 6A

Liquid level marked/sealed ✓ 290.7

Samples stored and locked
Remarks

✓

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Holcim; St Gen	1 / 11 /24	Main Stack	Method 26A	6 - ON OFF -M26A- 6 B

OPERATOR	AMBIENT PRESS (In. Hg)	STATIC PRESSURE (in. Water)	AMBIENT TEMP (deg. F)	FILTER NUMBERS	STACK ID (In.)	PITOT Cp	PROBE LENGTH AND LINER TYPE	NOZZLE NUMBER	NOZZLE DIAMETER
Lee Harris	29.0	1.1	50	N/A	~~218.9~~ 218.9	0.84	6 ft effective 7 ft glass	.249 .250 .251	.250

ASSUMED MOISTURE (%)	DGM BOX No.	DGM H@	DGM CAL FACTOR (Y)	STACK THERM NO.	STACK PITOT NO.	ORSAT NO.	LEAK CHECK (INITIAL)	LEAK CHECK (FINAL)	O2 CONTENT %	CO2 CONTENT %	K FACTOR
11	MS-18	1.65	0.9773	6F	6F	CEM	.001 CU. FT @ 12 "Hg	.001 CU. FT @ 14 "Hg	11	18	2.13

PITOT LEAK CHECK ----> ☑ PASSED [ ] FAILED

TRAVERSE PORT/ /POINT NO.	ELAPSED TEST TIME (MIN)	CLOCK TIME (24-HR)	DGM READING Vm (cu. ft.)	delta P VELOCITY HEAD (In. H2O)	delta H ORIFICE (In. H2O)	PROBE TEMP (deg. F)	STACK TEMP (deg. F)	DGM IN / OUT TEMP (deg. F)	FILTER OVEN TEMP (deg. F)	Sil Gel EXIT TEMP (deg. F)	SAMPLE TRAIN VAC (in. Hg)
A-1	0	1109	851.326	1.2	2.6	250	300	57	254	55	10
2	5		856.09	1.1	2.3	252	300	59	250	58	8
3	10		860.42	0.99	2.1	253	298	60	253	59	7
	15	1124	864.853	End of Port							
INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT)		INITIAL / FINAL	/	LEAK RATE:	/ CU.FT @ / CU.FT @	/	INCHES Hg / INCHES Hg				
B-1	15	1126	864.853	1.1	2.3	259	300	60	260	59	8
2	20		869.19	1.0	2.1	258	300	60	258	60	7
3	25		~~873.88~~	0.92	2.0	259	300	62	260	61	7
	30	1141	877.531	End of Port							
INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT)		INITIAL / FINAL	/	LEAK RATE:	/ CU.FT @ / CU.FT @	/	INCHES Hg / INCHES Hg				
C-1	30	1143	877.531	1.2	2.6	255	297	64	254	62	10
2	35		882.09	1.0	2.1	253	299	65	255	60	8
3	40		886.36	0.96	2.0	250	298	65	259	60	7
	45	1158	890.422	End of Port							
INTRA-PORT LEAK CHECK? DGM VOLUME (CU. FT)		INITIAL / FINAL	/	LEAK RATE:	/ CU.FT @ / CU.FT @	/	INCHES Hg / INCHES Hg				
D-1	45	1200	890.422	1.3	2.8	250	298	65	255	59	11
2	50		895.21	1.1	2.3	252	299	65	255	60	8
3	55		899.71	0.97	2.1	254	299	67	255	61	7
	60	1215	903.790	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.					

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Genevieve MO
Sample Location Main Stack
Run No. 56 ~~04f~~ -M26A- 6B
Filter Number(s) Not Applicable

Sample Date 1 / 11 /24
Recovery Date 1 / 11 /24
Recovered by SCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		833.1	788.6	654.2	746.7	748.5	1037.7	g
Initial weight		757.2	761.9	648.6	744.6	748.0	1020.3	g
Net weight		75.9	26.7	5.6	2.1	0.5	17.4	g

Description of impinger water clear

40 % spent
Blue Sil gel color
Total moisture = 128.2 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. 56 -M26A-H2SO4- 6B

Liquid level marked/sealed ✓ 425.0

NaOH Impingers contents and water rinse
container no. 56 -M26A-NaOH 6B

Liquid level marked/sealed ✓ 295.8

Samples stored and locked
Remarks

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Holcim Ste Genevieve MO
Sample Location MainStack
Run No. SG Off -M26A- FB
Filter Number(s) Not Applicable

Sample Date 1 / 11 /24
Recovery Date 1 / 11 /24
Recovered by SCS

MOISTURE

Impingers	1 50 ml 0.1N H_2SO_4 (knockout)	2 100 ml 0.1N H_2SO_4 (tipped)	3 100 ml 0.1N H_2SO_4 (tipped)	4 Optional Knockout (untipped)	5 100 ml 0.1N NaOH (untipped)	6 100 ml 0.1N NaOH (untipped)	Silica gel (untipped)	
Final weight		752.3	776.8	597.3	769.2	769.1	975.6	g
Initial weight		752.4	776.9	597.4	769.3	769.5	976.2	g
Net weight								g

Description of impinger water Clear

60 % spent
B/W Sil gel color
Total moisture = SCS grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. SG -M26A-H2SO4- Off FB

Liquid level marked/sealed ✓ 400.1

NaOH Impingers contents and water rinse
container no. SG -M26A-NaOH Off FB

Liquid level marked/sealed ✓ 369.8

Samples stored and locked
Remarks From Train 4A

Client: Holcim Ste Genevieve MO
Test Location: Main Stack Mill On
Date: Jan 10 24 Start Time: 14:30:12
Run number 1
One Minute Averages

	O2	CO2
	%,dry	%,dry
2:31:10 PM	8.9	21.6
2:32:10 PM	8.9	21.6
2:33:10 PM	8.8	21.6
2:34:10 PM	8.7	21.7
2:35:10 PM	8.7	21.7
2:36:10 PM	8.7	21.6
2:37:10 PM	8.7	21.7
2:38:10 PM	8.7	21.7
2:39:10 PM	8.6	21.8
2:40:10 PM	8.7	21.7
2:41:10 PM	8.8	21.6
2:42:10 PM	8.8	21.5
2:43:10 PM	8.8	21.6
2:44:10 PM	8.8	21.5
2:45:10 PM	8.8	21.7
2:46:10 PM	8.8	21.6
2:47:10 PM	8.8	21.7
2:48:10 PM	8.6	21.8
2:49:10 PM	8.7	21.7
2:50:10 PM	8.7	21.6
2:51:10 PM	8.7	21.8
2:52:10 PM	8.6	21.8
2:53:10 PM	8.7	21.7
2:54:10 PM	8.7	21.8
2:55:10 PM	8.7	21.7
2:56:10 PM	8.7	21.7
2:57:10 PM	8.7	21.8
2:58:10 PM	8.7	21.7
2:59:10 PM	8.7	21.8
3:00:10 PM	8.7	21.7
3:01:10 PM	8.7	21.8
3:02:10 PM	8.7	21.7
3:03:10 PM	8.7	21.7
3:04:10 PM	8.7	21.7
3:05:10 PM	8.7	21.8
3:06:10 PM	8.7	21.8
3:07:10 PM	8.7	21.7
3:08:10 PM	8.7	21.7
3:09:10 PM	8.7	21.7
3:10:10 PM	8.7	21.6
3:11:10 PM	8.7	21.7
3:12:10 PM	8.7	21.8
3:13:10 PM	8.7	21.6
3:14:10 PM	8.8	21.6
3:15:10 PM	8.7	21.8
3:16:10 PM	8.7	21.6
3:17:10 PM	8.7	21.7
3:18:10 PM	8.6	21.8
3:19:10 PM	8.6	21.8
3:20:10 PM	8.6	21.8
3:21:10 PM	8.6	21.8
3:22:10 PM	8.6	21.8
3:23:10 PM	8.7	21.7
3:24:10 PM	8.7	21.7
3:25:10 PM	8.6	21.8
3:26:10 PM	8.5	22.1
3:27:10 PM	8.6	22.0
3:28:10 PM	8.6	21.9
3:29:10 PM	8.6	21.9
3:30:10 PM	8.6	21.7
Run Avgs	8.7	21.7
Cal Gas	12.1	18.2
Initial Zero	0.2	0.2
Final Zero	-0.1	0.4
Initial cal.	12.0	17.9
Final Cal.	11.7	18.0
Corrected Average	8.9	22.1

Client: Holcim Ste Genevive MO
Test Location: Main Stack Mill On
Date: Jan 10 24 Start Time: 15:52:12
Run number 2
One Minute Averages

	O2 %,dry	CO2 %,dry
3:53:10 PM	9.2	21.7
3:54:10 PM	9.2	21.8
3:55:10 PM	9.1	21.9
3:56:10 PM	9.2	21.7
3:57:10 PM	9.2	21.7
3:58:10 PM	9.1	21.8
3:59:10 PM	9.2	21.7
4:00:10 PM	9.1	21.8
4:01:10 PM	9.2	21.6
4:02:10 PM	9.2	21.7
4:03:10 PM	9.2	21.8
4:04:10 PM	9.1	21.8
4:05:10 PM	9.1	21.7
4:06:10 PM	9.2	21.7
4:07:10 PM	9.2	21.7
4:08:10 PM	9.2	21.7
4:09:10 PM	9.2	21.7
4:10:10 PM	9.2	21.7
4:11:10 PM	9.2	21.9
4:12:10 PM	9.1	21.8
4:13:10 PM	9.1	21.8
4:14:10 PM	9.1	21.8
4:15:10 PM	9.1	21.7
4:16:10 PM	9.2	21.7
4:17:10 PM	9.1	21.8
4:18:10 PM	9.2	21.7
4:19:10 PM	9.2	21.7
4:20:10 PM	9.2	21.8
4:21:10 PM	9.2	21.7
4:22:10 PM	9.2	21.6
4:23:10 PM	9.2	21.7
4:24:10 PM	9.2	21.6
4:25:10 PM	9.2	21.6
4:26:10 PM	9.1	21.8
4:27:10 PM	9.2	21.8
4:28:10 PM	9.1	21.9
4:29:10 PM	9.1	21.9
4:30:10 PM	9.2	21.7
4:31:10 PM	9.2	21.7
4:32:10 PM	9.2	21.7
4:33:10 PM	9.1	21.8
4:34:10 PM	9.1	21.8
4:35:10 PM	9.1	21.9
4:36:10 PM	9.1	21.8
4:37:10 PM	9.1	21.9
4:38:10 PM	9.1	21.9
4:39:10 PM	9.1	21.8
4:40:10 PM	9.1	21.8
4:41:10 PM	9.1	21.9
4:42:10 PM	9.1	21.8
4:43:10 PM	9.0	21.9
4:44:10 PM	9.0	22.1
4:45:10 PM	9.1	21.8
4:46:10 PM	9.2	21.7
4:47:10 PM	9.1	21.8
4:48:10 PM	9.1	21.8
4:49:10 PM	9.2	21.6
4:50:10 PM	9.2	21.6
4:51:10 PM	9.3	21.5
4:52:10 PM	9.3	21.4
Run Avgs	9.2	21.8
Cal Gas	12.1	18.2
Initial Zero	0.3	0.1
Final Zero	0.3	0.1
Initial cal.	12.1	18.1
Final Cal.	12.2	17.9
Corrected Average	9.0	22.0

Client: Holcim Ste Genevive MO
Test Location: Main Stack Mill On
Date: Jan 10 24 Start Time: 17:10:36
Run number 3
One Minute Averages

	O2 %,dry	CO2 %,dry
5:11:34 PM	9.3	21.5
5:12:34 PM	9.2	21.5
5:13:34 PM	9.2	21.6
5:14:34 PM	9.3	21.5
5:15:34 PM	9.3	21.5
5:16:34 PM	9.3	21.5
5:17:34 PM	9.3	21.6
5:18:34 PM	9.4	21.4
5:30:18 PM	9.2	21.8
5:31:18 PM	9.2	21.8
5:32:18 PM	9.2	21.7
5:33:18 PM	9.2	21.8
5:34:18 PM	9.1	21.8
5:35:18 PM	9.2	21.7
5:36:18 PM	9.2	21.6
5:37:18 PM	9.2	21.6
5:38:18 PM	9.2	21.7
5:39:18 PM	9.3	21.6
5:40:18 PM	9.2	21.6
5:41:18 PM	9.2	21.6
5:42:18 PM	9.3	21.6
5:43:18 PM	9.3	21.5
5:44:18 PM	9.4	21.4
5:45:18 PM	9.3	21.6
5:46:18 PM	9.3	21.5
5:47:18 PM	9.4	21.5
5:48:18 PM	9.3	21.5
5:49:18 PM	9.3	21.5
5:50:18 PM	9.3	21.6
5:51:18 PM	9.3	21.4
5:52:18 PM	9.2	21.7
5:53:18 PM	9.2	21.7
5:54:18 PM	9.3	21.6
5:55:18 PM	9.3	21.6
5:56:18 PM	9.3	21.6
5:57:18 PM	9.2	21.7
5:58:18 PM	9.2	21.7
5:59:18 PM	9.2	21.8
6:00:18 PM	9.1	21.8
6:01:18 PM	9.2	21.9
6:02:18 PM	9.2	21.7
6:03:18 PM	9.2	21.7
6:04:18 PM	9.1	21.8
6:05:18 PM	9.2	21.7
6:06:18 PM	9.2	21.7
6:07:18 PM	9.2	21.7
6:08:18 PM	9.3	21.6
6:09:18 PM	9.3	21.5
6:10:18 PM	9.4	21.4
Run Avgs	9.2	21.6
Cal Gas	12.1	18.2
Initial Zero	0.3	0.1
Final Zero	0.3	0.2
Initial cal.	12.2	17.9
Final Cal.	12.2	17.9
Corrected Average	9.1	22.0

Holcim; Ste Genevieve MO Main Stack: Raw Mills On January 10, 2024 Operator

					Run No. 1		14:30-15:30			Run No.				
Cylinder ID	Gas Type	Value	Internal Response	Cal Error	Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift	Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift
	O2 Zero	Zero N2	0.0%	0.00%	0.2%	0.91%	-0.1%	-0.46%	-1.37%					
EB0070764	O2 Mid	12.1%	12.1%	0.09%	12.0%	-0.46%	11.7%	-1.83%	-1.37%					
ALM056015	O2 Span	21.9%	21.9%	0.00%	.									
	CO2 Zero	Zero N2	0.1%	0.28%	0.2%	0.28%	0.4%	0.85%	0.57%					
ALM056015	CO2 Mid	18.2%	18.2%	0.00%	17.9%	-0.85%	18.0%	-0.57%	0.28%					
CC714737	CO2 Span	35.1%	35.0%	-0.28%										

Holcim; Ste Genevieve MO Main Stack: Raw Mills On January 10, 2024 Operator

					Run No. 2		15:52-16:52			Run No. 3		17:10-18:10		
Cylinder ID	Gas Type	Value	Internal Response	Cal Error	Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift	Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift
	O2 Zero	Zero N2	0.0%	0.00%	0.3%	1.37%	0.3%	1.37%	0.00%	0.3%	1.37%	0.3%	1.37%	0.00%
EB0070764	O2 Mid	12.1%	12.1%	0.09%	12.1%	0.00%	12.2%	0.46%	0.46%	12.2%	0.46%	12.2%	0.46%	0.00%
ALM056015	O2 Span	21.9%	21.9%	0.00%										
	CO2 Zero	Zero N2	0.1%	0.28%	0.1%	0.00%	0.1%	0.00%	0.00%	0.1%	0.00%	0.2%	0.28%	0.28%
ALM056015	CO2 Mid	18.2%	18.2%	0.00%	18.1%	-0.28%	17.9%	-0.85%	-0.57%	17.9%	-0.85%	17.9%	-0.85%	0.00%
CC714737	CO2 Span	35.1%	35.0%	-0.28%										

Client: Holcim Ste Genevive MO
Test Location: Main Stack Mills Off
Date: Jan 11 24 Start Time: 08:35:08
Run number 1
One Minute Averages

	O2	CO2
	%,dry	%,dry
8:36:06 AM	9.1	21.3
8:37:06 AM	9.1	21.4
8:38:06 AM	9.1	21.3
8:39:06 AM	9.1	21.4
8:40:06 AM	9.1	21.3
8:41:06 AM	9.1	21.4
8:42:06 AM	9.0	21.5
8:43:06 AM	9.1	21.4
8:44:06 AM	9.1	21.4
8:45:06 AM	9.1	21.5
8:46:06 AM	9.1	21.4
8:47:06 AM	9.2	21.3
8:48:06 AM	9.2	21.3
8:49:06 AM	9.3	21.1
8:50:06 AM	9.3	21.2
8:51:06 AM	9.4	21.0
8:52:06 AM	9.4	21.0
8:53:06 AM	9.4	21.0
8:54:06 AM	9.4	20.9
8:55:06 AM	9.4	21.2
8:56:06 AM	9.4	21.0
8:57:06 AM	9.4	21.0
8:58:06 AM	9.3	21.2
8:59:06 AM	9.3	21.3
9:00:06 AM	9.2	21.3
9:01:06 AM	9.2	21.2
9:02:06 AM	9.3	21.2
9:03:06 AM	9.2	21.4
9:04:06 AM	9.2	21.3
9:05:06 AM	9.1	21.4
9:06:06 AM	9.1	21.4
9:07:06 AM	9.2	21.3
9:08:06 AM	9.2	21.3
9:09:06 AM	9.2	21.3
9:10:06 AM	9.2	21.4
9:11:06 AM	9.2	21.3
9:12:06 AM	9.3	21.2
9:13:06 AM	9.3	21.2
9:14:06 AM	9.3	21.2
9:15:06 AM	9.2	21.3
9:16:06 AM	9.2	21.4
9:17:06 AM	9.2	21.2
9:18:06 AM	9.2	21.3
9:19:06 AM	9.2	21.4
9:20:06 AM	9.3	21.2
9:21:06 AM	9.3	21.2
9:22:06 AM	9.3	21.1
9:23:06 AM	9.3	21.2
9:24:06 AM	9.4	21.2
9:25:06 AM	9.4	21.0
9:26:06 AM	9.4	21.2
9:27:06 AM	9.3	21.3
9:28:06 AM	9.3	21.2
9:29:06 AM	9.3	21.3
9:30:06 AM	9.4	21.1
9:31:06 AM	9.4	21.1
9:32:06 AM	9.4	21.2
9:33:06 AM	9.4	21.2
9:34:06 AM	9.5	21.0
9:35:06 AM	9.4	21.1
Run Avgs	9.3	21.2
Cal Gas	12.1	18.2
Initial Zero	0.3	0.2
Final Zero	0.3	0.3
Initial cal.	12.1	18.0
Final Cal.	12.1	18.0
Corrected Av	9.2	21.5

Client: Holcim Ste Genevive MO
Test Location: Main Stack Mills Off
Date: Jan 11 24 Start Time: 09:53:10
Run number 2
One Minute Averages

	O2 %,dry	CO2 %,dry
9:54:08 AM	9.3	21.3
9:55:08 AM	9.3	21.2
9:56:08 AM	9.3	21.2
9:57:08 AM	9.3	21.3
9:58:08 AM	9.4	21.2
9:59:08 AM	9.4	21.0
10:00:08 AM	9.4	21.2
10:01:08 AM	9.3	21.2
10:02:08 AM	9.3	21.2
10:03:08 AM	9.3	21.4
10:04:08 AM	9.3	21.3
10:05:08 AM	9.3	21.3
10:06:08 AM	9.3	21.3
10:07:08 AM	9.3	21.3
10:08:08 AM	9.3	21.4
10:09:08 AM	9.3	21.3
10:10:08 AM	9.3	21.3
10:11:08 AM	9.4	21.1
10:12:08 AM	9.4	21.2
10:13:08 AM	9.3	21.4
10:14:08 AM	9.4	21.2
10:15:08 AM	9.4	21.2
10:16:08 AM	9.3	21.4
10:17:08 AM	9.3	21.2
10:18:08 AM	9.4	21.2
10:19:08 AM	9.4	21.3
10:20:08 AM	9.4	21.1
10:21:08 AM	9.4	21.2
10:22:08 AM	9.4	21.2
10:23:08 AM	9.4	21.2
10:24:08 AM	9.3	21.4
10:25:08 AM	9.3	21.4
10:26:08 AM	9.3	21.4
10:27:08 AM	9.4	21.2
10:28:08 AM	9.3	21.3
10:29:08 AM	9.3	21.3
10:30:08 AM	9.2	21.4
10:31:08 AM	9.2	21.6
10:32:08 AM	9.1	21.6
10:33:08 AM	9.1	21.6
10:34:08 AM	9.2	21.5
10:35:08 AM	9.2	21.4
10:36:08 AM	9.2	21.4
10:37:08 AM	9.3	21.4
10:38:08 AM	9.3	21.2
10:39:08 AM	9.4	21.2
10:40:08 AM	9.3	21.4
10:41:08 AM	9.3	21.4
10:42:08 AM	9.3	21.3
10:43:08 AM	9.3	21.4
10:44:08 AM	9.3	21.3
10:45:08 AM	9.3	21.4
10:46:08 AM	9.3	21.4
10:47:08 AM	9.3	21.2
10:48:08 AM	9.4	21.0
10:49:08 AM	9.4	21.2
10:50:08 AM	9.4	21.1
10:51:08 AM	9.5	21.1
10:52:08 AM	9.4	21.1
10:53:08 AM	9.4	21.2
Run Avgs	9.3	21.3
Cal Gas	12.1	18.2
Initial Zero	0.3	0.3
Final Zero	0.4	0.2
Initial cal.	12.1	18.0
Final Cal.	12.2	18.0
Corrected Average	9.2	21.6

Client: Holcim Ste Genevive MO
Test Location: Main Stack Mills Off
Date: Jan 11 24 Start Time: 11:09:08
Run number 3
One Minute Averages

	O2 %,dry	CO2 %,dry
11:10:06 AM	9.3	21.4
11:11:06 AM	9.4	21.2
11:12:06 AM	9.3	21.3
11:13:06 AM	9.4	21.2
11:14:06 AM	9.4	21.1
11:15:06 AM	9.4	21.1
11:16:06 AM	9.3	21.3
11:17:06 AM	9.4	21.2
11:18:06 AM	9.3	21.3
11:19:06 AM	9.3	21.4
11:20:06 AM	9.4	21.3
11:21:06 AM	9.3	21.3
11:22:06 AM	9.4	21.3
11:23:06 AM	9.4	21.3
11:24:06 AM	9.4	21.3
11:25:06 AM	9.4	21.1
11:26:06 AM	9.4	21.3
11:27:06 AM	9.4	21.2
11:28:06 AM	9.4	21.2
11:29:06 AM	9.4	21.3
11:30:06 AM	9.4	21.3
11:31:06 AM	9.4	21.3
11:32:06 AM	9.3	21.3
11:33:06 AM	9.3	21.4
11:34:06 AM	9.3	21.3
11:35:06 AM	9.4	21.2
11:36:06 AM	9.3	21.3
11:37:06 AM	9.3	21.4
11:38:06 AM	9.4	21.2
11:39:06 AM	9.4	21.3
11:40:06 AM	9.4	21.2
11:41:06 AM	9.5	21.1
11:42:06 AM	9.5	21.2
11:43:06 AM	9.4	21.3
11:44:06 AM	9.4	21.3
11:45:06 AM	9.4	21.2
11:46:06 AM	9.4	21.2
11:47:06 AM	9.4	21.1
11:48:06 AM	9.4	21.1
11:49:06 AM	9.4	21.2
11:50:06 AM	9.4	21.3
11:51:06 AM	9.5	21.1
11:52:06 AM	9.5	21.1
11:53:06 AM	9.5	21.2
11:54:06 AM	9.4	21.2
11:55:06 AM	9.4	21.2
11:56:06 AM	9.4	21.1
11:57:06 AM	9.5	21.0
11:58:06 AM	9.4	21.2
11:59:06 AM	9.4	21.1
12:00:06 PM	9.4	21.2
12:01:06 PM	9.6	21.0
12:02:06 PM	9.7	20.8
12:03:06 PM	9.8	20.7
12:04:06 PM	9.6	20.9
12:05:06 PM	9.3	21.3
12:06:06 PM	9.3	21.3
12:07:06 PM	9.3	21.2
12:08:06 PM	9.4	21.0
12:09:06 PM	9.6	21.0
Run Avgs	9.4	21.2
Cal Gas	12.1	18.2
Initial Zero	0.4	0.2
Final Zero	0.4	0.3
Initial cal.	12.2	18.0
Final Cal.	12.2	18.1
Corrected Average	9.2	21.4

Holcim; Ste Genevieve MO Main Stack: Raw Mills Off January 11, 2024 Operator

					Run No. 1		08:35-09:35			Run No. 2		09:53-10:53			Run No. 3		11:09-12:09		
Cylinder ID	Gas Type	Value	Internal Response	Cal Error	Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift	Pre Run Bias	Percent Bias	Post Run 0.003	Percent Bias	Percent Drift	Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift
	O2 Zero	Zero N2	0.0%	0.00%	0.3%	1.37%	0.3%	1.37%	0.00%	0.3%	1.37%	0.4%	1.83%	0.46%	0.4%	1.83%	0.4%	1.83%	0.00%
EB0070764	O2 Mid	12.1%	12.1%	0.09%	12.1%	0.00%	12.1%	0.00%	0.00%	12.1%	0.00%	12.2%	0.46%	0.46%	12.2%	0.46%	12.2%	0.46%	0.00%
ALM056015	O2 Span	21.9%	21.9%	0.00%	.														
	CO2 Zero	Zero N2	0.1%	0.28%	0.2%	0.28%	0.3%	0.57%	0.28%	0.3%	0.57%	0.2%	0.28%	-0.28%	0.2%	0.28%	0.3%	0.57%	0.28%
ALM056015	CO2 Mid	18.2%	18.2%	0.00%	18.0%	-0.57%	18.0%	-0.57%	0.00%	18.0%	-0.57%	18.0%	-0.57%	0.00%	18.0%	-0.57%	18.1%	-0.28%	0.28%
CC714737	CO2 Span	35.1%	35.0%	-0.28%															

Holcim
Ste. Genevieve MO
Kiln Main Stack; Both Raw Mills On
HCN Analyte Spikes

	Date	**01/10/24**	**01/10/24**	**01/10/24**	**01/10/24**
	Time	**13:57-14:15**	**15:28-15:47**	**16:52-17:09**	**18:04-18:35**
		Main Pre 1	**Main Post 1**	**Main Post 2**	**Main Post 3**
	CC768222	**HCN**	**HCN**	**HCN**	**HCN**
Cs	Spike Direct, ppm	49.30	49.30	49.30	49.30
	SF6 Tracer Direct, ppm	4.86	4.86	4.86	4.86
SF6	Diluted SF6 Tracer, ppm	0.273	0.262	0.253	0.262
	Diluted SF6 Tracer, ppm	0.263	0.252	0.238	0.250
	Average Diluted SF6 Tracer, ppm	0.268	0.257	0.246	0.256
DF	Dilution Ratio	18.13	18.91	19.80	18.98
	Total, ppm	6.273	6.948	6.985	6.953
	Total, ppm	6.367	6.705	6.481	6.891
Ct	Average Total, ppm	6.320	6.827	6.733	6.922
	Pre Spike Native , ppm	3.959	4.238	4.239	4.341
	Pre Spike Native , ppm	3.645	4.234	4.709	4.374
	Post Spike Native , ppm	3.664	4.194	3.987	4.084
	Post Spike Native , ppm	3.564	4.276	4.093	4.181
Cn	Average Native , ppm	3.708	4.236	4.257	4.245
	Spike Recovery	**103.6%**	**108.0%**	**108.1%**	**111.7%**
	CTS Direct (CC426155)				
	Ethylene Expected (ppm)	75.47			75.48
	Ethylene Measured (ppm)	74.06			74.73
	CTS Error	**-1.9%**			**-1.0%**

