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

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

Buzzi Unicem USA, Inc.
Maryneal Cement Plant
Maryneal, TX

AUTHOR: Scott Steinsberger, Ph.D.

TEST DATES: November 29-30, 2023

FIELD TEAM: Lee Harris, Gage Mayer, and Scott Steinsberger

PREPARED FOR: Buzzi Unicem USA, Inc.
Maryneal Cement Plant
202 CR 306
Maryneal, TX 79535

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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 Buzzi Unicem USA, Inc (Buzzi) facility in Maryneal, TX is a 1.1 million ton per year rated cement pyro-processing system. The plant operates one dry-process rotary kiln (Kiln #4) that has a preheater/precalciner (PH/PC). It consists of a ThyssenKrupp Industrial Solution PREPOL AS Calciner. An in-line raw mill provides kiln feed to the system.

The Maryneal facility kiln has a Selective Non-Catalytic Reduction System (SNCR) for NOx control, a Dry Sorbent Injection (DSI) system for acid gas control, and a baghouse to control particulate matter (PM). The gases from the kiln process exhaust out of a main kiln stack.

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

The Buzzi retained DEECO Inc. (DEECO) to conduct emission tests for 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; BUZZI UNICEM USA, INC. MARYNEAL, TX FACILITY; NOVEMBER 29-30, 2023

Test Parameters	Main Stack Raw Mill On	Main Stack Raw Mill Off
Hydrogen Cyanide (FTIR)		
parts-per-million, dry basis corrected to 7% O_2	13.1	15.4
pounds-per-hour	9.6	10.6
pounds-per-ton of clinker	0.070	0.082
Hydrogen Fluoride (FTIR)		
parts-per-million, dry basis corrected to 7% O_2	<0.053	<0.047
pounds-per-hour	<0.029	<0.024
pounds-per-ton of clinker	<0.0002	<0.0002
Hydrogen Fluoride (Method 26A)		
parts-per-million, dry basis corrected to 7% O_2	<0.31	<0.34
pounds-per-hour	<0.170	<0.175
pounds-per-ton of clinker	<0.0012	<0.0014
Diatomic Chlorine (Method 26A)		
parts-per-million, dry basis corrected to 7% O_2	<0.06	0.20
pounds-per-hour	<0.114	0.40
pounds-per-ton of clinker	<0.0008	0.0031

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, Raw Mill On and Raw Mill Off. One Raw Mill On run was conducted on November 29, 2023. The remaining two Raw Mill On runs and three Raw Mill Off runs were conducted on November 30, 2023.

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 Lee Harris, Gage Mayer, 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 BUZZI UNICEM USA, INC. MARYNEAL, TX FACILITY

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 the Buzzi facility located in Maryneal, TX 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).

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

TABLE 2.1 BUZZI UNICEM USA, INC. MARYNEAL, TX FACILITY; KILN MAIN STACK HYDROGEN CYANIDE, HYDROGEN FLUORIDE, AND DIATOMIC CHLORINE EMISSIONS; RAW MILL ON; NOVEMBER 29-30, 2023

Test Parameter	Main Stack Raw Mill On Run 1	Main Stack Raw Mill On Run 2	Main Stack Raw Mill On Run 3	Main Stack Raw Mill On Average
Time	14:50-15:56	09:20-10:26	10:45-11:51	November 29-30, 2023
Flow Rate (dscfm)	256,850	244,700	251,600	251,050
Oxygen	10.7%	11.4%	11.7%	11.3%
Carbon Dioxide	16.9%	15.2%	14.9%	15.7%
Moisture	13.3%	14.0%	11.1%	12.8%
Hydrogen Cyanide (FTIR)				
ppm_{dry} at 7% O_2	13.8	13.1	12.4	13.1
pounds-per-hour	10.9	9.2	8.7	9.6
pounds-per-ton of clinker	0.073	0.069	0.067	0.070
Hydrogen Fluoride (FTIR)				
ppm_{dry} at 7% O_2	<0.050	<0.054	<0.054	<0.053
pounds-per-hour	<0.030	<0.028	<0.028	<0.029
pounds-per-ton of clinker	<0.0002	<0.0002	<0.0002	<0.0002
Hydrogen Fluoride (Method 26A)				
ppm_{dry} at 7% O_2	<0.29	<0.34	<0.32	<0.31
pounds-per-hour	<0.168	<0.178	<0.163	<0.170
pounds-per-ton of clinker	<0.0011	<0.0013	<0.0013	<0.0012
Diatomic Chlorine (Method 26A)				
ppm_{dry} at 7% O_2	<0.05	<0.07	<0.06	<0.06
pounds-per-hour	<0.105	<0.123	<0.114	<0.114
pounds-per-ton of clinker	<0.0007	<0.0009	<0.0009	<0.0008

TABLE 2.2 BUZZI UNICEM USA, INC. MARYNEAL, TX FACILITY; KILN MAIN STACK HYDROGEN CYANIDE, HYDROGEN FLUORIDE, AND DIATOMIC CHLORINE EMISSIONS; RAW MILL OFF; NOVEMBER 30, 2023

Test Parameter	Main Stack Raw Mill Off Run 1	Main Stack Raw Mill Off Run 2	Main Stack Raw Mill Off Run 3	Main Stack Raw Mill Off Average
Time	14:05-15:11	15:39-16:45	17:25-18:31	November 30, 2023
Flow Rate (dscfm)	202,100	208,800	207,350	206,083
Oxygen	9.7%	9.9%	10.0%	9.9%
Carbon Dioxide	18.2%	17.9%	17.8%	18.0%
Moisture	14.7%	13.8%	14.2%	14.2%
Hydrogen Cyanide (FTIR)				
ppm_{dry} at 7% O_2	15.1	15.7	15.5	15.4
pounds-per-hour	10.4	10.9	10.6	10.6
pounds-per-ton of clinker	0.080	0.085	0.082	0.082
Hydrogen Fluoride (FTIR)				
ppm_{dry} at 7% O_2	<0.047	<0.047	<0.048	<0.047
pounds-per-hour	<0.024	<0.024	<0.024	<0.024
pounds-per-ton of clinker	<0.0002	<0.0002	<0.0002	<0.0002
Hydrogen Fluoride (Method 26A)				
ppm_{dry} at 7% O_2	<0.34	<0.34	<0.35	<0.34
pounds-per-hour	<0.174	<0.174	<0.177	<0.175
pounds-per-ton of clinker	<0.0014	<0.0014	<0.0014	<0.0014
Diatomic Chlorine (Method 26A)				
ppm_{dry} at 7% O_2	0.25	0.11	0.23	0.20
pounds-per-hour	0.49	0.23	0.47	0.40
pounds-per-ton of clinker	0.0038	0.0018	0.0036	0.0031

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 main stack at Buzzi's Maryneal, TX facility. 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.

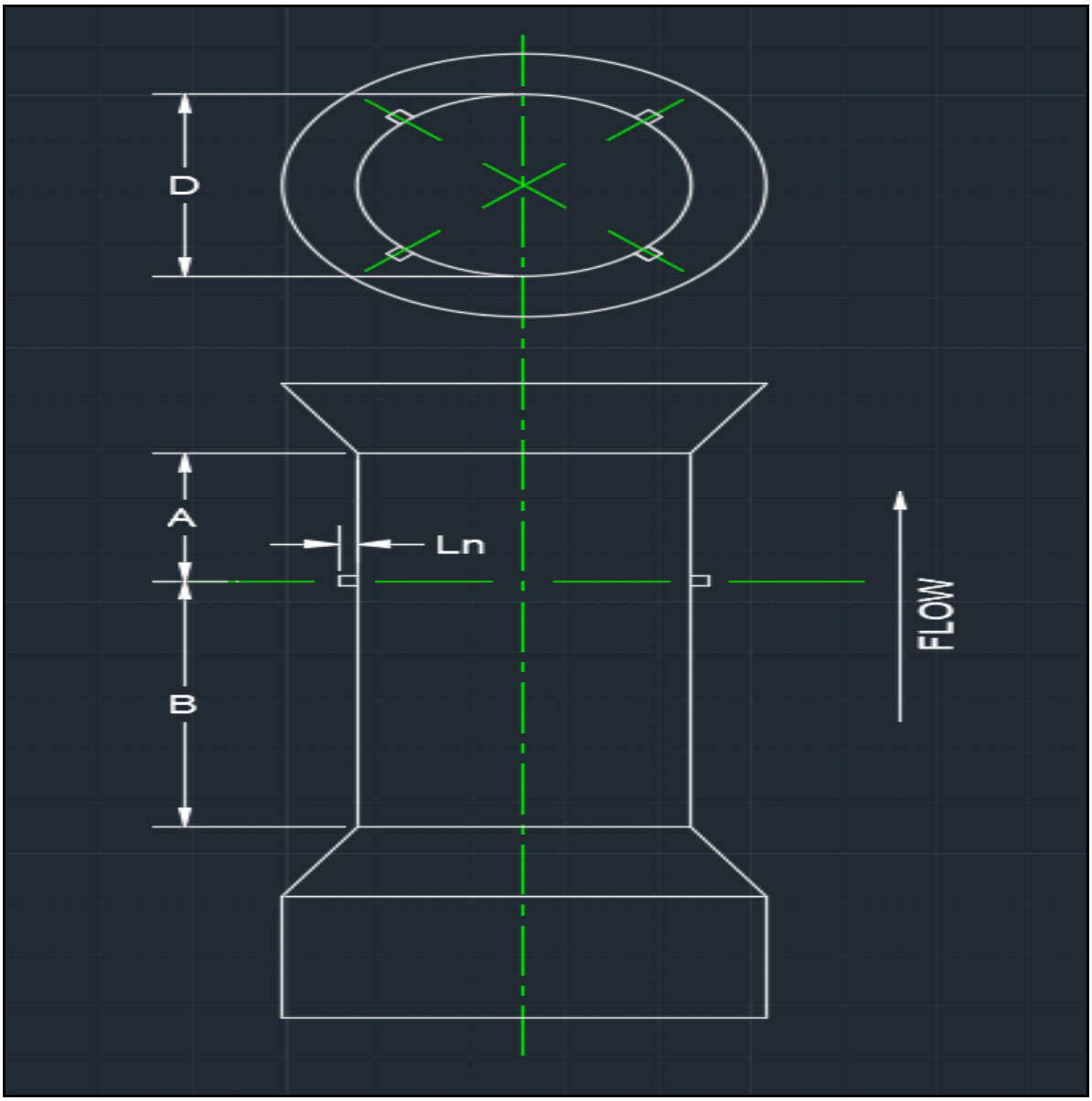
3.1 Sampling Point Determination - EPA Method 1

The main stack is a vertically-oriented circular stack with an inside diameter of 140.0" inside diameter. The stack gas sampling ports are located approximately 157' 9" (approximately 13.4 duct diameters) above the ID fan breaching and approximately 48' 3" (approximately 4.1 duct diameters) from the stack outlet.

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.



Stack Diameter (D) = 140.0”
Distance to nearest upstream disturbance (A) = 579”, 4.1 Duct Diameters
Distance to nearest downstream disturbance (B) = 1893”, 13.4 Duct Diameters
Sampling Ports Available = 4
Ports Diameter = 6”
Length of ports Ln = 6.25”

Figure 3.1 Schematic of the Main Stack Sampling Location

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.

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.

Specific HCN gases were manufactured for this test program in the range of 50-100 ppm to provide spikes in the 5-10 ppm range, or lower; with an SF_6 or appropriate tracer used to calculate the exact spike gas dilution ratio of 10% or less.

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 (2^{nd} 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; NOVEMBER 29-30, 2023

Run	Time	Train A Diatomic Chlorine Concentration (ppm,dry)	Train B Diatomic Chlorine Concentration (ppm,dry)	Absolute Difference (ppm,dry)
November 29-30, 2023; Main Stack; Raw Mill On				
Run 1	14:50-15:56	<0.037	<0.037	0.000
Run 2	09:20-10:26	<0.042	<0.049	0.006
Run 3	10:45-11:51	<0.043	<0.040	0.003
November 30, 2023; Main Stack; Raw Mill Off				
Run 1	14:05-15:11	0.192	0.206	0.015
Run 2	15:39-16:45	0.085	0.093	0.008
Run 3	17:25-18:31	0.173	0.185	0.012

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 (CC768233; 199.1 ppm HCN/10.0 ppm SF6)					
SPC__003164.LAB	196.3	9.6			
SPC__003165.LAB	197.0	9.6			
SPC__003166.LAB	197.0	9.6			
SPC__003167.LAB	197.3	9.6			
Averages	**196.9**	**9.6**			
HCN Standard (CC768222; 49.9 ppm HCN/5.0 ppm SF6)					
SPC__003173.LAB	49.91	4.85			
SPC__003174.LAB	49.93	4.85			
SPC__003175.LAB	49.82	4.85			
SPC__003176.LAB	49.90	4.85			
Averages	**49.89**	**4.85**			
Residuals for Post HCN analyte spike native scans					
SPC_003269.LAB					
Concentration	8.65		-0.06		
MDC3	0.38		0.25		
MDC3%	4.4%		NA		
SPC_003270LAB					
Concentration	8.64		-0.02		
MDC3	0.47		0.24		
MDC3%	5.4%		NA		
Final SNR @ 2500 cm^{-1} and single beam intensity @ 2500 cm^{-1}					
SPC__004198.LAB				3828.6	1.30

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; NOVEMBER 29-30, 2023

Run	Time	Average Native Hydrogen Cyanide Concentration (ppm,wet)	Spike plus Average Hydrogen Cyanide Native Concentration (ppm,wet)	Hydrogen Cyanide Spike Recovery	CTS Error
November 29, 2023; Main Stack Raw Mill On					
Pre Run 1	12:15-12:33	8.72	19.97	95.9%	-1.3%
Post Run 1	13:16-13:56	9.15	17.74	91.4%	-2.6%
November 30, 2023; Main Stack Raw Mill On					
Pre Run 2	09:08-09:24	7.66	10.95	92.3%	-2.1%
Post Run 2	10:27-10:39	7.56	11.36	91.7%	
Post Run 3	11:42-11:56	7.40	10.90	89.7%	-2.1%
November 30, 2023; Main Stack Raw Mill Off					
Pre Run 1	13:39-13:57	9.73	13.50	99.5%	-2.1%
Post Run 1	15:12-15:23	10.69	14.05	91.5%	
Post Run 2	16:46-16:58	10.87	14.40	94.2%	
Post Run 3	18:31-18:51	10.26	13.50	93.0%	-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: **Buzzi Unicem; Maryneal TX**
Source: **Main Stack; Raw Mill On**
Job ID: **23-3315**
Train Type: **EPA Method 26A**

	1A 11/29/23 1450-1556	1B 11/29/23 1450-1556	3A 11/30/23 920-1026	3B 11/30/23 920-1026	4A 11/30/23 1045-1151	4B 11/30/23 1045-1151	Average
Initial Meter Volume, ft^3	861.672	971.583	936.456	43.246	988.879	95.369	
Final Meter Volume, ft^3	917.275	1025.334	988.745	95.115	1040.834	147.364	
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	**55.603**	**53.751**	**52.289**	**51.869**	**51.955**	**51.995**	**52.910**
DGM Calibration Factor	0.975	0.985	0.975	0.985	0.975	0.985	0.980
Average DGM Temp, F	69.6	72.3	61.3	61.6	66.1	68.1	66.5
Average DGM delta H, "H2O	2.33	2.34	2.18	2.19	2.17	2.18	2.23
Barometric Pressure, "Hg	27.32	27.32	27.43	27.43	27.43	27.43	27.39
Corrected Sample Vol, dscf	**49.631**	**48.225**	**47.586**	**47.662**	**46.850**	**47.189**	**47.857**
Corrected Sample Vol, dscm	**1.405**	**1.366**	**1.347**	**1.350**	**1.327**	**1.336**	**1.355**
Sample Volume (at Stack Conditions), acf	**83.169**	**81.562**	**82.682**	**82.814**	**78.949**	**78.996**	**81.362**
Sample Volume (at Stack Conditions), acm	**2.355**	**2.310**	**2.341**	**2.345**	**2.236**	**2.237**	**2.304**
Oxygen, %	10.7	10.7	11.4	11.4	11.7	11.7	11.3
Carbon Dioxide, %	16.9	16.9	15.2	15.2	14.9	14.9	15.7
Nitrogen, %	72.4	72.4	73.4	73.4	73.4	73.4	73.1
Stack Gas Excess Air, %	127.2	127.2	142.9	142.9	152.4	152.4	140.8
Total Moisture Catch Weight, grams	155.3	162.7	164.1	164.6	128.4	120.7	137.9
Stack Gas Moisture, %	**12.9**	**13.7**	**14.0**	**14.0**	**11.4**	**10.8**	**12.8**
Stack Gas Dry Molecular Weight, lb/lbmole	31.13	31.13	30.89	30.89	30.85	30.85	30.96
Stack Gas Wet Molecular Weight, lb/lbmole	29.44	29.33	29.08	29.08	29.39	29.46	29.30
Average Stack Temp, F	242.4	242.4	262.0	262.0	261.4	261.5	255.3
Stack Static (Gauge) Pressure, "H2O	-0.67	-0.67	-0.67	-0.67	-0.67	-0.67	-0.67
Stack Gas Actual Pressure, "Hg	27.27	27.27	27.38	27.38	27.38	27.38	27.34
Average Sqrt delta P *	0.991	0.991	0.958	0.958	0.958	0.958	0.969
Pitot Tube Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Stack Gas Velocity, ft/second	**67.36**	**67.48**	**66.29**	**66.29**	**65.91**	**65.84**	**66.53**
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, %	**100.7**	**98.6**	**101.7**	**101.9**	**97.7**	**97.8**	**99.7**
Stack Dimensions	140 in. ID	140 in. ID	140 in. ID	140 in. ID	140 in. ID	140 in. ID	
Stack Area, sq ft	106.90	106.90	106.90	106.90	106.90	106.90	106.90
Actual Stack Gas Flow Rate, acfm	**432,000**	**432,800**	**425,200**	**425,200**	**422,700**	**422,300**	**426,700**
Actual Stack Gas Flow Rate, acmm	12,233	12,256	12,040	12,040	11,970	11,958	12,083
Stack Gas Flow Rate, dscfm	**257,800**	**255,900**	**244,700**	**244,700**	**250,900**	**252,300**	**251,100**
Stack Gas Flow Rate, dscmm	7,300	7,246	6,929	6,929	7,105	7,144	7,109

Company: Buzzi Unicem; Maryneal TX
Source: Main Stack; Raw Mill On
Job ID: 23-3315
Train Type: EPA Method 26A

NOTE: Average INCLUDES Non-detect runs' results

"ND()" denotes values below detection limits

		1A 11/29/23 1450-1556	1B 11/29/23 1450-1556	3A 30-Nov-23 920-1026	3B 30-Nov-23 920-1026	4A 30-Nov-23 1045-1151	4B 30-Nov-23 1045-1151	Average
Hydrogen Fluoride	Catch Wt, mg	ND(0.228)	ND(0.254)	ND(0.265)	ND(0.259)	ND(0.237)	ND(0.224)	ND(0.2445)
	Conc., mg/dscm	ND(0.162)	ND(0.186)	ND(0.197)	ND(0.192)	ND(0.179)	ND(0.168)	ND(0.181)
	Conc., mg/dscm @ 7% O2	ND(0.221)	ND(0.253)	ND(0.288)	ND(0.281)	ND(0.270)	ND(0.253)	ND(0.261)
	Conc., mg/dscm @ 12% CO2	ND(0.115)	ND(0.132)	ND(0.155)	ND(0.151)	ND(0.144)	ND(0.135)	ND(0.139)
	Conc., ppmvd	ND(0.195)	ND(0.224)	ND(0.237)	ND(0.231)	ND(0.215)	ND(0.202)	ND(0.217)
	Conc., ppmvd @ 7% O2	ND(0.266)	ND(0.305)	ND(0.346)	ND(0.338)	ND(0.324)	ND(0.305)	ND(0.314)
	Conc., ppmvd @ 12% CO2	ND(0.139)	ND(0.159)	ND(0.187)	ND(0.182)	ND(0.173)	ND(0.162)	ND(0.167)
	Emission Rate, lb/hr	ND(0.157)	ND(0.178)	ND(0.180)	ND(0.176)	ND(0.168)	ND(0.158)	ND(0.170)
	Clinker Rates (tph and lbs/ton)	150.90	ND(0.0011)	133.10	ND(0.0013)	130.40	ND(0.0013)	ND(0.0012)
Chlorine	Catch Wt, mg	ND(0.154)	ND(0.148)	ND(0.167)	ND(0.193)	ND(0.167)	ND(0.156)	ND(0.16416667)
	Conc., mg/dscm	ND(0.110)	ND(0.108)	ND(0.124)	ND(0.143)	ND(0.126)	ND(0.117)	ND(0.121)
	Conc., mg/dscm @ 7% O2	ND(0.149)	ND(0.148)	ND(0.181)	ND(0.209)	ND(0.190)	ND(0.176)	ND(0.176)
	Conc., mg/dscm @ 12% CO2	ND(0.078)	ND(0.077)	ND(0.098)	ND(0.113)	ND(0.101)	ND(0.094)	ND(0.093)
	Conc., ppmvd	ND(0.037)	ND(0.037)	ND(0.042)	ND(0.049)	ND(0.043)	ND(0.040)	ND(0.041)
	Absolute Difference, ppmvd (<0.2 required)		0.000		0.006		0.003	
	Conc., ppmvd @ 7% O2	ND(0.051)	ND(0.050)	ND(0.062)	ND(0.071)	ND(0.065)	ND(0.060)	ND(0.060)
	Conc., ppmvd @ 12% CO2	ND(0.026)	ND(0.026)	ND(0.033)	ND(0.038)	ND(0.034)	ND(0.032)	ND(0.032)
	Emission Rate, lb/hr	ND(0.106)	ND(0.104)	ND(0.114)	ND(0.131)	ND(0.118)	ND(0.110)	ND(0.114)
	Clinker Rates (tph and lbs/ton)	150.90	ND(0.0007)	133.10	ND(0.0009)	130.40	ND(0.0009	0.0008

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill 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__003397.LAB	11/29/23	14:50:36.250	8.594	-0.149	-0.016	3.326	13.327	14.169
SPC__003398.LAB	11/29/23	14:51:40.100	8.630	-0.138	-0.013	3.302	13.899	14.010
SPC__003399.LAB	11/29/23	14:52:44.007	8.670	-0.190	-0.015	3.328	13.465	14.167
SPC__003400.LAB	11/29/23	14:53:49.000	8.582	-0.138	-0.011	3.250	13.380	14.157
SPC__003401.LAB	11/29/23	14:54:51.854	8.565	-0.150	-0.010	3.209	14.220	13.875
SPC__003402.LAB	11/29/23	14:55:55.817	8.866	-0.187	-0.012	3.044	13.464	14.046
SPC__003403.LAB	11/29/23	14:56:59.807	8.389	-0.195	-0.010	2.948	13.550	14.321
SPC__003404.LAB	11/29/23	14:58:03.879	8.753	-0.194	-0.011	3.046	13.854	14.172
SPC__003405.LAB	11/29/23	14:59:07.449	8.843	-0.156	-0.012	3.120	13.626	14.101
SPC__003406.LAB	11/29/23	15:00:11.350	8.751	-0.146	-0.015	2.936	13.871	14.005
SPC__003407.LAB	11/29/23	15:01:15.337	8.807	-0.159	-0.009	3.134	13.760	14.114
SPC__003408.LAB	11/29/23	15:02:19.536	8.946	-0.148	-0.013	3.264	13.382	13.844
SPC__003409.LAB	11/29/23	15:03:23.083	8.897	-0.156	-0.012	3.157	13.671	13.937
SPC__003410.LAB	11/29/23	15:04:27.039	9.062	-0.164	-0.011	3.282	13.690	13.979
SPC__003411.LAB	11/29/23	15:05:30.949	8.680	-0.151	-0.013	3.200	14.052	13.914
SPC__003412.LAB	11/29/23	15:06:34.933	8.627	-0.131	-0.012	3.054	13.739	14.007
SPC__003413.LAB	11/29/23	15:07:38.726	8.533	-0.182	-0.012	3.069	13.359	14.256
SPC__003414.LAB	11/29/23	15:08:42.898	8.470	-0.142	-0.012	3.118	13.837	13.902
SPC__003415.LAB	11/29/23	15:09:46.594	8.473	-0.144	-0.015	3.089	13.311	13.992
SPC__003416.LAB	11/29/23	15:10:50.461	8.599	-0.198	-0.014	3.007	13.696	14.039
SPC__003417.LAB	11/29/23	15:11:54.373	8.754	-0.194	-0.008	3.035	13.674	14.073
SPC__003418.LAB	11/29/23	15:12:58.276	8.789	-0.199	-0.013	3.012	13.394	14.081
SPC__003419.LAB	11/29/23	15:14:02.467	8.619	-0.180	-0.015	2.986	13.748	14.105
SPC__003420.LAB	11/29/23	15:15:06.094	8.805	-0.177	-0.014	3.266	13.303	14.033
SPC__003421.LAB	11/29/23	15:16:10.001	8.895	-0.180	-0.010	3.172	13.315	14.007
SPC__003422.LAB	11/29/23	15:17:13.949	8.665	-0.190	-0.011	3.170	13.694	14.023
SPC__003423.LAB	11/29/23	15:18:17.859	8.820	-0.199	-0.012	3.219	13.027	14.179
SPC__003424.LAB	11/29/23	15:19:21.776	8.523	-0.125	-0.013	3.290	14.545	13.961
SPC__003425.LAB	11/29/23	15:20:25.788	8.835	-0.156	-0.012	3.324	13.315	14.144
SPC__003426.LAB	11/29/23	15:21:29.591	8.452	-0.143	-0.011	3.360	13.843	14.074
SPC__003427.LAB	11/29/23	15:22:33.598	8.550	-0.155	-0.013	3.264	13.644	14.104
SPC__003428.LAB	11/29/23	15:23:37.672	8.504	-0.199	-0.012	3.429	13.509	14.260
SPC__003429.LAB	11/29/23	15:24:41.527	8.507	-0.149	-0.013	3.474	14.010	14.046
SPC__003430.LAB	11/29/23	15:25:45.219	8.603	-0.145	-0.012	3.473	13.791	14.131
SPC__003431.LAB	11/29/23	15:26:49.142	8.822	-0.197	-0.013	3.342	13.709	14.163
SPC__003432.LAB	11/29/23	15:27:53.032	8.682	-0.191	-0.013	3.426	13.489	14.257
SPC__003433.LAB	11/29/23	15:28:56.947	8.799	-0.155	-0.015	3.497	13.562	14.093
SPC__003434.LAB	11/29/23	15:30:00.919	8.752	-0.203	-0.013	3.317	13.585	14.113
SPC__003435.LAB	11/29/23	15:31:04.736	8.747	-0.206	-0.012	3.234	13.616	14.251
SPC__003436.LAB	11/29/23	15:32:08.631	8.864	-0.202	-0.015	3.251	13.704	14.223
SPC__003437.LAB	11/29/23	15:33:12.655	8.947	-0.192	-0.014	3.253	13.955	14.169
SPC__003438.LAB	11/29/23	15:34:16.546	9.119	-0.208	-0.013	3.288	13.753	14.143
SPC__003439.LAB	11/29/23	15:35:20.365	8.815	-0.194	-0.014	3.359	13.818	14.182
SPC__003440.LAB	11/29/23	15:36:24.271	8.963	-0.176	-0.010	3.340	13.654	14.132
SPC__003441.LAB	11/29/23	15:37:28.220	8.788	-0.200	-0.013	3.345	13.721	14.181
SPC__003442.LAB	11/29/23	15:38:32.281	8.877	-0.218	-0.013	3.398	13.361	14.216
SPC__003443.LAB	11/29/23	15:39:35.994	8.680	-0.145	-0.011	3.316	13.892	14.028
SPC__003444.LAB	11/29/23	15:40:39.909	8.703	-0.147	-0.009	3.393	13.798	14.041
SPC__003445.LAB	11/29/23	15:41:44.131	8.798	-0.159	-0.011	3.296	13.976	13.983
SPC__003446.LAB	11/29/23	15:42:47.980	8.725	-0.157	-0.013	3.386	13.684	14.014
SPC__003447.LAB	11/29/23	15:43:51.673	8.569	-0.208	-0.012	3.320	13.670	14.152
SPC__003448.LAB	11/29/23	15:44:55.544	8.724	-0.201	-0.015	3.096	14.167	14.050
SPC__003449.LAB	11/29/23	15:45:59.447	8.729	-0.223	-0.014	3.087	13.426	14.337
SPC__003450.LAB	11/29/23	15:47:03.359	8.927	-0.201	-0.012	3.229	13.935	14.097
SPC__003451.LAB	11/29/23	15:48:07.270	8.949	-0.190	-0.014	3.202	14.110	13.961
SPC__003452.LAB	11/29/23	15:49:11.454	8.994	-0.204	-0.012	3.050	13.865	14.076
SPC__003453.LAB	11/29/23	15:50:15.091	9.203	-0.209	-0.015	3.036	13.801	13.982
SPC__003454.LAB	11/29/23	15:51:19.387	9.197	-0.220	-0.014	3.165	13.373	14.174
SPC__003455.LAB	11/29/23	15:52:23.149	9.098	-0.192	-0.010	3.224	14.096	13.950
SPC__003456.LAB	11/29/23	15:53:26.812	9.169	-0.214	-0.015	3.211	13.158	14.174
SPC__003457.LAB	11/29/23	15:54:30.763	8.867	-0.200	-0.013	3.159	14.139	14.091
SPC__003458.LAB	11/29/23	15:55:34.836	9.099	-0.227	-0.014	3.221	13.489	14.119
Mill On Run 1		**(actual)**	**8.783**	**< 0.032**	**-0.012**	**3.217**	**13.687**	**14.091**
Oxygen	**10.7%**	**(ppm,dry @7% O2)**	**13.805**	**< 0.050**	**-0.020**	**5.057**		
DSCFM	**256,850**	**(lbs/hr)**	**10.949**	**< 0.030**	**-0.084**	**4.163**	**13.3**	**M26A Moisture**
Clinker (tons/hr)	**150.90**	**(lbs/ton clinker)**	**0.073**	**< 0.0002**				

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill 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__003666.LAB	11/30/23	09:20:40.096	7.235		-0.059	-0.007	2.556	8.689	11.445
SPC__003667.LAB	11/30/23	09:21:43.959	8.068		-0.205	-0.008	2.878	12.316	13.310
SPC__003668.LAB	11/30/23	09:22:47.875	7.488		-0.185	-0.007	2.838	15.213	12.874
SPC__003669.LAB	11/30/23	09:23:51.774	7.647		-0.201	-0.007	2.849	14.042	12.954
SPC__003670.LAB	11/30/23	09:24:55.773	7.706		-0.213	-0.007	2.971	13.808	12.994
SPC__003671.LAB	11/30/23	09:25:59.590	7.681		-0.197	-0.004	2.883	14.617	13.017
SPC__003672.LAB	11/30/23	09:27:03.490	7.752		-0.217	-0.007	2.938	14.076	13.045
SPC__003673.LAB	11/30/23	09:28:07.607	7.788		-0.218	-0.004	2.884	14.450	12.991
SPC__003674.LAB	11/30/23	09:29:11.312	7.752		-0.215	-0.008	2.957	13.815	13.103
SPC__003675.LAB	11/30/23	09:30:15.404	7.645		-0.174	-0.006	2.946	14.263	13.015
SPC__003676.LAB	11/30/23	09:31:19.114	7.922		-0.180	-0.004	2.917	13.924	13.058
SPC__003677.LAB	11/30/23	09:32:23.380	7.719		-0.199	-0.007	2.855	14.720	12.887
SPC__003678.LAB	11/30/23	09:33:26.926	7.822		-0.189	-0.008	2.912	13.811	13.025
SPC__003679.LAB	11/30/23	09:34:30.839	7.571		-0.171	-0.007	2.886	14.210	12.796
SPC__003680.LAB	11/30/23	09:35:35.113	7.774		-0.192	-0.006	2.942	13.783	12.876
SPC__003681.LAB	11/30/23	09:36:38.846	7.809		-0.189	-0.007	2.846	13.926	12.855
SPC__003682.LAB	11/30/23	09:37:42.545	7.673		-0.195	-0.006	2.916	14.459	12.805
SPC__003683.LAB	11/30/23	09:38:46.449	7.792		-0.206	-0.007	2.954	13.585	12.855
SPC__003684.LAB	11/30/23	09:39:50.342	7.632		-0.179	-0.007	2.892	14.343	12.672
SPC__003685.LAB	11/30/23	09:40:54.247	7.700		-0.192	-0.006	2.994	14.064	12.760
SPC__003686.LAB	11/30/23	09:41:58.157	7.732		-0.197	-0.004	2.934	14.511	12.733
SPC__003687.LAB	11/30/23	09:43:02.055	7.793		-0.226	-0.007	3.024	13.787	12.853
SPC__003688.LAB	11/30/23	09:44:06.219	7.639		-0.214	-0.005	2.976	14.280	12.754
SPC__003689.LAB	11/30/23	09:45:10.246	7.694		-0.209	-0.008	2.940	14.105	12.778
SPC__003690.LAB	11/30/23	09:46:13.767	7.781		-0.223	-0.006	2.978	13.664	12.847
SPC__003691.LAB	11/30/23	09:47:17.716	7.475		-0.217	-0.006	3.008	14.258	12.814
SPC__003692.LAB	11/30/23	09:48:21.583	7.568		-0.189	-0.006	3.002	14.387	12.702
SPC__003693.LAB	11/30/23	09:49:25.486	7.622		-0.209	-0.008	3.018	14.519	12.762
SPC__003694.LAB	11/30/23	09:50:29.583	7.626		-0.228	-0.007	3.018	13.801	12.863
SPC__003695.LAB	11/30/23	09:51:33.336	7.624		-0.214	-0.005	2.954	13.729	12.840
SPC__003696.LAB	11/30/23	09:52:37.249	7.317		-0.191	-0.006	3.010	14.524	12.777
SPC__003697.LAB	11/30/23	09:53:41.109	7.594		-0.227	-0.007	2.983	13.891	12.877
SPC__003698.LAB	11/30/23	09:54:45.146	7.627		-0.171	-0.004	3.002	13.884	12.844
SPC__003699.LAB	11/30/23	09:55:49.264	7.532		-0.195	-0.008	3.020	14.255	12.770
SPC__003700.LAB	11/30/23	09:56:52.826	7.811		-0.195	-0.007	3.073	14.249	12.729
SPC__003701.LAB	11/30/23	09:57:56.739	8.000		-0.191	-0.004	3.221	13.629	12.938
SPC__003702.LAB	11/30/23	09:59:00.637	7.940		-0.191	-0.007	3.323	13.947	12.856
SPC__003703.LAB	11/30/23	10:00:04.543	7.778		-0.194	-0.004	3.301	14.475	12.709
SPC__003704.LAB	11/30/23	10:01:08.452	8.019		-0.194	-0.006	3.350	13.778	12.770
SPC__003705.LAB	11/30/23	10:02:12.349	8.179		-0.194	-0.007	3.365	13.986	12.820
SPC__003706.LAB	11/30/23	10:03:16.256	7.908		-0.177	-0.007	3.330	14.086	12.576
SPC__003707.LAB	11/30/23	10:04:20.159	8.265		-0.203	-0.004	3.386	13.489	12.726
SPC__003708.LAB	11/30/23	10:05:24.056	7.864		-0.186	-0.007	3.344	14.068	12.679
SPC__003709.LAB	11/30/23	10:06:27.958	7.626		-0.188	-0.006	3.297	14.189	12.528
SPC__003710.LAB	11/30/23	10:07:31.909	7.519		-0.216	-0.004	3.349	13.550	12.470
SPC__003711.LAB	11/30/23	10:08:35.819	7.584		-0.209	-0.004	3.314	13.551	12.353
SPC__003712.LAB	11/30/23	10:09:39.675	7.370		-0.210	-0.010	3.330	14.309	12.149
SPC__003713.LAB	11/30/23	10:10:43.586	7.440		-0.216	-0.009	3.252	13.573	12.296
SPC__003714.LAB	11/30/23	10:11:47.486	7.380		-0.202	-0.010	3.262	13.962	12.257
SPC__003715.LAB	11/30/23	10:12:51.519	7.498		-0.214	-0.008	3.271	14.386	12.264
SPC__003716.LAB	11/30/23	10:13:55.386	7.614		-0.212	-0.008	3.273	13.616	12.236
SPC__003717.LAB	11/30/23	10:14:59.247	7.447		-0.230	-0.008	3.200	13.904	12.152
SPC__003718.LAB	11/30/23	10:16:03.103	7.740		-0.234	-0.009	3.260	13.468	12.219
SPC__003719.LAB	11/30/23	10:17:07.046	7.555		-0.216	-0.007	3.136	13.991	12.218
SPC__003720.LAB	11/30/23	10:18:11.112	7.577		-0.217	-0.011	3.151	13.966	12.179
SPC__003721.LAB	11/30/23	10:19:14.808	7.667		-0.225	-0.010	3.217	13.258	12.267
SPC__003722.LAB	11/30/23	10:20:18.718	7.526		-0.216	-0.009	3.155	14.378	12.054
SPC__003723.LAB	11/30/23	10:21:22.875	7.490		-0.228	-0.007	3.120	13.516	12.151
SPC__003724.LAB	11/30/23	10:22:26.533	7.611		-0.221	-0.007	3.219	13.547	12.219
SPC__003725.LAB	11/30/23	10:23:30.466	7.412		-0.206	-0.008	3.172	14.020	12.116
SPC__003726.LAB	11/30/23	10:24:34.386	7.539		-0.212	-0.005	3.172	13.463	12.146
SPC__003727.LAB	11/30/23	10:25:38.231	7.704		-0.206	-0.009	3.176	13.501	12.198
Mill On Run 2		(actual)	**7.675**	**<**	**0.032**	**-0.007**	**3.076**	**13.896**	**12.642**
Oxygen	**11.4%**	(ppm,dry @7% O2)	**13.058**	**<**	**0.054**	**-0.012**	**5.233**		
DSCFM	**244,700**	(lbs/hr)	**9.190**	**<**	**0.028**	**-0.044**	**3.822**	**14.0**	**M26A Moisture**
Clinker (tons/hr)	**133.10**	(lbs/ton clinker)	**0.069**	**<**	**0.0002**				