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
Mills On Pre Run 1 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__007691.LAB	01/10/24	13:56:19.061	2.852	10.027	-0.022
SPC__007692.LAB	01/10/24	13:57:23.175	3.959	9.427	-0.017
SPC__007693.LAB	01/10/24	13:58:26.859	3.645	7.715	-0.016
SPC__007694.LAB	01/10/24	13:59:30.713	4.212	7.054	0.026
SPC__007695.LAB	01/10/24	14:00:34.672	6.273	6.529	0.273
SPC__007696.LAB	01/10/24	14:01:38.688	6.367	6.118	0.263
SPC__007697.LAB	01/10/24	14:02:42.406	6.882	5.444	0.246
SPC__007698.LAB	01/10/24	14:03:46.324	0.235	0.256	0.010
SPC__007699.LAB	01/10/24	14:04:50.439	0.004	0.255	-0.024
SPC__007700.LAB	01/10/24	14:05:54.196	0.137	0.233	-0.015
SPC__007701.LAB	01/10/24	14:06:58.117	0.007	0.372	-0.006
SPC__007702.LAB	01/10/24	14:08:02.105	3.224	6.788	-0.017
SPC__007703.LAB	01/10/24	14:09:05.920	3.211	5.278	-0.017
SPC__007704.LAB	01/10/24	14:10:10.184	3.565	4.583	-0.016
SPC__007705.LAB	01/10/24	14:11:13.817	3.382	4.042	-0.019
SPC__007706.LAB	01/10/24	14:12:17.670	3.733	3.463	-0.016
SPC__007707.LAB	01/10/24	14:13:21.598	3.486	3.417	-0.020
SPC__007708.LAB	01/10/24	14:14:25.852	3.664	3.197	-0.021
SPC__007709.LAB	01/10/24	14:15:29.634	3.564	3.224	-0.017
SPC__007710.LAB	01/10/24	14:16:33.330	2.529	1.437	-0.017

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
Post Mills On Run 1 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__007776.LAB	01/10/24	15:27:07.296	3.951	1.846	-0.018
SPC__007777.LAB	01/10/24	15:28:11.210	4.238	1.760	-0.020
SPC__007778.LAB	01/10/24	15:29:15.133	4.234	1.730	-0.018
SPC__007779.LAB	01/10/24	15:30:19.317	4.037	1.624	-0.019
SPC__007780.LAB	01/10/24	15:31:23.071	4.341	1.700	-0.012
SPC__007781.LAB	01/10/24	15:32:26.924	6.948	2.073	0.262
SPC__007782.LAB	01/10/24	15:33:30.851	6.705	1.896	0.252
SPC__007783.LAB	01/10/24	15:34:34.801	5.914	1.836	0.142
SPC__007784.LAB	01/10/24	15:35:38.651	1.200	0.141	0.075
SPC__007785.LAB	01/10/24	15:36:42.522	0.290	0.110	0.004
SPC__007786.LAB	01/10/24	15:37:46.786	0.226	0.103	-0.009
SPC__007787.LAB	01/10/24	15:38:50.401	0.172	0.110	-0.017
SPC__007788.LAB	01/10/24	15:39:54.656	0.377	0.118	-0.016
SPC__007789.LAB	01/10/24	15:40:58.447	-0.100	0.392	-0.009
SPC__007790.LAB	01/10/24	15:42:02.142	0.016	0.105	-0.010
SPC__007791.LAB	01/10/24	15:43:06.133	0.141	0.816	-0.016
SPC__007792.LAB	01/10/24	15:44:09.937	4.152	3.079	-0.018
SPC__007793.LAB	01/10/24	15:45:13.890	4.068	2.591	-0.017
SPC__007794.LAB	01/10/24	15:46:18.108	4.194	2.286	-0.015
SPC__007795.LAB	01/10/24	15:47:21.681	4.276	2.140	-0.013

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
Post Mills On Run 2 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__007853.LAB	01/10/24	16:50:32.090	4.215	0.685	-0.020
SPC__007854.LAB	01/10/24	16:51:36.000	4.239	0.697	-0.018
SPC__007855.LAB	01/10/24	16:52:39.960	4.709	0.914	-0.018
SPC__007856.LAB	01/10/24	16:53:43.865	6.872	1.143	0.222
SPC__007857.LAB	01/10/24	16:54:47.924	6.985	1.015	0.253
SPC__007858.LAB	01/10/24	16:55:51.845	6.481	0.976	0.238
SPC__007859.LAB	01/10/24	16:56:55.570	5.969	0.924	0.164
SPC__007860.LAB	01/10/24	16:57:59.667	1.623	0.081	0.091
SPC__007861.LAB	01/10/24	16:59:03.425	0.166	0.043	-0.024
SPC__007862.LAB	01/10/24	17:00:07.304	0.192	0.040	-0.019
SPC__007863.LAB	01/10/24	17:01:11.210	0.119	0.040	-0.006
SPC__007864.LAB	01/10/24	17:02:15.125	-0.006	0.061	-0.011
SPC__007865.LAB	01/10/24	17:03:19.116	0.220	0.048	-0.001
SPC__007866.LAB	01/10/24	17:04:22.952	0.309	0.042	-0.000
SPC__007867.LAB	01/10/24	17:05:26.866	-0.072	0.042	-0.001
SPC__007868.LAB	01/10/24	17:06:30.809	3.914	1.442	-0.022
SPC__007869.LAB	01/10/24	17:07:34.753	3.987	1.389	-0.018
SPC__007870.LAB	01/10/24	17:08:38.709	4.093	1.250	-0.018

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
Post Mills On Run 3 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__007920.LAB	01/10/24	18:02:45.796	4.194	0.483	-0.017	2.990
SPC__007921.LAB	01/10/24	18:03:49.738	4.341	0.481	-0.020	2.928
SPC__007922.LAB	01/10/24	18:04:53.906	4.374	0.462	-0.017	3.000
SPC__007923.LAB	01/10/24	18:05:57.516	4.222	0.473	-0.022	3.016
SPC__007924.LAB	01/10/24	18:07:01.382	4.193	0.462	-0.019	2.868
SPC__007925.LAB	01/10/24	18:08:05.310	3.770	0.468	-0.017	2.952
SPC__007926.LAB	01/10/24	18:09:09.320	4.016	0.503	-0.015	2.893
SPC__007927.LAB	01/10/24	18:10:13.464	4.045	0.448	-0.018	2.875
SPC__007928.LAB	01/10/24	18:11:17.405	4.850	0.500	-0.001	2.770
SPC__007929.LAB	01/10/24	18:12:20.939	6.953	0.803	0.262	2.608
SPC__007930.LAB	01/10/24	18:13:24.849	6.891	0.749	0.250	2.645
SPC__007931.LAB	01/10/24	18:14:28.752	4.368	0.409	0.185	1.806
SPC__007932.LAB	01/10/24	18:15:32.654	0.210	0.055	-0.013	0.028
SPC__007933.LAB	01/10/24	18:16:36.618	0.094	0.067	-0.017	-0.081
SPC__007934.LAB	01/10/24	18:17:40.493	0.036	0.033	-0.008	-0.030
SPC__007935.LAB	01/10/24	18:18:44.414	3.189	0.744	-0.021	2.280
SPC__007936.LAB	01/10/24	18:19:48.359	4.084	0.781	-0.020	2.956
SPC__007937.LAB	01/10/24	18:20:52.501	4.181	0.721	-0.019	2.891
SPC__007938.LAB	01/10/24	18:32:54.136	0.110	0.004	-0.017	24.139
SPC__007939.LAB	01/10/24	18:33:57.742	-0.078	-0.018	-0.009	74.792
SPC__007940.LAB	01/10/24	18:35:01.582	-0.047	-0.005	-0.011	74.668

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills On
CTS and HCN Analyte Spike Direct

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__007616.LAB	01/10/24	12:14:46.677	44.820	-0.003	4.614	73.527
SPC__007617.LAB	01/10/24	12:15:50.693	47.978	-0.011	4.864	73.742
SPC__007618.LAB	01/10/24	12:16:54.516	47.621	0.001	4.838	73.979
SPC__007619.LAB	01/10/24	12:17:58.620	49.064	-0.003	4.819	74.133
Ethylene CTS (CC426155)						**74.056**
SPC__007620.LAB	01/10/24	12:19:02.350	49.082	0.007	4.824	72.901
SPC__007621.LAB	01/10/24	12:20:06.314	48.911	-0.038	4.861	2.418
SPC__007622.LAB	01/10/24	12:21:10.197	48.882	0.018	4.862	-0.546
SPC__007623.LAB	01/10/24	12:22:14.323	49.141	-0.036	4.858	-0.537
SPC__007624.LAB	01/10/24	12:23:18.032	49.025	0.010	4.861	-0.516
SPC__007625.LAB	01/10/24	12:24:21.958	49.432	0.000	4.851	-0.527
SPC__007626.LAB	01/10/24	12:25:26.263	49.155	-0.008	4.856	-0.536
SPC__007627.LAB	01/10/24	12:26:29.984	49.300	-0.051	4.859	-0.524
HCN Analyte Spike (CC768222)			**49.295**		**4.855**	

Holcim
Ste. Genevieve MO
Kiln Main Stack; Raw Mills Off
HCN Analyte Spikes

	Date	**01/11/24**	**01/11/24**	**01/11/24**	**01/11/24**
	Time	**08:19-08:32**	**09:34-09:49**	**10:53-11:06**	**12:02-12:27**
		Main Pre 1	**Main Post 1**	**Main Post 2**	**Main Post 3**
	CC768222	**HCN**	**HCN**	**HCN**	**HCN**
Cs	Spike Direct, ppm	49.10	49.10	49.10	49.10
	SF6 Tracer Direct, ppm	4.87	4.87	4.87	4.87
SF6	Diluted SF6 Tracer, ppm	0.212	0.233	0.245	0.241
	Diluted SF6 Tracer, ppm	0.192	0.222	0.232	0.233
	Average Diluted SF6 Tracer, ppm	0.202	0.228	0.239	0.237
DF	Dilution Ratio	24.11	21.41	20.42	20.55
	Total, ppm	5.686	6.492	6.548	6.919
	Total, ppm	5.485	6.215	6.705	6.946
Ct	Average Total, ppm	5.586	6.354	6.627	6.933
	Pre Spike Native , ppm	3.732	4.355	4.657	4.896
	Pre Spike Native , ppm	3.661	4.072	4.544	4.864
	Post Spike Native , ppm	3.953	4.044	4.360	4.241
	Post Spike Native , ppm	3.703	3.948	4.490	4.300
Cn	Average Native , ppm	3.762	4.105	4.513	4.575
	Spike Recovery	**97.2%**	**106.4%**	**97.1%**	**108.0%**
	CTS Direct (CC426155)				
	Ethylene Expected (ppm)	75.47			75.48
	Ethylene Measured (ppm)	74.45			73.84
	CTS Error	**-1.4%**			**-2.2%**

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Pre Mills Off Run 1 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__007970.LAB	01/11/24	08:13:02.299	0.476	0.010	0.005
SPC__007971.LAB	01/11/24	08:14:06.253	0.917	0.093	0.004
SPC__007972.LAB	01/11/24	08:15:10.178	1.057	0.246	0.005
SPC__007973.LAB	01/11/24	08:16:14.040	0.061	0.114	0.000
SPC__007974.LAB	01/11/24	08:17:17.974	3.307	1.128	-0.024
SPC__007975.LAB	01/11/24	08:18:21.902	3.297	1.448	-0.016
SPC__007976.LAB	01/11/24	08:19:25.801	3.732	1.530	-0.020
SPC__007977.LAB	01/11/24	08:20:29.810	3.661	1.506	-0.018
SPC__007978.LAB	01/11/24	08:21:33.824	3.826	1.515	-0.019
SPC__007979.LAB	01/11/24	08:22:37.540	5.588	1.533	0.204
SPC__007980.LAB	01/11/24	08:23:41.456	5.686	1.519	0.212
SPC__007981.LAB	01/11/24	08:24:45.365	5.485	1.448	0.192
SPC__007982.LAB	01/11/24	08:25:49.536	5.246	1.397	0.117
SPC__007983.LAB	01/11/24	08:26:53.183	1.165	0.226	0.062
SPC__007984.LAB	01/11/24	08:27:57.091	-0.108	0.192	-0.012
SPC__007985.LAB	01/11/24	08:29:01.045	-0.085	0.092	-0.019
SPC__007986.LAB	01/11/24	08:30:04.938	3.415	1.433	-0.014
SPC__007987.LAB	01/11/24	08:31:08.954	3.953	1.404	-0.018
SPC__007988.LAB	01/11/24	08:32:12.760	3.703	1.340	-0.014
SPC__007989.LAB	01/11/24	08:33:16.677	4.060	1.346	-0.017

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Post Mills Off Run 1 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__008045.LAB	01/11/24	09:32:55.780	4.054	0.657	-0.018
SPC__008046.LAB	01/11/24	09:33:59.641	4.355	0.652	-0.017
SPC__008047.LAB	01/11/24	09:35:03.851	4.072	0.635	-0.016
SPC__008048.LAB	01/11/24	09:36:07.610	4.306	0.639	-0.015
SPC__008049.LAB	01/11/24	09:37:11.343	6.895	0.641	0.162
SPC__008050.LAB	01/11/24	09:38:15.238	6.818	0.606	0.248
SPC__008051.LAB	01/11/24	09:39:19.401	6.492	0.610	0.233
SPC__008052.LAB	01/11/24	09:40:23.052	6.215	0.567	0.222
SPC__008053.LAB	01/11/24	09:41:27.221	0.143	0.051	0.001
SPC__008054.LAB	01/11/24	09:42:30.870	0.119	0.066	-0.019
SPC__008055.LAB	01/11/24	09:43:34.779	0.221	0.147	-0.009
SPC__008056.LAB	01/11/24	09:44:38.682	0.124	0.044	-0.010
SPC__008057.LAB	01/11/24	09:45:42.718	0.171	0.038	-0.002
SPC__008058.LAB	01/11/24	09:46:46.520	3.532	0.757	-0.015
SPC__008059.LAB	01/11/24	09:47:50.426	4.044	0.724	-0.016
SPC__008060.LAB	01/11/24	09:48:54.335	3.948	0.694	-0.015
SPC__008061.LAB	01/11/24	09:49:58.251	3.724	0.677	-0.016

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Post Mills Off Run 2 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__008118.LAB	01/11/24	10:51:32.978	4.483	0.426	-0.017
SPC__008119.LAB	01/11/24	10:52:36.882	4.657	0.434	-0.014
SPC__008120.LAB	01/11/24	10:53:40.792	4.544	0.430	-0.017
SPC__008121.LAB	01/11/24	10:54:44.739	4.675	0.446	-0.018
SPC__008122.LAB	01/11/24	10:55:48.712	4.713	0.435	-0.017
SPC__008123.LAB	01/11/24	10:56:52.517	6.494	0.435	0.013
SPC__008124.LAB	01/11/24	10:57:56.433	6.548	0.418	0.245
SPC__008125.LAB	01/11/24	10:59:00.439	6.705	0.448	0.232
SPC__008126.LAB	01/11/24	11:00:04.245	5.494	0.444	0.110
SPC__008127.LAB	01/11/24	11:01:08.142	1.236	0.079	0.081
SPC__008128.LAB	01/11/24	11:02:12.159	-0.076	0.050	-0.019
SPC__008129.LAB	01/11/24	11:03:15.957	0.199	0.019	-0.017
SPC__008130.LAB	01/11/24	11:04:19.886	3.136	0.403	-0.020
SPC__008131.LAB	01/11/24	11:05:23.836	4.360	0.389	-0.016
SPC__008132.LAB	01/11/24	11:06:27.728	4.490	0.515	-0.014

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Post Mills Off Run 3 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__008183.LAB	01/11/24	12:01:22.314	4.831	0.377	-0.014	2.590
SPC__008184.LAB	01/11/24	12:02:25.969	4.896	0.362	-0.015	2.585
SPC__008185.LAB	01/11/24	12:03:29.878	4.864	0.195	-0.013	2.589
SPC__008186.LAB	01/11/24	12:04:33.829	4.510	0.209	-0.017	2.635
SPC__008187.LAB	01/11/24	12:05:37.740	4.502	0.227	-0.016	2.791
SPC__008188.LAB	01/11/24	12:06:41.653	4.212	0.204	-0.016	2.754
SPC__008189.LAB	01/11/24	12:07:45.526	4.156	0.222	-0.017	2.707
SPC__008190.LAB	01/11/24	12:08:49.431	4.213	0.218	-0.017	2.570
SPC__008191.LAB	01/11/24	12:09:53.727	4.474	0.265	-0.016	2.612
SPC__008192.LAB	01/11/24	12:10:57.630	7.016	0.274	0.042	2.530
SPC__008193.LAB	01/11/24	12:12:01.159	6.919	0.384	0.241	2.465
SPC__008194.LAB	01/11/24	12:13:05.065	6.946	0.399	0.233	2.460
SPC__008195.LAB	01/11/24	12:14:09.008	6.264	0.330	0.175	2.154
SPC__008196.LAB	01/11/24	12:15:12.970	0.180	0.061	-0.010	0.096
SPC__008197.LAB	01/11/24	12:16:17.155	-0.063	0.022	-0.019	-0.092
SPC__008198.LAB	01/11/24	12:17:20.815	0.000	0.021	-0.014	0.056
SPC__008199.LAB	01/11/24	12:18:24.798	-0.003	0.051	-0.013	0.187
SPC__008200.LAB	01/11/24	12:19:28.523	4.241	0.330	-0.018	2.626
SPC__008201.LAB	01/11/24	12:20:32.434	4.300	0.235	-0.017	2.649
SPC__008202.LAB	01/11/24	12:21:36.323	0.324	0.097	-0.012	0.433
SPC__008203.LAB	01/11/24	12:22:40.418	0.007	0.032	-0.002	0.078
SPC__008204.LAB	01/11/24	12:23:44.141	0.282	0.027	-0.001	0.118
SPC__008205.LAB	01/11/24	12:24:48.042	-0.063	0.027	-0.010	9.396
SPC__008206.LAB	01/11/24	12:25:51.951	-0.098	0.005	-0.014	73.850
SPC__008207.LAB	01/11/24	12:26:55.982	0.260	-0.005	-0.014	73.826

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
CTS and HCN Analyte Spike Direct

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__007941BKG.LAB	01/11/24	07:32:21.674	0.000	0.000	0.000	0.000
SPC__007942.LAB	01/11/24	07:33:32.444	-0.054	-0.019	-0.002	-0.001
SPC__007943.LAB	01/11/24	07:34:35.963	-0.059	-0.025	-0.001	-0.045
SPC__007944.LAB	01/11/24	07:35:40.004	-0.094	-0.019	-0.001	0.027
SPC__007945BKG.LAB	01/11/24	07:38:41.217	0.000	0.000	0.000	0.000
SPC__007946.LAB	01/11/24	07:39:51.654	-0.113	0.006	-0.001	0.062
SPC__007947.LAB	01/11/24	07:40:55.423	-0.006	-0.001	0.000	0.051
SPC__007948.LAB	01/11/24	07:41:59.342	-0.180	0.016	-0.008	67.206
SPC__007949.LAB	01/11/24	07:43:03.627	-0.112	0.007	-0.009	74.451
SPC__007950.LAB	01/11/24	07:44:07.279	-0.096	-0.001	-0.008	74.445
Ethylene CTS (CC426155)						**74.448**
SPC__007951.LAB	01/11/24	07:45:11.183	23.230	0.040	2.270	33.235
SPC__007952.LAB	01/11/24	07:46:15.072	48.321	0.021	4.864	-0.513
SPC__007953.LAB	01/11/24	07:47:18.880	49.018	0.010	4.866	-0.498
SPC__007954.LAB	01/11/24	07:48:22.794	48.912	-0.013	4.876	-0.571
SPC__007955.LAB	01/11/24	07:49:26.789	49.042	0.001	4.874	-0.525
SPC__007956.LAB	01/11/24	07:50:30.613	49.119	0.024	4.868	-0.532
SPC__007957.LAB	01/11/24	07:51:34.641	49.128	0.031	4.871	-0.503
HCN Analyte Spike (CC768222)			**49.096**		**4.871**	
SPC__007958.LAB	01/11/24	07:52:38.711	22.834	0.000	2.061	1.942

Appendix C

Ion Chromatography Analytical Report Data

Deeco, Inc.

3404 Lake Woodard Drive
Raleigh, NC 27604

Project No: 23-3309
Holcim Ste.Genevieve

Hydrogen Fluoride & Chlorine

EPA Method 26A Analysis

Analytical Report
41873

el1

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

The following data for Analytical Report 41873
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

Linda Ann Webb, M.S. Analytical Chemist
January 26, 2024

Report Reviewed and Finalized by:

Ken Smith, Laboratory Director
January 26, 2024

SUMMARY OF RESULTS

Summary of Analysis

Summary of Method 26A Analysis

Element	SG-M26A-R1A e41873-1 Total mg	SG-M26A-R2A e41873-2 Total mg	SG-M26A-R3A e41873-3 Total mg
HF	< 0.264	< 0.266	< 0.281
Cl_2	0.208	0.222	0.193

Element	SG-M26A-R4A e41873-4 Total mg	SG-M26A-R5A e41873-5 Total mg	SG-M26A-R6A e41873-6 Total mg
HF	< 0.268	< 0.252	< 0.208
Cl_2	0.713	0.265	0.276

Element	SG-M26A-R1B e41873-7 Total mg	SG-M26A-R2B e41873-8 Total mg	SG-M26A-R3B e41873-9 Total mg
HF	< 0.263	< 0.262	< 0.276
Cl_2	< 0.181	< 0.194	< 0.188

Element	SG-M26A-R4B e41873-10 Total mg	SG-M26A-R5B e41873-11 Total mg	SG-M26A-R6B e41873-12 Total mg
HF	< 0.252	< 0.249	< 0.224
Cl_2	< 0.164	0.283	0.357

Element	SG-M26A-FBON e41873-13 Total mg	SG-M26A-FBOFF e41873-14 Total mg
HF	< 0.212	< 0.211
Cl_2	< 0.170	< 0.185

ANALYTICAL NARRATIVE

Element One Analytical Narrative

Client:	Deeco, Inc.	Element One #:	41873
Client ID:	23-3309 Holcim Ste.Genevieve	Analyst:	LAW
Method:	M26A	Dates Received:	01.15.24
Analytes:	HF, Cl_2	Dates Analyzed:	01.18-24.24

Summary of Analysis

The samples were prepared and analyzed according to Method 26A protocol. The samples were analyzed for fluoride and chloride on Metrohm 930/858 and 881/858 ion chromatograph systems respectively.

Detection Limits

The Metrohm reporting limit was 0.1 µg/mL for fluoride and chloride.

Analysis QA/QC

Duplicate analyses relative percent difference (RPD), spike recovery and second source verification data are summarized in the Quality Control section. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. Due to the sample matrix, it was necessary to analyze all samples at a minimum five-fold dilution to reduce interferences and to preserve the anion column. The reported results relate only to the items tested or calibrated.

QUALITY CONTROL SUMMARY

Summary of Quality Control Data

Summary of Method 26A Duplicate Analysis RPD

(Method 26A QC limits: <5% for RPD)

Element	SG-M26A-R1A RPD	SG-M26A-R2A RPD	SG-M26A-R3A RPD
HF	NA	NA	NA
Cl_2	1.8%	3.3%	0.0%

Element	SG-M26A-R4A RPD	SG-M26A-R5A RPD	SG-M26A-R6A RPD
HF	NA	NA	NA
Cl_2	0.9%	3.5%	0.0%

Element	SG-M26A-R1B RPD	SG-M26A-R2B RPD	SG-M26A-R3B RPD
HF	NA	NA	NA
Cl_2	NA	NA	NA

Element	SG-M26A-R4B RPD	SG-M26A-R5B RPD	SG-M26A-R6B RPD
HF	NA	NA	NA
Cl_2	NA	2.2%	1.2%

Element	SG-M26A-FBON RPD	SG-M26A-FBOFF RPD
HF	NA	NA
Cl_2	NA	NA

Summary of Quality Control Data

Summary of Method 26A Spike Recoveries

(Method 26A QC limits: 90-110% for Spike Recoveries)

Element	SG-M26A-R3A Recovery	SG-M26A-R3B Recovery
HF	101%	102%
Cl_2	107%	106%

Second Source Calibration Verification

*(*Laboratory QC limits: 90-110%)*

Element	DL 0.1mg/L Recovery	*QC 5.0mg/L Recovery
HF	97%	100%
Cl_2	108%	101%

SAMPLE CUSTODY

41873

DEECO, Inc

3404 Lake Woodard Dr.
Raleigh, NC 27604
919-250-0285

Date:	1/12/24
Lab:	Element One
Train:	EPA Method 26A

Plant Name: Holcim | Plant Location: Ste. Genevive MO | Project Name: 23-3309

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
		Lisa Burton	1.15.24	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments

Field Sample No.	Date	Composite or Grab	Analysis Required	Sampling Train	Sample Description	Special Notes	Lab
SG-1A-H_2SO_4	01/10/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 502.1 mL	Element One
SG-1A-NaOH	01/10/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 371.2 mL **Sodium thiosulfate not added**	Element One
SG-1B-H_2SO_4	01/10/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 499.7 mL	Element One
SG-1B-NaOH	01/10/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 361.1 mL **Sodium thiosulfate not added**	Element One
SG-2A-H_2SO_4	01/10/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 504.6 mL	Element One
SG-2A-NaOH	01/10/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 369.9 mL **Sodium thiosulfate not added**	Element One

Samples received in good condition in Env. Express containers. No empty containers.

41873

DEECO, Inc

3404 Lake Woodard Dr.
Raleigh, NC 27604
919-250-0285

Date:	1/12/24
Lab:	Element One
Train:	EPA Method 26A

Plant Name: Holcim

Plant Location: Ste. Genevive MO

Project Name: 23-3309

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
		[illegible]	1.15.24	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments

Field Sample No.	Date	Composite or Grab	Analysis Required	Sampling Train	Sample Description	Special Notes	Lab
SG-2B-H_2SO_4	01/10/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 497.3 mL	Element One
SG-2B-NaOH	01/10/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 388.0 mL **Sodium thiosulfate not added**	Element One
SG-3A-H_2SO_4	01/10/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 533.8 mL	Element One
SG-3A-NaOH	01/10/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 373.8 mL **Sodium thiosulfate not added**	Element One
SG-3B-H_2SO_4	01/10/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 524.5 mL	Element One
SG-3B-NaOH	01/10/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 375.6 mL **Sodium thiosulfate not added**	Element One

41873

DEECO, Inc

3404 Lake Woodard Dr.
Raleigh, NC 27604
919-250-0285

Date:	1/12/24
Lab:	Element One
Train:	EPA Method 26A

Plant Name: Holcim — Plant Location: Ste. Genevive MO — Project Name: 23-3309

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
		Lisa Bruton	1.15.24	

Field Sample No.	Date	Composite or Grab	Analysis Required	Sampling Train	Sample Description	Special Notes	Lab
SG-FBOn-H_2SO_4	01/10/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 403.0 mL	Element One
SG-FBOn-NaOH	01/10/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 339.7 mL **Sodium thiosulfate not added**	Element One
SG-4A-H_2SO_4	01/11/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 509.5 mL	Element One
SG-4A-NaOH	01/11/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 337.5 mL **Sodium thiosulfate not added**	Element One
SG-4B-H_2SO_4	01/11/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 478.6 mL	Element One
SG-4B-NaOH	01/11/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 327.3 mL **Sodium thiosulfate not added**	Element One

41873

DEECO, Inc
3404 Lake Woodard Dr.
Raleigh, NC 27604
919-250-0285

Date:	1/12/24
Lab:	Element One
Train:	EPA Method 26A

Plant Name: Holcim | Plant Location: Ste. Genevive MO | Project Name: 23-3309

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
		Lisa Burton	1.15.24	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments

Field Sample No.	Date	Composite or Grab	Analysis Required	Sampling Train	Sample Description	Special Notes	Lab
SG-5A-H_2SO_4	01/11/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 479.0 mL	Element One
SG-5A-NaOH	01/11/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 368.8 mL **Sodium thiosulfate not added**	Element One
SG-5B-H_2SO_4	01/11/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 472.3 mL	Element One
SG-5B-NaOH	01/11/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 413.8 mL **Sodium thiosulfate not added**	Element One
SG-6A-H_2SO_4	01/11/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 395.9 mL	Element One
SG-6A-NaOH	01/11/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 290.7 mL **Sodium thiosulfate not added**	Element One

41873

DEECO, Inc

3404 Lake Woodard Dr.
Raleigh, NC 27604
919-250-0285

Date:	1/12/24
Lab:	Element One
Train:	EPA Method 26A

Plant Name: Holcim | Plant Location: Ste. Genevive MO | Project Name: 23-3309

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
		[illegible]	1.15.24	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments

Field Sample No.	Date	Composite or Grab	Analysis Required	Sampling Train	Sample Description	Special Notes	Lab
SG-6B-H_2SO_4	01/11/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 425.0 mL	Element One
SG-6B-NaOH	01/11/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 295.8 mL **Sodium thiosulfate not added**	Element One
SG-FBOff-H_2SO_4	01/11/24	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 400.1 mL	Element One
SG-FBOff-NaOH	01/11/24	Comp.	Chloride ion as Diatomic Chlorine	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 369.8 mL **Sodium thiosulfate not added**	Element One

ANALYTICAL DATA

Analytical Calculations

HF -

$$\text{Total HX (mg)} = \frac{[\text{X Results } (\mu g/mL) * \text{Dilution} * \text{Beginning Vol (mL)}] * \text{Correction Factor}}{1000}$$

Where-

X Results= Raw sample concentration (ppm) — *IC Data Sheet*

$$\text{Dilution} = \frac{\text{Diluted Volume}}{\text{Aliquot}}$$ —*IC Run Sheet*

Beginning Volume--*Sample Submission*

1.053= Correction factor for hydrogen fluoride

Cl_2 -

$$\text{Total } X_2 \text{ (mg)} = \frac{\text{X Results } (\mu g/mL) * \text{Dilution} * \text{Beginning Volume (mL)}}{1000}$$

Where-

X Results= Raw sample concentration (ppm)—*Cl_2 IC Data Sheet*

$$\text{Dilution} = \frac{\text{Diluted Volume}}{\text{Aliquot}}$$ —*IC Run Sheet*

Beginning Volume--*Sample Submission*

Analytical Calculations

Spike Recovery-

$$\textbf{Spike (\%)} = \frac{\text{(Spiked Result (µg/mL) – Sample Result (µg/mL))}}{\text{Spike Amount (µg/mL)}} \times 100$$

Where-

Spike Result = Raw sample concentration (ppm)--*IC-Data Sheet*

Sample Result = Raw sample concentration (ppm)--*IC-Data Sheet*

Spike Amount—*IC-Data Sheet*

Duplicate Analysis RPD-

$$\textbf{RPD (\%)} = \frac{\text{(Duplicate Result (µg/mL) - Sample Result (µg/mL))}}{\text{Average (µg/mL)}} \times 100$$

Where-

Sample Result and Duplicate Results=Raw sample concentration (ppm)--*IC-Data Sheet*

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

elementOne **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID 41873**

Analysis Due Date	01.23.24
QA/QC/Report Due Date	01.25.24

Client:	Deeco, Inc.
Project No	23-3309

Date Rec	01.15.24
Time Rec	1100

Volume Marked		Volume Loss			FH pH < 2		BH pH > 8		Ref. Method:
Y	N	Y	N	?	Y	N	Y	N	**26A**

Sample Identification

. 1	SG-M26A-R1A	· 7	SG-M26A-R1B	13	SG-M26A-FBON
· 2	SG-M26A-R2A	8	SG-M26A-R2B	14	SG-M26A-FBOFF
, 3	SG-M26A-R3A	9	SG-M26A-R3B		
	SG-M26A-R3A Spike		SG-M26A-R3B Spike		
, 4	SG-M26A-R4A	10	SG-M26A-R4B		
, 5	SG-M26A-R5A	11	SG-M26A-R5B		
· 6	SG-M26A-R6A	12	SG-M26A-R6B		

Analyses Requested	Samples 1-14	HF
	Samples 1-14	Cl_2

Runs/FB

	FH Impinger 1 (or Combined Imp)		FH Impinger 2		FH Impinger 3		BH Impinger 4 (or Combined Imp)		BH Impinger 5	
Lab ID	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml
1	502.1						371.2			
2	504.6						369.9			
3.S	533.8						373.8			
4	509.5						337.5			
5	479.0						368.8			
6	395.9						290.7			
7	499.7						361.1			
8	497.3						388.0			
9.S	524.5						375.6			
10	478.6						327.3			
11	472.3						413.8			
12	425.0						295.8			
13	403.0						339.7			
14	400.1						369.8			

Lab Communications See bottles for sample volumes - KLH

Rec Runs/FB: H2SO4; NaOH; No RB received---01.15.24 LLB

SS Page 1 of 2 KLH 1/18/24
SS by LLB
1/15/2024 3:51:40 PM

Imp 1, 2, &3 Prep By / Date KLH 1/18/24
Imp 4 & 5 Prep By / Date MMB 1.23.24
Labeled By/Date DAZ 1/15/24
ID Verification By/Date KLH 1.15.24

Metrohm 930/858 Ion Chromatograph System

elementOne | **M26A-HF IC Data Sheet** | **Lab ID #: 41873**

Client: Deeco
Date: 01.23.24
Analyst: LAW
Detection Limit, (µg/ml): 0.10

Column: IonPac AS14A
Eluent: 8.0 mM Na_2CO_3/ 1.0 mM $NaHCO_3$
Flow Rate: 1.0 mL/min.
F^- to HF factor: 1.053

Sample ID	F^- µg/ml	Dilution	Final Vol, ml	HF, Total mg	Spike, µg/ml	% Recovery/ RPD	File Name	Date Time
LRB	0.000	1	10	< 0.001			-7650ee00:18d1e609e6c:-7c08	1/18/2024 21:18
LRB	0.000	1	10	< 0.001		NA	-7650ee00:18d1e609e6c:-7c06	1/18/2024 21:38
LRB SPK	5.022	1	10	0.053	5.00	100%	-7650ee00:18d1e609e6c:-7c04	1/18/2024 21:59
LRB SPK	5.071	1	10	0.053	5.00	101%	-7650ee00:18d1e609e6c:-7c02	1/18/2024 22:19
41873-1	0.000	5	502.1	< 0.264			-7650ee00:18d1e609e6c:-7c00	1/18/2024 22:40
41873-1 DUP	0.000	5	502.1	< 0.264		NA	-7650ee00:18d1e609e6c:-7bfe	1/18/2024 23:00
41873-2	0.000	5	504.6	< 0.266			-7650ee00:18d1e609e6c:-7bfc	1/18/2024 23:21
41873-2 DUP	0.000	5	504.6	< 0.266		NA	-7650ee00:18d1e609e6c:-7bfa	1/18/2024 23:41
41873-3	0.000	5	533.8	< 0.281			-7650ee00:18d1e609e6c:-7bec	1/19/2024 2:04
41873-3 DUP	0.000	5	533.8	< 0.281		NA	-7650ee00:18d1e609e6c:-7bea	1/19/2024 2:25
41873-3 SPK	5.042	5	533.8	14.2	5.00	101%	-7650ee00:18d1e609e6c:-7be8	1/19/2024 2:45
41873-3 SPK DUP	5.018	5	533.8	14.1	5.00	100%	-7650ee00:18d1e609e6c:-7be6	1/19/2024 3:06
41873-4	0.000	5	509.5	< 0.268			-7650ee00:18d1e609e6c:-7bf8	1/19/2024 0:01
41873-4 DUP	0.000	5	509.5	< 0.268		NA	-7650ee00:18d1e609e6c:-7bf6	1/19/2024 0:22
41873-5	0.000	5	479.0	< 0.252			-7650ee00:18d1e609e6c:-7be4	1/19/2024 3:26
41873-5 DUP	0.000	5	479.0	< 0.252		NA	-7650ee00:18d1e609e6c:-7be2	1/19/2024 3:47
41873-6	0.000	5	395.9	< 0.208			-7650ee00:18d1e609e6c:-7be0	1/19/2024 4:07
41873-6 DUP	0.000	5	395.9	< 0.208		NA	-7650ee00:18d1e609e6c:-7bde	1/19/2024 4:27
41873-7	0.000	5	499.7	< 0.263			-7650ee00:18d1e609e6c:-7bdc	1/19/2024 4:48
41873-7 DUP	0.000	5	499.7	< 0.263		NA	-7650ee00:18d1e609e6c:-7bda	1/19/2024 5:08
41873-8	0.000	5	497.3	< 0.262			-7650ee00:18d1e609e6c:-7bd0	1/19/2024 6:51
41873-8 DUP	0.000	5	497.3	< 0.262		NA	-7650ee00:18d1e609e6c:-7bce	1/19/2024 7:11
41873-9	0.000	5	524.5	< 0.276			-7650ee00:18d1e609e6c:-7b1f	1/19/2024 7:32
41873-9 DUP	0.000	5	524.5	< 0.276		NA	-7650ee00:18d1e609e6c:-7b1d	1/19/2024 7:52
41873-9 SPK	5.101	5	524.5	14.1	5.00	102%	-7650ee00:18d1e609e6c:-7b1b	1/19/2024 8:13
41873-9 SPK DUP	5.095	5	524.5	14.1	5.00	102%	-7650ee00:18d1e609e6c:-7b19	1/19/2024 8:33
41873-10	0.000	5	478.6	< 0.252			-7650ee00:18d1e609e6c:-7b15	1/19/2024 8:54
41873-10 DUP	0.000	5	478.6	< 0.252		NA	-7650ee00:18d1e609e6c:-7b13	1/19/2024 9:14
41873-11	0.000	5	472.3	< 0.249			-7650ee00:18d1e609e6c:-7b11	1/19/2024 9:34
41873-11 DUP	0.000	5	472.3	< 0.249		NA	-7650ee00:18d1e609e6c:-7b17	1/19/2024 9:55
41873-12	0.000	5	425.0	< 0.224			-7650ee00:18d1e609e6c:-7a34	1/19/2024 11:37
41873-12 DUP	0.000	5	425.0	< 0.224		NA	-7650ee00:18d1e609e6c:-7a32	1/19/2024 11:58
41873-13 FB	0.000	5	403.0	< 0.212			-7650ee00:18d1e609e6c:-7a30	1/19/2024 12:18
41873-13 FB DUP	0.000	5	403.0	< 0.212		NA	-7650ee00:18d1e609e6c:-7a2e	1/19/2024 12:39
41873-14 FB	0.000	5	400.1	< 0.211			-7650ee00:18d1e609e6c:-79bd	1/19/2024 12:59
41873-14 FB DUP	0.000	5	400.1	< 0.211		NA	-7650ee00:18d1e609e6c:-78da	1/19/2024 13:20

elementOne **M26A-HF IC Data Sheet** **Lab ID #: 41873**

Client: Deeco
Date: 01.23.24
Analyst: LAW
Detection Limit, (µg/ml): 0.10

Column: IonPac AS14A
Eluent: 8.0 mM Na_2CO_3/ 1.0 mM $NaHCO_3$
Flow Rate: 1.0 mL/min.
F^- to HF factor: 1.053

Standards	F^- µg/ml	Dilution	QC, µg/ml	% Relative Error	% Recovery	File Name	Date Time
0.0	0.00					-7650ee00:18d1e609e6c:-78e6	1/18/2024 17:12
0.1	0.103			3.0%	103%	-7650ee00:18d1e609e6c:-78e4	1/18/2024 17:33
1.0	0.964			-3.6%	96%	-7650ee00:18d1e609e6c:-78e2	1/18/2024 17:53
3.0	3.00			0.1%	100%	-7650ee00:18d1e609e6c:-78e0	1/18/2024 18:14
5.0	5.05			1.0%	101%	-7650ee00:18d1e609e6c:-78de	1/18/2024 18:34
10.0	9.98			-0.2%	100%	-7650ee00:18d1e609e6c:-78dc	1/18/2024 18:54
0.1	0.097			-3.0%	97%	-7650ee00:18d1e609e6c:-78d2	1/19/2024 14:41
1.0	0.986			-1.4%	99%	-7650ee00:18d1e609e6c:-78d0	1/19/2024 15:02
3.0	3.09			2.9%	103%	-7650ee00:18d1e609e6c:-78ce	1/19/2024 15:22
5.0	5.19			3.7%	104%	-7650ee00:18d1e609e6c:-78cc	1/19/2024 15:43
10.0	10.2			2.3%	102%	-7650ee00:18d1e609e6c:-78ca	1/19/2024 16:03
Correlation-	0.999965						
QC	5.01		5.00		100%	-7650ee00:18d1e609e6c:-7c14	1/18/2024 19:15
QC	5.03		5.00		101%	-7650ee00:18d1e609e6c:-7c12	1/18/2024 19:35
QC	5.04		5.00		101%	-7650ee00:18d1e609e6c:-7bf4	1/19/2024 0:42
QC	5.08		5.00		102%	-7650ee00:18d1e609e6c:-7bf2	1/19/2024 1:03
QC	5.13		5.00		103%	-7650ee00:18d1e609e6c:-7bd8	1/19/2024 5:29
QC	5.09		5.00		102%	-7650ee00:18d1e609e6c:-7bd6	1/19/2024 5:49
QC	5.06		5.00		101%	-7650ee00:18d1e609e6c:-7a3c	1/19/2024 10:15
QC	5.07		5.00		101%	-7650ee00:18d1e609e6c:-7a3a	1/19/2024 10:36
QC	5.15		5.00		103%	-7650ee00:18d1e609e6c:-78d8	1/19/2024 13:40
QC	5.18		5.00		104%	-7650ee00:18d1e609e6c:-78c8	1/19/2024 16:24
DL	0.097		0.10		97%	-7650ee00:18d1e609e6c:-7c0c	1/18/2024 20:37
DL	0.096		0.10		96%	-7650ee00:18d1e609e6c:-7c0a	1/18/2024 20:57
DL	0.099		0.10		99%	-7650ee00:18d1e609e6c:-78d6	1/19/2024 14:00
DL	0.098		0.10		98%	-7650ee00:18d1e609e6c:-78c6	1/19/2024 16:44
36738-5QC	6.79	1	6.96		103%	-7650ee00:18d1e609e6c:-78c2	1/19/2024 17:25
BLK	0.00					-7650ee00:18d1e609e6c:-7c10	1/18/2024 19:56
BLK	0.00					-7650ee00:18d1e609e6c:-7c0e	1/18/2024 20:16
BLK	0.00					-7650ee00:18d1e609e6c:-7bf0	1/19/2024 1:23
BLK	0.00					-7650ee00:18d1e609e6c:-7bee	1/19/2024 1:44
BLK	0.00					-7650ee00:18d1e609e6c:-7bd4	1/19/2024 6:10
BLK	0.00					-7650ee00:18d1e609e6c:-7bd2	1/19/2024 6:30
BLK	0.00					-7650ee00:18d1e609e6c:-7a38	1/19/2024 10:56
BLK	0.00					-7650ee00:18d1e609e6c:-7a36	1/19/2024 11:17
BLK	0.00					-7650ee00:18d1e609e6c:-78d4	1/19/2024 14:21
BLK	0.00					-7650ee00:18d1e609e6c:-78c4	1/19/2024 17:05

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41873

Date: 1.18.24
Analyst: KLG /LAW

Column: Metrosep A Supp 19
Conc. Eluent: 8.0 mM Na_2CO_3/ 0.25 mM $NaHCO_3$

Instrument: 930 1858
Lot# Metrohm 231206

Batch name: 011824-41873 HF 10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 500 mM H_2SO_4 Lot # IC11-112-3
Flow Rate: 0.7 mL/min. Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
1	0.0			R2	QC lot #		
2	0.1		F	.999965	BBCJ0574 Sigma		
3	1.0						
4	3.0						
5	5.0						
6	10.0						
7	QC						
8	QC						
9	Blk						
10	Blk						
11	DL						
12	DL						
13	LRB						
14	LRB						
15	LRB+						
16	LRB+						
17	41873-1	Deeco	HF		—	5X	
18	-1dup				—		
19	-2				—		
20	-2dup				—		
21	-4				—		
22	-4dup				—		
23	QC						
24	QC						
25	Blk						

Manual integrations noted by M
Curve IC Lot # IC11-115-3 Comments: p. 1 of 3
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s:**IC ME Solution** 2303029-250HPS **IC NO2 Solution** 2308942-250 HPS
QC: Spike 50 uL from 1000 ug/mL F, Cl, Br, and SO_4 Std. to 10mL sample; lot #'s listied above.
QC: Spike 20 uL from 1000 ug/mL NO_2, NO_3, and PO_4 Std. to 10mL sample; lot #'s listed above.
Submitted for QC- Date: 01.22.24 Time: 8:30 By: LAW QC Review- Date:____ Time:____ By:____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41873

Date: 1.18.24
Analyst: KLG/LAW
Batch name: 011824-41873 HF
Column: Metrosep A Supp 19
Conc. Eluent: 8.0 mM Na_2CO_3/ 0.25 mM $NaHCO_3$
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 500 mM H_2SO_4
Flow Rate: 0.7 mL/min.
Instrument: 930 / 858
Lot# Metrohm 231206
Lot # IC11-112-3
Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
26	Blk						
27	41873-3	Deeco	HF		—	5X	
28	-3dup	↓	↓		5.042	↓	
29	-3spk				[illegible]		
30	-3spk dup				5.098		
31	-5				—		
32	-5dup				—		
33	-6				—		
34	-6dup				—		
35	-7				—		
36	-7 dup	↓	↓		—	↓	
37	QC						
38	QC						
39	Blk						
40	Blk						
41	41873-8	Deeco	HF		—	5X	
42	-8dup	↓	↓		—	↓	
43	-9				—		
44	-9dup				—		
45	-9spk				5.161		
46	-9spk dup				5.095		
47	-10				—		
48	-10 dup				—		
49	-11				—		
50	-11 dup	↓	↓		—	↓	

Manual integrations noted by M
Curve IC Lot #____ Comments: p. 2 of 3
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** ____ **IC NO2 Solution** ____
QC: Spike 50 uL from 1000 ug/mL F, Cl, Br, and SO Std. to 10mL sample; lot #'s listied above.
QC: Spike 20 uL from 1000 ug/mL NO_2, NO_3, and PO_4 Std. to 10mL sample; lot #'s listed above.
Submitted for QC- Date:____ Time:____ By:____ QC Review Date:____ Time:____ By:____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41873

Date: 1.18.24
Analyst: KLG/LAW
Batch name: 011824-41873 HF

Column: Metrosep A Supp 19
Conc. Eluent: 8.0 mM Na_2CO_3/ 0.25 mM $NaHCO_3$
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 500 mM H_2SO_4
Flow Rate: 0.7 mL/min.

Instrument: 930/858
Lot# Metrohm 231206
Lot # IC 11-112-3
Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
51	QC						
52	QC						
53	Blk						
54	Blk						
55	41873-12	Deeco	HF		—	5X	
56	-12dup				—		
57	-13FB				—		
58	-13FB dup				—		
59	-14FB				—		
60	-14FB dup				—		
61	QC						
62	DL						
63	Blk						
64	0.1						
65	1.0						
66	3.0						
67	5.0						
68	10.0						
69	QC						
70	DL						
71	Blk						
72	36738-SQC		HF		6.290	1X	TV=6.96
73							
74							
75							

Manual integrations noted by M
Curve IC/Lot #______ Comments: p. 3 of 3
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** ______ **IC NO2 Solution** ______
QC: Spike 50 uL from 1000 ug/mL F, Cl, Br, and SO Std. to 10mL sample; lot #'s listed above.
QC: Spike 20 uL from 1000 ug/mL NO_2, NO_3, and PO_4 Std. to 10mL sample; lot #'s listed above.
Submitted for QC- Date:______ Time:______ By:______ QC Review- Date:______ Time:______ By:______

elementOne

M26A-Cl_2 IC Data Sheet

Lab ID #: 41873

Client: Deeco
Date: 01.25.24
Analyst: LAW/MNB
Detection Limit, (µg/ml): 0.10

Column: IonPac AS14A
Eluent: 8.0 mM Na_2CO_3/ 1.0 mM $NaHCO_3$
Flow Rate: 1.0 mL/min.

Sample ID	Cl^- µg/ml	Dilution	Final Vol, ml	Cl_2, Total mg	Spike, µg/ml	% RPD/ Recovery	File Name	Date Time
LRB	-0.029	1	10	< 0.001			-4d041e00:18d2346a31a:-6b9c	1/24/2024 16:13
LRB	-0.027	1	10	< 0.001		NA	-4d041e00:18d2346a31a:-6b9a	1/24/2024 16:37
LRB SPK	5.22	1	10	0.052	5.00	104%	-4d041e00:18d2346a31a:-6c12	1/23/2024 17:07
LRB SPK	5.41	1	10	0.054	5.00	108%	-4d041e00:18d2346a31a:-6c10	1/23/2024 17:30
41873-1	0.111	5	371.2	0.206			-4d041e00:18d2346a31a:-6c0e	1/23/2024 17:54
41873-1 DUP	0.113	5	371.2	0.210		1.8%	-4d041e00:18d2346a31a:-6c0c	1/23/2024 18:17
41873-2	0.122	5	369.9	0.226			-4d041e00:18d2346a31a:-6c0a	1/23/2024 18:41
41873-2 DUP	0.118	5	369.9	0.218		3.3%	-4d041e00:18d2346a31a:-6c08	1/23/2024 19:04
41873-3	0.103	5	373.8	0.193			-4d041e00:18d2346a31a:-6bfa	1/23/2024 21:49
41873-3 DUP	0.103	5	373.8	0.193		0.0%	-4d041e00:18d2346a31a:-6bf8	1/23/2024 22:12
41873-3 SPK	5.37	5	373.8	10.0	5.00	105%	-4d041e00:18d2346a31a:-6bf6	1/23/2024 22:36
41873-3 SPK DUP	5.50	5	373.8	10.3	5.00	108%	-4d041e00:18d2346a31a:-6bf4	1/23/2024 22:59
41873-4	0.420	5	337.5	0.709			-4d041e00:18d2346a31a:-6c06	1/23/2024 19:28
41873-4 DUP	0.424	5	337.5	0.716		0.9%	-4d041e00:18d2346a31a:-6c04	1/23/2024 19:51
41873-5	0.146	5	368.8	0.269			-4d041e00:18d2346a31a:-6bf2	1/23/2024 23:23
41873-5 DUP	0.141	5	368.8	0.260		3.5%	-4d041e00:18d2346a31a:-6bf0	1/23/2024 23:46
41873-6	0.190	5	290.7	0.276			-4d041e00:18d2346a31a:-6bee	1/24/2024 0:10
41873-6 DUP	0.190	5	290.7	0.276		0.0%	-4d041e00:18d2346a31a:-6bec	1/24/2024 0:33
41873-7	0.033	5	361.1	< 0.181			-4d041e00:18d2346a31a:-6b3f	1/24/2024 0:57
41873-7 DUP	0.065	5	361.1	< 0.181		NA	-4d041e00:18d2346a31a:-6b3c	1/24/2024 1:20
41873-8	0.091	5	388.0	< 0.194			-4d041e00:18d2346a31a:-6bde	1/24/2024 3:18
41873-8 DUP	0.087	5	388.0	< 0.194		NA	-4d041e00:18d2346a31a:-6bdc	1/24/2024 3:41
41873-9	0.096	5	375.6	< 0.188			-4d041e00:18d2346a31a:-6bda	1/24/2024 4:05
41873-9 DUP	0.095	5	375.6	< 0.188		NA	-4d041e00:18d2346a31a:-6bd8	1/24/2024 4:28
41873-9 SPK	5.40	5	375.6	10.1	5.00	106%	-4d041e00:18d2346a31a:-6bd6	1/24/2024 4:52
41873-9 SPK DUP	5.40	5	375.6	10.1	5.00	106%	-4d041e00:18d2346a31a:-6bd4	1/24/2024 5:15
41873-10	0.047	5	327.3	< 0.164			-4d041e00:18d2346a31a:-6b3b	1/24/2024 5:39
41873-10 DUP	0.046	5	327.3	< 0.164		NA	-4d041e00:18d2346a31a:-6b39	1/24/2024 6:02
41873-11	0.138	5	413.8	0.286			-4d041e00:18d2346a31a:-6bce	1/24/2024 6:26
41873-11 DUP	0.135	5	413.8	0.279		2.2%	-4d041e00:18d2346a31a:-6bcc	1/24/2024 6:49
41873-12	0.240	5	295.8	0.355			-4d041e00:18d2346a31a:-6bc2	1/24/2024 8:47
41873-12 DUP	0.243	5	295.8	0.359		1.2%	-4d041e00:18d2346a31a:-6bc0	1/24/2024 9:10
41873-13 FB	0.074	5	339.7	< 0.17			-4d041e00:18d2346a31a:-6b90	1/24/2024 18:34
41873-13 FB DUP	0.076	5	339.7	< 0.17		NA	-4d041e00:18d2346a31a:-6b8e	1/24/2024 18:58
41873-14 FB	0.074	5	369.8	< 0.185			-4d041e00:18d2346a31a:-6bba	1/24/2024 10:21
41873-14 FB DUP	0.077	5	369.8	< 0.185		NA	-4d041e00:18d2346a31a:-6bb8	1/24/2024 10:44

LukAn

Metrohm 881/858 Ion Chromatograph System

elementOne

M26A-Cl_2 IC Data Sheet

Lab ID #: 41873

Client: Deeco
Date: 01.25.24
Analyst: LAW/MNB
Detection Limit, (µg/ml): 0.10

Column: IonPac AS14A
Eluent: 8.0 mM Na_2CO_3/ 1.0 mM $NaHCO_3$
Flow Rate: 1.0 mL/min.