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill 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__003745.LAB	11/30/23	10:46:06.396	7.396	-0.199	-0.005	3.062	14.339	12.339
SPC__003746.LAB	11/30/23	10:47:10.302	7.584	-0.213	-0.006	3.094	13.227	12.549
SPC__003747.LAB	11/30/23	10:48:14.289	7.548	-0.218	-0.005	3.105	13.350	12.545
SPC__003748.LAB	11/30/23	10:49:18.063	7.513	-0.198	-0.008	3.092	14.511	12.240
SPC__003749.LAB	11/30/23	10:50:21.963	7.559	-0.217	-0.004	3.091	13.550	12.480
SPC__003750.LAB	11/30/23	10:51:25.877	7.558	-0.168	-0.005	3.032	13.509	12.350
SPC__003751.LAB	11/30/23	10:52:29.768	7.846	-0.226	-0.005	3.102	13.285	12.496
SPC__003752.LAB	11/30/23	10:53:33.702	7.574	-0.213	-0.009	2.955	14.588	12.213
SPC__003753.LAB	11/30/23	10:54:37.561	7.629	-0.201	-0.006	3.012	13.256	12.454
SPC__003754.LAB	11/30/23	10:55:41.465	7.559	-0.225	-0.008	3.034	13.534	12.325
SPC__003755.LAB	11/30/23	10:56:45.407	7.483	-0.200	-0.006	2.953	13.574	12.319
SPC__003756.LAB	11/30/23	10:57:49.305	7.432	-0.216	-0.009	2.897	14.480	12.175
SPC__003757.LAB	11/30/23	10:58:53.170	7.555	-0.215	-0.003	2.956	13.565	12.372
SPC__003758.LAB	11/30/23	10:59:57.064	7.636	-0.211	-0.004	2.997	13.306	12.432
SPC__003759.LAB	11/30/23	11:01:01.161	7.383	-0.213	-0.007	2.896	14.606	12.360
SPC__003760.LAB	11/30/23	11:02:05.067	7.133	-0.172	-0.006	2.993	13.192	12.434
SPC__003761.LAB	11/30/23	11:03:08.775	7.121	-0.166	-0.006	3.047	13.972	12.320
SPC__003762.LAB	11/30/23	11:04:12.675	7.157	-0.185	-0.007	3.007	13.668	12.398
SPC__003763.LAB	11/30/23	11:05:16.699	6.954	-0.192	-0.009	3.063	13.718	12.282
SPC__003764.LAB	11/30/23	11:06:20.473	7.168	-0.175	-0.008	2.948	14.311	12.188
SPC__003765.LAB	11/30/23	11:07:24.377	7.034	-0.164	-0.004	2.940	13.469	12.380
SPC__003766.LAB	11/30/23	11:08:28.335	6.937	-0.170	-0.009	3.010	13.949	12.260
SPC__003767.LAB	11/30/23	11:09:32.225	7.235	-0.159	-0.006	2.956	13.411	12.402
SPC__003768.LAB	11/30/23	11:10:36.133	7.053	-0.172	-0.006	3.058	13.344	12.400
SPC__003769.LAB	11/30/23	11:11:40.265	6.866	-0.186	-0.006	2.989	13.248	12.274
SPC__003770.LAB	11/30/23	11:12:43.883	6.919	-0.154	-0.008	2.867	14.398	12.035
SPC__003771.LAB	11/30/23	11:13:47.987	7.167	-0.194	-0.008	2.932	12.894	12.249
SPC__003772.LAB	11/30/23	11:14:51.692	7.118	-0.167	-0.006	2.865	13.268	12.179
SPC__003773.LAB	11/30/23	11:15:55.709	7.003	-0.164	-0.005	2.853	13.898	12.062
SPC__003774.LAB	11/30/23	11:16:59.489	7.183	-0.177	-0.007	2.858	13.145	12.123
SPC__003775.LAB	11/30/23	11:18:03.514	7.256	-0.168	-0.006	2.929	12.866	12.176
SPC__003776.LAB	11/30/23	11:19:07.443	7.138	-0.203	-0.006	2.793	14.153	12.201
SPC__003777.LAB	11/30/23	11:20:11.196	7.158	-0.222	-0.009	2.799	12.927	12.264
SPC__003778.LAB	11/30/23	11:21:15.186	7.280	-0.206	-0.005	2.767	13.067	12.269
SPC__003779.LAB	11/30/23	11:22:19.101	7.191	-0.220	-0.002	2.877	13.055	12.393
SPC__003780.LAB	11/30/23	11:23:23.281	6.902	-0.216	-0.011	2.881	14.123	12.220
SPC__003781.LAB	11/30/23	11:24:26.809	7.455	-0.217	-0.005	2.896	12.892	12.509
SPC__003782.LAB	11/30/23	11:25:30.744	7.639	-0.220	-0.005	2.838	13.007	12.622
SPC__003783.LAB	11/30/23	11:26:34.599	7.334	-0.203	-0.007	2.826	14.319	12.448
SPC__003784.LAB	11/30/23	11:27:38.507	7.558	-0.212	-0.006	2.871	13.156	12.732
SPC__003785.LAB	11/30/23	11:28:42.406	7.503	-0.215	-0.006	2.768	13.713	12.669
SPC__003786.LAB	11/30/23	11:29:46.645	7.657	-0.232	-0.006	2.877	12.964	12.782
SPC__003787.LAB	11/30/23	11:30:50.210	7.560	-0.226	-0.007	2.898	13.310	12.716
SPC__003788.LAB	11/30/23	11:31:54.104	7.385	-0.203	-0.009	2.908	13.978	12.653
SPC__003789.LAB	11/30/23	11:32:58.006	7.764	-0.241	-0.008	2.913	13.261	12.852
SPC__003790.LAB	11/30/23	11:34:02.030	7.447	-0.207	-0.005	2.960	13.953	12.772
SPC__003791.LAB	11/30/23	11:35:05.819	7.450	-0.229	-0.004	2.854	13.626	12.719
SPC__003792.LAB	11/30/23	11:36:10.081	7.467	-0.237	-0.007	2.897	13.302	12.819
SPC__003793.LAB	11/30/23	11:37:13.665	7.421	-0.215	-0.006	2.943	13.886	12.708
SPC__003794.LAB	11/30/23	11:38:17.860	7.515	-0.231	-0.007	3.012	13.274	12.840
SPC__003795.LAB	11/30/23	11:39:21.418	7.280	-0.167	-0.003	2.916	13.463	12.764
SPC__003796.LAB	11/30/23	11:40:25.446	7.099	-0.166	-0.008	2.915	13.410	12.686
SPC__003797.LAB	11/30/23	11:41:29.223	7.118	-0.171	-0.009	2.811	14.606	12.507
SPC__003798.LAB	11/30/23	11:42:33.378	7.424	-0.195	-0.008	2.839	13.173	12.740
SPC__003799.LAB	11/30/23	11:43:37.025	7.136	-0.166	-0.006	2.792	14.555	12.543
SPC__003800.LAB	11/30/23	11:44:41.107	7.167	-0.192	-0.003	2.823	13.340	12.684
SPC__003801.LAB	11/30/23	11:45:44.866	7.048	-0.166	-0.006	2.831	13.534	12.736
SPC__003802.LAB	11/30/23	11:46:49.116	7.173	-0.186	-0.008	2.761	14.227	12.527
SPC__003803.LAB	11/30/23	11:47:53.006	7.110	-0.193	-0.005	2.749	13.729	12.697
SPC__003804.LAB	11/30/23	11:48:56.618	7.212	-0.196	-0.002	2.730	13.438	12.719
SPC__003805.LAB	11/30/23	11:50:00.436	6.988	-0.185	-0.004	2.719	13.440	12.666
SPC__003806.LAB	11/30/23	11:51:04.476	6.925	-0.189	-0.006	2.649	14.510	12.460
Mill On Run 3		**(actual)**	**7.308**	**< 0.032**	**-0.006**	**2.915**	**13.626**	**12.463**
Oxygen	**11.7%**	**(ppm,dry @7% O2)**	**12.419**	**< 0.054**	**-0.011**	**4.954**		
DSCFM	**251,600**	**(lbs/hr)**	**8.703**	**< 0.028**	**-0.040**	**3.603**	**11.1**	**M26A Moisture**
Clinker (tons/hr)	**130.40**	**(lbs/ton clinker)**	**0.067**	**< 0.0002**				

Company: **Buzzi Unicem; Maryneal TX**
Source: **Main Stack; Raw Mill Off**
Job ID: **23-3315**
Train Type: **EPA Method 26A**

	5A 11/30/23 1405-1511	5B 11/30/23 1405-1511	6A 11/30/23 1539-1645	6B 11/30/23 1539-1645	7A 11/30/23 1725-1831	7B 11/30/23 1725-1831	Average
Initial Meter Volume, ft^3	42.388	148.366	87.361	192.402	133.245	237.196	
Final Meter Volume, ft^3	87.059	192.303	133.165	236.989	178.981	282.538	
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	**44.671**	**43.937**	**45.804**	**44.587**	**45.736**	**45.342**	**45.013**
DGM Calibration Factor	0.975	0.985	0.975	0.985	0.975	0.985	0.980
Average DGM Temp, F	78.0	82.3	78.1	81.3	78.1	82.3	80.0
Average DGM delta H, "H2O	1.48	1.46	1.51	1.51	1.52	1.54	1.50
Barometric Pressure, "Hg	27.43	27.43	27.43	27.43	27.43	27.43	27.43
Corrected Sample Vol, dscf	**39.318**	**38.757**	**40.311**	**39.408**	**40.252**	**40.005**	**39.675**
Corrected Sample Vol, dscm	**1.113**	**1.097**	**1.141**	**1.116**	**1.140**	**1.133**	**1.123**
Sample Volume (at Stack Conditions), acf	**72.248**	**71.720**	**72.656**	**71.524**	**72.766**	**73.081**	**72.333**
Sample Volume (at Stack Conditions), acm	**2.046**	**2.031**	**2.057**	**2.025**	**2.061**	**2.069**	**2.048**
Oxygen, %	9.7	9.7	9.9	9.9	10.0	10.0	9.9
Carbon Dioxide, %	18.2	18.2	17.9	17.9	17.8	17.8	18.0
Nitrogen, %	72.1	72.1	72.2	72.2	72.2	72.2	72.2
Stack Gas Excess Air, %	103.9	103.9	108.1	108.1	110.4	110.4	107.5
Total Moisture Catch Weight, grams	140.1	144.8	133.2	137.5	135.2	145.3	139.3
Stack Gas Moisture, %	**14.4**	**15.0**	**13.5**	**14.1**	**13.7**	**14.6**	**14.2**
Stack Gas Dry Molecular Weight, lb/lbmole	31.30	31.30	31.26	31.26	31.25	31.25	31.27
Stack Gas Wet Molecular Weight, lb/lbmole	29.38	29.31	29.47	29.39	29.43	29.31	29.38
Average Stack Temp, F	300.0	300.0	293.3	293.3	293.8	293.8	295.7
Stack Static (Gauge) Pressure, "H2O	-0.67	-0.67	-0.67	-0.67	-0.67	-0.67	-0.67
Stack Gas Actual Pressure, "Hg	27.38	27.38	27.38	27.38	27.38	27.38	27.38
Average Sqrt delta P *	0.822	0.822	0.838	0.838	0.835	0.835	0.832
Pitot Tube Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Stack Gas Velocity, ft/second	**58.06**	**58.13**	**58.84**	**58.92**	**58.69**	**58.81**	**58.58**
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, %	**101.5**	**100.6**	**100.7**	**99.0**	**101.1**	**101.3**	**100.7**
Stack Dimensions	140 in. ID	140 in. ID	140 in. ID	140 in. ID	140 in. ID	140 in. ID	
Stack Area, sq ft	106.90	106.90	106.90	106.90	106.90	106.90	106.90
Actual Stack Gas Flow Rate, acfm	**372,400**	**372,800**	**377,400**	**377,900**	**376,400**	**377,200**	**375,700**
Actual Stack Gas Flow Rate, acmm	10,545	10,557	10,687	10,701	10,659	10,681	10,638
Stack Gas Flow Rate, dscfm	**202,700**	**201,500**	**209,400**	**208,200**	**208,200**	**206,500**	**206,100**
Stack Gas Flow Rate, dscmm	5,740	5,706	5,930	5,896	5,896	5,847	5,836

Company: Buzzi Unicem; Maryneal TX
Source: Main Stack; Raw Mill Off
Job ID: 23-3315
Train Type: EPA Method 26A

NOTE: Average INCLUDES Non-detect runs' results

"ND()" denotes values below detection limits

		5A 11/30/23 1405-1511	5B 11/30/23 1405-1511	6A 30-Nov-23 1539-1645	6B 30-Nov-23 1539-1645	7A 30-Nov-23 1725-1831	7B 30-Nov-23 1725-1831	Average
Hydrogen Fluoride	Catch Wt, mg	ND(0.243)	ND(0.265)	ND(0.253)	ND(0.251)	ND(0.251)	ND(0.267)	ND(0.255)
	Conc., mg/dscm	ND(0.218)	ND(0.242)	ND(0.222)	ND(0.225)	ND(0.220)	ND(0.236)	ND(0.227)
	Conc., mg/dscm @ 7% O2	ND(0.271)	ND(0.300)	ND(0.280)	ND(0.284)	ND(0.281)	ND(0.301)	ND(0.286)
	Conc., mg/dscm @ 12% CO2	ND(0.144)	ND(0.159)	ND(0.149)	ND(0.151)	ND(0.148)	ND(0.159)	ND(0.152)
	Conc., ppmvd	ND(0.263)	ND(0.290)	ND(0.267)	ND(0.270)	ND(0.265)	ND(0.283)	ND(0.273)
	Conc., ppmvd @ 7% O2	ND(0.326)	ND(0.360)	ND(0.337)	ND(0.342)	ND(0.338)	ND(0.361)	ND(0.344)
	Conc., ppmvd @ 12% CO2	ND(0.173)	ND(0.192)	ND(0.179)	ND(0.181)	ND(0.178)	ND(0.191)	ND(0.182)
	Emission Rate, lb/hr	ND(0.166)	ND(0.182)	ND(0.174)	ND(0.175)	ND(0.172)	ND(0.182)	ND(0.175)
	Clinker Rates (tph and lbs/ton)	128.90	ND(0.0014)	128.90	ND(0.0014)	128.90	ND(0.0014)	ND(0.0014)
Chlorine	Catch Wt, mg	0.631	0.672	0.286	0.306	0.580	0.617	0.515
	Conc., mg/dscm	0.567	0.613	0.251	0.274	0.509	0.545	0.460
	Conc., mg/dscm @ 7% O2	0.704	0.760	0.317	0.346	0.649	0.694	0.578
	Conc., mg/dscm @ 12% CO2	0.374	0.404	0.168	0.184	0.343	0.367	0.307
	Conc., ppmvd	0.192	0.208	0.085	0.093	0.173	0.185	0.156
	Absolute Difference, ppmvd (<0.2 required)		0.015		0.008		0.012	
	Conc., ppmvd @ 7% O2	0.239	0.258	0.107	0.118	0.220	0.236	0.196
	Conc., ppmvd @ 12% CO2	0.127	0.137	0.057	0.062	0.116	0.125	0.104
	Emission Rate, lb/hr	0.479	0.507	0.224	0.239	0.452	0.477	0.396
	Clinker Rates (tph and lbs/ton)	128.90	0.0038	128.90	0.0018	128.90	0.0036	0.0031