Standards	Cl^- µg/ml	Dilution	QC µg/ml	%Relative Error	% Recovery	File Name	Date Time
0.0	0.00					-4d041e00:18d2346a31a:-6b4b	1/23/2024 11:38
0.1	0.102			2.0%	102%	-4d041e00:18d2346a31a:-6b49	1/23/2024 12:01
1.0	0.986			-1.4%	99%	-4d041e00:18d2346a31a:-6b47	1/23/2024 12:25
3.0	2.95			-1.8%	98%	-4d041e00:18d2346a31a:-6b45	1/23/2024 12:49
5.0	5.09			1.9%	102%	-4d041e00:18d2346a31a:-6b43	1/23/2024 13:12
10.0	9.97			-0.3%	100%	-4d041e00:18d2346a31a:-6b41	1/23/2024 13:36
0.1	0.109			9.0%	109%	-4d041e00:18d2346a31a:-6bac	1/24/2024 13:05
1.0	1.01			0.9%	101%	-4d041e00:18d2346a31a:-6baa	1/24/2024 13:29
3.0	3.03			0.9%	101%	-4d041e00:18d2346a31a:-6ba8	1/24/2024 13:52
5.0	5.22			4.5%	104%	-4d041e00:18d2346a31a:-6ba6	1/24/2024 14:16
10.0	10.5			5.4%	105%	-4d041e00:18d2346a31a:-6ba4	1/24/2024 14:39
Correlation-	0.999899						
QC	5.07		5.00		101%	-4d041e00:18d2346a31a:-6c22	1/23/2024 13:59
QC	5.03		5.00		101%	-4d041e00:18d2346a31a:-6c20	1/23/2024 14:23
QC	4.97		5.00		99%	-4d041e00:18d2346a31a:-6c02	1/23/2024 20:15
QC	5.17		5.00		103%	-4d041e00:18d2346a31a:-6c00	1/23/2024 20:38
QC	5.04		5.00		101%	-4d041e00:18d2346a31a:-6be6	1/24/2024 1:44
QC	5.24		5.00		105%	-4d041e00:18d2346a31a:-6be4	1/24/2024 2:07
QC	5.17		5.00		103%	-4d041e00:18d2346a31a:-6bca	1/24/2024 7:13
QC	5.24		5.00		105%	-4d041e00:18d2346a31a:-6bc8	1/24/2024 7:36
QC	5.27		5.00		105%	-4d041e00:18d2346a31a:-6bb2	1/24/2024 11:55
QC	5.27		5.00		105%	-4d041e00:18d2346a31a:-6ba2	1/24/2024 15:03
QC	5.10		5.00		102%	-4d041e00:18d2346a31a:-6b8c	1/24/2024 19:21
DL	0.108		0.10		108%	-4d041e00:18d2346a31a:-6c1a	1/23/24 15:33
DL	0.098		0.10		98%	-4d041e00:18d2346a31a:-6c18	1/23/2024 15:56
DL	0.102		0.10		102%	-4d041e00:18d2346a31a:-6bb0	1/24/2024 12:18
DL	0.098		0.10		98%	-4d041e00:18d2346a31a:-6ba0	1/24/2024 15:26
40034-7 QC	7.84	10	78.0		101%	-4d041e00:18d2346a31a:-6bb6	1/24/2024 11:08
40034-7 QC	7.85	10	78.0		101%	-4d041e00:18d2346a31a:-6bb4	1/24/2024 11:31
BLK	-0.026					-4d041e00:18d2346a31a:-6c1e	1/23/2024 14:46
BLK	-0.026					-4d041e00:18d2346a31a:-6c1c	1/23/2024 15:10
BLK	-0.027					-4d041e00:18d2346a31a:-6bfe	1/23/2024 21:02
BLK	-0.021					-4d041e00:18d2346a31a:-6bfc	1/23/2024 21:25
BLK	-0.027					-4d041e00:18d2346a31a:-6be2	1/24/2024 2:31
BLK	-0.027					-4d041e00:18d2346a31a:-6be0	1/24/2024 2:54
BLK	-0.021					-4d041e00:18d2346a31a:-6bc6	1/24/2024 8:00
BLK	-0.010					-4d041e00:18d2346a31a:-6bc4	1/24/2024 8:23
BLK	-0.024					-4d041e00:18d2346a31a:-6bae	1/24/2024 12:42
BLK	-0.020					-4d041e00:18d2346a31a:-6b9e	1/24/2024 15:50
BLK	-0.028					-4d041e00:18d2346a31a:-6b8a	1/24/2024 19:45

elementOne

IC Sample Sheet/Digestion Worksheet

Lab ID #: 41873

Date: 1.23.24
Analyst: LAW | MMB

Batch name: 012324-41873

Column: IonPac AS14A
Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 100mM H_3PO_4
Flow Rate: 1.0 mL/min.

Instrument: 881|858
Lot# IC11.106.1
Lot # IC11.117.2
Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
1	0.0			QC	MANF	B2	
2	0.1		Cl-	4308159	RICCA	0.999899	
3	1.0						
4	3.0						
5	5.0						
6	10.0						
7	QC						
8	QC						
9	BLK						
10	BLK						
11	DL						
12	DL						
13	LRB						
14	LRB						
15	LRB+						
16	LRB+						
17	41873-1	Deeco	Cl_2	0.111	0.352	5X	
18	-1d			0.113	0.344		
19	-2			0.122	0.401		
20	-2d			0.118	0.392		
21	-4			0.420	0.439		
22	-4d			0.424	0.453		
23	QC						
24	QC						
25	BLK						

Co-elut needed to separate peaks
verified @10X

Manual integrations noted by M
Curve IC Lot # IC11.117.4 Sodium Thiosulfate Lot # IC11.73.4 Comments: pg 1 of 9
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** 2303029-250 HPS
QC: Spike 50 uL from 1000 ug/mL Br Std. to 10mL sample; lot #'s listied above.
Submitted for QC- Date: 1.25.24 Time: 1000 By: MMB QC Review- Date:________ Time:________ By:________

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41873

Date: 1.23.24
Analyst: Law/mms
Batch name: 012324-41873

Column: IonPac AS14A
Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 100mM H_3PO_4
Flow Rate: 1.0 mL/min.

Instrument: 881/858
Lot# 1C11-106-1
Lot # 1C11-117-2
Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
26	BLK						
27	41873-3	Deeco	Cl_2	0.103	0.330	5x	
28	-3d			0.103	0.327		
29	-3+			5.373	5.373		
30	-3+dup			5.504	5.513		
31	-5			0.146	0.329		
32	-5d			0.141	0.333		
33	-6			0.190	0.464		
34	-6d			0.190	0.467		
35	-7			—	0.324		
36	-7d			—	0.356		
37	QC						
38	QC						
39	BLK						
40	BLK						
41	41873-8	Deeco	Cl_2	0.091	0.269	5x	
42	-8d			0.087	0.249		
43	-9			0.096	0.287		
44	-9d			0.095	0.286		
45	-9+			5.401	5.417		
46	-9+dup			5.398	5.398		
47	-10			—	0.380		
48	-10d			—	0.389		
49	-11			0.138	0.293		
50	-11d			0.135	0.309		

Manual integra
Curve IC Lot #______ Sodium Thiosulfate Lot #______ Comments: pg 2 of 4
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** ______
QC: Spike 50 uL from 1000 ug/mL Br Std. to 10mL sample; lot #'s listed above.
Submitted for QC- Date:____ Time:____ By:____ QC Review- Date:____ Time:____ By:____

elementOne

IC Sample Sheet/Digestion Worksheet

Lab ID #: 41873

Date: 1.23.24
Analyst: lam/mmb
Batch name: 012324-41873

Column: IonPac AS14A
Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 100mM H_3PO_4
Flow Rate: 1.0 mL/min.

Instrument: 881 | 858
Lot# 1611-166-1
Lot # 1611-117-2
Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
51	QC						
52	QC						
53	BLK						
54	BLK						
55	41873-12	Deeco	Cl_2	0.240	0.611	5X	
56	-12d			0.243	0.614		
57	-13 FB			0.106	0.106		RC confirm
58	-13 FBd			0.109	0.109		⊕ 1 80 81
59	-14 FB			—	—		
60	-14 FBd			—	—		
61	40034-7 QC			7.841	7.841	10 x	TV: 78.0
62	-7 QCd			7.849	7.849		
63	QC						
64	DL						
65	BLK						
66	0.1						
67	1.0						
68	3.0						
69	5.0						
70	10.0						
71	QC						
72	DL						
73	BLK						
74	LRB						
75	LRB						

Manual integra
Curve IC Lot #______ Sodium Thiosulfate Lot #______ Comments: pg 3 of 4
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** ______
QC: Spike 50 uL from 1000 ug/mL Br Std. to 10mL sample; lot #'s listed above.
Submitted for QC- Date:____ Time:____ By:____ QC Review- Date:____ Time:____ By:____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41873

Date: 1.23.24
Analyst: LAW/MNB

Batch name: 012324-41873

Column: IonPac AS14A
Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 100mM H_3PO_4
Flow Rate: 1.0 mL/min.

Instrument: 881/858
Lot# 1C11.106.1
Lot # 1C11.117.2
Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
76	41873-3	deeco	Cl_2		~~0.167~~	10x	Report and 5X separate peaks
77	-3+	↓	↓		~~5.443~~	↓	
78	-9				~~0.111~~		
79	-9+				5.445		
80	~~QC~~-13HB	↓	↓		—	5x	
81	~~BLK~~13HBd				—	↓	
82	QC						
83	BLK						

Manual integra
Curve IC Lot #______ Sodium Thiosulfate Lot #______ Comments: pg 4 of 4
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** ______
QC: Spike 50 uL from 1000 ug/mL Br Std. to 10mL sample; lot #'s listied above.
Submitted for QC- Date:_____ Time:_____ By:_____ QC Review- Date:_____ Time:_____ By:_____

Appendix D

Plant Process Data

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On
DAS Time

Run 1	Clinker Production (mtph)
1/10/2024 14:30	423.1
1/10/2024 14:31	500.0
1/10/2024 14:32	500.0
1/10/2024 14:33	1076.9
1/10/2024 14:34	0.0
1/10/2024 14:35	1000.0
1/10/2024 14:36	500.0
1/10/2024 14:37	576.9
1/10/2024 14:38	423.1
1/10/2024 14:39	576.9
1/10/2024 14:40	500.0
1/10/2024 14:41	1076.9
1/10/2024 14:42	0.0
1/10/2024 14:43	1000.0
1/10/2024 14:44	0.0
1/10/2024 14:45	1000.0
1/10/2024 14:46	500.0
1/10/2024 14:47	500.0
1/10/2024 14:48	1076.9
1/10/2024 14:49	0.0
1/10/2024 14:50	1000.0
1/10/2024 14:51	0.0
1/10/2024 14:52	1076.9
1/10/2024 14:53	500.0
1/10/2024 14:54	500.0
1/10/2024 14:55	500.0
1/10/2024 14:56	1076.9
1/10/2024 14:57	0.0
1/10/2024 14:58	1000.0
1/10/2024 14:59	500.0
1/10/2024 15:00	500.0
1/10/2024 15:01	500.0
1/10/2024 15:02	500.0
1/10/2024 15:03	1076.9
1/10/2024 15:04	0.0
1/10/2024 15:05	1000.0
1/10/2024 15:06	500.0

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On
DAS Time

Run 1	Clinker Production (mtph)
1/10/2024 15:07	576.9
1/10/2024 15:08	500.0
1/10/2024 15:09	500.0
1/10/2024 15:10	500.0
1/10/2024 15:11	1076.9
1/10/2024 15:12	0.0
1/10/2024 15:13	1000.0
1/10/2024 15:14	500.0
1/10/2024 15:15	500.0
1/10/2024 15:16	576.9
1/10/2024 15:17	423.1
1/10/2024 15:18	576.9
1/10/2024 15:19	1000.0
1/10/2024 15:20	0.0
1/10/2024 15:21	1076.9
1/10/2024 15:22	423.1
1/10/2024 15:23	576.9
1/10/2024 15:24	500.0
1/10/2024 15:25	500.0
1/10/2024 15:26	1076.9
1/10/2024 15:27	0.0
1/10/2024 15:28	500.0
1/10/2024 15:29	1000.0
1/10/2024 15:30	500.0
01/10/2024 15:31	500.0
01/10/2024 15:32	0.0
01/10/2024 15:33	500.0
01/10/2024 15:34	1576.9
01/10/2024 15:35	0.0
01/10/2024 15:36	1000.0
Run Averages	580.9

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On
DAS Time

Run 2	Clinker Production (mtph)
1/10/2024 15:52	576.9
1/10/2024 15:53	0.0
1/10/2024 15:54	1000.0
1/10/2024 15:55	500.0
1/10/2024 15:56	500.0
1/10/2024 15:57	576.9
1/10/2024 15:58	1000.0
1/10/2024 15:59	500.0
1/10/2024 16:00	500.0
1/10/2024 16:01	500.0
1/10/2024 16:02	500.0
1/10/2024 16:03	576.9
1/10/2024 16:04	1000.0
1/10/2024 16:05	0.0
1/10/2024 16:06	500.0
1/10/2024 16:07	1076.9
1/10/2024 16:08	500.0
1/10/2024 16:09	500.0
1/10/2024 16:10	500.0
1/10/2024 16:11	500.0
1/10/2024 16:12	1076.9
1/10/2024 16:13	0.0
1/10/2024 16:14	1000.0
1/10/2024 16:15	500.0
1/10/2024 16:16	500.0
1/10/2024 16:17	500.0
1/10/2024 16:18	576.9
1/10/2024 16:19	500.0
1/10/2024 16:20	500.0
1/10/2024 16:21	1000.0
1/10/2024 16:22	576.9
1/10/2024 16:23	500.0
1/10/2024 16:24	500.0
1/10/2024 16:25	500.0
1/10/2024 16:26	0.0
1/10/2024 16:27	1576.9
1/10/2024 16:28	0.0
1/10/2024 16:29	1000.0

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On
DAS Time

Run 2	Clinker Production (mtph)
1/10/2024 16:30	0.0
1/10/2024 16:31	1076.9
1/10/2024 16:32	423.1
1/10/2024 16:33	576.9
1/10/2024 16:34	1000.0
1/10/2024 16:35	0.0
1/10/2024 16:36	1076.9
1/10/2024 16:37	500.0
1/10/2024 16:38	500.0
1/10/2024 16:39	500.0
1/10/2024 16:40	500.0
1/10/2024 16:41	500.0
1/10/2024 16:42	1076.9
1/10/2024 16:43	0.0
1/10/2024 16:44	1000.0
1/10/2024 16:45	500.0
1/10/2024 16:46	500.0
1/10/2024 16:47	500.0
1/10/2024 16:48	576.9
1/10/2024 16:49	1000.0
1/10/2024 16:50	0.0
1/10/2024 16:51	1076.9
1/10/2024 16:52	500.0
01/10/2024 16:53	500.0
01/10/2024 16:54	500.0
01/10/2024 16:55	576.9
01/10/2024 16:56	423.1
01/10/2024 16:57	576.9
01/10/2024 16:58	500.0
Run Average	575.8

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On

DAS Time	CEMs
Run 1	O2 (%dry)
1/10/2024 14:30	8.63
1/10/2024 14:31	8.64
1/10/2024 14:32	8.65
1/10/2024 14:33	8.58
1/10/2024 14:34	8.58
1/10/2024 14:35	8.53
1/10/2024 14:36	8.55
1/10/2024 14:37	8.52
1/10/2024 14:38	8.55
1/10/2024 14:39	8.49
1/10/2024 14:40	8.53
1/10/2024 14:41	8.59
1/10/2024 14:42	8.66
1/10/2024 14:43	8.68
1/10/2024 14:44	8.67

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On
DAS Time

Run 3	Clinker Production (mtph)
1/10/2024 17:10	500.0
1/10/2024 17:11	500.0
1/10/2024 17:12	1000.0
1/10/2024 17:13	0.0
1/10/2024 17:14	1076.9
1/10/2024 17:15	500.0
1/10/2024 17:16	500.0
1/10/2024 17:17	500.0
1/10/2024 17:18	576.9
1/10/2024 17:19	500.0
1/10/2024 17:20	500.0
1/10/2024 17:21	1076.9
1/10/2024 17:22	500.0
1/10/2024 17:23	500.0
1/10/2024 17:24	500.0
1/10/2024 17:25	0.0
1/10/2024 17:26	1000.0
1/10/2024 17:27	576.9
1/10/2024 17:28	500.0
1/10/2024 17:29	1000.0
1/10/2024 17:30	500.0
1/10/2024 17:31	0.0
1/10/2024 17:32	1000.0
1/10/2024 17:33	0.0
1/10/2024 17:34	1076.9
1/10/2024 17:35	1076.9
1/10/2024 17:36	0.0
1/10/2024 17:37	1000.0
1/10/2024 17:38	500.0
1/10/2024 17:39	500.0
1/10/2024 17:40	500.0
1/10/2024 17:41	500.0
1/10/2024 17:42	1076.9
1/10/2024 17:43	0.0
1/10/2024 17:44	500.0
1/10/2024 17:45	1000.0
1/10/2024 17:46	576.9
1/10/2024 17:47	423.1

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On
DAS Time

Run 3	Clinker Production (mtph)
1/10/2024 17:48	576.9
1/10/2024 17:49	500.0
1/10/2024 17:50	1076.9
1/10/2024 17:51	0.0
1/10/2024 17:52	1000.0
1/10/2024 17:53	500.0
1/10/2024 17:54	500.0
1/10/2024 17:55	0.0
1/10/2024 17:56	1000.0
1/10/2024 17:57	576.9
1/10/2024 17:58	1000.0
1/10/2024 17:59	0.0
1/10/2024 18:00	1000.0
1/10/2024 18:01	500.0
1/10/2024 18:02	576.9
1/10/2024 18:03	500.0
1/10/2024 18:04	500.0
1/10/2024 18:05	1076.9
1/10/2024 18:06	0.0
1/10/2024 18:07	1000.0
1/10/2024 18:08	500.0
1/10/2024 18:09	500.0
1/10/2024 18:10	576.9
01/10/2024 18:11	423.1
01/10/2024 18:12	576.9
01/10/2024 18:13	1000.0
01/10/2024 18:14	0.0
01/10/2024 18:15	1000.0
01/10/2024 18:16	500.0
Run Averges	582.1

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills Off
DAS Time

Run 1	Clinker Production (mtph)
1/11/2024 8:35	423.1
1/11/2024 8:36	1000.0
1/11/2024 8:37	0.0
1/11/2024 8:38	923.1
1/11/2024 8:39	500.0
1/11/2024 8:40	0.0
1/11/2024 8:41	923.1
1/11/2024 8:42	500.0
1/11/2024 8:43	1000.0
1/11/2024 8:44	0.0
1/11/2024 8:45	846.2
1/11/2024 8:46	576.9
1/11/2024 8:47	423.1
1/11/2024 8:48	500.0
1/11/2024 8:49	500.0
1/11/2024 8:50	423.1
1/11/2024 8:51	1000.0
1/11/2024 8:52	0.0
1/11/2024 8:53	923.1
1/11/2024 8:54	500.0
1/11/2024 8:55	423.1
1/11/2024 8:56	500.0
1/11/2024 8:57	500.0
1/11/2024 8:58	423.1
1/11/2024 8:59	1000.0
1/11/2024 9:00	423.1
1/11/2024 9:01	0.0
1/11/2024 9:02	1000.0
1/11/2024 9:03	423.1
1/11/2024 9:04	576.9
1/11/2024 9:05	423.1
1/11/2024 9:06	923.1
1/11/2024 9:07	0.0
1/11/2024 9:08	923.1
1/11/2024 9:09	576.9
1/11/2024 9:10	423.1
1/11/2024 9:11	500.0
1/11/2024 9:12	500.0

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills Off
DAS Time

Run 1	Clinker Production (mtph)
1/11/2024 9:13	423.1
1/11/2024 9:14	1000.0
1/11/2024 9:15	0.0
1/11/2024 9:16	923.1
1/11/2024 9:17	500.0
1/11/2024 9:18	423.1
1/11/2024 9:19	576.9
1/11/2024 9:20	423.1
1/11/2024 9:21	923.1
1/11/2024 9:22	0.0
1/11/2024 9:23	1000.0
1/11/2024 9:24	500.0
1/11/2024 9:25	423.1
1/11/2024 9:26	500.0
1/11/2024 9:27	500.0
1/11/2024 9:28	423.1
1/11/2024 9:29	1000.0
1/11/2024 9:30	0.0
01/11/2024 9:31	846.2
01/11/2024 9:32	576.9
01/11/2024 9:33	0.0
01/11/2024 9:34	423.1
01/11/2024 9:35	1000.0
01/11/2024 9:36	923.1
01/11/2024 9:37	0.0
01/11/2024 9:38	1000.0
01/11/2024 9:39	423.1
01/11/2024 9:40	500.0
01/11/2024 9:41	500.0
Run Average	540.8

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills Off
DAS Time

Run 2	Clinker Production (mtph)
1/11/2024 9:53	0.0
1/11/2024 9:54	923.1
1/11/2024 9:55	500.0
1/11/2024 9:56	500.0
1/11/2024 9:57	0.0
1/11/2024 9:58	923.1
1/11/2024 9:59	1000.0
1/11/2024 10:00	0.0
1/11/2024 10:01	923.1
1/11/2024 10:02	500.0
1/11/2024 10:03	423.1
1/11/2024 10:04	500.0
1/11/2024 10:05	0.0
1/11/2024 10:06	923.1
1/11/2024 10:07	1000.0
1/11/2024 10:08	0.0
1/11/2024 10:09	1000.0
1/11/2024 10:10	423.1
1/11/2024 10:11	500.0
1/11/2024 10:12	500.0
1/11/2024 10:13	0.0
1/11/2024 10:14	1423.1
1/11/2024 10:15	0.0
1/11/2024 10:16	846.2
1/11/2024 10:17	576.9
1/11/2024 10:18	423.1
1/11/2024 10:19	500.0
1/11/2024 10:20	423.1
1/11/2024 10:21	500.0
1/11/2024 10:22	1000.0
1/11/2024 10:23	0.0
1/11/2024 10:24	923.1
1/11/2024 10:25	500.0
1/11/2024 10:26	423.1
1/11/2024 10:27	500.0
1/11/2024 10:28	500.0
1/11/2024 10:29	423.1

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills Off
DAS Time

Run 2	Clinker Production (mtph)
1/11/2024 10:30	500.0
1/11/2024 10:31	923.1
1/11/2024 10:32	576.9
1/11/2024 10:33	423.1
1/11/2024 10:34	500.0
1/11/2024 10:35	500.0
1/11/2024 10:36	423.1
1/11/2024 10:37	1000.0
1/11/2024 10:38	0.0
1/11/2024 10:39	923.1
1/11/2024 10:40	500.0
1/11/2024 10:41	423.1
1/11/2024 10:42	500.0
1/11/2024 10:43	500.0
1/11/2024 10:44	423.1
1/11/2024 10:45	1000.0
1/11/2024 10:46	0.0
1/11/2024 10:47	923.1
1/11/2024 10:48	0.0
1/11/2024 10:49	923.1
1/11/2024 10:50	500.0
1/11/2024 10:51	500.0
1/11/2024 10:52	923.1
1/11/2024 10:53	0.0
01/11/2024 10:54	923.1
01/11/2024 10:55	0.0
01/11/2024 10:56	1000.0
01/11/2024 10:57	500.0
01/11/2024 10:58	500.0
01/11/2024 10:59	423.1
Run Average	533.3

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills Off
DAS Time

Run 3	Clinker Production (mtph)
01/11/2024 11:09	1000.0
01/11/2024 11:10	423.1
01/11/2024 11:11	500.0
01/11/2024 11:12	500.0
01/11/2024 11:13	500.0
01/11/2024 11:14	423.1
01/11/2024 11:15	1000.0
01/11/2024 11:16	0.0
01/11/2024 11:17	846.2
01/11/2024 11:18	0.0
01/11/2024 11:19	1000.0
01/11/2024 11:20	423.1
01/11/2024 11:21	576.9
01/11/2024 11:22	923.1
01/11/2024 11:23	0.0
01/11/2024 11:24	1000.0
01/11/2024 11:25	423.1
01/11/2024 11:26	500.0
01/11/2024 11:27	423.1
01/11/2024 11:28	0.0
01/11/2024 11:29	1000.0
01/11/2024 11:30	1000.0
01/11/2024 11:31	0.0
01/11/2024 11:32	923.1
01/11/2024 11:33	0.0
01/11/2024 11:34	923.1
01/11/2024 11:35	500.0
01/11/2024 11:36	500.0
01/11/2024 11:37	423.1
01/11/2024 11:38	1000.0
01/11/2024 11:39	500.0
01/11/2024 11:40	423.1
01/11/2024 11:41	500.0
01/11/2024 11:42	423.1
01/11/2024 11:43	0.0
01/11/2024 11:44	1000.0
01/11/2024 11:45	1000.0

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills Off
DAS Time

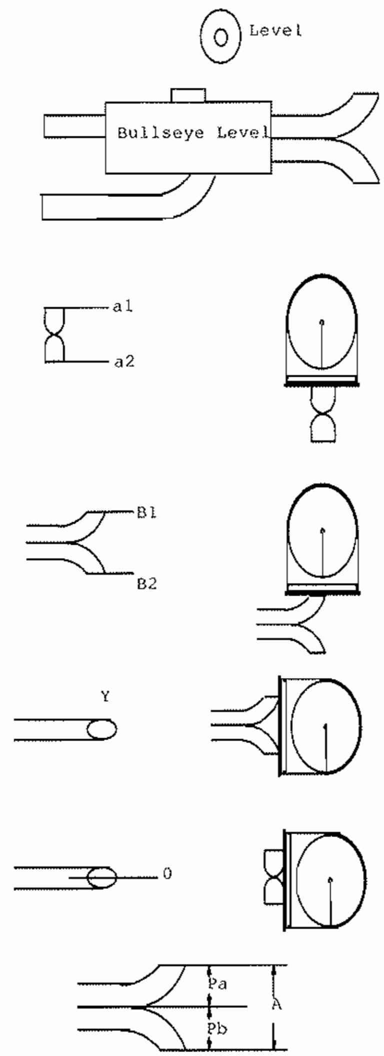
Run 3	Clinker Production (mtph)
01/11/2024 11:46	0.0
01/11/2024 11:47	923.1
01/11/2024 11:48	423.1
01/11/2024 11:49	0.0
01/11/2024 11:50	1000.0
01/11/2024 11:51	423.1
01/11/2024 11:52	500.0
01/11/2024 11:53	1000.0
01/11/2024 11:54	0.0
01/11/2024 11:55	1000.0
01/11/2024 11:56	423.1
01/11/2024 11:57	423.1
01/11/2024 11:58	576.9
01/11/2024 11:59	423.1
01/11/2024 12:00	1000.0
01/11/2024 12:01	0.0
01/11/2024 12:02	846.2
01/11/2024 12:03	0.0
01/11/2024 12:04	500.0
01/11/2024 12:05	1000.0
01/11/2024 12:06	423.1
01/11/2024 12:07	500.0
01/11/2024 12:08	1000.0
01/11/2024 12:09	0.0
01/11/2024 12:10	923.1
01/11/2024 12:11	500.0
01/11/2024 12:12	0.0
01/11/2024 12:13	923.1
01/11/2024 12:14	500.0
01/11/2024 12:15	923.1
Run Average	548.2

Appendix E

Calibration Documents

Probe or Pitot No: **6E**

Pitot Tube Inspection Sheet



Date	04/10/23
Tube Assembly Level?	Yes
Ports Damaged?	No
-10 deg < a1 < +10 deg	1
-10 deg < a2 < +10 deg	2
-5 deg < B1 < +5 deg	1
-5 deg < B2 < +5 deg	2
Y (gamma)	1
0 (theta)	1
A (alpha)	0.977
Z = A (sin y) < 0.125"?	yes
W = A (sin 0) < 0.031"?	yes
Pa =	0.488
Pb =	0.489
Tube Diameter (Dt) =	0.379
Pa = Pb +- 0.063"?	yes
(1.05 x Dt)?	0.39795
(1.50 x Dt)?	0.5685
(1.05 x Dt)< P < (1.50 x Dt)?	yes
Eligible for Default Pitot Calibration Factor (Cp = 0.84)?	**Yes**

Thermocouple Calibration

Type of Reference Thermometer?	Mercury	Date	04/10/23
Barometeric Pressure?	29.92	Ambient Temperature?	71.9

Source	Reference Temp, F	Thermocouple Temp, F	Absolute Temp Difference
cold air	36	37	-0.20%
medium air	215	214	0.15%
hot air	325	323	0.25%

Windtunnel Calibration

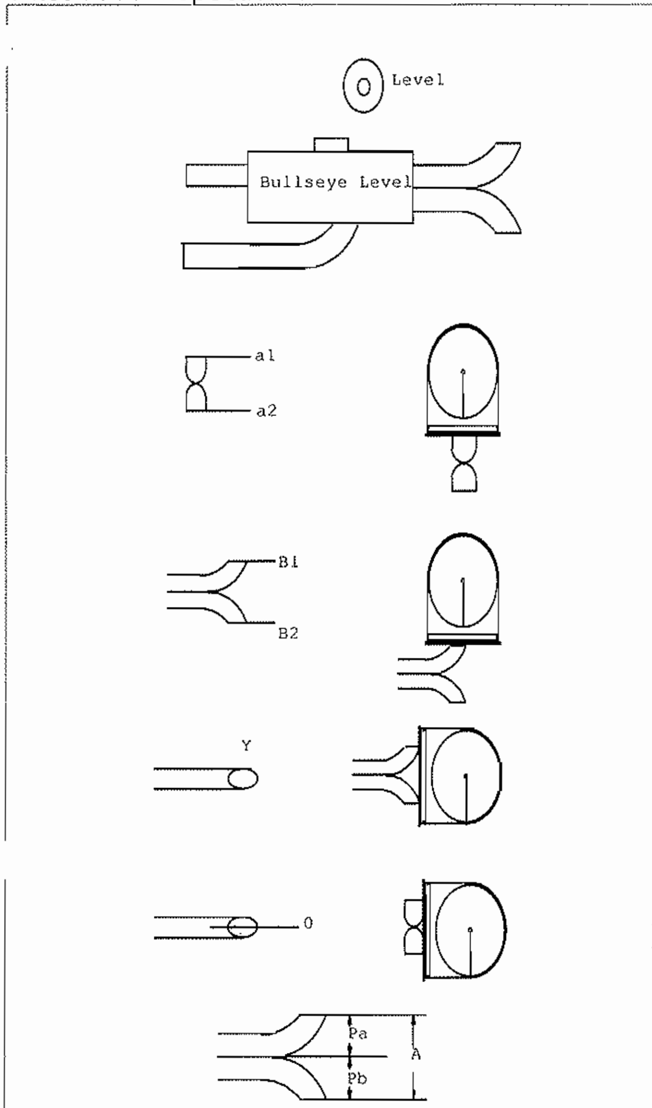
Pitot Reading	Reference (0.99)	6E S-Type Pitot	Cp
ΔP_1	0.32	0.44	0.85
ΔP_2	0.31	0.43	0.85
ΔP_3	0.31	0.44	0.84
		Average Pitot Tube Calibration Factor--->	**0.85**

Thermocouple Calibration Check (EPA ALT-011 Procedure), performed on 4/10/23

Source	Ref. Temp. F	Thermocouple Temp. F	± 2 deg F?
Ambient	71.9	70.8	Yes

Probe or Pitot No:	**6F**

Pitot Tube Inspection Sheet



Date	12/29/23
Tube Assembly Level?	Yes
Ports Damaged?	No
-10 deg < a1 < +10 deg	0
-10 deg < a2 < +10 deg	1
-5 deg < B1 < +5 deg	1
-5 deg < B2 < +5 deg	1
Y (gamma)	1
0 (theta)	1
A (alpha)	0.918
Z = A (sin y) < 0.125"?	yes
W = A (sin 0) < 0.031"?	yes
Pa =	0.459
Pb =	0.459
Tube Diameter (Dt) =	0.372
Pa = Pb +- 0.063"?	yes
(1.05 x Dt)?	0.3906
(1.50 x Dt)?	0.558
(1.05 x Dt)< P < (1.50 x Dt)?	yes
Eligible for Default Pitot Calibration Factor (Cp = 0.84)?	**Yes**

Thermocouple Calibration

Type of Reference Thermometer?	Mercury	Date	12/29/23
Barometeric Pressure?	29.53	Ambient Temperature?	60

Source	Reference Temp, F	Thermocouple Temp, F	Absolute Temp Difference
cold air	38	38	0.00%
medium air	215	214	0.15%
hot air	325	326	-0.13%

Windtunnel Calibration

Pitot Reading	Reference (0.99)	6F S-Type Pitot	Cp
ΔP_1	0.31	0.44	0.84
ΔP_2	0.31	0.43	0.85
ΔP_3	0.31	0.44	0.84
	Average Pitot Tube Calibration Factor--->		**0.84**

Thermocouple Calibration Check (EPA ALT-011 Procedure), performed on 12/29/23

Source	Ref. Temp. F	Thermocouple Temp. F	± 2 deg F?
Ambient	64	63	Yes

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Quality - Service - Reliability

ENVIRONMENTAL SUPPLY COMPANY

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the GREEN cells, YELLOW cells are calculated.