Company: Buzzi Unicem; Maryneal TX
Source: Main Stack; Raw Mill Off
Job ID: 23-3315
Train Type: EPA Method 26A

NOTE: Average INCLUDES Non-detect runs' results

"ND()" denotes values below detection limits

		5A 11/30/23 1405-1511	5B 11/30/23 1405-1511	6A 30-Nov-23 1539-1645	6B 30-Nov-23 1539-1645	7A 30-Nov-23 1725-1831	7B 30-Nov-23 1725-1831	Average
Hydrogen Fluoride	Catch Wt, mg	ND(0.243)	ND(0.265)	ND(0.253)	ND(0.251)	ND(0.251)	ND(0.267)	ND(0.255)
	Conc., mg/dscm	ND(0.218)	ND(0.242)	ND(0.222)	ND(0.225)	ND(0.220)	ND(0.236)	ND(0.227)
	Conc., mg/dscm @ 7% O2	ND(0.271)	ND(0.300)	ND(0.280)	ND(0.284)	ND(0.281)	ND(0.301)	ND(0.286)
	Conc., mg/dscm @ 12% CO2	ND(0.144)	ND(0.159)	ND(0.149)	ND(0.151)	ND(0.148)	ND(0.159)	ND(0.152)
	Conc., ppmvd	ND(0.263)	ND(0.290)	ND(0.267)	ND(0.270)	ND(0.265)	ND(0.283)	ND(0.273)
	Conc., ppmvd @ 7% O2	ND(0.326)	ND(0.360)	ND(0.337)	ND(0.342)	ND(0.338)	ND(0.361)	ND(0.344)
	Conc., ppmvd @ 12% CO2	ND(0.173)	ND(0.192)	ND(0.179)	ND(0.181)	ND(0.178)	ND(0.191)	ND(0.182)
	Emission Rate, lb/hr	ND(0.166)	ND(0.182)	ND(0.174)	ND(0.175)	ND(0.172)	ND(0.182)	ND(0.175)
	Clinker Rates (mtph and lbs/ton)	128.90	ND(0.0012)	128.90	ND(0.0012)	128.90	ND(0.0012)	ND(0.0012)
Chlorine	Catch Wt, mg	0.631	0.672	0.286	0.306	0.580	0.617	0.515
	Conc., mg/dscm	0.567	0.613	0.251	0.274	0.509	0.545	0.460
	Conc., mg/dscm @ 7% O2	0.704	0.760	0.317	0.346	0.649	0.694	0.578
	Conc., mg/dscm @ 12% CO2	0.374	0.404	0.168	0.184	0.343	0.367	0.307
	Conc., ppmvd	0.195	0.210	0.086	0.094	0.175	0.187	0.158
	Absolute Difference, ppmvd (<0.2 required)		0.016		0.008		0.012	
	Conc., ppmvd @ 7% O2	0.241	0.261	0.109	0.119	0.223	0.238	0.199
	Conc., ppmvd @ 12% CO2	0.128	0.139	0.058	0.063	0.118	0.126	0.105
	Emission Rate, lb/hr	0.479	0.507	0.224	0.239	0.452	0.477	0.396
	Clinker Rates (mtph and lbs/ton)	128.90	0.0035	128.90	0.0016	128.90	0.0033	0.0028

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill 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__003932.LAB	11/30/23	14:06:06.642	10.570		-0.218	-0.013	3.152	15.198	14.762
SPC__003933.LAB	11/30/23	14:07:10.538	10.511		-0.176	-0.010	3.101	15.046	14.788
SPC__003934.LAB	11/30/23	14:08:14.400	10.391		-0.183	-0.008	3.066	15.083	14.882
SPC__003935.LAB	11/30/23	14:09:18.347	10.589		-0.235	-0.009	3.078	15.003	15.079
SPC__003936.LAB	11/30/23	14:10:22.556	10.494		-0.226	-0.012	3.169	14.960	14.866
SPC__003937.LAB	11/30/23	14:11:26.114	10.419		-0.186	-0.011	3.393	14.971	14.791
SPC__003938.LAB	11/30/23	14:12:30.024	10.333		-0.185	-0.009	3.335	15.192	14.902
SPC__003939.LAB	11/30/23	14:13:33.930	10.158		-0.182	-0.011	3.487	15.281	14.914
SPC__003940.LAB	11/30/23	14:14:38.121	10.201		-0.181	-0.010	3.521	15.436	14.824
SPC__003941.LAB	11/30/23	14:15:41.810	10.293		-0.174	-0.008	3.485	15.044	14.936
SPC__003942.LAB	11/30/23	14:16:45.633	10.328		-0.185	-0.010	3.401	15.260	14.875
SPC__003943.LAB	11/30/23	14:17:49.577	10.330		-0.187	-0.009	3.257	15.165	15.010
SPC__003944.LAB	11/30/23	14:18:53.483	10.515		-0.178	-0.009	3.239	15.112	15.024
SPC__003945.LAB	11/30/23	14:19:57.457	10.322		-0.167	-0.010	3.284	15.647	14.932
SPC__003946.LAB	11/30/23	14:21:01.245	10.202		-0.192	-0.008	3.332	15.279	14.787
SPC__003947.LAB	11/30/23	14:22:05.536	10.446		-0.192	-0.013	3.355	15.270	15.000
SPC__003948.LAB	11/30/23	14:23:09.059	10.126		-0.173	-0.010	3.239	15.526	14.803
SPC__003949.LAB	11/30/23	14:24:12.997	10.281		-0.179	-0.006	3.243	15.466	14.773
SPC__003950.LAB	11/30/23	14:25:16.972	10.354		-0.178	-0.010	3.132	14.991	14.932
SPC__003951.LAB	11/30/23	14:26:21.106	10.401		-0.183	-0.009	3.162	15.189	14.972
SPC__003952.LAB	11/30/23	14:27:24.661	10.564		-0.184	-0.011	3.041	15.351	14.923
SPC__003953.LAB	11/30/23	14:28:28.819	10.630		-0.239	-0.009	3.036	15.002	15.135
SPC__003954.LAB	11/30/23	14:29:32.581	10.388		-0.177	-0.010	3.145	15.058	14.940
SPC__003955.LAB	11/30/23	14:30:36.465	10.320		-0.184	-0.009	3.061	15.512	14.742
SPC__003956.LAB	11/30/23	14:31:40.282	10.449		-0.184	-0.008	3.116	14.955	14.950
SPC__003957.LAB	11/30/23	14:32:44.180	10.478		-0.193	-0.013	3.102	15.110	14.866
SPC__003958.LAB	11/30/23	14:33:48.124	10.380		-0.186	-0.011	3.094	15.562	14.819
SPC__003959.LAB	11/30/23	14:34:51.999	10.313		-0.184	-0.009	3.015	15.515	14.940
SPC__003960.LAB	11/30/23	14:35:55.890	10.396		-0.173	-0.009	3.089	15.250	14.603
SPC__003961.LAB	11/30/23	14:36:59.796	10.166		-0.194	-0.007	3.107	15.190	14.835
SPC__003962.LAB	11/30/23	14:38:03.707	10.313		-0.175	-0.009	3.130	15.240	14.897
SPC__003963.LAB	11/30/23	14:39:07.600	10.326		-0.181	-0.006	3.097	15.247	14.830
SPC__003964.LAB	11/30/23	14:40:11.655	10.298		-0.193	-0.009	3.081	15.281	14.815
SPC__003965.LAB	11/30/23	14:41:15.482	10.198		-0.180	-0.009	3.124	15.678	14.811
SPC__003966.LAB	11/30/23	14:42:19.679	10.453		-0.186	-0.010	3.154	15.269	14.783
SPC__003967.LAB	11/30/23	14:43:23.209	10.245		-0.174	-0.008	3.124	14.990	14.855
SPC__003968.LAB	11/30/23	14:44:27.506	10.243		-0.183	-0.006	3.091	15.417	14.732
SPC__003969.LAB	11/30/23	14:45:31.061	10.282		-0.186	-0.010	3.012	15.105	14.831
SPC__003970.LAB	11/30/23	14:46:34.916	10.230		-0.189	-0.009	3.029	15.001	14.947
SPC__003971.LAB	11/30/23	14:47:38.824	10.360		-0.190	-0.008	3.070	15.013	14.807
SPC__003972.LAB	11/30/23	14:48:42.718	10.319		-0.189	-0.008	2.996	15.236	14.868
SPC__003973.LAB	11/30/23	14:49:46.618	10.282		-0.190	-0.010	3.001	14.946	14.878
SPC__003974.LAB	11/30/23	14:50:50.570	10.318		-0.186	-0.010	3.148	15.152	14.861
SPC__003975.LAB	11/30/23	14:51:54.426	10.298		-0.197	-0.009	3.143	15.217	14.768
SPC__003976.LAB	11/30/23	14:52:58.382	10.527		-0.180	-0.014	3.214	15.235	14.809
SPC__003977.LAB	11/30/23	14:54:02.241	10.476		-0.189	-0.008	3.167	15.011	14.947
SPC__003978.LAB	11/30/23	14:55:06.281	10.632		-0.185	-0.008	3.100	14.942	14.973
SPC__003979.LAB	11/30/23	14:56:10.104	10.525		-0.205	-0.011	3.208	14.899	15.101
SPC__003980.LAB	11/30/23	14:57:14.298	10.446		-0.177	-0.012	3.128	15.196	14.880
SPC__003981.LAB	11/30/23	14:58:17.848	10.250		-0.200	-0.009	3.225	15.114	14.842
SPC__003982.LAB	11/30/23	14:59:21.816	9.997		-0.203	-0.011	3.049	15.263	14.736
SPC__003983.LAB	11/30/23	15:00:25.653	10.134		-0.195	-0.008	3.084	15.148	14.752
SPC__003984.LAB	11/30/23	15:01:29.668	10.441		-0.173	-0.010	2.954	14.943	14.860
SPC__003985.LAB	11/30/23	15:02:33.505	10.531		-0.182	-0.010	3.058	14.827	14.799
SPC__003986.LAB	11/30/23	15:03:37.361	10.589		-0.187	-0.008	3.041	15.016	14.820
SPC__003987.LAB	11/30/23	15:04:41.368	10.463		-0.184	-0.012	2.991	14.959	14.709
SPC__003988.LAB	11/30/23	15:05:45.202	10.697		-0.231	-0.012	2.986	15.176	14.973
SPC__003989.LAB	11/30/23	15:06:49.416	10.516		-0.229	-0.010	3.043	15.223	14.910
SPC__003990.LAB	11/30/23	15:08:07.985	10.424		-0.187	-0.008	3.062	14.959	14.830
SPC__003991.LAB	11/30/23	15:09:11.851	10.606		-0.195	-0.010	3.034	14.878	14.793
SPC__003992.LAB	11/30/23	15:10:15.789	10.483		-0.230	-0.010	3.052	14.903	14.823
SPC__003993.LAB	11/30/23	15:11:19.695	10.536		-0.182	-0.009	3.149	15.146	14.853
Mill Off Run 1		**(actual)**	**10.384**	**<**	**0.032**	**-0.009**	**3.145**	**15.165**	**14.866**
Oxygen	**9.7%**	**(ppm,dry @7% O2)**	**15.108**	**<**	**0.047**	**-0.014**	**4.576**		
DSCFM	**202,100**	**(lbs/hr)**	**10.352**	**<**	**0.024**	**-0.051**	**3.254**	**14.7**	**M26A Moisture**
Clinker (tons/hr)	**128.90**	**(lbs/ton clinker)**	**0.080**	**<**	**0.0002**				

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill 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__004019.LAB	11/30/23	15:39:46.051	10.622		-0.220	-0.008	3.275	15.467	14.836
SPC__004020.LAB	11/30/23	15:40:49.948	10.468		-0.220	-0.010	3.219	14.988	14.908
SPC__004021.LAB	11/30/23	15:41:53.859	10.538		-0.240	-0.013	3.233	14.903	14.815
SPC__004022.LAB	11/30/23	15:42:57.759	10.431		-0.237	-0.011	3.190	15.191	14.990
SPC__004023.LAB	11/30/23	15:44:01.662	10.563		-0.182	-0.010	3.194	15.081	14.850
SPC__004024.LAB	11/30/23	15:45:05.573	10.535		-0.253	-0.010	3.164	14.971	14.816
SPC__004025.LAB	11/30/23	15:46:09.529	10.387		-0.237	-0.010	3.280	15.002	14.850
SPC__004026.LAB	11/30/23	15:47:13.374	10.500		-0.247	-0.009	3.338	14.996	14.700
SPC__004027.LAB	11/30/23	15:48:17.285	10.631		-0.238	-0.010	3.364	14.754	14.803
SPC__004028.LAB	11/30/23	15:49:21.226	10.658		-0.244	-0.010	3.276	14.856	14.781
SPC__004029.LAB	11/30/23	15:50:25.479	10.477		-0.250	-0.009	3.268	15.256	14.733
SPC__004030.LAB	11/30/23	15:51:29.040	10.623		-0.239	-0.007	3.316	14.982	14.679
SPC__004031.LAB	11/30/23	15:52:32.943	10.664		-0.238	-0.010	3.143	14.834	14.729
SPC__004032.LAB	11/30/23	15:53:36.840	10.701		-0.247	-0.010	3.038	14.601	14.785
SPC__004033.LAB	11/30/23	15:54:41.129	10.721		-0.244	-0.011	3.115	15.011	14.541
SPC__004034.LAB	11/30/23	15:55:44.645	10.601		-0.245	-0.009	3.088	14.806	14.581
SPC__004035.LAB	11/30/23	15:56:48.598	10.546		-0.241	-0.008	3.186	14.513	14.563
SPC__004036.LAB	11/30/23	15:57:52.416	10.623		-0.239	-0.007	3.130	14.525	14.754
SPC__004037.LAB	11/30/23	15:58:56.315	10.683		-0.241	-0.007	3.204	14.911	14.543
SPC__004038.LAB	11/30/23	16:00:00.269	10.553		-0.251	-0.007	3.182	15.004	14.648
SPC__004039.LAB	11/30/23	16:01:04.131	10.643		-0.250	-0.011	3.158	14.591	14.674
SPC__004040.LAB	11/30/23	16:02:08.072	10.605		-0.244	-0.008	3.111	14.865	14.762
SPC__004041.LAB	11/30/23	16:03:11.977	10.737		-0.240	-0.008	3.161	14.845	14.637
SPC__004042.LAB	11/30/23	16:04:15.847	10.513		-0.250	-0.009	3.140	15.018	14.562
SPC__004043.LAB	11/30/23	16:05:20.159	10.615		-0.242	-0.006	3.179	14.787	14.643
SPC__004044.LAB	11/30/23	16:06:23.661	10.571		-0.235	-0.007	3.126	14.748	14.589
SPC__004045.LAB	11/30/23	16:07:27.548	10.479		-0.236	-0.007	3.212	14.562	14.588
SPC__004046.LAB	11/30/23	16:08:31.831	10.364		-0.222	-0.008	3.195	14.956	14.632
SPC__004047.LAB	11/30/23	16:09:35.397	10.652		-0.239	-0.011	3.247	14.745	14.505
SPC__004048.LAB	11/30/23	16:10:39.261	10.555		-0.258	-0.007	3.139	14.600	14.697
SPC__004049.LAB	11/30/23	16:11:43.205	10.746		-0.243	-0.010	3.198	14.873	14.841
SPC__004050.LAB	11/30/23	16:12:47.061	10.608		-0.239	-0.009	3.183	15.088	14.563
SPC__004051.LAB	11/30/23	16:13:50.987	10.772		-0.243	-0.010	3.078	14.569	14.713
SPC__004052.LAB	11/30/23	16:14:54.863	10.551		-0.243	-0.011	3.162	14.934	14.585
SPC__004053.LAB	11/30/23	16:15:58.770	10.793		-0.231	-0.011	3.157	14.444	14.681
SPC__004054.LAB	11/30/23	16:17:02.677	10.556		-0.254	-0.010	3.222	15.074	14.494
SPC__004055.LAB	11/30/23	16:18:06.574	10.782		-0.242	-0.008	3.217	14.724	14.573
SPC__004056.LAB	11/30/23	16:19:10.527	10.843		-0.232	-0.007	3.215	15.064	14.675
SPC__004057.LAB	11/30/23	16:20:14.391	10.739		-0.250	-0.009	3.201	14.851	14.669
SPC__004058.LAB	11/30/23	16:21:18.288	10.771		-0.260	-0.011	3.276	14.626	14.737
SPC__004059.LAB	11/30/23	16:22:22.543	10.759		-0.236	-0.009	3.264	14.830	14.550
SPC__004060.LAB	11/30/23	16:23:26.385	10.863		-0.245	-0.009	3.244	14.565	14.682
SPC__004061.LAB	11/30/23	16:24:30.138	10.868		-0.240	-0.008	3.340	15.076	14.607
SPC__004062.LAB	11/30/23	16:25:33.905	10.880		-0.232	-0.006	3.212	14.649	14.745
SPC__004063.LAB	11/30/23	16:26:38.204	10.756		-0.244	-0.009	3.259	14.703	14.725
SPC__004064.LAB	11/30/23	16:27:41.735	10.918		-0.234	-0.010	3.147	14.750	14.696
SPC__004065.LAB	11/30/23	16:28:45.615	10.864		-0.234	-0.011	3.088	14.718	14.768
SPC__004066.LAB	11/30/23	16:29:49.525	10.852		-0.231	-0.008	3.185	14.903	14.583
SPC__004067.LAB	11/30/23	16:30:53.421	10.886		-0.262	-0.008	3.198	14.701	14.806
SPC__004068.LAB	11/30/23	16:31:57.322	10.971		-0.244	-0.006	3.123	14.603	14.628
SPC__004069.LAB	11/30/23	16:33:01.232	10.925		-0.253	-0.008	3.253	14.722	14.689
SPC__004070.LAB	11/30/23	16:34:05.474	10.825		-0.247	-0.009	3.307	14.841	14.687
SPC__004071.LAB	11/30/23	16:35:09.032	10.722		-0.248	-0.009	3.324	14.820	14.746
SPC__004072.LAB	11/30/23	16:36:12.943	10.768		-0.239	-0.008	3.298	15.010	14.722
SPC__004073.LAB	11/30/23	16:37:16.837	10.858		-0.238	-0.008	3.313	14.735	14.793
SPC__004074.LAB	11/30/23	16:38:20.733	10.921		-0.256	-0.009	3.202	15.039	14.629
SPC__004075.LAB	11/30/23	16:39:24.642	10.836		-0.241	-0.010	3.225	14.708	14.837
SPC__004076.LAB	11/30/23	16:40:28.543	11.054		-0.244	-0.008	3.141	14.565	14.758
SPC__004077.LAB	11/30/23	16:41:32.449	10.957		-0.243	-0.010	3.365	14.859	14.669
SPC__004078.LAB	11/30/23	16:42:36.357	10.862		-0.247	-0.008	3.296	14.751	14.743
SPC__004079.LAB	11/30/23	16:43:40.252	10.947		-0.247	-0.008	3.298	14.730	14.693
SPC__004080.LAB	11/30/23	16:44:44.156	11.000		-0.247	-0.008	3.242	14.694	14.789
Mill Off Run 2		**(actual)**	**10.705**	**<**	**0.032**	**-0.009**	**3.211**	**14.832**	**14.698**
Oxygen	**9.9%**	**(ppm,dry @7% O2)**	**15.693**	**<**	**0.047**				
DSCFM	**208,800**	**(lbs/hr)**	**10.912**	**<**	**0.024**			**13.8**	**M26A Moisture**
Clinker (tons/hr)	**128.90**	**(lbs/ton clinker)**	**0.085**	**<**	**0.0002**				

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill 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__004118.LAB	11/30/23	17:26:09.022	10.517		-0.246	-0.010	3.276	14.933	14.473
SPC__004119.LAB	11/30/23	17:27:12.780	10.549		-0.230	-0.008	3.210	14.588	14.725
SPC__004120.LAB	11/30/23	17:28:16.755	10.754		-0.241	-0.009	3.220	14.704	14.674
SPC__004121.LAB	11/30/23	17:29:20.541	10.674		-0.231	-0.008	3.364	14.451	14.612
SPC__004122.LAB	11/30/23	17:30:24.453	10.611		-0.237	-0.009	3.293	14.866	14.580
SPC__004123.LAB	11/30/23	17:31:28.458	10.873		-0.257	-0.008	3.229	14.558	14.705
SPC__004124.LAB	11/30/23	17:32:32.248	10.763		-0.246	-0.008	3.185	14.530	14.732
SPC__004125.LAB	11/30/23	17:33:36.161	10.527		-0.240	-0.009	3.263	14.955	14.614
SPC__004126.LAB	11/30/23	17:34:40.063	10.569		-0.242	-0.010	3.219	14.748	14.657
SPC__004127.LAB	11/30/23	17:35:44.006	10.628		-0.252	-0.011	3.182	14.391	14.733
SPC__004128.LAB	11/30/23	17:36:47.866	10.788		-0.241	-0.009	3.167	14.765	14.818
SPC__004129.LAB	11/30/23	17:37:51.777	10.578		-0.241	-0.009	3.236	14.712	14.901
SPC__004130.LAB	11/30/23	17:38:55.678	10.358		-0.231	-0.009	3.378	14.988	14.579
SPC__004131.LAB	11/30/23	17:39:59.580	10.293		-0.193	-0.009	3.368	14.906	14.539
SPC__004132.LAB	11/30/23	17:41:03.605	10.447		-0.240	-0.007	3.291	14.294	14.644
SPC__004133.LAB	11/30/23	17:42:07.595	10.584		-0.237	-0.008	3.274	15.011	14.540
SPC__004134.LAB	11/30/23	17:43:11.290	10.699		-0.248	-0.007	3.262	14.491	14.691
SPC__004135.LAB	11/30/23	17:44:15.287	10.431		-0.255	-0.008	3.233	14.868	14.636
SPC__004136.LAB	11/30/23	17:45:19.096	10.514		-0.201	-0.008	3.209	14.493	14.676
SPC__004137.LAB	11/30/23	17:46:23.001	10.322		-0.184	-0.009	3.136	14.907	14.527
SPC__004138.LAB	11/30/23	17:47:26.909	10.585		-0.204	-0.008	3.172	14.302	14.578
SPC__004139.LAB	11/30/23	17:48:31.017	10.564		-0.207	-0.009	3.051	15.012	14.525
SPC__004140.LAB	11/30/23	17:49:34.713	10.548		-0.202	-0.010	3.075	14.573	14.678
SPC__004141.LAB	11/30/23	17:50:38.626	10.244		-0.244	-0.008	3.229	14.941	14.579
SPC__004142.LAB	11/30/23	17:51:42.523	10.179		-0.255	-0.007	3.251	15.102	14.365
SPC__004143.LAB	11/30/23	17:52:46.426	10.116		-0.245	-0.010	3.280	14.821	14.468
SPC__004144.LAB	11/30/23	17:53:50.521	10.485		-0.235	-0.009	3.269	14.648	14.579
SPC__004145.LAB	11/30/23	17:54:54.231	10.541		-0.239	-0.006	3.245	14.697	14.593
SPC__004146.LAB	11/30/23	17:55:58.190	10.558		-0.241	-0.009	3.203	14.838	14.593
SPC__004147.LAB	11/30/23	17:57:02.225	10.404		-0.251	-0.008	3.286	14.986	14.414
SPC__004148.LAB	11/30/23	17:58:06.149	10.307		-0.244	-0.009	3.384	14.964	14.473
SPC__004149.LAB	11/30/23	17:59:09.886	10.405		-0.256	-0.009	3.293	14.832	14.572
SPC__004150.LAB	11/30/23	18:00:14.088	10.384		-0.251	-0.008	3.275	14.569	14.662
SPC__004151.LAB	11/30/23	18:01:17.651	10.186		-0.239	-0.008	3.350	15.102	14.622
SPC__004152.LAB	11/30/23	18:02:21.552	10.296		-0.231	-0.009	3.332	14.519	14.642
SPC__004153.LAB	11/30/23	18:03:25.852	10.298		-0.246	-0.009	3.359	14.754	14.684
SPC__004154.LAB	11/30/23	18:04:29.358	10.112		-0.249	-0.010	3.253	15.734	14.523
SPC__004155.LAB	11/30/23	18:05:33.469	10.248		-0.237	-0.010	3.307	14.929	14.713
SPC__004156.LAB	11/30/23	18:06:37.169	10.432		-0.235	-0.008	3.397	14.654	14.673
SPC__004157.LAB	11/30/23	18:07:41.071	10.205		-0.237	-0.010	3.351	15.142	14.510
SPC__004158.LAB	11/30/23	18:08:45.346	10.194		-0.244	-0.007	3.340	14.776	14.645
SPC__004159.LAB	11/30/23	18:09:49.016	10.140		-0.242	-0.007	3.313	14.675	14.656
SPC__004160.LAB	11/30/23	18:10:52.779	10.399		-0.250	-0.009	3.182	15.002	14.582
SPC__004161.LAB	11/30/23	18:11:56.684	10.378		-0.229	-0.009	3.197	14.720	14.603
SPC__004162.LAB	11/30/23	18:13:00.589	10.363		-0.197	-0.007	3.161	14.598	14.612
SPC__004163.LAB	11/30/23	18:14:04.490	10.297		-0.215	-0.008	3.103	14.831	14.747
SPC__004164.LAB	11/30/23	18:15:08.392	10.250		-0.240	-0.011	3.229	14.724	14.676
SPC__004165.LAB	11/30/23	18:16:12.302	10.429		-0.247	-0.010	3.109	15.036	14.472
SPC__004166.LAB	11/30/23	18:17:16.308	10.520		-0.246	-0.006	3.239	15.098	14.439
SPC__004167.LAB	11/30/23	18:18:20.148	10.653		-0.248	-0.009	3.133	14.508	14.546
SPC__004168.LAB	11/30/23	18:19:24.007	10.351		-0.247	-0.008	3.095	15.108	14.556
SPC__004169.LAB	11/30/23	18:20:27.917	10.274		-0.249	-0.009	3.054	14.813	14.565
SPC__004170.LAB	11/30/23	18:21:31.896	10.264		-0.244	-0.007	3.210	14.584	14.620
SPC__004171.LAB	11/30/23	18:22:35.720	9.999		-0.234	-0.011	3.097	15.059	14.415
SPC__004172.LAB	11/30/23	18:23:39.629	10.145		-0.256	-0.005	3.122	14.533	14.763
SPC__004173.LAB	11/30/23	18:24:43.869	10.289		-0.246	-0.009	3.040	14.664	14.625
SPC__004174.LAB	11/30/23	18:25:47.772	10.239		-0.251	-0.008	3.073	14.624	14.580
SPC__004175.LAB	11/30/23	18:26:51.580	9.984		-0.235	-0.011	3.168	14.955	14.550
SPC__004176.LAB	11/30/23	18:27:55.226	10.296		-0.215	-0.006	3.001	14.670	14.523
SPC__004177.LAB	11/30/23	18:28:59.136	10.222		-0.209	-0.010	3.093	15.188	14.477
SPC__004178.LAB	11/30/23	18:30:03.292	10.323		-0.245	-0.007	3.046	14.659	14.748
SPC__004179.LAB	11/30/23	18:31:07.393	10.394		-0.189	-0.008	3.109	14.757	14.556
Mill Off Run 3		(actual)	**10.403**	**<**	**0.032**	**-0.009**	**3.217**	**14.788**	**14.604**
Oxygen	**10.0%**	(ppm,dry @7% O2)	**15.453**	**<**	**0.048**	**-0.013**	**4.779**		
DSCFM	**207,350**	(lbs/hr)	**10.573**	**<**	**0.024**	**-0.047**	**3.394**	**14.2**	**M26A Moisture**
Clinker (tons/hr)	**128.90**	(lbs/ton clinker)	**0.082**	**<**	**0.0002**				

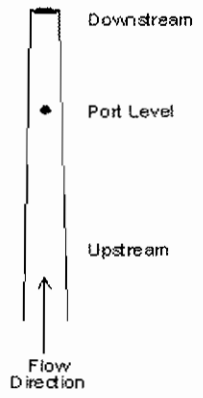
Appendix B

Field Data
and
CEM/FTIR Data

EPA Method 1
Traverse Point Location for Circular Ducts

Plant	Lone Star Industries
City	Maryneal
State	TX
Location	Main Kiln Stack
Stack ID (inches)	140
Nipple Length	6.25
Nearest Upstream Disturbance (Bend, ID FAN, etc)	
Distance (inches)	1893
Type of Disturbance	
Nearest Downstream Disturbance (Bend, or Stack Outlet)	
Distance (inches)	579
Type of Disturbance	
Sampler	SCS
Date	11/28/23

Example For Syntax



See Report Text

For Figure of Location

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	140	6.16	6.25	12 3/8 in.
2	0.146	140	20.44	6.25	26 3/4 in.
3	0.296	140	41.44	6.25	47 3/4 in.
4	0.704	140	98.56	6.25	104 3/4 in.
5	0.854	140	119.56	6.25	125 3/4 in.
6	0.956	140	133.84	6.25	140 1/8 in.

Cyclonic Flow Check Data Sheet

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Borger Morgrad TX	11/29/23	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
WW/GM	27.32	-0.67	50	140	0.84	MS-15	NA	NA		5B

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
	A	1	0.90	241	5
		2	0.90	244	3
		3	0.95	240	3
	B	1	1.1	243	4
		2	1.0	247	4
		3	0.95	244	4
	C	1	1.0	242	3
		2	0.96	243	4
		3	0.90	240	3
	D	1	0.98	240	5
		2	1.0	241	3
		3	1.0	244	3
Pitot Leak Check			✓		
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
Buzzi Unicem Mary Neal Texas IV	29 /23	main stack	M26A	1A ON

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 Thrift	27.32	-0.67	50	N/A	140.00"	0.85 0.84	ft glass effective	.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
11.3	MS-15	1.69	0.975	5A	5A	CEM	.001 CU. FT @ 13 "Hg	.001 CU. FT @ 11 "Hg	11 %	10.5 %	2.57

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	1450	861.672	0.98	2.1	253	243	68	246	61	5
2	5		866.17	0.92	2.2	254	241	70	248	57	5
3	10		870.61	0.93	2.2	256	239	70	255	55	6
	15	1505	875.079	End of Port							
B-1	15	1507	875.079	1.2	2.3	255	245	69	250	56	8
2	20		880.19	0.95	2.3	255	245	70	249	57	6
3	25		884.88	0.90	2.1	256	245	71	255	58	6
	30	1522	889.319	End of Port							
C-1	30	1524	889.319	0.94	2.2	254	243	69	251	58	6
2	35		893.34	0.96	2.3	255	242	70	248	56	7
3	40		898.19	0.92	2.2	253	238	69	252	56	6
	45	1539	902.718	End of Port							
D-1	45	1541	902.718	1.0	2.4	256	238	68	252	57	8
2	50		907.44	1.1	2.6	257	242	70	257	56	8
3	55		912.34	1.1	2.6	255	245	71	254	56	9
	60	1556	917.275	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL 875.079 FINAL 875.079 LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL 889.319 FINAL 889.319 LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL 902.718 FINAL 902.718 LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

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 Borger Maryred TX.
Sample Location Main Stack
Run No. 1A ON -M26A- TA
Filter Number(s) Not Applicable

Sample Date 11 / 29 /23
Recovery Date 11 / 29 /23
Recovered by GC S

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		842.4	784.5	648.9	751.4	742.9	920.6	g
Initial weight		737.5	758.1	643.2	747.9	741.0	907.7	g
Net weight		104.9	26.4	5.7	3.5	1.9	12.9	g

Description of impinger water Clear
25 % spent
B/W Sil gel color
Total moisture = 155.3 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN ON-M26A-H2SO4- 1A
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN ON -M26A-NaOH 1B
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Burns Run Mary Neal Texas	11 / 29 /23	Main Stack	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
Engl Mayll	27.32	-.50	~40	N/A	140"00	0.83 0.84	Quartz probe	.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
13	M5-21	1.69	.985	5A	5A	GEM	.001 CU. FT @ 12 "Hg	.001 CU. FT @ 12 "Hg	11	16.5	2.38

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

TRAVERSE PORT/ A /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	14:50	971.583	.9	2.1	256	243	71	246	53	2
2	5		974.33	.92	2.2	256	244	72	249	53	2
3	10		978.51	.93	2.2	256	239	72	249	54	3
	15	15:05	982.935	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	15:07	982.935	1.2	2.9	256	245	72	250	54	3 6
2	20		985.91	.95	2.3	257	245	72	252	54	3
3	25		990.68	.90	2.1	258	245	72	252	54	3
	30	15:22	995.641	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	15:24	995.641	.94	2.2	244	243	73	265	54	3
2	35		999.41	.96	2.3	248	242	73	256	56	3
3	40		1005.52	.92	2.2	253	238	73	258	56	3
	45	15:39	1009.782	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	15:41	1009.782	1.0	2.4	246	238	72	256	57	3
2	50		1014.73	1.1	2.6	246	242	72	256	57	3
3	55		1020.08	1.1	2.6	249	245	73	258	57	3
	60	15:56	1025.334	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.	1025.334				

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Buzzi Maryneal TX
Sample Location Main Stack
Run No. 1B ON -M26A- 1B
Filter Number(s) Not Applicable

Sample Date 11/28/23
Recovery Date 11/29/23
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		845.7	789.8	615.1	740.0	740.8	912.3	g
Initial weight		749.9	747.1	611.9	734.9	738.1	899.1	g
Net weight		95.8	42.7	3.2	5.1	2.7	13.2	g

Description of impinger water clear
25 % spent
BU Sil gel color
Total moisture = 162.7 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN ON -M26A-H2SO4- 1B
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN ON -M26A-NaOH 1B
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

Run 2
Aborted
Process Problem

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem, Maryneal, TX	11 / 29 /23	Main stack	M26A	2A ON

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	27.32	-0.07	50		140	0.84		.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
13	MS-15	1.68	0.975				0.001 CU. FT @ 14 "Hg	_____ CU. FT @ _____ "Hg	11	16.5	2.87

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	1620	917.865	1.7	2.3	254	248	66	259	57	4
2	5		923.29	1.1	2.6	254	248	65	256	56	4
3	10		928.33	1.0	2.4	258	263	67	258	57	4
	15	1635	933.085	End of Port							

INTRA-PORT LEAK CHECK?
DGM VOLUME (CU. FT) INITIAL 933.085 FINAL 933.085 LEAK RATE: _____ CU.FT @ _____ INCHES Hg _____ CU.FT @ _____ INCHES Hg