DATE: 12/23/23
METER PART #: M5-18
METER SERIAL #: M5-18
CRITICAL ORIFICE SET SERIAL #: 14315

BAROMETRIC PRESSURE (in Hg): INITIAL 30.15 | FINAL 30.18 | AVG (P_{bar}) 30.165

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	ΔH@
12	1	0.3283				0.000						0							
	2					0.000						0							
	3					0.000						0							
																AVG =			
15	1	0.4094	18	361.456	367.017	5.561	69	59	67	58	61	61.25	10.00	0.81	5.6915	5.3709	0.944		1.62
	2	0.4094	18	367.017	372.464	5.447	69	64	71	61	64	65	10.00	0.81	5.5349	5.3709	0.970		1.60
	3					0.000						0							
																AVG =	0.957	-1.65	
19	1	0.5047	18	372.917	379.625	6.708	69	71	76	65	68	70	10.00	1.3	6.7600	6.6212	0.979		1.68
	2	0.5047	18	379.625	386.363	6.738	69	73	77	68	70	72	10.00	1.3	6.7647	6.6212	0.979		1.67
	3					0.000						0							
																AVG =	0.979	0.62	
23	1	0.6426	18	387.121	395.674	8.553	69	75	81	70	73	74.75	10.00	2.1	8.5593	8.4303	0.985		1.66
	2	0.6426	18	395.674	404.294	8.620	68	79	80	73	74	76.5	10.00	2.1	8.5982	8.4383	0.981		1.65
	3					0.000						0							
																AVG =	0.983	1.03	
32	1	0.8587				0.000						0							
	2					0.000						0							
	3					0.000						0							
																AVG =			

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, Vm (std), and the critical orifice, Vcr (std), and the DGM calibration factor, Y. These equations are automatically calculated in the

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = **0.973**

AVERAGE ΔH@ = **1.65**

Potentiometer Check, °F (per manufacturer procedure)		
	0	@ 0 F
	496	@ 500 F
	1000	@ 1000 F

Avg Absolute Difference = **0.1%**

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$ = DGM calibration factor

ENVIRONMENTAL SUPPLY COMPANY

Quality - Service - Reliability

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record data and information in the GREEN cells, YELLOW cells are calculated.

DATE: 12/21/23

METER PART #: m5-25

METER SERIAL #: m5-25

CRITICAL ORIFICE SET SERIAL #: 1431S

	INITIAL	FINAL	AVG (P_{bar})
BAROMETRIC PRESSURE (in Hg):	30.18	30.15	30.165

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
12	1	0.3283				0.000						0							
	2					0.000						0							
	3					0.000						0							
																AVG =			
15	1	0.4094	18	576.201	581.661	5.460	55	53	55	53	54	53.75	10.00	0.97	5.6719	5.4435	0.960		1.91
	2	0.4094	18	581.661	587.119	5.458	55	55	58	54	55	55.5	10.00	0.97	5.6506	5.4435	0.963		1.91
	3					0.000						0							
																AVG =	0.962	-0.59	
19	1	0.5047	18	587.424	594.121	6.697	55	57	61	55	56	57.25	10.00	1.5	6.9187	6.7106	0.970		1.94
	2	0.5047	18	594.121	600.831	6.710	57	59	63	56	57	58.75	10.00	1.5	6.9121	6.6976	0.969		1.94
	3					0.000						0							
																AVG =	0.969	0.22	
23	1	0.6426	18	601.129	609.648	8.519	57	62	65	58	59	61	10.00	2.5	8.7589	8.5276	0.974		1.99
	2	0.6426	18	609.648	618.182	8.534	58	63	62	58	55	59.5	10.00	2.5	8.7997	8.5194	0.968		2.00
	3					0.000						0							
																AVG =	0.971	0.37	
32	1	0.8587				0.000						0							
	2					0.000						0							
	3					0.000						0							
																AVG =			

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, Vm (std), and the critical orifice, Vcr (std), and the DGM calibration factor, Y. These equations are automatically calculated in the

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = **0.967**

AVERAGE $\Delta H_@$ = **1.95**

Potentiometer Check, °F (per manufacturer procedure)		
	0	@ 0 F
	498	@ 500 F
	1004	@ 1000 F

Avg Absolute Difference = **0.0%**

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$ = DGM calibration factor

Company: **Holcim; Ste. Genevieve MO**
Source: **Main Stack; Raw Mills Off**
Job ID: **24-3316**
Train Type: **EPA Method 26A**

Alt-009 Alternate Post Test Calibration Data	M5-25 4A 01/11/24 835-941	M5-18 4B 01/11/24 835-941	M5-25 5A 01/11/24 953-1059	M5-18 5B 01/11/24 953-1059	M5-25 6A 01/11/24 1109-1215	M5-18 6B 01/11/24 1109-1215	M5-25 Averages	M5-18 Averages
Vm	52.032	51.553	52.585	51.248	53.385	52.464		
Tm	503.8	511.1	515.3	517.1	522	522.4		
Pb	29	29	29	29	29	29		
Havg	2.71	2.29	2.63	2.23	2.69	2.28		
H@	1.95	1.65	1.95	1.65	1.95	1.65		
Md	31.808	31.808	31.824	31.824	31.792	31.792		
(Havg)^0.5	1.64229839	1.51048892	1.61791554	1.48901693	1.63825252	1.50607719		
Run Time, Min	60	60	60	60	60	60		
Calculated Gamma (Yqa)	0.961	0.977	0.947	0.974	0.951	0.968	0.953	0.973
Meter Gamma	0.967	0.973	0.967	0.973	0.967	0.973	0.967	0.973
% difference from Actual Y	0.65%	0.41%	2.07%	0.14%	1.65%	0.51%	1.46%	0.35%

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA LLC
630 United Drive
Durham, NC 27713
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E04NI77E15A3796	Reference Number:	122-402389886-1
Cylinder Number:	EB0070764	Cylinder Volume:	151.0 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22022	Valve Outlet:	590
Gas Code:	CO,CO2,O2,BALN	Certification Date:	Mar 23, 2022

Expiration Date: Mar 23, 2030

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.

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 MONOXIDE	65.00 PPM	62.51 PPM	G1	+/- 0.6% NIST Traceable	03/23/2022
CARBON DIOXIDE	10.00 %	10.14 %	G1	+/- 0.6% NIST Traceable	03/23/2022
OXYGEN	12.00 %	12.08 %	G1	+/- 0.4% NIST Traceable	03/23/2022
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	09010213	KAL004779	98.48 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Oct 16, 2024
NTRM	19060402	6162642Y	11.105 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Dec 04, 2025
NTRM	10010616	K014963	9.967 % OXYGEN/NITROGEN	+/- 0.3%	Apr 19, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VA-5001 CO2 BF89GV17	Nondispersive Infrared (NDIR)	Mar 01, 2022
Horiba VIA510 CO 1G46EA07	Nondispersive Infrared (NDIR)	Mar 09, 2022
Siemens Oxymat 61 M3299 O2	Paramagnetic	Mar 01, 2022

Triad Data Available Upon Request

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA LLC
630 United Drive
Durham, NC 27713
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Part Number:	E04NI59E15A38X3	Reference Number:	122-402389885-1A
Cylinder Number:	ALM-056015	Cylinder Volume:	143.7 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2016 PSIG
PGVP Number:	B22022	Valve Outlet:	590
Gas Code:	CO,CO2,O2,BALN	Certification Date:	Mar 28, 2022

Expiration Date: Mar 28, 2030

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.
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 MONOXIDE	120.0 PPM	116.5 PPM	G1	+/- 0.3% NIST Traceable	03/28/2022
CARBON DIOXIDE	18.00 %	18.17 %	G1	+/- 0.7% NIST Traceable	03/28/2022
OXYGEN	22.00 %	21.90 %	G1	+/- 0.5% NIST Traceable	03/28/2022
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13010207	KAL003102	246.9 PPM CARBON MONOXIDE/NITROGEN	+/- 0.2%	Oct 16, 2024
NTRM	12061508	CC354696	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	08010220	K013155	23.20 % OXYGEN/NITROGEN	+/- 0.4%	Jun 01, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VA-5001 CO2 BF89GV17	Nondispersive Infrared (NDIR)	Mar 01, 2022
Horiba VIA510 CO RS2EGL6K	Nondispersive Infrared (NDIR)	Mar 01, 2022
Siemens Oxymat 61 M3299 O2	Paramagnetic	Mar 01, 2022

Triad Data Available Upon Request

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
630 United Drive
Durham, NC 27713
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI65E15A6270	Reference Number:	122-401213509-1
Cylinder Number:	CC714737	Cylinder Volume:	142.3 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	1690 PSIG
PGVP Number:	B22018	Valve Outlet:	580
Gas Code:	CO2,BALN	Certification Date:	May 31, 2018

Expiration Date: May 31, 2026

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 volume/volume basis unless otherwise noted.

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	35.00 %	35.10 %	G2	+/- 0.6% NIST Traceable	05/31/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060810	CC415934	24.04 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 16, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	May 10, 2018

Triad Data Available Upon Request

Approved for Release

Airgas
An Air Liquide company

CERTIFICATE OF ACCURACY: *GMACS-c Calibration Standard*

…AY LABORATORY | **CUSTOMER INFORMATION**

AIRGAS SPECIALTY GASES
Exploratory Products Group
6141 Easton Road
Plumsteadville, PA 18949

Work Order #: 160-402845897-1
Sales Order #: 1123601913
PO #: 7100179560

Customer: DEECO Inc.
Address 1: 3404 Lake Woodard Road
Address 2:
City / State / Zip: Raleigh, NC 27604

PRODUCT INFORMATION

COMPOSITION	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
Hydrogen Cyanide	49.9 PPM	2.3 PPM	4.6 %
Sulfur Hexafluoride	5.0 PPM	0.07 PPM	1.3 %
Nitrogen	Balance		

CYLINDER #: **CC768222**
CYLINDER TYPE: **150A Aluminum**
CGA: **350 SS**
CYLINDER PRESSURE: **2000 psig**

AIRGAS PART #: **X03NI99C15AC0W8**
CERTIFICATION DATE: **7-Sep-2023**
EXPIRATION DATE: **7-Mar-2024**
MIXTURE DEW POINT: **N/A**

CERTIFICATION DATA

BLENDING PROCESS: **GravStat™ Gravimetry**

COMPONENT	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
…rogen Cyanide	50.02 PPM	0.9 PPM	1.8 %
Sulfur Hexafluoride	5.02 PPM	0.07 PPM	1.3 %

CONFIRMING ANALYSIS: **FTIR Spectroscopy**
INSTRUMENT / MODEL: **CAI Model 700 FTIR**

COMPONENT	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
Hydrogen Cyanide	49.8 PPM	2.1 PPM	4.2 %

REFERENCE STANDARD: **GMPS-c 50 PPM Hydrogen Cyanide**
CYLINDER NUMBER: **CC768196**
EXPIRATION DATE: **2/29/2024**

COMPONENT	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
Hydrogen Cyanide	48.9 PPM	1.7 PPM	3.4 %

CALIBRATION CURVE DATA	Curve Order	Correlation	Slope (X2)	Slope (X)	Intercept
Point-to-Point Matching Std	Linear / Direct Ratio	N/A	N/A	N/A	N/A

INTERLOCK STATISTICS

	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
BLEND RESULT:	50.02 PPM	0.9 PPM	1.8 %
ANALYSIS RESULT:	49.8 PPM	2.1 PPM	4.2 %
INTERLOCK RESULT:	49.9 PPM	2.3 PPM	4.6 %

…OMMENTS / SPECIAL INSTRUCTIONS

1. A GMACS-c ("Candidate GMACS") is made and certified according to the EPA GMACS Procedure (Alt-114) found at: https://cfpub.epa.gov
2. Do not use this standard if pressure is less than 200 psig.
3. Do not use or store this product at or below the stated dew point.

APPROVED BY: ______________________ BOB GRASMEDER an Air Liquide company

Airgas Specialty Gases
Airgas USA LLC
630 United Drive
Durham, NC 27713
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X02NI99C15A54F5	Reference Number:	122-402705571-1
Cylinder Number:	CC426155	Cylinder Volume:	144.0 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
Analysis Date:	Mar 28, 2023	Valve Outlet:	350
Lot Number:	122-402705571-1		

Expiration Date: Mar 28, 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	75.00 PPM	75.47 PPM	+/- 2%
NITROGEN	Balance		

Approved for Release

Client: Holcim Ste Genevieve MO
Test Location: Main Stack Mill On
Date: Jan 10 24 Start Time: 14:30:12
Run number Stratification Check
One Minute Averages

	Reference O2 %,dry	Plant O2 %,dry
2:31:10 PM	8.9	8.6
2:32:10 PM	8.9	8.6
2:33:10 PM	8.8	8.7
2:34:10 PM	8.7	8.6
2:35:10 PM	8.7	8.6
Point A	8.8	8.6
2:36:10 PM	8.7	8.5
2:37:10 PM	8.7	8.6
2:38:10 PM	8.7	8.5
2:39:10 PM	8.6	8.6
2:40:10 PM	8.7	8.5
Point B	8.7	8.5
2:41:10 PM	8.8	8.5
2:42:10 PM	8.8	8.6
2:43:10 PM	8.8	8.7
2:44:10 PM	8.8	8.7
2:45:10 PM	8.8	8.7
Point C	8.8	8.6

Holcim
Ste. Genevieve MO
Main Stack
Raw Mills On
DAS Time CEMs

Run 1	O2 (%dry)
1/10/2024 14:30	8.63
1/10/2024 14:31	8.64
1/10/2024 14:32	8.65
1/10/2024 14:33	8.58
1/10/2024 14:34	8.58
1/10/2024 14:35	8.53
1/10/2024 14:36	8.55
1/10/2024 14:37	8.52
1/10/2024 14:38	8.55
1/10/2024 14:39	8.49
1/10/2024 14:40	8.53
1/10/2024 14:41	8.59
1/10/2024 14:42	8.66
1/10/2024 14:43	8.68
1/10/2024 14:44	8.67

Analysis Validation Report

Sample Filename: F:\SteGEn JAnuary2024\January 10\SPC__007708.LAB

Filename for noise: F:\Midlothian on Rental\November 14\SPC__000837.LAB
Interferences Filenames: C:\Midlothian on Rental\November 15\SPC__001463.LAB
C:\Midlothian on Rental\November 15\SPC__001464.LAB
C:\Midlothian on Rental\November 15\SPC__001465.LAB
C:\Midlothian on Rental\November 15\SPC__001466.LAB
C:\Midlothian on Rental\November 15\SPC__001467.LAB
C:\Midlothian on Rental\November 15\SPC__001468.LAB
C:\Midlothian on Rental\November 15\SPC__001469.LAB
C:\Midlothian on Rental\November 15\SPC__001470.LAB

Recipe path: C:\OLT\recipes\Cement Testing R3.MGRCP

Gas calibration Name	Conc	MDC3	MDC2	MDC1	MAU	FMU*R	OCU	~ DL	~ CL	~ Bias	Sigma	Range	Span	Comment
SG1 HCN (200) PCA 191C 191	3.66	0.18	-	0.24	0.3	0.23	0.3	-	0.08	-	-	0-200	-	Good
HF PPM (10) 191C	2.44	0.45	0.05	0.04	0.07	0.8	0.8	0.07	0.34	0.02	0.02	0-10	-	Good
SF6 (10) 191C	-0.02	0.03	-	0	0	0.04	0.04	-	0.03	-	-	0-10	-	Check it!
ETHYLENE (100,3000) 191C	2.83	2.28	0.33	0.17	0.29	3.96	3.96	1.08	2.04	0.75	0.11	0-3000	-	Close to DL
H2O% (40) 191C	11.17	0.15	-	0.01	0.02	0.3	0.3	-	0.22	-	-	0-40	-	Good
CO2% (40) 191C	18.57	0.38	-	0.01	0.02	0.52	0.52	-	0.37	-	-	0-40	-	Good
HCL PPM (100) 191C	0.04	0.71	0.05	0.15	0.28	1.29	1.29	0.06	0.58	0.01	0.02	0-100	-	Close to DL
SO2 (1000) 191C	12.78	1.21	0.37	0.14	0.27	2.33	2.33	0.79	0.83	0.42	0.12	0-1000	-	Good
NO (350,3000) 191C	145.31	3.93	0.22	0.26	0.35	5.39	5.39	0.45	2.94	0.23	0.07	0-3000	-	Good
NH3 (300) 191C (1OF2)	4.54	1.7	0.03	0.12	0.2	2.89	2.89	0.15	1.46	0.11	0.01	0-300	-	Check it!
CO (500) 191C (1OF2)	147.34	4.62	-	0.2	0.43	9.42	9.42	-	2.95	-	-	0-500	-	Good
CO% (1) 191C (2OF2)	0.01	0	0	0	0	0	0	0	0	0	0	0-1	-	Good
FORMALDEHYDE (70) 191C	3.07	1.57	0.28	0.2	0.24	1.9	1.9	0.33	1.3	0.04	0.09	0-70	-	Check it!
ACETALDEHYDE (1000) 191C	0.96	3.36	0.23	0.35	0.38	3.65	3.65	0.59	2.98	0.35	0.08	0-1000	-	Close to DL
CH4 (250) 191C (1OF2)	3.34	1.17	0.05	0.26	0.7	3.08	3.08	0.06	0.82	0.01	0.02	0-250	-	Check it!
PROPANE (100) 191C	0.68	0.89	0.42	0.12	0.14	1.06	1.06	0.72	0.75	0.3	0.14	0-100	-	Close to DL
HBR (100) 180C	-0.62	7.08	0.17	0.68	1.39	14.39	14.39	0.19	6.41	0.02	0.06	0-100	-	Close to DL
NO2 (150) 191C (1OF2)	-0.05	0.36	0.04	0.02	0.03	0.38	0.38	0.05	0.34	0.01	0.01	0-150	-	Close to DL
NO2 (2000) 191C (2OF2)	1.02	5.9	2.03	0.88	1.12	7.52	7.52	3.81	5.03	1.78	0.68	0-2000	-	Close to DL
N2O (100,200,300) 191C	0.51	0.14	0.05	0.04	0.05	0.17	0.17	0.07	0.09	0.02	0.02	0-300	-	Close to DL
NH3 (3000) 191C (2OF2)	6.19	11.68	0.35	1.19	2.25	22.04	22.04	0.44	10.53	0.09	0.12	0-3000	-	Check it!
CH4 (3000) 191C (2OF2)	2.56	8.46	0.34	1.1	1.81	13.93	13.93	0.61	7.33	0.27	0.11	0-3000	-	Close to DL
ACETYLENE (1000) 191C	0.69	2.1	0.15	0.31	0.37	2.54	2.54	0.21	1.79	0.06	0.05	0-1000	-	Close to DL
PROPYLENE (200,1000) 191C	1.9	5.71	0.19	0.43	0.5	6.69	6.69	0.49	5.24	0.3	0.06	0-1000	-	Check it!
COS (100) 150C	0.36	0.22	0.02	0.02	0.02	0.3	0.3	0.02	0.19	0	0.01	0-100	-	Check it!
ETHANE (500) 191C	1.17	1.42	0.32	0.2	0.22	1.58	1.58	0.54	1.19	0.22	0.11	0-500	-	Close to DL
H2SO4 (50) 150C	0	0.15	0.04	0.05	0.05	0.16	0.16	0.29	0.29	0.25	0.01	0-50	-	Close to DL
MEOH (10) 191C	-0.11	0.61	0.14	0.14	0.16	0.7	0.7	0.17	0.48	0.03	0.05	0-10	-	Close to DL
SO3 (150) 191C	-4.15	0.37	0.7	0.03	0.04	0.4	0.4	1.14	1.14	0.44	0.23	0-150	-	Close to DL

Analysis Validation Report

Sample Filename: F:\SteGEn JAnuary2024\January 10\SPC__007709.LAB

Filename for noise: F:\Midlothian on Rental\November 14\SPC__000837.LAB
Interferences Filenames: C:\Midlothian on Rental\November 15\SPC__001463.LAB
C:\Midlothian on Rental\November 15\SPC__001464.LAB
C:\Midlothian on Rental\November 15\SPC__001465.LAB
C:\Midlothian on Rental\November 15\SPC__001466.LAB
C:\Midlothian on Rental\November 15\SPC__001467.LAB
C:\Midlothian on Rental\November 15\SPC__001468.LAB
C:\Midlothian on Rental\November 15\SPC__001469.LAB
C:\Midlothian on Rental\November 15\SPC__001470.LAB

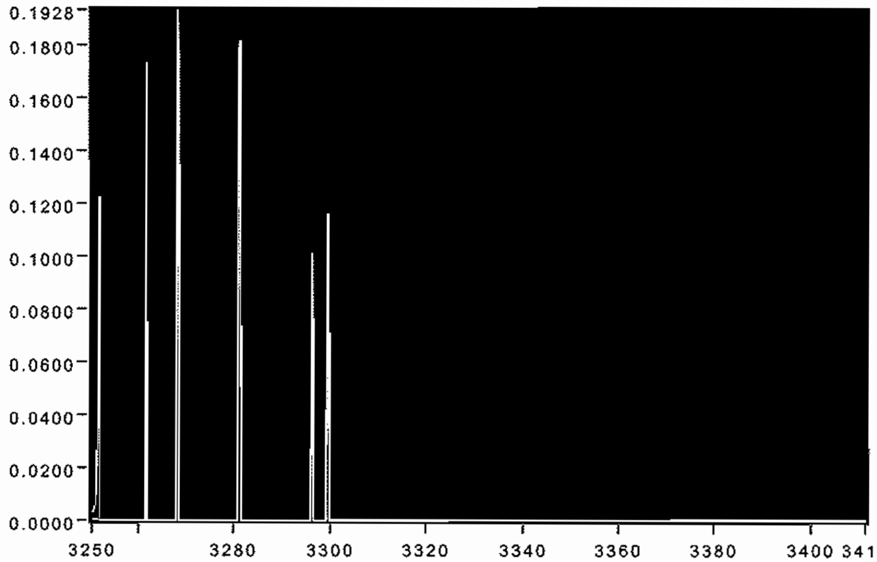
Recipe path: C:\OLT\recipes\Cement Testing R3.MGRCP

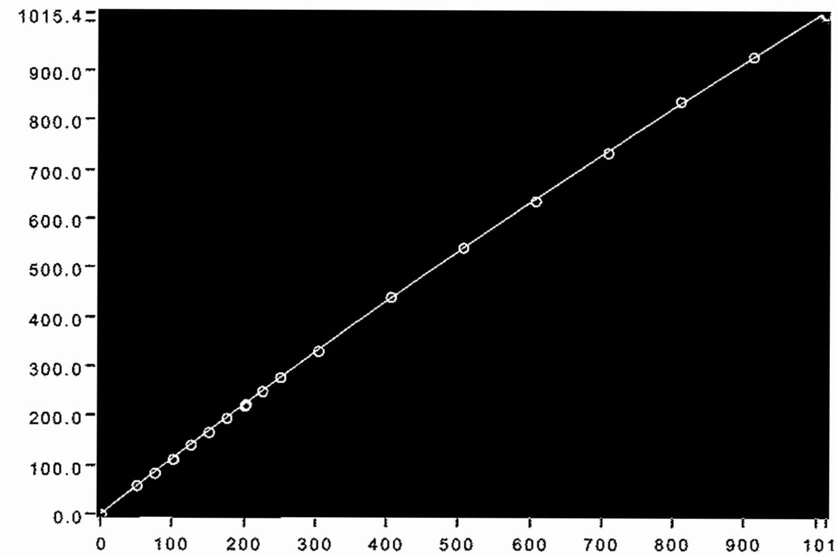
Gas calibration Name	Conc	MDC3	MDC2	MDC1	MAU	FMU*R	OCU	~ DL	~ CL	~ Bias	Sigma	Range	Span	Comment
SG1 HCN (200) PCA 191C 191C	3.56	0.2	-	0.24	0.3	0.25	0.3	-	0.09	-	-	0-200	-	Good
HF PPM (10) 191C	2.46	0.45	0.05	0.04	0.07	0.81	0.81	0.07	0.35	0.02	0.02	0-10	-	Good
SF6 (10) 191C	-0.02	0.03	-	0	0	0.03	0.03	-	0.02	-	-	0-10	-	Check it!
ETHYLENE (100,3000) 191C	2.82	2.28	0.33	0.17	0.29	3.97	3.97	1.08	2.04	0.75	0.11	0-3000	-	Close to DL
H2O% (40) 191C	11.25	0.14	-	0.01	0.02	0.28	0.28	-	0.22	-	-	0-40	-	Good
CO2% (40) 191C	18.51	0.37	-	0.01	0.02	0.51	0.51	-	0.37	-	-	0-40	-	Good
HCL PPM (100) 191C	0.04	0.68	0.05	0.15	0.28	1.24	1.24	0.06	0.55	0.01	0.02	0-100	-	Close to DL
SO2 (1000) 191C	12.4	1.11	0.37	0.14	0.27	2.14	2.14	0.79	0.83	0.42	0.12	0-1000	-	Good
NO (350,3000) 191C	143.64	3.87	0.22	0.26	0.35	5.31	5.31	0.45	2.91	0.23	0.07	0-3000	-	Good
NH3 (300) 191C (1OF2)	4.5	1.67	0.03	0.12	0.2	2.83	2.83	0.15	1.43	0.11	0.01	0-300	-	Check it!
CO (500) 191C (1OF2)	142.82	4.39	-	0.2	0.43	9.05	9.05	-	2.86	-	-	0-500	-	Good
CO% (1) 191C (2OF2)	0.01	0	0	0	0	0	0	0	0	0	0	0-1	-	Good
FORMALDEHYDE (70) 191C	2.91	1.52	0.28	0.2	0.24	1.83	1.83	0.33	1.25	0.04	0.09	0-70	-	Check it!
ACETALDEHYDE (1000) 191C	0.9	3.23	0.23	0.35	0.38	3.52	3.52	0.59	2.86	0.35	0.08	0-1000	-	Close to DL
CH4 (250) 191C (1OF2)	3.35	1.17	0.05	0.26	0.7	3.1	3.1	0.06	0.82	0.01	0.02	0-250	-	Check it!
PROPANE (100) 191C	0.78	0.88	0.42	0.12	0.14	1.05	1.05	0.72	0.74	0.3	0.14	0-100	-	Close to DL
HBR (100) 180C	-0.67	6.9	0.17	0.68	1.39	14.01	14.01	0.19	6.22	0.02	0.06	0-100	-	Close to DL
NO2 (150) 191C (1OF2)	-0.03	0.35	0.04	0.02	0.03	0.37	0.37	0.05	0.33	0.01	0.01	0-150	-	Close to DL
NO2 (2000) 191C (2OF2)	0.38	5.66	2.03	0.88	1.12	7.21	7.21	3.81	4.81	1.78	0.68	0-2000	-	Close to DL
N2O (100,200,300) 191C	0.55	0.15	0.05	0.04	0.05	0.17	0.17	0.07	0.09	0.02	0.02	0-300	-	Good
NH3 (3000) 191C (2OF2)	6.17	11.35	0.35	1.19	2.25	21.41	21.41	0.44	10.2	0.09	0.12	0-3000	-	Check it!
CH4 (3000) 191C (2OF2)	2.55	8.11	0.34	1.1	1.81	13.35	13.35	0.61	6.98	0.27	0.11	0-3000	-	Close to DL
ACETYLENE (1000) 191C	0.63	1.96	0.15	0.31	0.37	2.37	2.37	0.21	1.65	0.06	0.05	0-1000	-	Close to DL
PROPYLENE (200,1000) 191C	1.63	5.56	0.19	0.43	0.5	6.52	6.52	0.49	5.1	0.3	0.06	0-1000	-	Close to DL
COS (100) 150C	0.38	0.21	0.02	0.02	0.02	0.29	0.29	0.02	0.18	0	0.01	0-100	-	Check it!
ETHANE (500) 191C	1.26	1.39	0.32	0.2	0.22	1.55	1.55	0.54	1.16	0.22	0.11	0-500	-	Close to DL
H2SO4 (50) 150C	0.01	0.15	0.04	0.05	0.05	0.16	0.16	0.29	0.29	0.25	0.01	0-50	-	Close to DL
MEOH (10) 191C	-0.06	0.57	0.14	0.14	0.16	0.66	0.66	0.17	0.45	0.03	0.05	0-10	-	Close to DL
SO3 (150) 191C	-3.46	0.35	0.7	0.03	0.04	0.38	0.38	1.14	1.14	0.44	0.23	0-150	-	Close to DL

Holcim; Ste. Genevieve MO
Main Stack; Raw Mills Off
Run 3

Spectrum	Date	Time	SNR 2500	sBeam @ 2500
SPC__008190.LAB	01/11/24	12:08:49.431	5052.990234	1.239564

Calibration Generated	0‥ .54 PM 01/15/2024	Gas ID	SG1 HCN (200) PCA 191C 191c	Lo Alarm	NaN	Span	Offset: .0000
		LRF Path	C:\OLT\Methods R3\Cement-coal-EGU method 191C\SG1 HCN (200) PCA 191C 191c_18.lrf	Hi Alarm	NaN	Mutations	FALSE





Cal Spectra	Temp (C)	Pres (atm)	Conc (ppm-m)	Actual	Calc'd
HCN (200) PCA 191C (9.86ppm, 5.11r	191.209	0.977	50.385	50.338	58.783
HCN (200) PCA 191C (14.79ppm, 5.11	191.194	0.977	75.577	75.505	83.841
HCN (200) PCA 191C (19.72ppm, 5.11	191.202	0.977	100.769	100.670	111.887
HCN (200) PCA 191C (19.87ppm, 5.11	191.196	0.978	101.536	101.566	112.063
HCN (200) PCA 191C (24.65ppm, 5.11	191.204	0.977	125.962	125.832	141.005
HCN (200) PCA 191C (29.58ppm, 5.11	191.209	0.977	151.154	150.999	166.591
HCN (200) PCA 191C (34.51ppm, 5.11	191.225	0.977	176.346	176.168	195.479
HCN (200) PCA 191C (39.44ppm, 5.11	191.217	0.977	201.538	201.349	219.828
HCN (200) PCA 191C (39.74ppm, 5.11	191.194	0.978	203.071	203.055	223.703
HCN (200) PCA 191C (44.37ppm, 5.11	191.203	0.977	226.731	226.500	249.690
HCN (200) PCA 191C (49.30ppm, 5.11	191.199	0.977	251.923	251.691	277.964
HCN (200) PCA 191C (59.61ppm, 5.11	191.221	0.978	304.607	304.577	330.988
HCN (200) PCA 191C (79.48ppm, 5.11	191.195	0.977	406.143	405.954	440.831
HCN (200) PCA 191C (99.35ppm, 5.11	191.258	0.977	507.679	507.181	541.777
HCN (200) PCA 191C (119.22ppm, 5.11	191.209	0.977	609.214	608.643	637.005
HCN (200) PCA 191C (139.09ppm, 5.11	191.246	0.977	710.750	709.953	735.231
HCN (200) PCA 191C (158.96ppm, 5.11	191.263	0.977	812.286	811.364	839.113
HCN (200) PCA 191C (178.83ppm, 5.11	191.221	0.977	913.821	913.339	929.366
HCN (200) PCA 191C (198.70ppm, 5.11	191.202	0.978	1015.357	1015.357	1015.357

Interpolation: Quadratic
Force Through Zero ☒
Min % Residuals ☐ Excl. Zero ☐ Quant w/ Highest ☐

Spectral Regions
Region 00 - 3250.25 to 3411.52 cm-1
Region 01 - 593.01 to 840.34 cm-1
Region 02 - 1295.95 to 1518.21 cm-1
Region 03 - 2496.93 to 2901.43 cm-1
Region 04 - 3172.38 to 3250.01 cm-1
Region 05 - 3881.35 to 4113.97 cm-1

Calibration Generated: ..:50 AM 11/30/2012

Gas ID: Ethylene (100,3000) 191C

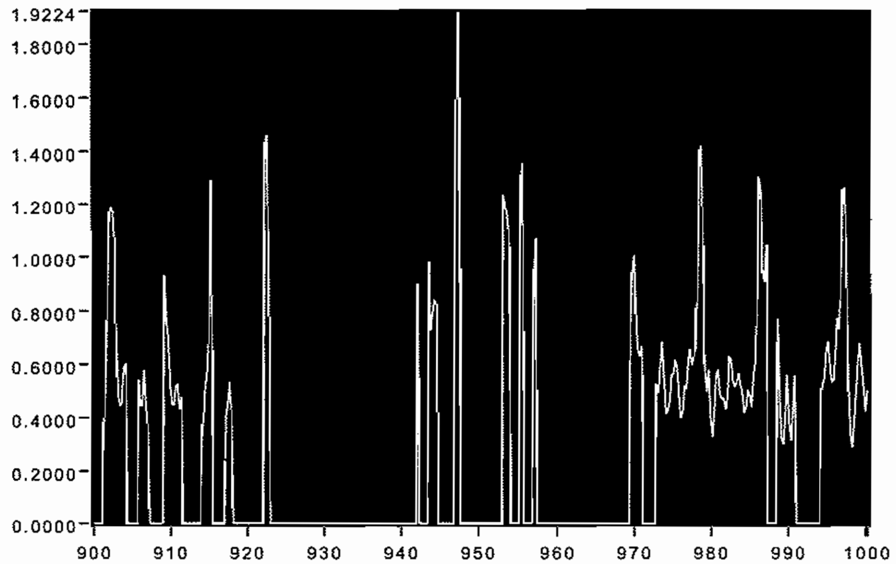
LRF Path: C:\OLT\Methods R3\Cement-coal-EGU method 191C\Ethylene (100,3000) 191C_19.lrf

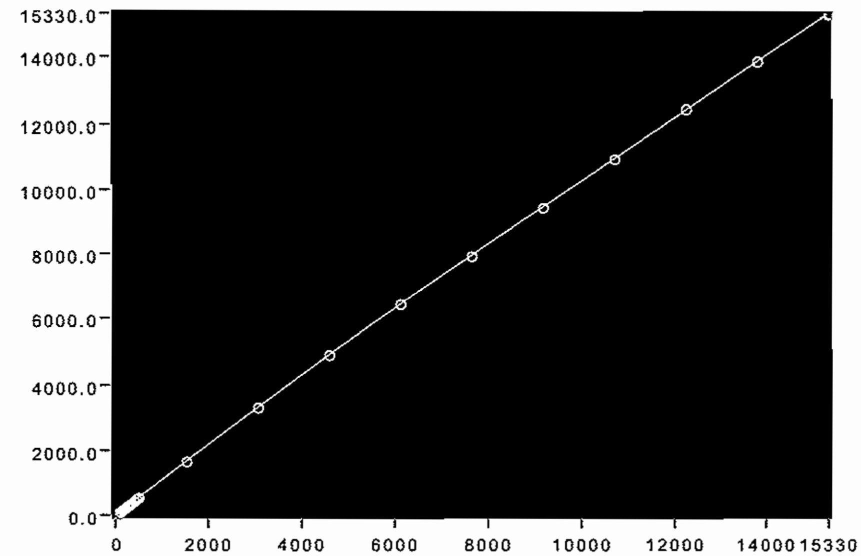
Lo Alarm: NaN

Hi Alarm: NaN

Span: Offset. J0000

Mutations: FALSE





Cal Spectra	Temp (C)	Pres (atm)	Conc (ppm-m)	Actual	Calc'd
Ethylene (9.74ppm, 5.11m, 190C).lab	190.014	0.994	49.792	49.542	54.522
Ethylene (19.49ppm, 5.11m, 190C).lab	189.989	0.994	99.594	99.135	107.070
Ethylene (29.23ppm, 5.11m, 190C).lab	189.985	0.994	149.365	148.729	162.298
Ethylene (38.98ppm, 5.11m, 190C).lab	189.998	0.995	199.188	198.392	217.388
Ethylene (48.72ppm, 5.11m, 190C).lab	189.971	0.995	248.959	247.990	272.190
Ethylene (58.46ppm, 5.11m, 190C).lab	189.964	0.995	298.731	297.587	327.537
Ethylene (68.21ppm, 5.11m, 190C).lab	189.977	0.995	348.553	347.251	383.508
Ethylene (77.95ppm, 5.11m, 190C).lab	189.933	0.995	398.325	396.868	439.409
Ethylene (87.70ppm, 5.11m, 190C).lab	189.964	0.995	448.127	446.506	495.696
Ethylene (97.44ppm, 5.11m, 190C).lab	189.934	0.995	497.918	496.089	551.021
Ethylene (300.00ppm, 5.11m, 190C).la	189.942	0.997	1533.000	1531.357	1654.977
Ethylene (600.00ppm, 5.11m, 190C).la	189.991	0.998	3066.000	3063.066	3290.420
Ethylene (900.00ppm, 5.11m, 190C).la	189.934	0.998	4599.000	4597.015	4885.213
Ethylene (1200.00ppm, 5.11m, 190C).la	189.933	0.998	6132.000	6130.754	6446.341
Ethylene (1500.00ppm, 5.11m, 190C).la	189.960	0.998	7664.999	7658.046	7940.995
Ethylene (1800.00ppm, 5.11m, 190C).la	189.922	0.998	9197.999	9195.039	9445.204
Ethylene (2100.00ppm, 5.11m, 190C).la	189.971	0.998	10730.999	10728.462	10942.161
Ethylene (2400.00ppm, 5.11m, 190C).la	189.936	0.998	12263.999	12262.913	12444.229
Ethylene (2700.00ppm, 5.11m, 190C).la	189.914	0.998	13796.999	13797.629	13888.468

Interpolation: Quartic

Force Through Zero ☒

Min % Residuals ☒ Excl. Zero ☐ Quant w/ Highest ☐

Spectral Regions
Region 00 - 900.12 to 1000.16 cm-1
Region 01 - 615.91 to 899.88 cm-1
Region 02 - 1000.40 to 1211.33 cm-1
Region 03 - 1341.75 to 2117.96 cm-1
Region 04 - 2901.41 to 3286.87 cm-1

Calibration Generated	1 .22 AM 06/26/2012	Gas ID	HF ppm (10) 191C	Lo Alarm	NaN	Span	Offset. 0000
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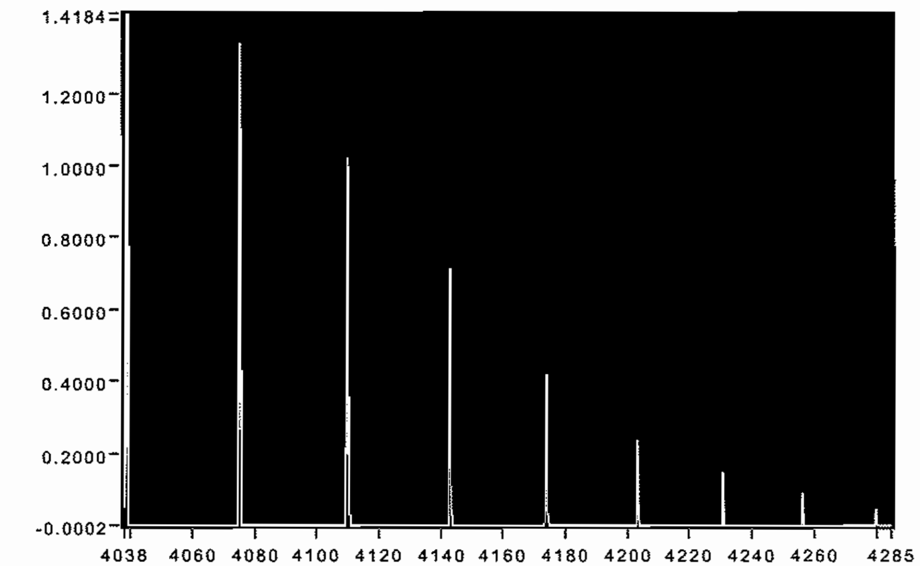
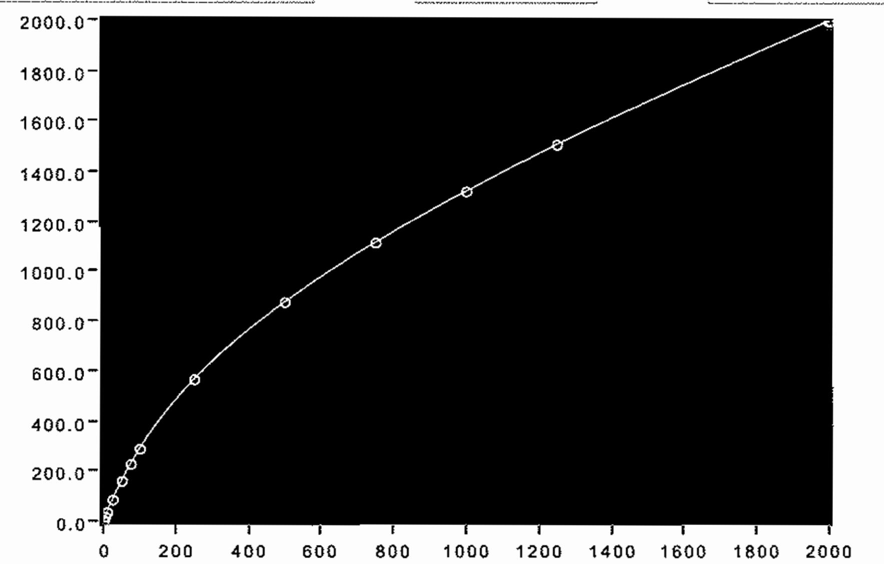




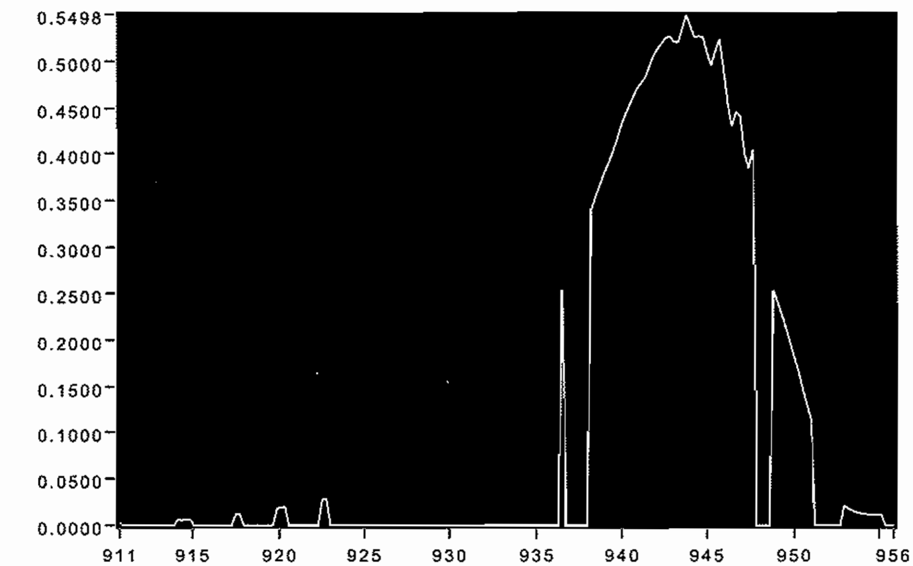
Cal Spectra	Temp (C)	Pres (atm)	Conc (ppm-m)	Actual	Calc'd
HF 96 MNB-fz 1ppm-m (1ppm, 1.000m, 1	191.000	1.000	1.000	1.000	3.620
HF 96 MNB-fz 5ppm-m (5ppm, 1.000m,	191.000	1.000	5.000	5.000	17.914
HF 96 MNB-fz 10ppm-m (10ppm, 1.000m	191.000	1.000	10.000	10.000	35.375
HF 96 MNB-fz 25ppm-m (25ppm, 1.000r	191.000	1.000	25.000	25.000	85.208
HF 96 MNB-fz 50ppm-m (50ppm, 1.000r	191.000	1.000	50.000	50.000	160.659
HF 96 MNB-fz 75ppm-m (75ppm, 1.000r	191.000	1.000	75.000	75.000	228.048
HF 96 MNB-fz 100ppm-m (100ppm, 1.00	191.000	1.000	100.000	100.000	288.789
HF 96 MNB-fz 250ppm-m (250ppm, 1.00	191.000	1.000	250.000	250.000	565.147
HF 96 MNB-fz 500ppm-m (500ppm, 1.00	191.000	1.000	500.000	500.000	875.753
HF 96 MNB-fz 750ppm-m (750ppm, 1.00	191.000	1.000	750.000	750.000	1115.993
HF 96 MNB-fz 1000ppm-m (1000ppm, 1.	191.000	1.000	1000.000	1000.000	1322.828
HF 96 MNB-fz 1250ppm-m (1250ppm, 1	191.000	1.000	1250.000	1250.000	1509.378
HF 96 MNB-fz 2000ppm-m (2000ppm, 1	191.000	1.000	2000.000	2000.000	2000.000

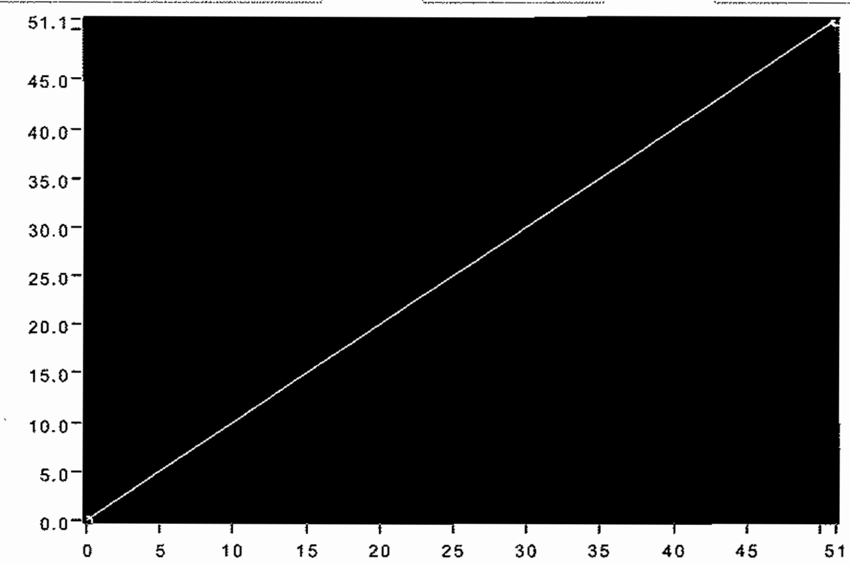
Interpolation: Spline — Force Through Zero [X]

Min % Residuals [ ] Excl. Zero [ ] Quant w/ Highest [ ]

Spectral Regions
Region 00 - 4037.90 to 4284.87 cm-1
Region 01 - 3405.41 to 4037.84 cm-1
Region 02 - 4284.93 to 4363.63 cm-1

Calibration	0[illegible]:34 PM	Gas ID	SF6 (10) 191C	Lo Alarm	NaN	Span	Offset. J0000
Generated	07/09/2012	LRF Path	C:\OLT\Methods R3\Cement-coal-EGU method 191C\SF6 (10) 191C_0.lrf	Hi Alarm	NaN	Mutations	FALSE





Cal Spectra	Temp (C)	Pres (atm)	Conc (ppm-m)	Actual	Calc'd
SF6 (10ppm, 5.11m, 191C) #1.LAB	191.504	1.008	51.100	51.100	51.100

Interpolation: Linear
Force Through Zero ☒
Min % Residuals ☒ Excl. Zero ☐ Quant w/ Highest ☐

Spectral Regions
Region 00 - 910.73 to 955.81 cm-1
Region 01 - 902.05 to 910.49 cm-1
Region 02 - 956.05 to 1004.99 cm-1

Appendix F

Test Participants

Scott Steinsberger	Project Manager and FTIR Operator
Dustin Carpenter	Sample Technician
Lee Harris	Sampling Technician
Andrew Horrell	Holcim Plant Contact

Appendix G

RTR Sampling and Analytical Protocol

DEECO Inc.
3404 Lake Woodard Road
Raleigh, NC 27604
(919) 250-0285 (ph); (919) 250-1835 (Fax) www.deeco.com

PROTOCOL TO PERFORM A SAMPLING AND ANALYTICAL TESTING PROGRAM AS PART OF THE US EPA RISK AND TECHNOLOGY REVIEW

at

Holcim Inc.
Ste. Genevieve Facility
2942 US Highway 61
Bloomsdale, MO 63627

Submitted By:
DEECO, INC.
3404 Lake Woodard Road
Raleigh, NC 27604

September 29, 2023

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APPENDICES

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

The United States Environmental Protection Agency (US EPA) has directed the portland cement industry (SIC 3241) to conduct emissions testing as part of the US EPA Risk and Technology Review (RTR). This document provides the overall test program approach and specifies minimum sample collection procedures, data quality objectives, and quality assurance/quality control measures to be used by the source testing firms selected by the cement companies performing tests. The test program is designed to be a comprehensive and robust test of each facility. The quality assurance and quality control (QA/QC) measures are designed to produce standardized data having known precision and accuracy. Collection of accurate, representative, and standardized data for facilities with low emissions is necessary especially in view of MACT standard setting procedures.

Cement kiln pyro-processing systems located throughout the US will be included in this request. Individual facilities have a wide range of kiln system configurations and air pollution control (APC) trains. Site-specific considerations will be required to capture emissions profiles for the target analytes that represent the extent of control or possible emissions increases from these controls.

1.2 PLANT NAME, ADDRESS, AND CONTACT

Holcim (US) Inc. - Ste. Genevieve Plant
2942 US Highway 61
Bloomsdale, MO 63627

Mr. Andrew Horrell
TEL (636) 524-8425
FAX (636) 524-8140
andrew.horrell@holcim.com

1.3 PROCESS OF INTEREST

The process to be tested at the Ste. Genevieve facility is a preheater/precalciner pyro-processing system with two inline raw mills producing portland cement.

1.4 AIR POLLUTION CONTROL EQUIPMENT

The air pollution control equipment at the Ste. Genevieve facility consists of three control devices. A selective noncatalytic reduction (SNCR) post combustion emissions control technology for reducing NOx by injecting ammonia into the kiln at a properly determined location. A dry sorbent injection system utilizing lime is used to control acid gas emissions. Exhaust from the kiln, both inline raw mills, clinker cooler, and coal mills directed through respective fabric filters for particulate removal, and directed into individual kiln/raw mills, clinker cooler, and coal mills stacks.

1.5 EMISSION POINTS AND SAMPLING LOCATIONS

Sampling will be conducted on the Kiln/Raw Mills Main stack.

1.6 POLLUTANTS TO BE MEASURED

Emission testing will be conducted for hydrogen cyanide (HCN), hydrogen fluoride (HF), and diatomic chlorine (Cl_2). Concurrent measurements to determine volumetric flow rate will be made. The sampling and analytical procedures to be followed are discussed in detail in Section 4.

1.7 EXPECTED TEST DATES

Test dates are to be determined.

1.8 TEST PROGRAM ORGANIZATION

The test program organizational chart is presented in Figure 1.1.