B-1	15	1641	933.085	0.90	2.1	252	240	66	250	56	4
2	20			0.93	2.2						
3	25										
	30			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										
2	35										
3	40										
	45			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										
2	50										
3	55										
	60			End of Port							

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

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem Maryneal, TX	11/30/23	Main Stack GN	M26A	5A GN

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	27.43	-0.67	50	NA	140	0.85 0.84	5ft glass	0.250 0.250 0.250	0.250

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
13	M5-15	1.68	0.975	5A	5A	CEM	.001 CU. FT @ 12 "Hg	.001 CU. FT @ 10 "Hg	11	16.5	2.37

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	0920	936.456	0.86	2.0	253	263	58	257	56	5
2	5		940.72	0.84	2.0	256	262	59	250	50	6
3	10		944.95	0.76	1.8	255	261	59	256	48	6
	15	0935	948.941	End of Port							

INTRA-PORT LEAK CHECK? INITIAL _____ FINAL _____ LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

B-1	15	0937	948.941	0.95	2.3	254	262	60	254	50	7
2	20		953.45	0.93	2.2	254	262	62	253	49	7
3	25		957.91	0.89	2.1	253	262	63	258	51	7
	30	0952	962.175	End of Port							

INTRA-PORT LEAK CHECK? INITIAL _____ FINAL _____ LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

C-1	30	0954	962.175	1.0	2.4	253	263	60	253	54	7
2	35		966.64	0.98	2.3	256	263	63	253	54	7
3	40		971.07	0.96	2.3	257	263	63	254	55	7
	45	1009	975.464	End of Port							

INTRA-PORT LEAK CHECK? INITIAL _____ FINAL _____ LEAK RATE: / CU.FT @ / INCHES Hg / CU.FT @ / INCHES Hg

D-1	45	1011	975.464	0.96	2.3	255	260	62	254	59	8
2	50		980.01	0.95	2.3	255	262	64	258	59	8
3	55		984.33	0.94	2.2	257	261	64	255	62	8
	60	1026	988.745	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 Borger Maryneal Tx
Sample Location Main Stack
Run No. MN ON -M26A-3A
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/30/23
Recovered by SCJ

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		831.8	812.3	652.5	759.7	731.0	934.1	g
Initial weight		749.2	750.2	648.8	758.1	730.4	920.6	g
Net weight								g

Description of impinger water Clear

50 % spent
B/W Sil gel color
Total moisture = 164.1 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN On -M26A-H2SO4- 3A
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN On -M26A-NaOH 3A
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem Maryland	11/30/23	Main Stack	M26A	3 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
Gage Mayer	27.43	-.67	~ 76	NA	140	0.84	5ft 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
13%	21	1.69	.985	5A	5A	OSM 2	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	11	16.5	2.38

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	9:20	43.246	.86	2.0	257	262	58	251	58	3
2	5		47.32	.84	2.0	262	262	59	250	51	3
3	10		51.34	.76	1.8	258	261	60	256	51	3
	15	9:35	55.331	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	9:37	55.331	.95	2.3	253	262	61	254	53	3
2	20		59.46	.93	2.2	252	262	61	253	52	3
3	25		63.86	.89	2.1	251	263	63	258	54	3
	30	9:52	68.186	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	9:54	68.186	1.0	2.4	253	263	62	253	55	3
2	35		72.15	.98	2.4	248	263	63	253	56	3
3	40		76.84	.96	2.3	247	263	63	254	53	3
	45	10:09	81.840	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	10:11	81.840	.96	2.3	253	260	62	254	53	3
2	50		85.108	.95	2.3	254	262	63	255	54	3
3	55		90.20	.94	2.2	254	261	64	255	54	3
	60	10:26	95.115	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 Buzzi Maryneal TX
Sample Location Main Stack
Run No. MN ON -M26A- 313
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/30/23
Recovered by SCS

782.9 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		865.3	~~755.0~~	615.4	~~748.7~~	~~747.0~~	925.1	g
Initial weight		755.0	747.7	613.1	745.9	746.0	912.1	g
Net weight		110.3	35.2	2.3	2.9	1.0	13.0	g

Description of impinger water clear
60 % spent
B/U Sil gel color
Total moisture = 164.6 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN On -M26A-H2SO4- 313
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN On -M26A-NaOH 3B
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem Maryneal, TX	11/30/23	Main Stack ON	M26A	4A ON

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	27.43	-0.67	50	N/A	1.40	0.84	5' 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
13	M5-15	1.68	0.775	5A	4A	CEM	.001 CU. FT @ 13 "Hg	.001 CU. FT @ 10 "Hg	N	16.5	2.37

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	1045	988.879	0.85	2.0	254	261	60	255	58	5
2	5		993.24	0.88	2.1	256	262	63	260	56	5
3	10		997.47	0.79	1.9	256	261	65	255	56	4
	15	1100	1001.527	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	1102	1001.527	0.94	2.2	256	262	65	254	58	5
2	20		1005.77	0.94	2.2	254	262	67	254	59	5
3	25		1009.94	0.87	2.1	254	261	67	254	60	6
	30	1117	1014.335	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	1119	1014.335	0.98	2.3	255	261	66	256	61	6
2	35		1018.95	0.99	2.3	256	262	67	250	61	6
3	40		1023.54	0.94	2.2	253	262	69	251	63	6
	45	1134	1027.161	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	1136	1027.161	0.96	2.3	255	262	70	251	60	7
2	50		1031.95	0.94	2.2	254	261	65	252	61	7
3	55		1036.33	0.94	2.2	256	260	69	256	63	7
	60	1151	1040.834	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 Buzzi Maryneal TX
Sample Location Main Stack Mill
Run No. 4 ~~OFF~~ ON -M26A- 4A
Filter Number(s) Not Applicable
SCJ

Sample Date 11 / 30 /23
Recovery Date 11 / 30 /23
Recovered by SCJ

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		841.8	761.7	615.9	751.5	751.5	935.5	g
Initial weight		747.2	747.6	614.4	751.1	751.5	921.7	g
Net weight	✓	94.6	14.1	1.5	0.4	0.0	17.8	g

Description of impinger water clear

50 % spent
13/W Sil gel color
Total moisture = 128.4 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN ~~OFF~~ ON -M26A-H2SO4- 4A SCJ
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN ~~OFF~~ ON -M26A-NaOH 4A
Liquid level marked/sealed ✓

Samples stored and locked _____
Remarks _____

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Barzi Unicem Magnesia	11 / 30 /23	Main Stack Mill ON	M26A	4B ON

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
Gage Mayer	27.43	- 0.67	~ 75	NA	140	0.84	5' 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
13	M5-21	1.69	.985	5A	5A	C [illegible]	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	11	16.5	2.31

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	10:45 0	~~10:25~~	95.369	~~.65~~	2.0	256	262	64	259	59	3
2	5		99.24	.88	2.1	248	261	65	256	56	3
3	10		103.55	.79	1.9	253	261	65	254	56	3
	15	11:00	107.634	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	11:02	107.634	.94	2.2	255	262	66	254	59	3
2	20		112.14	.92	2.2	252	261	67	254	59	3
3	25		116.56	.87	2.1	249	262	68	254	60	3
	30	11:17	121.091	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	11:19	121.091	.98	2.4	254	261	68	~~255~~	61	4
2	35		125.06	.99	2.4	252	262	69	255	62	3
3	40		129.86	.94	2.2	253	262	70	257	63	3
	45	11:34	134.457	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	11:36	134.457	.96	2.3	256	262	71	254	63	3
2	50		139.50	.94	2.2	253	261	72	255	63	3
3	55		~~139.58~~ 143.28	.94	2.2	254	261	72	257	64	3
	60	11:51	~~143.28~~	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.	137.364				

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Buzzi Maynard TX
Sample Location
Run No. 4 ON -M26A- 4B
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/30/23
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		838.4	741.8	665.7	753.1	742.7	936.7	g
Initial weight		742.6	733.8	665.3	753.2	742.7	920.1	g
Net weight		95.8	8.0	0.4	-0.1	0.0	16.6	g

Description of impinger water clear 50 % spent
B/W Sil gel color
Total moisture = 120.7 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN ON -M26A-H2SO4- 4B
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN ON -M26A-NaOH 4B
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem Maryneal, Tx	11/30/23	Main Stack OFF	M26A	5A OFF

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	27.47	-0.67	65	N/A	140	0.84	6' 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
14	MS-15	1.68	0.975	5A	5A	[illegible]	.001 CU. FT @ 12 "Hg	.001 CU. FT @ 10 "Hg	9.8	17.7	2.16

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	1455	42.388	0.65	1.4	251	303	71	250	62	5
2	5		46.02	0.60	1.3	254	300	73	253	62	4
3	10		49.44	0.58	1.3	254	300	76	248	60	4
	15	1420	52.766	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	1422	52.766	0.69	1.5	256	301	75	255	60	5
2	20		56.41	0.64	1.4	252	301	77	248	61	5
3	25		60.01	0.62	1.4	252	301	80	253	60	5
	30	1437	63.606	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	1439	63.606	0.76	1.6	255	301	79	256	61	5
2	35		67.53	0.71	1.5	257	300	80	259	62	6
3	40		71.37	0.70	1.5	252	299	81	254	60	6
	45	1454	75.149	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	1456	75.149	0.79	1.7	256	298	80	255	62	6
2	50		79.18	0.72	1.6	254	299	81	254	63	6
3	55		83.21	0.68	1.5	250	297	83	249	63	6
	60	1511	87.059	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 Buzzi Marvreal TX
Sample Location Main
Run No. MN Off -M26A- 5A
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/30/23
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		859.6	768.9	646.8	747.4	762.7	946.5	g
Initial weight		750.3	753.6	643.9	746.6	763.2	934.2	g
Net weight	✓	109.3	15.3	2.9	0.8	-0.5	12.3	g

Description of impinger water clear
60 % spent
B/W Sil gel color
Total moisture = 140.1 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN Off -M26A-H2SO4- 5A
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN Off -M26A-NaOH 5A
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Bunge Unicem Mason	11/30/23	Main Stack Mill	M26A	5B 0856

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
Greg, Mark	27.93	-.67	75	N/A	140	0.850.84	Quartz	.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
14 15 Dm	M5-21	1.6	.985	5H	5H	CEM1	.001 CU. FT @ 10 "Hg	.00 CU. FT @ 10 "Hg	9.8 Dm	6.5 Dm 6.7	2.17

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	2:05	148.366	.63	1.4	248	303	78	252	60	2
2	5		152.17	.60	1.3	246	300	79	255	58	2
3	10		155.45	.58	1.3	245	299	81	256	60	2
	15	2:20	158.898	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	2:22	158.898	.69	1.5	244	301	82	257	60	3
2	20		162.37	.64	1.3	246	301	82	245	58	2
3	25		165.06	.62	1.3	252	300	83	256	56	2
	30	14:37	171.504	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	14:39	171.504	.76	1.6	257	301	83	258	58	3
2	35		173.36	.71	1.5	252	299	84	255	58	3
3	40		177.07	.70	1.5	249	298	84	256	56	3
	45	14:54	180.525	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	14:56	180.525	.79	1.7	250	298	83	255	55	3
2	50		184.55	.72	1.6	254	299	84	257	59	3
3	55		188.49	.68	1.5	250	297	85	249	60	3
	60	15:11	192.303	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.	192303				

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Burzi Maryneal TX
Sample Location Main Stack
Run No. MN Off-M26A-5B
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/30/23
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		868.9	768.1	614.1	757.7	737.2	937.0	g
Initial weight		760.9	747.0	612.5	755.7	737.1	925.0	g
Net weight		108.0	21.1	1.6	2.0	0.1	12.0	g

Description of impinger water clear

80 % spent
B/W Sil gel color
Total moisture = 144.8 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN Off-M26A-H2SO4- 5B
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN Off-M26A-NaOH 5B
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem Midlothian TX	7/30/23	Main Stack	M26A	6A OFF

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	27.45	-0.67	105	N/A	140.0	0.65-0.84	5 Ft glass effective	.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
14	MS-15	1.68	0.975	5A	5A	CEM	.001 CU. FT @ 14 "Hg	.001 CU. FT @ 10 "Hg	9.8	17.7	2.16

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	1539	87.361	0.65	1.4	248	293	73	246	61	2
2	5		91.09	0.62	1.3	249	294	75	251	62	2
3	10		94.61	0.57	1.2	247	293	76	253	60	2
	15	1554	97.936	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	1556	97.936	0.70	1.5	247	293	76	249	61	3
2	20		101.69	0.66	1.4	248	293	77	254	60	3
3	25		105.38	0.60	1.3	245	294	78	251	61	2
	30	1611	108.815	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	1613	108.815	0.79	1.7	246	294	80	256	62	3
2	35		112.81	0.75	1.6	248	293	80	249	61	3
3	40		116.77	0.73	1.6	245	293	81	251	62	3
	45	1628	120.734	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	1630	120.734	0.84	1.8	245	293	81	256	63	3
2	50		124.87	0.80	1.7	246	293	80	251	63	3
3	55		129.01	0.74	1.6	250	294	80	248	64	3
	60	1645	133.165	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 Buzzi Monyreal TX
Sample Location Main Stack
Run No. MN Off -M26A- 6A
Filter Number(s) Not Applicable

Sample Date 11 / 30 /23
Recovery Date 11 / 31 /23
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		860.3	767.0	619.3	750.1	748.7	950.7	g
Initial weight		751.7	757.7	616.7	749.7	747.7	939.4	g
Net weight		108.6	9.3	2.6	0.4	1.0	11.3	g

Description of impinger water Clear
75 % spent
B/W Sil gel color
Total moisture = 133.2 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN Off -M26A-H2SO4- 6A
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN Off -M26A-NaOH 6A
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem Maryneal	11 / 30 /23	Main Stack w/ Hoff	M26A	6B

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
Gage Mayer	27.43	-.67	65	NA	140	0.84	5' 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
14	M5-21	~~1.93~~ 1.69	.985	5A	5A	CFM	.001 CU. FT @ 12 "Hg	.003 CU. FT @ 13 "Hg	9.8	17.7	2.17

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	15:39	192.402	.63	1.4	250	293	75	251	60	3
2	5		195.89	.62	1.3	249	294	77	251	60	3
3	10		199.23	.57	1.2	253	294	79	256	58	2
	15	15:54	202.698	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	15:56	202.698	.70	1.5	254	293	82	247	56	3
2	20		205.89	.66	1.4	250	293	83	257	55	2
3	25		209.37	.60	1.3	253	293	85	246	55	2
	30	16.11	213.136	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	16.13	213.136	.79	1.7	257	294	83	256	56	3
2	35		217.06	.75	1.6	254	293	82	255	58	3
3	40		220.98	.73	1.6	257	294	82	255	53	4
	45	16.28	224.839	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	16.30	224.839	.64	1.8	252	295	82	253	55	4
2	50		228.87	.80	1.7	251	293	82	255	56	4
3	55		232.94	.74	1.6	255	294	83	254	58	4
	60	16.45	236.989	End of Port							

TOTAL TIME		DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.		236.989				

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Borger Maryneal TX
Sample Location N
Run No. MN Out -M26A- 6B
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/31/23
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		877.8	770.9	671.1	745.6	744.3	950.4	g
Initial weight		771.2	756.7	668.2	745.6	744.2	936.7	g
Net weight		106.6	14.2	2.9	0.0	0.1	13.7	g

Description of impinger water Clear
80 % spent
B/W Sil gel color
Total moisture = 137.5 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse container no. MN Out -M26A-H2SO4- 6B
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse container no. MN Out -M26A-NaOH 6B
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem, Maryneal, TX	11/30/23	Main Stack OFF	M26A	7A OFF

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	27.43	-0.67	60	NA	140.0	0.84 SCS	5' 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
14	M5-15	1.68	0.975	5A	5A	CEM	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 12 "Hg	9.8	17.7	2.16

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	1725	133.245	0.67	1.5	255	293	75	257	62	5
2	5		137.01	0.64	1.4	253	294	77	257	60	5
3	10		140.54	0.59	1.3	256	294	77	256	62	4
	15	1740	143.915	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	1742	143.915	0.70	1.5	255	295	76	256	63	5
2	20		147.46	0.65	1.4	255	295	77	254	62	5
3	25		151.07	0.60	1.3	255	293	78	251	62	5
	30	1757	154.811	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	1759	154.811	0.77	1.7	254	294	77	254	59	6
2	35		158.89	0.75	1.6	256	293	79	255	58	6
3	40		162.95	0.70	1.5	254	293	80	256	59	5
	45	1814	166.699	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	1816	166.699	0.81	1.8	255	293	80	255	60	6
2	50		171.02	0.79	1.7	253	294	81	255	61	6
3	55		174.98	0.72	1.6	256	294	80	255	60	6
	60	1831	178.981	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 Bunge Marysneal
Sample Location Main Stack
Run No. MN OFF -M26A- 7A
Filter Number(s) Not Applicable

Sample Date 11 / 30 /23
Recovery Date 11/31/23
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		845.5	778.8	645.4	747.4	757.0	1042.3	g
Initial weight		742.9	761.4	643.4	747.0	751.4	1029.1	g
Net weight		102.6	17.4	2.0	0.4	-0.4	13.2	g

Description of impinger water Clear
25 % spent
B/W Sil gel color
Total moisture = 135.2 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN OFF -M26A-H2SO4- 7A
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN OFF -M26A-NaOH 7A
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

METHOD 26A FIELD DATA SHEET

PLANT AND CITY	DATE	SAMPLING LOCATION	SAMPLE TYPE	RUN NUMBER
Buzzi Unicem Maryneal	4 / 30 /23	Main Stack Mill 9/9	M26A	FB

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
Gage Mayes	27.43	-.67	60	NA	140	0.85 0.84	5' Glass	.25 .25	.251