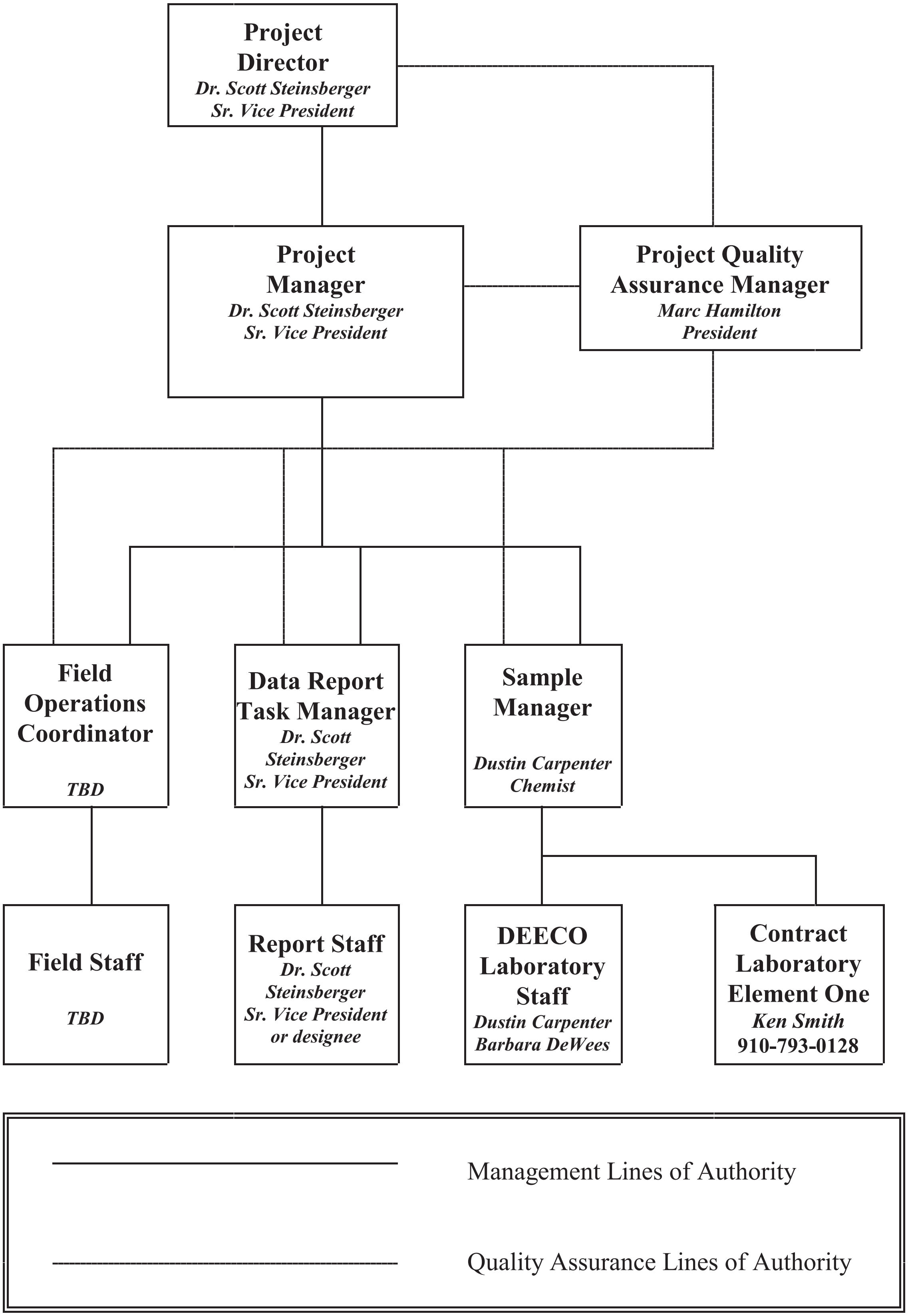

Figure 1.1 Organizational Chart

2.0 SOURCE DESCRIPTION

2.1 PROCESS DESCRIPTION

Holcim (US) Inc. operates a facility east of the township of Danby in Ste. Genevieve County, Missouri designated as the Ste. Genevieve plant. The Ste. Genevieve plant is expected to have an annual clinker production capacity of 4,828,074 tons with a Portland cement production capacity of 5,082,183 tons. Operational units that accommodate this level of production include an on-site quarry, raw material storage, crushing and milling, solid fuel (coal and petroleum coke) storage and milling, liquid fuel storage, one preheater/precalciner cement kiln system, product milling, product storage, and loading and unloading systems.

Cement manufacturing involves chemical and physical processing of large quantities of raw materials. The raw materials used include sources of calcium, silica, alumina and iron. These are the components necessary for the manufacture of the cement chemicals dicalcium silicate, tricalcium silicate, tricalcium aluminate, and tetra-calcium aluminoferrite. The raw feed is prepared for use in the kiln system by sizing, grinding and blending the various raw materials to produce the necessary mix for quality production. The prepared raw feed is introduced to the kiln system where it is physically and chemically transformed into clinker, the intermediate product of Portland cement. In the kiln system, the raw materials are exposed to temperatures reaching up to 3,500°F through a countercurrent process in the kiln and a co-current process in the preheater. The raw materials are heated to 2,650°F, the temperature required to produce quality clinker. Both on-site and off-site sources supply raw materials for cement kiln feed at the Ste. Genevieve plant. Quarry resources include limestone and shale deposits that will comprise part of the raw material blend to become clinker, the principal product. Holcim will receive other raw materials from off-site suppliers at the Ste. Genevieve plant by rail, truck, and barge via the Mississippi River. Materials received from off-site may include limestone, iron ore, clay, bottom ash, fly ash, bauxite, diaspore, gypsum and other materials as necessary. An important source of raw materials is nonhazardous waste materials from other industries that have the proper chemical and physical properties to be used as a raw material source. The Ste. Genevieve plant is designed for these types of materials as sources of calcium, silica, alumina and iron. Preparation of raw materials, depending on its source and physical properties, involves primary and secondary crushing, and screening, blending and grinding in the raw mills prior to entrance into the preheater tower of the cement kiln system.

Holcim uses coal and petroleum coke as the primary fuels for the cement manufacturing process at the Ste. Genevieve plant. Holcim uses coal mills to prepare raw coal/coke for firing in the precalciner and the kiln. Solid fuels are received at the facility by truck, rail, and river barge. Liquid oils and similar non-hazardous materials are used as a secondary fuel in critical situations such as start-up and back-up. The facility's equipment design also allows Holcim to beneficially use many other sources of energy bearing, non-hazardous waste materials as supplemental fuel, when available. The preheater/precalciner pyroprocess is a state-of-the-art design that features five-stage cyclone-type preheater tower, low-NO_x precalciner, and a rotary kiln. The preheater/precalciner portion of the system is located in a tall tower adjacent to the kiln. The low-NO_x precalciner will be located at the base of the tower. The precalciner allows the burning fuel to be thoroughly mixed with the kiln feed. Excess heated air from the clinker cooler (tertiary air) will provide combustion air for the precalciner. Preheater/precalciner kilns feature greater thermal efficiency as compared to long dry or long wet kilns. This results in significantly lower emissions and decreased fuel consumption per ton of clinker produced. To increase energy efficiency even further, hot exhaust gases from the preheater tower are utilized to dry kiln feed in the raw mills and fuel in the coal mill.

2.2 CONTROL EQUIPMENT DESCRIPTION

The air pollution control equipment at the Ste. Genevieve facility consists of three control devices. A selective noncatalytic reduction (SNCR) post combustion emissions control technology for reducing NO_x by injecting ammonia into the kiln at a properly determined location. A dry sorbent injection system utilizing lime is used to control acid gas emissions. Exhaust from the kiln/raw mills, clinker cooler, and coal mills directed through respective fabric filters for particulate removal, and directed into individual kiln/raw mills, clinker cooler, and coal mills stacks.

A schematic of the Ste. Genevieve process, including control equipment is shown below in Figure 2.1.

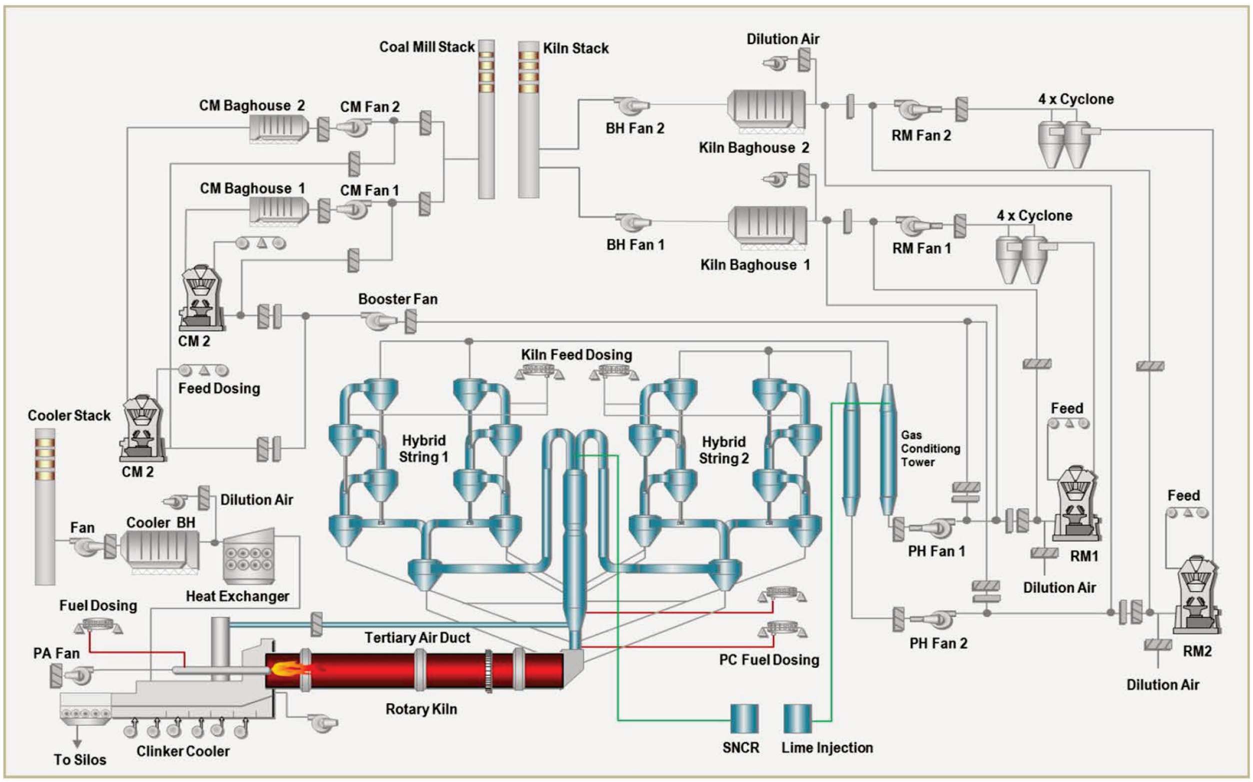

Figure 2.1 Ste. Genevieve Detailed Process Schematic

3.0 TEST PROGRAM

3.1 OBJECTIVES

An air emissions sampling and analytical program will be conducted on the Kiln/Raw Mills Main stack at the Ste. Genevieve cement facility located in Bloomsdale, MO. All testing will be performed following accepted EPA methodology. The test program is to provide a standardized data set to the EPA and the cement industry so that reliable facility inter-comparisons of emissions can be made.

All testing will be performed in strict accordance with "DRAFT GENERAL TEST PLAN Testing To Determine HCN, HF, and Cl_2 Emissions From Cement Kilns" dated March 2, 2023" and the specifications stipulated in 40 CFR 60, Appendix A for flow rate following EPA Method 1, 2, 3A, and 4) and hydrogen fluoride (HF) and diatomic chlorine (Cl_2) following EPA Method 26A and in 40 CFR 63, Appendix A for hydrogen cyanide (HCN) and (HF) following EPA Method 320. All sampling runs will be one hour long.

The source emission test will be performed on a date to be determined. Testing will be conducted under representative process and control system operating conditions. For facilities with inline raw mills, testing will be performed while operating in the "Mill On" and "Mill Off" conditions. Ste. Genevieve is equipped with two (2) inline raw mills, therefore the expected operating conditions are "Both Mills On" and "Both Mills Off".

3.2 TEST MATRIX

Table 3-1 presents the sampling and analytical matrix and proposed test schedule.

TABLE 3-1 PROGRAM OUTLINE AND TENTATIVE TEST SCHEDULE

Sampling Location	No. of runs	Sample/Type Pollutant	Sampling Method	Sample Run Times (min)	Analytical Method	Analytical Laboratory
Day 1						
Stack	Arrive on-site and set up test equipment					
Day 2						
Stack; Both Raw Mills On	3	O_2/CO_2	EPA Method 3A	60	Paramagnetic (O_2) NDIR (CO_2)	DEECO
	3	HF and Cl_2	EPA Method 26A[1]	60	Ion Chromatograph	Element One
	3	HCN and HF	EPA Method 320	60	FTIR (Method 320)	DEECO
Day 3						
Stack; Both Raw Mills Off	3	O_2/CO_2	EPA Method 3A	60	Paramagnetic (O_2) NDIR (CO_2)	DEECO
	3	HF and Cl_2	EPA Method 26A[1]	60	Ion Chromatograph	Element One
	3	HCN and HF	EPA Method 320	60	FTIR (Method 320)	DEECO

[1] Stack gas flow rate and moisture measurement may be taken from concurrent Method 26A sampling trains.

3.3 TEST COORDINATION

Mr. Andrew Horrell, the Ste. Genevieve facility contact, will serve as the test coordinator and will be responsible for:

1. Scheduling the start of all testing
2. Principal contact with the agency officials concerning the tests
3. Principal contact with DEECO concerning the tests
4. Recording the process data during the testing
5. Providing copies of any field test data to the agency

If there is a temporary equipment malfunction in the middle of a test, radio contact will be made with the test crew in order to delay the test. When problems have been corrected, the test will continue from the point where it was delayed. If the malfunction or upset condition results in an extended test delay, then the affected test run(s) may be aborted and a new run(s) conducted when the malfunction has been corrected or process upset cleared. Any samples or field data from aborted runs may be discarded.

4.0 SAMPLING LOCATION DESCRIPTIONS

4.1 SAMPLING LOCATION DESCRIPTION

The Kiln/Raw Mills Main stack is a vertically-oriented circular stack with an inside diameter of 218.9 inches. Four equidistant sampling ports are located at about located approximately 146.7' (approximately 8.0 duct diameters) above the closest disturbance and approximately 147.3' (approximately 8.1 duct diameters) from the stack outlet.

This sampling location meets the minimum specifications for selection of a measurement site as outlined in EPA Method 1. Cyclonic flow checks, as described in EPA Method 1 Section 2.4, using the Type-S pitot null procedure and angle measurements will be conducted at the Kiln/Raw Mills Main stack test location.

A twelve (12) point sampling traverse will be made using 3 points in each of 4 sampling ports at the Kiln/Raw Mills Main stack. Each traverse will be made at each sampling location using a type-S pitot tube in accordance with EPA Methods 2 procedures. Gas temperatures are to be measured using calibrated Type K thermocouples and digital readout devices. All measurements are to be performed in accordance with the procedures in EPA Methods 2, and 26A.

A schematic of the Kiln/Raw Mills Main stack is provided in Figure 4.1.

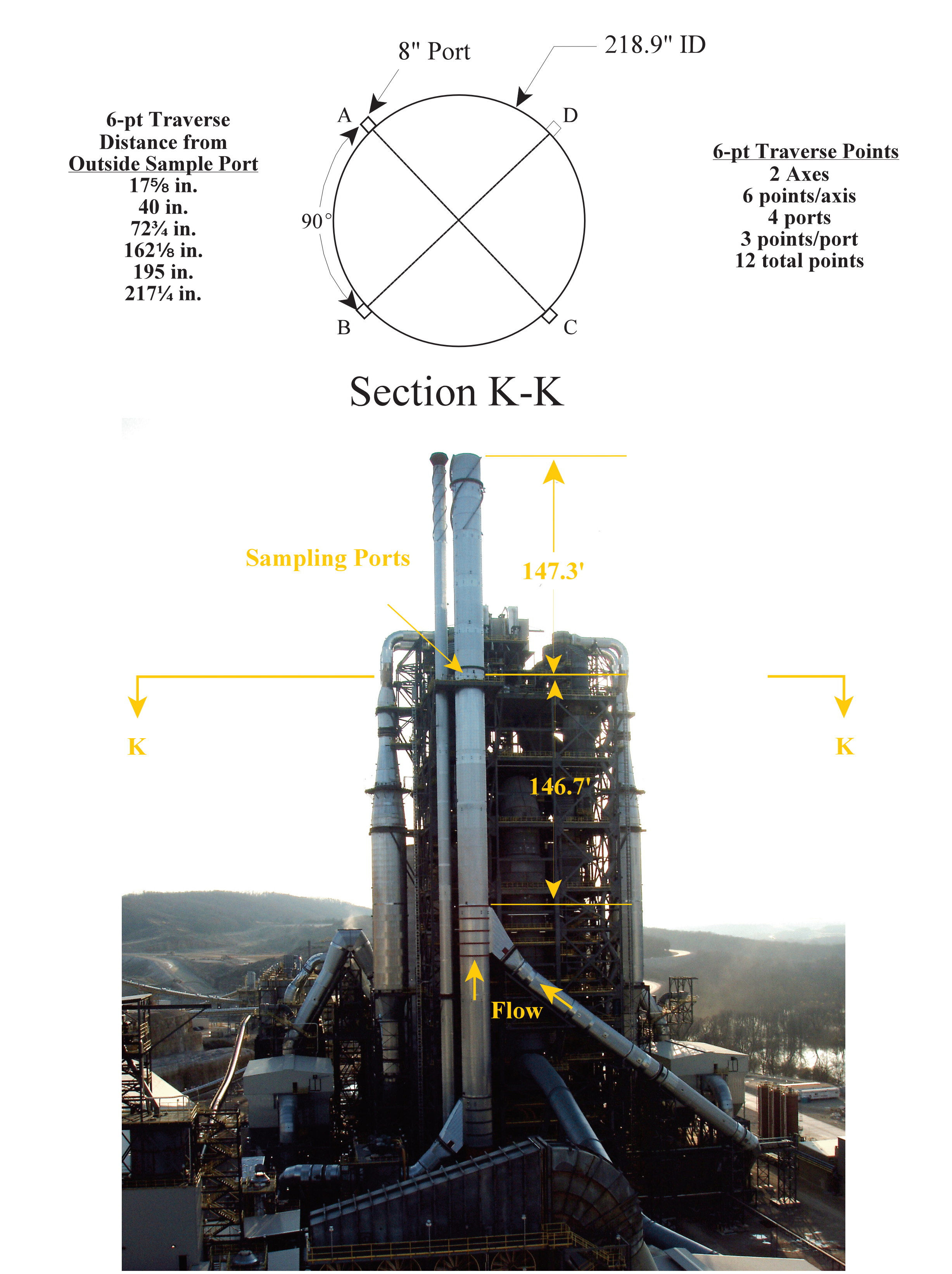

Figure 4.1 Schematic of Stack Sampling Location

5.0 SAMPLING AND ANALYTICAL PROCEDURES

This section contains a brief description of the sampling and analytical procedures for each method that will be employed during the test program. All equipment, procedures, and quality assurance measures necessary for completion of the test program will meet or exceed the specifications of the appropriate methods Any deviations from the methods to ensure quality representativeness of the results are also discussed.

5.1 TEST METHODS

The methods for the test program are described below, and apply to all process operating conditions (e.g. where there is an inline raw mill, testing will be performed while operating in the "Mill On" and "Mill Off" conditions). Table 3-1 outlines expected operating conditions for this test.

5.1.1 SAMPLING POINT DETERMINATION - EPA METHOD 1

The number and location of the sampling or traverse points will be determined according to the procedures outlined in EPA Method 1. The sample location will be inspected to insure EPA Method 1 criteria is met. All points will be at least 1.0 inches from the stack wall, per Method 1.

5.1.2 FLUE GAS VELOCITY AND VOLUMETRIC FLOW RATE - EPA METHOD 2

The flue gas velocity and volumetric flow rate will be determined according to the procedures outlined in EPA Method 2. Velocity measurements will be made using type S pitot tubes conforming to the calibration specifications outlined in EPA Method 2, Section 10.1. Each Type-S pitot tube, calibrated according to these standards, will have an assigned coefficient. Differential pressures will be measured with Magnehelic gauges of appropriate range or with fluid manometers. Effluent gas temperatures will be measured with chromel-alumel thermocouples equipped with digital readouts.

5.1.3 OUTLET FLUE GAS COMPOSITION - EPA METHOD 3A

Outlet flue gas analysis for oxygen (O_2) and carbon dioxide (CO_2) concentrations, and the calculation of percent excess air and flue gas dry molecular weight will be performed in accordance with EPA Method 3A.

To evaluate the sampling location and points for FTIR and O_2 sampling, a three-point O_2 concentration stratification test on a line passing through the centroidal area at 16.7, 50.0 and 83.3 percent of the measurement line (or for stacks is greater than 2.4 meters (7.8 ft) at 0.4, 1.2 and 2.0 meters from the stack or duct wall). The procedures in Section 8.1.2 of Method 7E will be followed, but oxygen will be used as parameter as allowed by fourth sentence in Section 8.1.2. The plant O_2 CEMS as a control. A criteria of <5% variation from combined mean for each point will be used as indication of non-stratification and allowing single point sampling at the point closest to the mean. Otherwise, sampling for equal periods at the three test points during test run will be conducted.

Per EPA Method 3A for determining molecular weight, integrated sampling will be obtain using the Method 320 sampling system described in Section 5.1.6.

A portion of the hot , wet gas sample will be sent through a condensing system to remove the stack moisture, A portion of the moisture-free gas sample will be snt to a CAI Model 200 O_2 (or equivalent) analyzer measures using the paramagnetic technique. An oxygen molecule, because of its sp3 electron orbital distribution, has an unpaired electron and hence displays a magnetic orientation. Since other elements that display this magnetic phenomenon are not common gasses at normal temperatures, the paramagnetic measurement technique is virtually specific for oxygen. The sample gas flows through a detection cell located in a very strong magnetic field. The concentration of O_2 gas present induces a pressure differential in the detector cell. The amount of differential pressure is proportional to the concentration of O_2 gas present.

Calibration procedures will be performed in accordance with EPA methodology. Analyzers will be calibrated before and after each test and a calibration check between each test run.

The pretest calibrations will consist of the following steps:

- Internal (direct) calibration of each analyzer to adjust calibration and check linearity.
- External (through the entire sampling system) calibration to check the system bias on zero and span gases.

The post test calibration will consist of an external system bias calibration check.

The analyzer will be as calibrated using a certified zero and span (mid or high range) gas. Zero and span gases were directed to each analyzer through the appropriate plumbing, the calibration gas flow rates will be adjusted to the correct flow rate and the analyzer will be adjusted with the appropriate span pot.

After the analyzer is properly adjusted the linearity will be checked using a low and high range calibration gas. The maximum allowable limit for linearity is 2% of the analyzer range. All analyzers will be shown to be linear within these limits before proceding..

The external calibration bias check will be performed by placing the CEM system in sampling mode and injecting a zero and span gas into the sample line at the probe exit. This check shows if there is any sampling system related bias, and also checks the integrity of the sample line.

5.1.3.1 Calibration Gases-DEECO will use EPA Protocol and/or ±2% NIST Traceable gases for calibration as required by the various reference methods employed in this test program. Calibration gases will be selected from previous experience with similar sources and/or from information obtained from the facility engineer prior to sampling. In some cases if the gases that are selected are out of the optimum range of operation then no significant impact of data quality is expected due to the linear nature of the analyzers that were used.

Audit gases, if available from a federal or a state agency, will be analyzed.

5.1.3.2 Sampling Procedures-At the completion of the pretest calibration routine, the CEM system will be ready for operation. No further adjustments of sample flow rates, analyzer zero or span adjustments, or other critical CEM operating parameters will be made until testing and post test calibration were complete.

Each sampling run will be one hour. At the completion for each test run, calibration gases will be used to check between test runs. A zero and the upscale calibration gas closest to the actual emission concentrations will be used for the pretest and post test calibrations.

5.1.4 FLUE GAS MOISTURE CONTENT - EPA METHOD 4

The flue gas moisture content will be determined in conjunction with the EPA Method 26A trains according to the sampling and analytical procedures outlined in EPA Method 4. (**NOTE:** In order to maintain isokinetic sampling, the sampling rate used may be required to temporarily exceed the EPA Method 4-specified maximum sampling rate of 0.75 CFM, based on observed stack gas pitot readings.) The impingers will be connected in series and will contain reagents as described below. The impingers will be contained in an ice bath in order to assure condensation of the moisture in the flue gas stream. Any moisture that is not condensed in the impingers is captured in the silica gel, therefore all moisture can be weighed and entered into moisture content calculations.

5.1.5 HYDROGEN FLUORIDE AND DIATOMIC CHLORINE - EPA METHOD 26A

Sampling and analytical procedures will be similar to those outlined in EPA Method 26A to determine primarily diatomic chlorine (Cl_2) emissions and hydrogen fluoride (HF) emissions at main stack outlet sampling locations. Duplicate simultaneous trains (a.k.a "paired trains") for each test run will be used to determine precision.

Sample is collected through a heated glass probe, followed by a heated quartz fiber filter, where stack gas HF and Cl_2 are collected in a series of chilled impingers. The sampling train impingers will contain 50 ml of 0.1N sulfuric acid in the first impinger (optional should high moisture warrant a modified short stem), 100 ml of 0.1N sulfuric acid in the second and third, an empty fourth impinger, 100 ml of 0.1N NaOH in the fifth and sixth and 200 grams of silica gel in the last impinger. (**NOTE**: For plants with scrubbers, the optional cyclone may be used since the gas stream may be saturated with moisture.)

Sampling will be conducted isokinetically (±10%) with readings of flue gas parameters recorded at traverse points selected according to EPA Method 1. Leak-checks on the Method 26A sampling train will be are performed before and after each sampling run and optionally for any port change. In the event that any portion of the train needed to be disassembled and reassembled (i.e., due to filter or resin changes), leak-checks are performed. The sampling train leak-checks and leakage rate (where applicable) are documented on the field test data sheet for each respective run. All leak checks will be acceptable.

The glass button hook nozzle and probe liner will be constructed of borosilicate glass or quartz. The filter holder will be constructed of borosilicate glass with a Teflon frit filter support and a sealing gasket. A heated quartz fiber filter, for sources above 210°C, or PTFE-bonded glass fiber filter will be used. The probe and filter housing will heated to above 248°F and not exceed an upper boundary of 273°F. Probe liners and filter holders will be cleaned thoroughly prior to testing.

The Method 26A trains will be operated isokinetically for a minimum of 60 minutes and collect a minimum of 1 dry, standard cubic meter (DSCM). Pretest preparations, preliminary determinations, and leak check procedures will be those outlined in EPA Method 5.

After completion of sampling the train will be leak checked and transferred to the sample recovery trailer. All leak checks will be acceptable. The impingers will be weighed to determine moisture gain in accordance with EPA Method 4.

Sample recovery will involve quantitative recovery of the sulfuric acid impinger contents and the NaOH impinger contents into separate tare-weighed, precleaned polyethylene sample containers.

The nozzle, probe, filter and filter housing will not be recovered.

The contents of sulfuric acid impingers, including the contents if any of the empty (2nd knockout or fourth) impinger will be quantitatively transferred to the tare-weighed, precleaned polyethylene sample container, followed by three rinses with deionized (DI) water of the impingers and all connecting glassware (including the connecting glassware to the first impinger) placed in the same H_2SO_4 container. The container will be labeled and weighed to determine the final sample volume. The liquid level will be marked on the sample container.

The contents NaOH impingers will be quantitatively transferred to a second tare-weighed, precleaned polyethylene sample container, followed by three rinses with DI water of the impingers and all connecting glassware placed in the same NaOH container. The container will be labeled and weighed to determine the final sample volume. The liquid level will be marked on the sample container

Sample recovery from each train will include:

1. Container No. 1 - Contents 1st knockout, H_2SO_4 impingers, and 2nd knockout and, and DI rinse of impingers and connecting glassware; and
2. Container No. 2 - Contents NaOH impingers, and DI rinse of impingers and connecting glassware.

Additional quality control consists of collecting and analyzing a field blank train for every three test runs. The blank train is to be assembled from a used train, leak checked and sit for a period equal to the sampling time (i.e, 1-hr). The blank train data will be used to determine the method detection limit for the test program target analytes (ie. The lowest number that could be detected), and compared to stack emissions.

Reagent blanks of 0.1 N H_2SO_4, 0.1N NaOH, and DI water will be collected and archived for later analysis should there be any issues with the field blank train samples

The H_2SO_4 impinger solutions will be analyzed using ion chromatography techniques for fluoride ions (F^-) (EPA SW-9057). Duplicate analyses will be performed on the samples and a reagent blank. Precision will be demonstrated by duplicate injection of each sample, the results of each individual analysis must be within 5% of their mean to be acceptable. If the precision criteria is not met, analysis of the sample is repeated until consecutive injections meet the criteria.