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
14	MS-31	1.69	.9866	5A	5A	CEM 3	.001 CU. FT @ 10 "Hg	.001 CU. FT @ 10 "Hg	9.8	17.7	2.17

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	17:25	237.196	.67	1.5	250	295	80	256	58	2
2	5		240.61	.64	1.4	252	295	81	256	56	2
3	10		244.13	.59	1.3	242	294	82	252	56	2
	15	17:40	247.755	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	17:42	247.755	.70	1.5	245	293	82	255	54	3
2	20		251.43	.65	1.4	249	295	83	250	54	2
3	25		255.11	.60	1.3	258	294	83	252	56	2
	30	17:57	258.330	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	17:59	258.330	.77	1.7	250	294	82	256	55	2
2	35		262.23	.75	1.7	247	294	83	257	55	2
3	40		266.19	.71	1.5	255	293	83	253	59	2
	45	18:14	269.956	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	18:16	269.956	.81	1.8	244	293	83	254	58	2
2	50		273.85	.79	1.8	253	294	83	252	59	2
3	55		277.09	.78	1.6	256	294	83	255	60	2
	60	18:31	282538	End of Port							

TOTAL TIME	DGM VOLUME	AVE SQRT delta P	AVE delta H	AVE. TEMP.	AVE. TEMP.
60 Min.	282.538				

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Buzzi Marvel TX
Sample Location Main Stack
Run No. MN Oct -M26A- 7AB
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 12/1/23
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		853.6	798.3	612.9	748.4	733.0	982.1	g
Initial weight		761.1	754.2	611.3	744.6	732.8	967.0	g
Net weight		92.5	34.1	1.6	1.8	0.2	15.1	g

Description of impinger water Clear

20 % spent
13/W Sil gel color
Total moisture = 145.3 grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse container no. MN Oct -M26A-H2SO4- 7B
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse container no. MN Oct -M26A-NaOH 7B
Liquid level marked/sealed ✓

Samples stored and locked
Remarks

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Buzzi Marvneal TX
Sample Location Main Stack
Run No. OEF-M26A- FB
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/31/23
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		766.0	760.4	616.0	799.9	752.7	951.3	g
Initial weight		766.2	760.4	618.1	760.0	752.8	950.2	g
Net weight								g

Description of impinger water Clear _____ % spent
_____ Sil gel color
Total moisture = _____ grams

RECOVERED SAMPLE

H_2SO_4 Impingers and knockout contents and water rinse
container no. MN 044 -M26A-H2SO4- FB
Liquid level marked/sealed ✓

NaOH Impingers contents and water rinse
container no. MN044 -M26A-NaOH FB
Liquid level marked/sealed ✓

Samples stored and locked _____
Remarks From train 6A

EPA METHOD 26A RECOVERY AND INTEGRITY DATA SHEET

Plant Buzzi Marvneal TX
Sample Location Main Stack
Run No. MN ON -M26A- FB
Filter Number(s) Not Applicable

Sample Date 11/30/23
Recovery Date 11/30/23
Recovered by SLG

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		750.9	752.6	613.0	749.7	744.7	932.3	g
Initial weight		757.3	752.5	612.9	749.5	741.7	932.2	g
Net weight								g

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

RECOVERED SAMPLE

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

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

Samples stored and locked _____
Remarks From train 3A

Client: Buzzi Maryneal TX
Test Location: Main Stack; Raw Mill On
Date: Nov 29, 2023 Start Time: 14:50:05
Run number 1
One Minute Averages

	O2 %,dry	CO2 %,dry
2:51:03 PM	10.8	16.7
2:52:03 PM	10.7	16.8
2:53:03 PM	10.8	16.6
2:54:03 PM	10.8	16.6
2:55:03 PM	10.8	16.7
2:56:03 PM	10.7	17.0
2:57:03 PM	10.8	16.8
2:58:03 PM	10.8	16.7
2:59:03 PM	10.8	16.7
3:00:03 PM	10.8	16.8
3:01:03 PM	10.8	16.3
3:02:03 PM	10.8	16.5
3:03:03 PM	10.8	16.6
3:04:03 PM	10.8	16.5
3:05:03 PM	10.8	16.7
3:06:03 PM	10.8	16.8
3:07:03 PM	10.8	16.7
3:08:03 PM	10.8	16.5
3:09:03 PM	10.8	16.6
3:10:03 PM	10.8	16.7
3:11:03 PM	10.8	16.6
3:12:03 PM	10.8	16.7
3:13:03 PM	10.8	16.8
3:14:03 PM	10.9	16.5
3:15:03 PM	10.9	16.5
3:16:03 PM	10.8	16.6
3:17:03 PM	10.8	16.7
3:18:03 PM	10.8	16.8
3:19:03 PM	10.8	16.7
3:20:03 PM	10.8	16.8
3:21:03 PM	10.7	16.7
3:22:03 PM	10.7	16.9
3:23:03 PM	10.7	16.9
3:24:03 PM	10.7	16.7
3:25:03 PM	10.7	16.9
3:26:03 PM	10.7	16.9
3:27:03 PM	10.7	16.8
3:28:03 PM	10.7	16.7
3:29:03 PM	10.7	16.7
3:30:03 PM	10.7	17.0
3:31:03 PM	10.7	16.9
3:32:03 PM	10.7	16.9
3:33:03 PM	10.7	16.8
3:34:03 PM	10.7	16.9
3:35:03 PM	10.8	16.8
3:36:03 PM	10.8	16.8
3:37:03 PM	10.7	16.8
3:38:03 PM	10.7	16.7
3:39:03 PM	10.7	16.8
3:40:03 PM	10.7	16.6
3:41:03 PM	10.7	16.7
3:42:03 PM	10.7	16.6
3:43:03 PM	10.7	16.8
3:44:03 PM	10.7	16.8
3:45:03 PM	10.7	17.0
3:46:03 PM	10.7	16.7
3:47:03 PM	10.8	16.7
3:48:03 PM	10.8	16.7
3:49:03 PM	10.8	16.6
3:50:03 PM	10.8	16.8
3:51:03 PM	10.8	16.8
3:52:03 PM	10.8	16.6
3:53:03 PM	10.8	16.9
3:54:03 PM	10.8	16.7
3:55:03 PM	10.8	16.8
3:56:03 PM	10.8	16.7
Run Avgs	10.8	16.7
Cal Gas	11.8	10.0
Initial Zero	0.0	0.2
Final Zero	0.2	0.3
Initial cal.	11.8	10.0
Final Cal.	11.9	10.0
Corrected Average	10.7	16.9

Buzzi Unicem; Maryneal TX Main Stack: Raw Mill On November 29, 2023 Operator

Cylinder ID	Gas Type	Value	Internal Response	Cal Error	Run No. 1 14:50-15:56 Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift	Run No. Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift	Run No. Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift
	O2 Zero	Zero N2	0.0%	0.00%	0.0%	0.00%	0.2%	0.91%	0.91%										
EB0066680	O2 Mid	11.8%	12.0%	0.82%	11.8%	-0.91%	11.9%	-0.46%	0.46%										
ALM056015	O2 Span	21.9%	21.9%	0.00%															
	CO2 Zero	Zero N2	0.0%	0.00%	0.2%	1.10%	0.3%	1.65%	0.55%										
EB0066680	CO2 Mid	10.0%	9.9%	-0.61%	10.0%	0.55%	10.0%	0.55%	0.00%										
ALM056015	CO2 Span	18.2%	18.2%	0.17%															

Client: Buzzi Maryneal TX
Test Location: Main Stack; Raw Mill On
Date: Nov 30, 2023 Start Time: 09:20:23
Run number 2
One Minute Averages

	O2 %,dry	CO2 %,dry
9:21:21 AM	11.2	15.4
9:22:21 AM	11.2	15.3
9:23:21 AM	11.2	15.2
9:24:21 AM	11.2	15.4
9:25:21 AM	11.3	15.4
9:26:21 AM	11.3	15.4
9:27:21 AM	11.3	15.4
9:28:21 AM	11.3	15.4
9:29:21 AM	11.3	15.4
9:30:21 AM	11.3	15.4
9:31:21 AM	11.4	15.3
9:32:21 AM	11.4	15.3
9:33:21 AM	11.4	15.1
9:34:21 AM	11.4	15.1
9:35:21 AM	11.4	15.1
9:36:21 AM	11.4	15.2
9:37:21 AM	11.4	15.1
9:38:21 AM	11.4	15.0
9:39:21 AM	11.5	15.0
9:40:21 AM	11.5	15.1
9:41:21 AM	11.5	15.1
9:42:21 AM	11.5	15.1
9:43:21 AM	11.4	15.1
9:44:21 AM	11.5	15.1
9:45:21 AM	11.5	15.1
9:46:21 AM	11.5	15.1
9:47:21 AM	11.5	15.0
9:48:21 AM	11.5	15.2
9:49:21 AM	11.5	15.1
9:50:21 AM	11.5	15.1
9:51:21 AM	11.5	15.2
9:52:21 AM	11.5	15.2
9:53:21 AM	11.5	15.1
9:54:21 AM	11.5	15.1
9:55:21 AM	11.5	15.1
9:56:21 AM	11.5	15.1
9:57:21 AM	11.5	15.1
9:58:21 AM	11.5	15.2
9:59:21 AM	11.5	15.0
10:00:21 AM	11.5	15.1
10:01:21 AM	11.5	15.1
10:02:21 AM	11.6	14.8
10:03:21 AM	11.6	14.9
10:04:21 AM	11.6	15.0
10:05:21 AM	11.7	14.8
10:06:21 AM	11.7	14.6
10:07:21 AM	11.8	14.4
10:08:21 AM	11.8	14.4
10:09:21 AM	11.8	14.4
10:10:21 AM	11.8	14.5
10:11:21 AM	11.8	14.5
10:12:21 AM	11.8	14.4
10:13:21 AM	11.9	14.3
10:14:21 AM	11.9	14.3
10:15:21 AM	11.9	14.3
10:16:21 AM	11.9	14.4
10:17:21 AM	11.9	14.3
10:18:21 AM	11.9	14.3
10:19:21 AM	12.0	14.3
10:20:21 AM	12.0	14.2
10:21:21 AM	12.0	14.3
10:22:21 AM	12.0	14.3
10:23:21 AM	12.0	14.2
10:24:21 AM	12.0	14.2
10:25:21 AM	11.9	14.3
10:26:21 AM	12.0	14.2
10:27:21 AM	12.0	14.2
Run Avgs	11.6	14.9
Cal Gas	11.8	10.0
Initial Zero	0.0	0.0
Final Zero	0.1	0.1
Initial cal.	11.9	9.8
Final Cal.	12.0	9.8
Corrected Average	11.4	15.2

Client: Buzzi Maryneal TX
Test Location: Main Stack; Raw Mill On
Date: Nov 30, 2023 Start Time: 10:39:23
Run number 3
One Minute Averages

	O2 %,dry	CO2 %,dry
10:46:21 AM	11.9	14.5
10:47:21 AM	11.9	14.5
10:48:21 AM	11.9	14.4
10:49:21 AM	11.9	14.5
10:50:21 AM	11.9	14.3
10:51:21 AM	11.9	14.5
10:52:21 AM	11.9	14.4
10:53:21 AM	11.9	14.4
10:54:21 AM	12.0	14.3
10:55:21 AM	12.0	14.3
10:56:21 AM	12.0	14.3
10:57:21 AM	11.9	14.4
10:58:21 AM	12.0	14.3
10:59:21 AM	11.9	14.6
11:00:21 AM	11.9	14.4
11:01:21 AM	11.9	14.4
11:02:21 AM	11.9	14.4
11:03:21 AM	11.9	14.4
11:04:21 AM	11.9	14.3
11:05:21 AM	11.9	14.3
11:06:21 AM	12.0	14.4
11:07:21 AM	12.0	14.3
11:08:21 AM	12.0	14.4
11:09:21 AM	12.0	14.4
11:10:21 AM	12.0	14.2
11:11:21 AM	12.1	14.2
11:12:21 AM	12.1	14.1
11:13:21 AM	12.1	14.0
11:14:21 AM	12.1	14.1
11:15:21 AM	12.1	14.0
11:16:21 AM	12.2	14.0
11:17:21 AM	12.2	14.2
11:18:21 AM	12.2	14.2
11:19:21 AM	12.2	14.1
11:20:21 AM	12.2	14.2
11:21:21 AM	12.1	14.3
11:22:21 AM	12.1	14.3
11:23:21 AM	12.0	14.4
11:24:21 AM	12.0	14.6
11:25:21 AM	11.9	14.6
11:26:21 AM	11.9	14.7
11:27:21 AM	11.8	14.8
11:28:21 AM	11.8	14.8
11:29:21 AM	11.8	14.8
11:30:21 AM	11.8	14.8
11:31:21 AM	11.8	14.8
11:32:21 AM	11.7	15.0
11:33:21 AM	11.7	14.9
11:34:21 AM	11.7	14.9
11:35:21 AM	11.7	14.9
11:36:21 AM	11.7	14.9
11:37:21 AM	11.7	14.9
11:38:21 AM	11.7	14.8
11:39:21 AM	11.7	14.8
11:40:21 AM	11.7	14.8
11:41:21 AM	11.7	14.8
11:42:21 AM	11.7	14.8
11:43:21 AM	11.7	14.8
11:44:21 AM	11.7	14.8
11:45:21 AM	11.7	14.8
11:46:21 AM	11.7	14.8
11:47:21 AM	11.7	14.8
11:48:21 AM	11.7	14.8
11:49:21 AM	11.7	14.7
11:50:21 AM	11.7	14.7
11:51:21 AM	11.7	14.7
Run Avgs	11.9	14.5
Cal Gas	11.8	10.0
Initial Zero	0.1	0.1
Final Zero	0.0	0.1
Initial cal.	12.0	9.8
Final Cal.	11.9	9.8
Corrected Average	11.7	14.9

Buzzi Unicem; Maryneal TX Main Stack: Raw Mill On November 30, 2023 Operator

					Run No. 2 09:20-10:26					Run No. 3 10:45-11:51					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	Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift
	O2 Zero	Zero N2	0.0%	0.00%	0.0%	0.00%	0.1%	0.46%	0.46%	0.1%	0.46%	0.0%	0.00%	-0.46%					
EB0066680	O2 Mid	11.8%	12.0%	0.82%	11.9%	-0.46%	12.0%	0.00%	0.46%	12.0%	0.00%	11.9%	-0.46%	-0.46%					
ALM056015	O2 Span	21.9%	21.9%	0.00%															
	CO2 Zero	Zero N2	0.0%	0.00%	0.0%	0.00%	0.1%	0.55%	0.55%	0.1%	0.55%	0.1%	0.55%	0.00%					
EB0066680	CO2 Mid	10.0%	9.9%	-0.61%	9.8%	-0.55%	9.8%	-0.55%	0.00%	9.8%	-0.55%	9.8%	-0.55%	0.00%					
ALM056015	CO2 Span	18.2%	18.2%	0.17%															

Client: Buzzi Maryneal TX
Test Location: Main Stack Mill Off
Date: Nov 30, 2023 Start Time: 13:58:53
Run number 4
One Minute Averages

	O2 %,dry	CO2 %,dry
2:05:51 PM	9.9	17.6
2:06:51 PM	9.9	17.6
2:07:51 PM	9.8	17.9
2:08:51 PM	9.8	17.8
2:09:51 PM	9.8	17.5
2:10:51 PM	9.7	17.7
2:11:51 PM	9.7	17.8
2:12:51 PM	9.6	17.8
2:13:51 PM	9.7	17.8
2:14:51 PM	9.6	17.8
2:15:51 PM	9.7	17.7
2:16:51 PM	9.6	18.0
2:17:51 PM	9.6	17.9
2:18:51 PM	9.6	18.0
2:19:51 PM	9.7	17.6
2:20:51 PM	9.6	17.9
2:21:51 PM	9.6	17.8
2:22:51 PM	9.6	17.7
2:23:51 PM	9.7	17.7
2:24:51 PM	9.6	17.9
2:25:51 PM	9.7	17.7
2:26:51 PM	9.7	18.0
2:27:51 PM	9.6	18.1
2:28:51 PM	9.7	17.7
2:29:51 PM	9.8	17.7
2:30:51 PM	9.7	17.8
2:31:51 PM	9.8	17.7
2:32:51 PM	9.8	17.8
2:33:51 PM	9.7	17.9
2:34:51 PM	9.9	17.4
2:35:51 PM	9.8	17.7
2:36:51 PM	9.8	17.8
2:37:51 PM	9.7	17.8
2:38:51 PM	9.8	17.6
2:39:51 PM	9.7	17.8
2:40:51 PM	9.8	17.6
2:41:51 PM	9.8	17.8
2:42:51 PM	9.8	17.6
2:43:51 PM	9.8	17.7
2:44:51 PM	9.8	17.7
2:45:51 PM	9.7	17.7
2:46:51 PM	9.7	17.7
2:47:51 PM	9.7	17.7
2:48:51 PM	9.8	17.7
2:49:51 PM	9.8	17.7
2:50:51 PM	9.8	17.7
2:51:51 PM	9.8	17.7
2:52:51 PM	9.7	17.8
2:53:51 PM	9.7	17.8
2:54:51 PM	9.7	18.0
2:55:51 PM	9.8	17.8
2:56:51 PM	9.8	17.7
2:57:51 PM	9.8	17.6
2:58:51 PM	9.9	17.5
2:59:51 PM	9.9	17.7
3:00:51 PM	9.9	17.6
3:01:51 PM	9.9	17.7
3:02:51 PM	9.9	17.5
3:03:51 PM	9.8	17.7
3:04:51 PM	9.8	17.8
3:05:51 PM	9.8	17.9
3:06:51 PM	9.8	17.7
3:07:51 PM	9.9	17.6
3:08:51 PM	9.8	17.6
3:09:51 PM	9.8	17.7
3:10:51 PM	9.9	17.6
Run Avgs	9.8	17.7
Cal Gas	11.8	10.0
Initial Zero	0.1	0.1
Final Zero	0.1	0.1
Initial cal.	11.9	9.8
Final Cal.	11.9	9.8
Corrected Average	9.7	18.2