The NaOH impinger solutions will be treated with sodium thiosulfate to ensure complete conversion of hypochlorous acid (HClO) to chloride ions (Cl^-). The resulting solution will be analyzed using ion chromatography techniques for chloride ions (EPA SW-9057). Duplicate analyses will be performed on the samples and a reagent blank. Precision will be demonstrated by duplicate injection of each sample, the results of each individual analysis must be within 5% of their mean to be acceptable. If the precision criteria is not met, analysis of the sample is repeated until consecutive injections meet the criteria.

All EPA Method 26A HF/Cl_2 samples will be analyzed by Element One of Wilmington NC. Refer to Section 1, Figure 1.1 for contact information.

The relative deviation (RD)will be calculated as described in EPA Method 30B between the Cl_2 concentrations measured with the paired trains.

5.1.6 HYDROGEN CYANIDE AND HYDROGEN FLUORIDE - EPA METHOD 320

EPA Method 320 will be performed to determine emissions of concentrations of HCN and HF. Three, 1-hour sampling runs will be conducted under representative process and control system operating conditions.

The gas sample will be extracted from the stack through a glass-lined probe and filter heated to 375° F. For external calibration checks and analyte spikes, the gases will be introduced in front of the heated filter. Any excess calibration gas will be diverted through the sample probes into the source. Outflow of gas from the heated filter enclosure was transported through a Teflon sample line heated to 375° F. For this source approximately 100’ of sample line will be required. The heated sample line will be connected directly to the FTIR sample cell. Using heat-traced Teflon tubing the exit of the FTIR cell will be connected to a sample pump with a heated stainless steel pump head. The pump discharge will be directed to a proprietary chiller-type gas conditioner to remove moisture prior to delivery sample gas to the O_2/CO_2 monitors.

The distribution of the gas sample to the monitors will be accomplished using a panel equipped with valves and rotometers. The gas sample was then divided and directed to the analyzers.

FTIR sample cell will be maintained at 191°C and connected to a MKS Instruments Multigas 2030 Fourier Transform Infrared Spectrometer and Detector.

The FTIR spectrometer will measure vapor phase organic or inorganic compounds which absorb energy in the mid-infrared spectral region, about 400 to 4000 cm^{-1} (25 to 2.5 µm). Continuous measurement will be made by matching sample absorbance bands with bands in reference spectra, and comparing sample band intensities with reference band intensities.

The principle limitation to FTIR spectroscopy are the presence of interfering compounds that also absorb energy in the mid-infrared spectral region. In a cement kiln stack gas matrix, water vapor (H_2O) and carbon dioxide (CO_2) are the primary interferents that must be incorporated into the identification and quantitation method.

The FTIR software performs the computation for a single compound by subtracting all the other compounds (interferants and target) from the absorbance spectra and quantifies the single compound based on the remain absorbance. The FTIR software provides a Standard Error Calculation (SEC) value that is an indication of how well the identification and quantitation has been performed. A high SEC indicates that other interferants have not been accounted for in the analysis method, and a low SEC is indicative of greater confidence measurement.

The instrument is operated with a resolution of 0.5 cm^{-1} with 4x zero filling. Beer-Norton Medium apodization is used with amplitude phase correction.

For this RTR test program, following specific QA/QC activities for EPA Method 320 will be performed and criterium met.

5.1.6.1 Laboratory QA/QC Activities Before Field Test Program- Before field testing occurs, the following QA/QC activities will be conducted;

1) Seven consecutive samples of dry nitrogen through the sampling system will be acquired and used to calculate the standard deviation for each of the test program target analytes multiplied

by a factor of 3. These data will be considered representative of detection limits for this test program and are to be compared to the 0.5 ppm required DL;

2) From these seven dry nitrogen samples, the results for the Signal-to-Noise Ratio (SNR) @ 2500 cm^{-1} should be >2500, at 64 scans and the results for single beam intensity @ 2500 cm^{-1} should be >0.9; and

3 Upon receipt of HCN calibration gases a direct analysis will be performed to verify FTIR response agrees with tag value within 5%. Analysis results will be reported to PCA to assess need for modified reference spectra and/or change to direct analysis criterion:

5.1.6.2 QA/QCActivities During Field Test Program- During the field test program, following QA/QC activities will be performed and criterium met;

1) On each test day prior to any testing , an instrument background will be collected using dry nitrogen directed to the gas cell. The background will be collected with at least 128 scans;
2) The probe, filter, sample line and all sample system components in contact with effluent will be maintained at or above 375ºF or 191ºC (consistent with FTIR calibration temperature) to avoid any possible "cold spots;"
3) Heated sample lines will be ≤100 feet wherever possible, and not longer than 200 feet, without prior approval for unusual test circumstances;
4) A system zero with all sampling system components at operating temperature will be performed by injecting nitrogen at the sample probe and through sample filter and entire measurement system. After zero equilibration has been achieved, all measurement components will be quantified for at least 128 scans;
5) Ambient air will be sampled until equilibration of the measurement system has been achieved and all measurement components will be quantify for at least 128 scans;
6) The sample probe will be position at effluent measurement point and sampling will continue until equilibration of the measurement system has been achieved. At this point, the effluent concentrations will be quantified with two consecutive 64-scan samples as the initial native concentration for the dynamic spike;
7) Analyte spiking will be conducted for HCN before the first test run, and after each successive test run for a minimum of 4 spikes per test condition. (Additional spikes would be required before and after corrective action for the sampling or analysis system and/or before and after removing the sampling system from the stack.) These results will determine accuracy;
8) The spike gas injections will be maintained at 10% or less of total sample volume. The spike gas concentration and flow rate will be selected to approximately double the native effluent concentration, or the spike will be conducted to add 3-4 ppm to native concentration, whichever results in greater spiked concentration. Spike recovery results will be within ±20% of the expected value or ±0.5 ppm, whichever is least restrictive. (Specific HCN gases will be manufactured for this test program in the range of 50-100 ppm to provide spikes in the 5-10 ppm range, or lower. An SF_6 or appropriate tracer will be used to calculate the exact spike gas dilution ratio of 10% or less;)
9) After the dynamic spike, nitrogen will be sent through the sampling system until all traces of spike gas are removed and lines are proven below DL for target analytes;
10) The nitrogen purge will be discontinued and the sampling system will be allowed to equilibrate with stack gas before starting a test run. The first two consecutive 64-scan samples of a sample run will be used for the final native concentration. Residual results for HCN and HF will be verified to be less than 0.2-0.3 ppm for data acceptance, or less than 5% of the measured value, whichever is least restrictive. Calculate the standard deviation for

each of the test program target analytes for seven consecutive sample spectra from Run 1, multiplied by a factor of 3. These data will be compared to the pre-test system nitrogen standard deviation results and also included in the facility test report;

11) The SNR @ 2500 cm^{-1}, at 64 scans, and the results for single beam intensity @ 2500 cm^{-1} will be verified to met the >2500 and >0.9 criterium; respectively. The analyte spiking for HCN and subsequent system nitrogen injection will be conducted after each test run. Continue sequence until at least three valid runs per test condition are completed.

6.0 QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

6.1 QA/QC PROCEDURES

The QA/QC procedures for this RTR test program are summarized in Table 6-1.

TABLE 6-1 QA/QC PROCEDURES AND REQUIREMENTS

Target Analyte	Test Method	Detection Limit	QA/QC
HCN	EPA Method 320	0.5 ppm	Increase scans if needed to achieve detection limits. Increasing to 400 from relative 64 (gives a 2.5 S/N advantage). HCN spiking before and after each run by adding 10% or less spike to approximately double the native effluent concentration, or conduct spike to add 3-4 ppm to native concentration, whichever results in greater spiked concentration. Spike recovery results shall be within ±20% of the expected value or ±0.5 ppm, whichever is least restrictive 5% pre-to-post run calibration transfer standard (CTS) requirement
HF		0.2-0.3 ppm	Rely on CTS (5%), HCN and tracer gas responses to validate HF FTIR data
Cl_2	EPA Method 26A	~ 0.07 mg/m^3 (~0.2 ppm)	Duplicate Simultaneous Trains; Collect minimum of 1 dscm for each sample train. Acceptance criteria for paired samples: 10% Relative Deviation or 0.2 ppm absolute difference, whichever is least restrictive. Insert dry impinger between acid and base impingers
Effluent Flow Rate	EPA Methods 1-4	Not Applicable	As per M26A isokinetic testing or separately by Methods 1-3. FTIR measurements for H_2O. **Wind Tunnel calibrated pitot tube having a Cp of 0.84 or less is required for all flow measurements**. Compare preliminary velocity traverse measurements and sample run flow rate measurements to installed certified flow rate monitor. Investigate and resolve differences greater than 10% of average flow rate.
O_2	EPA Method 3A	Not Applicable	Analyte concentrations corrected @ 7% O_2 Span is 10%, 15%, or 20% (for co-mingled stacks only) Acceptance criteria are 0.2% O_2 difference for analyzer calibration error, and 0.3% O_2 for system bias checks, and zero and upscale drift checks.

6.2 SAMPLE IDENTIFICATION AND CUSTODY

Sample custody procedures for this program are based on EPA recommended procedures. Since samples will be analyzed by one or more laboratories as well as in the field, the custody procedures emphasize careful documentation of sample collection and field analytical data and the use of chain of custody records for samples being transported. The procedures which will be used are discussed below.

The project manager will be responsible for ensuring that proper custody and documentation procedures are followed for the field sampling and field analytical efforts. He will be assisted in this effort by key sampling personnel involved in sampling recovery.

Samples will be collected, transported, and stored in clean containers which are constructed of materials inert to the analytical matrix such as glass jars. Only containers which allow air tight seals will be used. Amber glass jars will be employed when containers are needed to inhibit photochemical reactions.

All sampling data, including information regarding sampling times, locations, and any specific considerations associated with sample acquisition will be recorded on preformatted data sheets. All samples will be given unique, identifying alphanumeric sample codes which will serve to track samples from the field to the laboratory.

Samples will be stored for transport from the lab to the field to the lab in storage boxes constructed in a fashion which minimizes movement and thus prevents breakage of containers. For example, boxes used for transporting glass containers will have foam inserts with form-fitting cutouts. Sample transport boxes will be locked except when in use. Vans containing equipment and samples will be locked whenever they are left unattended.

A daily activity log will be maintained by the project supervisor. This will be an informal log used to record various types of information, such as minor problems which arise, sketches of sampling locations, names and phone numbers of plant contacts. daily activity summaries, etc.

This section provides information regarding the organization of the sampling and analytical program. The following details the key positions and their responsibilities. Once personnel have been assigned to these positions, their qualifications will be provided as an addendum.

The organization of the project team, including QA functions, is shown in the project organization chart (see Figure 1.1).

7.0 SAMPLE CUSTODY

Sample custody procedures for this program are based on EPA recommended procedures. Since samples will be analyzed by one or more laboratories as well as in the field, the custody procedures emphasize careful documentation of sample collection and field analytical data and the use of chain of custody records for samples being transported. The procedures which will be used are discussed below.

7.1 FIELD SAMPLING OPERATIONS

The project manager will be responsible for ensuring that proper custody and documentation procedures are followed for the field sampling and field analytical efforts. He will be assisted in this effort by key sampling personnel involved in sampling recovery.

Samples will be collected, transported, and stored in clean containers which are constructed of materials inert to the analytical matrix such as glass jars. Only containers which allow air tight seals will be used. Amber glass jars will be employed when containers are needed to inhibit photochemical reactions.

All sampling data, including information regarding sampling times, locations, and any specific considerations associated with sample acquisition will be recorded on preformatted data sheets. All samples will be given unique, identifying alphanumeric sample codes which will serve to track samples from the field to the laboratory.

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A daily activity log will be maintained by the project supervisor. This will be an informal log used to record various types of information, such as minor problems which arise, sketches of sampling locations, names and phone numbers of plant contacts. daily activity summaries, etc.

7.2 ANALYTICAL OPERATIONS

Analytical operations will be performed on-site in the laboratory as well as in the remote laboratories. Samples analyzed by outside laboratories are transported with a Change of Custody form. This form will list sample identifications, analytical parameters, sample matrices, anticipated date of results, and other relevant information necessary to ensure the appropriate analyses are performed and to document the progress of the samples.

8.0 INTERNAL QUALITY CONTROL CHECKS

Specific quality control (QC) procedures will be followed to ensure the continuous production of useful and valid data throughout the course of this test program. The QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme. Strict adherence to prescribed procedures is quite often the most applicable QC check. A discussion of both the sampling and analytical QC checks that will be utilized during this program is presented below.

8.1 EQUIPMENT INSPECTION AND MAINTENANCE

Each item of field test equipment will be assigned a unique, permanent identification number. An effective preventative maintenance program is necessary to ensure data quality. Each item of equipment returning from the field will be inspected before it is returned to storage. During the course of these inspections, items are cleaned, repaired, reconditioned, and recalibrated where necessary.

Each item of equipment transported to the field for this test program will be inspected again before being packed to detect equipment problems which may originate during periods of storage. This minimizes lost time on the job site due to equipment failure.

Occasional equipment failure in the field is unavoidable despite the most rigorous inspection and maintenance procedures. For this reason, replacement equipment for all critical sampling train components will be transported to the job site.

8.2 EQUIPMENT CALIBRATION

New items for which calibration is required will be calibrated before initial field use. Equipment whose calibration status may change with use or time will be inspected in the field before testing begins and again upon return form each field use. When an item of equipment is found to be out of calibration, it will be repaired and recalibrated or retired from service. All equipment will be periodically recalibrated in full, regardless of the outcome of these regular inspections.

Calibrations will be conducted in a manner, and at a frequency, which meets or exceeds U.S. EPA specifications. The calibration procedures outlined in the EPA Methods will be followed. When these methods are inapplicable, methods such as those prescribed by the American Society for Testing Materials (ASTM) will be used.

Data obtained during calibrations will be recorded on standardized forms, which will be checked for completeness and accuracy by the quality assurance manager. Data reduction and subsequent calculations will be performed using computer facilities. Calculations will be checked at least twice for accuracy. Copies of calibration forms will be included in the test or projects reports.

Emissions sampling equipment requiring calibration includes pitot tubes, pressure gauges, thermometers, dry gas meters and barometers. The following sections elaborate on the calibration procedures to be followed for these items of equipment.

A: **Pitot Tubes.** All Type S pitot tubes used, whether separate or attached to a sampling probe, will be constructed in-house or by a third-party vendor. Each new pitot will be calibrated in accordance with Section 10.1 of EPA Method 2. Each Type-S pitot tube, calibrated according to these standards, will have an assigned coefficient. This coefficient should not change as long as the pitot tube is not damaged.

Each pitot tube will be inspected visually upon return from the field. If a cursory inspection indicates damage or raises doubt that the pitot remains in accordance with the EPA geometry standards, the pitot tube will be refurbished as needed and recalibrated.

B: **Differential Pressure Gauge.** All meter consoles used are equipped with 10-inch water column (W.C.) inclined-vertical manometers. Fluid manometers do not require calibration other than leak checks. Manometers will be leak checked in the field prior to each test series, and again upon return from the field.

C: **Impinger Thermometer.** Prior to the start of testing, the thermometer used to monitor the temperature of the gas leaving the last impinger will be compared with a mercury-in-glass thermometer which meets ASTM E-1 No. 63F specifications. The impinger thermometer is adjusted if necessary until is agrees within 2ºF of the reference thermometer. If the thermometer is not adjustable, it is labeled with a correction factor.

D: **Dry Gas Meter Thermometer.** The thermometer used to measure the temperature of the metered gas sample will be checked prior to each field trip against an ASTM mercury-in-glass thermometer. The dry gas meter thermometer is acceptable if the values agree within ± 5.4ºF. Thermometers not meeting this requirements will be adjusted or labeled with a correction factor.

E: **Flue Gas Temperature Sensor.** All thermocouples employed for the measurement of flue gas temperature are calibrated upon receipt. Initial calibrations will be performed at three points (ice bath, boiling water, and hot oil). An ASTM mercury-in-glass thermometer will be used as a reference. The thermocouple is acceptable if the agreement is within 1.5 percent (absolute) at each of the three calibration points.

Before and after each field use, the reading from the flue gas thermocouple-potentiometer combination will be compared with an ASTM mercury-in-glass reference thermometer at ambient conditions. If the two agree within ± 1.5 percent (absolute), the thermocouple and potentiometer are considered to be in proper working order.

F: **Dry Gas Meter and Orifice.** Two procedures will be used to calibrate the dry gas meter and orifice simultaneously. The full calibration will be a complete laboratory procedure used to obtain the calibration factor of the dry gas meter. Full calibrations will be performed over a wide range of orifice settings. A simpler procedure, the post-test calibration, will be designed to check whether the calibration factor has changed.

A dry gas meter that is calibrated annually against a spirometer or a set of calibrated critical orifices will be used as a transfer standard. During the annual calibration, triplicate calibration runs will be performed at seven flow rates ranging from 0.25 to 1.40 cfm.

G: **Dry Gas Meter.** Each metering system receives a full calibration at the time of purchase and a post-test calibration after each field use. If the calibration factor, γ, deviates by less than five percent from the initial value, the test data are acceptable. If γ deviates by more than 5 percent, the meter is recalibrated and the meter coefficient (initial or recalibrated) that yields the lowest sample volume for the test runs is used.

EPA Method 5 requires another full calibration anytime the post-test calibration check indicates that γ changed by more than 5 percent. Standard practice is to adjust and recalibrate the dry gas meter anytime γ is found to be outside the range of 0.96 to 1.04. Post-test calibrations will be performed after each field test series per EPA Method 5, section 16.3 procedures.

H: **Orifice.** An orifice calibration factor will be calculated for each flow setting during a full calibration. If the range of values does not vary by more than 0.20 in H_2O over a range of 0.4 to 4.0 in H_2O, the arithmetic average of the values obtained during the calibration is used.

I: **Barometer.** Each field barometer will be adjusted before each test series to agree within ± 0.1 inches of a reference aneroid barometer. The reference barometer will be checked against the station pressure value (corrected for elevation difference) reported by the National Weather Service.

8.3 SAMPLING QUALITY CONTROL PROCEDURES

The following pretest QC checks will be conducted:

- All sampling equipment will be thoroughly checked to ensure clean and operable components.
- Equipment will be inspected for possible damage from shipment.
- The oil manometer or Magnehelic gauge used to measure pressure across the Type S pitot tube will be leveled and zeroed.
- The number and location of the sampling traverse points will be checked before taking measurements.
- The temperature measurement system will be visually checked for damage and operability by measuring the ambient temperature prior to each traverse.

In addition to the general QC procedures listed above, QC procedures specific to each sampling method will also be incorporated into the sampling scheme. These methods and specific procedures are discussed below.

A: Sampling Train QC checks. The following QC procedures will be emphasized:

Prior to Start of Tests

- Keep all cleaned glassware and sample train components sealed until train assembly.
- Assemble the sampling trains in an environment free from uncontrolled dust.
- Visually inspect each sampling train for proper assembly.
- Perform pretest calculations to determine the proper sampling nozzle size.

Prior to Each Test Run

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

During Each Test Run

- Readings of temperature and differential pressure will be taken at each transverse point.
- All sampling data and calculations will be recorded on preformatted data sheets.
- All calibration data forms will be reviewed for completeness and accuracy.
- Any unusual occurrences will be noted during each run on the appropriate data form.
- The project supervisor will review sampling data sheets daily during testing.
- Properly maintain the roll and pitch axis of the Type S pitot tube and the sampling nozzle.
- Leak check the train before and after any move from one sampling port to another during a run (at DEECO's option) or if a filter change takes place.
- Conduct additional leak checks if the sampling time exceeds 4 hours.
- Maintain the probe, filter, and impingers at the proper temperatures.
- Maintain ice in the ice bath at all times.
- Make proper readings of the dry gas meter, delta P and delta H, temperature, and pump vacuum during sampling at each traverse point.
- Maintain isokinetic sampling within ± 10% of 100%.

After Each Test Run

- Visually inspect the sampling nozzle.
- Visually inspect the Type S pitot tube.
- Leak check each leg of the Type S pitot tube.
- Leak check the entire sampling train.

B: QC for Volumetric air flow rate determinations

Flue Gas Velocity. Data required to determine the flue gas velocity will be collected using the methodology specified in EPA Method 2. Quality control procedures are as follows.

- Visually inspect the Type S pitot tube before and after sampling.
- Leak check both legs of the pitot tube before and after sampling.
- Check the number and location of the sampling traverse points before taking measurements.

Flue Gas Molecular Weight. In the event that that integrated bag samples are to be used for determination of flue gas molecular weight, EPA Method 3 will be the sampling technique specified. Quality control will focus on the following procedures:

- The sampling train will be leak checked before and after each run.
- A constant sampling rate will be used in withdrawing a sample.
- The sampling train will be purged prior to sample collection.
- The sampling port will be properly sealed to prevent air in-leakage.

Moisture Content. The moisture content of the gas stream will be determined using the technique specified in EPA Method 4. The following QC checks will be performed:

- The sampling train will be leak checked before and after each run.
- Ice will be maintained in the ice bath throughout each run to insure an exit temperature (after the silica gel impinger) of $\leq 67°F$.

8.4 ANALYTICAL QUALITY CONTROL PROCEDURES

All analyses for this program will be performed using accepted laboratory procedures in accordance with the specified analytical protocols. Adherence to prescribed QC procedures will ensure data of consistent and measurable quality. Analytical QC will focus upon the use of control standards to provide a measure of analytical precision and accuracy. Also, specific acceptance criteria are defined for various analytical operations including calibrations, control standard analyses, drift checks, blanks, etc. The following general QC procedures will be incorporated into the analytical effort:

- The on-site project manager will review all analytical data and QC data on a daily basis for completeness and acceptability.
- Analytical QC data will be tabulated using the appropriate charts and forms on a daily basis
- Copies of the QC data tabulation will be submitted to the quality assurance manager following the completion of the test program.
- All hard copy raw data (i.e., chromatograms, computer printouts, etc.) will be maintained in organized files.

Specific analytical QC procedures for the Orsat analyzer (if used) are listed below.

- The analyzer will be leveled and the fluid levels zeroed prior to use.
- The analyzer will be leak checked prior to use.
- The analyzer will be thoroughly purged with sample prior to use.
- The analyzer will be checked by analyzing an ambient air sample.

EPA Method 26A Sample Analysis QC Checks are listed below.

- Calibration curve consisting of 4 calibration levels that bracket the expected sample range. Dilute samples as necessary to reach the calibration range;
- Duplicate analysis of calibration standards, before and after sample analysis, with duplicate injections being within 5% of their mean;
- Duplicate analysis of reagent blanks, quality control samples and field samples with duplicate injections being within 5% of their mean;
- Matrix spike samples may be prepared and analyzed. Matrix spike recoveries should be 90-110%
- A field blank will be carried through the procedure and analyzed with the field samples.
- An audit sample will be analyzed for if available from two or more independent, Approved Audit Sample Providers no less than 60 days prior to the test effort.

9.0 REPORTING AND DATA REDUCTION REQUIREMENTS

9.1 DATA REPORTING

The reporting units for HCN, HF, and Cl_2 will be in parts-per-million by volume, wet basis ($ppm_{v,d}$), parts-per-million by volume, dry corrected to 7% oxygen ($ppm_{v,d}@7\%O_2$), pounds-per-hour (lbs/hr), and pounds-per-ton of clinker (lbs/ton). Additional supporting data for CO_2, O_2, and H_2O concentrations and volumetric flow rates (actual cubic feet-per-minute, wet,standard cubic feet-per-minute, and dry,standard cubic feet-per-minute) will be reported. The clinker production, in short tons-per-hour (TPH) will be reported.

Any data that is not acceptable because of technical difficulties will be indicated, and an explanation of the technical problem will be given. All related QC and calibration data will be in the final report.

9.2 REPORT CONTENTS

Copies of the test report will be submitted after the test series has been completed. Results reported will include, but not be limited to emission rates and concentrations of gaseous pollutants, and process sample determinations, any liquid stream constituents determinations, and any other type of data requested. This report will also include a list of all personnel present during testing, summary results, descriptions of test procedures used, a description of the source and its operation during testing, test locations drawings, example calculations, raw field data, and equipment calibrations.

9.3 DATA REDUCTION

Care will be exercised to ensure hand recorded data is written accurately and legibly. Additionally, the use of prepared data recording forms, conveniently formatted, is an important aid to verify that all necessary data items are recorded. The collected field and laboratory data will be reviewed by the analyst and the Project Manager.

The Project Manager will reduce and validate all of the sampling and analytical data that is collected. The sampling data will include flow measurements, calibrations, etc. Each laboratory will reduce all analytical results prior to their submission to the Project Manager. The analytical data will be used to determine concentrations and emission rates of the compounds of interest.

Data reduction follows guidelines published in EPA Reference Methods, where applicable, and by guideline documents where EPA Reference Methods are not available. Validated computer programs will be used to calculate all reported values.

9.4 DATA VALIDATION

A second technical review of the data will be performed and documented by a qualified scientist other than the one who performed the actual analyses. The second reviewer will include evidence (e.g., check marks, recalculations, etc.) that show which data points were checked. Finally, the second reviewer will sign and date the cover page of the data packet or the record that was reviewed.

In-situ measurements will be validated by demonstrated acceptable post-test leak checks and calibration verifications according to the referenced method used.

Analysis data may be validated according to defined criteria by a secondary reviewer or by the analyst. At a minimum and if applicable, analysis data will be validated according to the following criteria (additional method-specific criteria or project requirements may apply):

- Sampling records complete and traceable

- All appropriate QC samples included with the analytical batch and reported with the sample results

- Routine tuning, calibration and inspection of analytical instrumentation documented and performed prior to analyses

- Initial and continuing calibration criteria met

- Method/reagent blanks confirm no background contamination

- Surrogate recoveries within criteria

- Qualitative sample results (e.g., retention times, mass spectra, isotopic ratios) consistent with standard data

- Sample data within the calibrated range of the instrument

- Chromatograms or other raw data consistent with computer-generated quantitation reports

- Accuracy of intermediate data manipulations, transcribed numbers and/or final reported results verified

- Reference standards, instrumentation, sample identification, analysts, methodology, and sequence of processing clearly identified and traceable in the project records

- Lost data or corrective actions documented (e.g., loss of sample, reanalysis, redilutions, additional cleanup steps, alternative calculations etc.)

- Data that does not meet the validation requirements flagged accordingly

- Data reported in the correct units (e.g., "ppm" should not be used without specifying volume or mass units; "ug/g" are preferred units for data reporting)

10.0 PLANT ENTRY AND SAFETY

10.1 SAFETY RESPONSIBILITIES

The Project Manager is responsible for ensuring compliance with plant entry, health, and safety requirements. The Facility Contact (refer to Section 1.2) as the authority to impose or waive facility restrictions. The Project Manager has the authority to negotiate with facility person any deviations from the facility restrictions.

10.2 SAFETY PROGRAM

DEECO has a comprehensive health and safety program that satisfies Federal OSHA and MSHA requirements. The basic elements include: (1) written policies and procedures, (2) routine training of employees and supervisors, (3) medical monitoring, (4) use of personal protection equipment, (5) hazard communication, (6) pre-mobilization meetings with Holcim personnel and DEECO test team personnel, and (7) routine surveillance of the on-going test work.

10.3 SAFETY REQUIREMENTS

All test personnel will adhere to the following standard safety and precautionary measures as follows:

1) Confine activities to test area only;
2) Wear hard hats at all times on-site, except inside sample recovery trailers and mobile CEM laboratory;
3) Wear protective shoes or boots in test area:
4) Wear protective glasses or goggles at the outlet test sites, and other areas as designated;
5) Have readily available first aid equipment and fire extinguishers.

Before or on the first day on-site, the Project Manager will fill out the Emergency Response Procedure form and provide copies to be posted at each test site.

Appendix A

Sampling and Analytical Methods

The sampling and analytical methods for this sampling effort can be found at the following website:

Promulgated EPA test methods, 40 CFR 60 (Methods 1-4, 26A, and 320)

https://www.epa.gov/emc/emc-promulgated-test-methods