Client: Buzzi Maryneal TX
Test Location: Main Stack Mill Off
Date: Nov 30, 2023 Start Time: 15:22:49
Run number 5
One Minute Averages

	O2 %,dry	CO2 %,dry
3:39:47 PM	9.8	17.8
3:40:47 PM	9.9	17.6
3:41:47 PM	9.8	17.9
3:42:47 PM	9.9	17.8
3:43:47 PM	9.9	17.7
3:44:47 PM	9.9	17.7
3:45:47 PM	9.9	17.6
3:46:47 PM	9.9	17.6
3:47:47 PM	9.9	17.6
3:48:47 PM	10.0	17.5
3:49:47 PM	10.0	17.6
3:50:47 PM	10.0	17.4
3:51:47 PM	10.1	17.6
3:52:47 PM	10.1	17.5
3:53:47 PM	10.2	17.2
3:54:47 PM	10.2	17.3
3:55:47 PM	10.2	17.2
3:56:47 PM	10.1	17.5
3:57:47 PM	10.1	17.3
3:58:47 PM	10.1	17.4
3:59:47 PM	10.1	17.4
4:00:47 PM	10.1	17.5
4:01:47 PM	10.1	17.5
4:02:47 PM	10.1	17.3
4:03:47 PM	10.2	17.3
4:04:47 PM	10.1	17.5
4:05:47 PM	10.2	17.1
4:06:47 PM	10.1	17.5
4:07:47 PM	10.1	17.3
4:08:47 PM	10.2	17.3
4:09:47 PM	10.1	17.5
4:10:47 PM	10.0	17.6
4:11:47 PM	10.1	17.4
4:12:47 PM	10.1	17.4
4:13:47 PM	10.1	17.3
4:14:47 PM	10.1	17.4
4:15:47 PM	10.1	17.3
4:16:47 PM	10.1	17.3
4:17:47 PM	10.1	17.4
4:18:47 PM	10.1	17.4
4:19:47 PM	10.0	17.7
4:20:47 PM	10.1	17.3
4:21:47 PM	10.1	17.2
4:22:47 PM	10.0	17.5
4:23:47 PM	10.1	17.5
4:24:47 PM	10.1	17.5
4:25:47 PM	10.1	17.5
4:26:47 PM	10.1	17.5
4:27:47 PM	10.1	17.5
4:28:47 PM	10.2	17.4
4:29:47 PM	10.1	17.6
4:30:47 PM	10.1	17.4
4:31:47 PM	10.1	17.5
4:32:47 PM	10.1	17.5
4:33:47 PM	10.0	17.6
4:34:47 PM	10.0	17.6
4:35:47 PM	10.0	17.6
4:36:47 PM	10.0	17.5
4:37:47 PM	10.1	17.4
4:38:47 PM	10.0	17.8
4:39:47 PM	10.1	17.4
4:40:47 PM	10.0	17.6
4:41:47 PM	10.0	17.4
4:42:47 PM	10.0	17.6
4:43:47 PM	10.0	17.6
4:44:47 PM	10.1	17.5
4:45:47 PM	10.1	17.5
Run Avgs	10.1	17.5
Cal Gas	11.8	10.0
Initial Zero	0.1	0.1
Final Zero	0.1	0.1
Initial cal.	11.9	9.8
Final Cal.	12.0	9.8
Corrected Average	9.9	17.9

Client: Buzzi Maryneal TX
Test Location: Main Stack Mill Off
Date: Nov 30, 2023 Start Time: 16:57:03
Run number 6
One Minute Averages

	O2 %,dry	CO2 %,dry
5:26:01 PM	10.1	17.5
5:27:01 PM	10.1	17.5
5:28:01 PM	10.2	17.3
5:29:01 PM	10.1	17.3
5:30:01 PM	10.1	17.5
5:31:01 PM	10.1	17.5
5:32:01 PM	10.1	17.4
5:33:01 PM	10.1	17.4
5:34:01 PM	10.1	17.4
5:35:01 PM	10.0	17.6
5:36:01 PM	10.0	17.7
5:37:01 PM	10.0	17.6
5:38:01 PM	10.0	17.4
5:39:01 PM	10.1	17.3
5:40:01 PM	10.1	17.3
5:41:01 PM	10.1	17.4
5:42:01 PM	10.1	17.4
5:43:01 PM	10.0	17.5
5:44:01 PM	10.1	17.4
5:45:01 PM	10.1	17.4
5:46:01 PM	10.2	17.2
5:47:01 PM	10.1	17.3
5:48:01 PM	10.2	17.4
5:49:01 PM	10.2	17.4
5:50:01 PM	10.2	17.3
5:51:01 PM	10.3	17.0
5:52:01 PM	10.2	17.3
5:53:01 PM	10.2	17.3
5:54:01 PM	10.3	17.4
5:55:01 PM	10.2	17.4
5:56:01 PM	10.3	17.2
5:57:01 PM	10.2	17.2
5:58:01 PM	10.2	17.3
5:59:01 PM	10.2	17.4
6:00:01 PM	10.1	17.5
6:01:01 PM	10.2	17.3
6:02:01 PM	10.1	17.5
6:03:01 PM	10.1	17.7
6:04:01 PM	10.2	17.4
6:05:01 PM	10.1	17.6
6:06:01 PM	10.1	17.4
6:07:01 PM	10.1	17.4
6:08:01 PM	10.1	17.5
6:09:01 PM	10.1	17.5
6:10:01 PM	10.2	17.3
6:11:01 PM	10.2	17.4
6:12:01 PM	10.2	17.4
6:13:01 PM	10.1	17.6
6:14:01 PM	10.1	17.5
6:15:01 PM	10.2	17.3
6:16:01 PM	10.2	17.3
6:17:01 PM	10.2	17.3
6:18:01 PM	10.2	17.4
6:19:01 PM	10.2	17.4
6:20:01 PM	10.2	17.4
6:21:01 PM	10.2	17.3
6:22:01 PM	10.2	17.4
6:23:01 PM	10.2	17.5
6:24:01 PM	10.2	17.3
6:25:01 PM	10.2	17.3
6:26:01 PM	10.2	17.4
6:27:01 PM	10.2	17.3
6:28:01 PM	10.2	17.3
6:29:01 PM	10.2	17.6
6:30:01 PM	10.2	17.3
6:31:01 PM	10.2	17.4
Run Avgs	10.2	17.4
Cal Gas	11.8	10.0
Initial Zero	0.1	0.1
Final Zero	0.1	0.1
Initial cal.	12.0	9.8
Final Cal.	12.0	9.8
Corrected Average	10.0	17.8

Buzzi Unicem; Maryneal TX Main Stack: Raw Mill Off November 30, 2023 Operator

Cylinder ID	Gas Type	Value	Internal Response	Cal Error	Run No. 1 14:05-15:11 Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift	Run No. 2 15:39-16:45 Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift	Run No. 3 17:25-18:31 Pre Run Bias	Percent Bias	Post Run Bias	Percent Bias	Percent Drift
	O2 Zero	Zero N2	0.0%	0.00%	0.1%	0.46%	0.1%	0.46%	0.00%	0.1%	0.46%	0.1%	0.46%	0.00%	0.1%	0.46%	0.1%	0.46%	0.00%
EB0066680	O2 Mid	11.8%	12.0%	0.82%	11.9%	-0.46%	11.9%	-0.46%	0.00%	11.9%	-0.46%	12.0%	0.00%	0.46%	12.0%	0.00%	12.0%	0.00%	0.00%
ALM056015	O2 Span	21.9%	21.9%	0.00%															
	CO2 Zero	Zero N2	0.0%	0.00%	0.1%	0.55%	0.1%	0.55%	0.00%	0.1%	0.55%	0.1%	0.55%	0.00%	0.1%	0.55%	0.1%	0.55%	0.00%
EB0066680	CO2 Mid	10.0%	9.9%	-0.61%	9.8%	-0.55%	9.8%	-0.55%	0.00%	9.8%	-0.55%	9.8%	-0.55%	0.00%	9.8%	-0.55%	9.8%	-0.55%	0.00%
ALM056015	CO2 Span	18.2%	18.2%	0.17%															

Buzzi Unicem
Maryneal TX
Main Stack; Mill On
HCN Analyte Spikes

	Date	**11/29/23**	**11/29/23**
	Time	**12:15-12:33**	**15:57-16:15**
		Main Pre 1 HCN	**Main Post 1 HCN**
Cs	Spike Direct, ppm	197.19	197.19
	SF6 Tracer Direct, ppm	9.58	9.58
SF6	Diluted SF6 Tracer, ppm	0.616	0.533
	Diluted SF6 Tracer, ppm	0.579	0.429
	Average Diluted SF6 Tracer, ppm	0.598	0.481
DF	Dilution Ratio	16.03	19.92
	Total, ppm	20.211	18.671
	Total, ppm	19.721	16.802
Ct	Average Total, ppm	19.966	17.737
	Pre Spike Native , ppm	8.868	9.151
	Pre Spike Native , ppm	8.704	8.908
	Post Spike Native , ppm	8.650	9.353
	Post Spike Native , ppm	8.642	9.180
Cn	Average Native , ppm	8.716	9.148
	Spike Recovery	**95.9%**	**91.4%**
	CTS Direct (CC426155)		
	Ethylene Expected (ppm)	75.47	75.47
	Ethylene Measured (ppm)	74.48	73.48
	CTS Error	**-1.3%**	**-2.6%**

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
Pre Run 1 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__003252.LAB	11/29/23	12:13:49.127	10.097	-0.043	0.032
SPC__003253.LAB	11/29/23	12:14:53.023	8.868	-0.052	-0.006
SPC__003254.LAB	11/29/23	12:15:56.935	8.704	-0.075	-0.010
SPC__003255.LAB	11/29/23	12:17:00.851	13.783	-0.080	0.306
SPC__003256.LAB	11/29/23	12:18:04.795	24.690	-0.072	0.868
SPC__003257.LAB	11/29/23	12:19:08.664	22.206	-0.093	0.730
SPC__003258.LAB	11/29/23	12:20:12.632	20.211	-0.063	0.616
SPC__003259.LAB	11/29/23	12:21:16.495	19.721	-0.071	0.579
SPC__003260.LAB	11/29/23	12:22:20.410	21.800	-0.062	0.711
SPC__003261.LAB	11/29/23	12:23:24.329	44.831	-0.084	1.916
SPC__003262.LAB	11/29/23	12:24:28.549	10.093	-0.090	0.193
SPC__003263.LAB	11/29/23	12:25:32.136	0.235	-0.025	0.001
SPC__003264.LAB	11/29/23	12:26:36.375	0.237	-0.000	-0.004
SPC__003265.LAB	11/29/23	12:27:40.087	0.081	-0.012	-0.009
SPC__003266.LAB	11/29/23	12:28:44.166	0.794	-0.016	-0.007
SPC__003267.LAB	11/29/23	12:29:47.797	9.255	0.058	-0.010
SPC__003268.LAB	11/29/23	12:30:52.098	9.025	-0.036	-0.010
SPC__003269.LAB	11/29/23	12:31:55.611	8.650	-0.059	-0.013
SPC__003270.LAB	11/29/23	12:32:59.572	8.642	-0.018	-0.010

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
Post Run 1 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__003459.LAB	11/29/23	15:56:38.579	9.151	-0.186	-0.008
SPC__003460.LAB	11/29/23	15:57:42.450	8.908	-0.195	-0.013
SPC__003461.LAB	11/29/23	15:58:46.356	15.433	-0.158	0.483
SPC__003462.LAB	11/29/23	15:59:50.268	24.154	-0.154	0.848
SPC__003463.LAB	11/29/23	16:00:54.215	12.849	-0.186	0.211
SPC__003464.LAB	11/29/23	16:01:58.082	24.883	-0.194	0.880
SPC__003465.LAB	11/29/23	16:03:01.992	21.645	-0.195	0.688
SPC__003466.LAB	11/29/23	16:04:05.903	18.671	-0.215	0.533
SPC__003467.LAB	11/29/23	16:05:09.802	16.802	-0.214	0.429
SPC__003468.LAB	11/29/23	16:06:13.717	15.668	-0.214	0.359
SPC__003469.LAB	11/29/23	16:07:17.877	13.151	-0.097	0.345
SPC__003470.LAB	11/29/23	16:08:21.640	0.315	-0.036	0.005
SPC__003471.LAB	11/29/23	16:09:25.432	0.084	-0.025	-0.000
SPC__003472.LAB	11/29/23	16:10:29.343	-0.008	-0.036	-0.009
SPC__003473.LAB	11/29/23	16:11:33.434	3.554	-0.031	-0.011
SPC__003474.LAB	11/29/23	16:12:37.253	9.649	-0.103	-0.011
SPC__003475.LAB	11/29/23	16:13:41.122	9.353	-0.191	-0.013
SPC__003476.LAB	11/29/23	16:14:45.034	9.180	-0.213	-0.013

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
Post Run 1 CTS

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__003560.LAB	11/29/23	18:45:53.586	0.053	-0.013	-0.010	16.286
SPC__003561.LAB	11/29/23	18:46:57.614	-0.226	-0.005	-0.013	73.543
SPC__003562.LAB	11/29/23	18:48:01.393	-0.128	-0.007	-0.014	73.411
SPC__003563.LAB	11/29/23	18:49:05.439	-0.316	-0.013	-0.020	53.814

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
CTS and HCN Direct

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__003128.LAB	11/29/23	09:48:23.996	0.020	0.006	0.001	-0.072
SPC__003129.LAB	11/29/23	09:49:27.908	0.134	-0.005	-0.001	-0.058
SPC__003130.LAB	11/29/23	09:50:31.936	0.044	-0.008	0.003	-0.116
SPC__003131BKG.LAB	11/29/23	09:53:26.078	0.000	0.000	0.000	0.000
SPC__003132.LAB	11/29/23	09:54:36.458	0.000	0.000	0.001	-0.015
SPC__003133.LAB	11/29/23	09:55:40.374	0.109	0.009	0.000	0.002
SPC__003134.LAB	11/29/23	09:56:44.401	-0.042	-0.006	0.001	-0.051
SPC__003135.LAB	11/29/23	09:57:48.181	-0.080	-0.006	0.000	-0.006
SPC__003136.LAB	11/29/23	09:58:52.214	-0.022	0.049	-0.001	-0.033
SPC__003137.LAB	11/29/23	09:59:56.406	0.006	0.033	0.001	-0.047
SPC__003138.LAB	11/29/23	10:00:59.901	-0.032	0.047	0.002	-0.051
SPC__003139.LAB	11/29/23	10:02:03.848	-0.090	0.127	-0.001	0.015
SPC__003140.LAB	11/29/23	10:03:07.759	-0.001	0.125	-0.011	22.400
SPC__003141.LAB	11/29/23	10:04:11.624	-0.293	0.061	-0.005	61.988
SPC__003142.LAB	11/29/23	10:05:15.938	-0.165	0.060	-0.011	58.433
SPC__003143.LAB	11/29/23	10:06:19.438	-0.142	0.062	-0.009	54.454
SPC__003144.LAB	11/29/23	10:07:23.437	-0.070	0.009	-0.009	74.299
SPC__003145.LAB	11/29/23	10:08:27.783	-0.180	0.010	-0.008	74.579
SPC__003146.LAB	11/29/23	10:09:31.168	-0.255	0.004	-0.011	74.391
SPC__003147.LAB	11/29/23	10:10:35.067	-0.286	-0.005	-0.008	74.456
SPC__003148.LAB	11/29/23	10:11:39.102	-0.083	-0.001	-0.006	9.761
SPC__003149.LAB	11/29/23	10:12:42.891	-0.151	-0.001	-0.005	0.481
SPC__003150.LAB	11/29/23	10:13:46.799	-0.048	-0.009	-0.005	0.478
SPC__003151.LAB	11/29/23	10:14:50.845	-0.038	0.011	-0.007	0.442
SPC__003152.LAB	11/29/23	10:15:54.666	-0.180	0.006	-0.004	0.467
SPC__003153.LAB	11/29/23	10:16:58.915	-0.100	-0.004	-0.006	0.497
SPC__003154.LAB	11/29/23	10:18:02.445	-0.007	0.002	-0.002	0.472
SPC__003155.LAB	11/29/23	10:19:06.462	10.754	0.013	1.172	0.663
SPC__003156.LAB	11/29/23	10:20:10.264	41.711	0.028	4.607	-0.076
SPC__003157.LAB	11/29/23	10:21:14.292	45.886	0.017	4.849	-0.279
SPC__003158.LAB	11/29/23	10:22:18.085	46.590	-0.006	4.851	-0.135
SPC__003159.LAB	11/29/23	10:23:21.995	46.739	0.016	4.856	-0.264
SPC__003160.LAB	11/29/23	10:24:25.960	47.320	0.003	4.860	-0.268
SPC__003161.LAB	11/29/23	10:25:29.819	37.078	0.008	4.848	-0.184
SPC__003162.LAB	11/29/23	10:26:33.849	28.421	0.018	4.624	-0.228
SPC__003163.LAB	11/29/23	10:32:14.551	195.980	0.011	9.583	-0.647
SPC__003164.LAB	11/29/23	10:33:18.264	196.278	-0.026	9.585	-0.465
SPC__003165.LAB	11/29/23	10:34:22.223	196.975	0.012	9.583	-0.523
SPC__003166.LAB	11/29/23	10:35:26.094	197.038	0.007	9.580	-0.445
SPC__003167.LAB	11/29/23	10:36:30.150	197.342	-0.007	9.580	-0.500
SPC__003168.LAB	11/29/23	10:37:34.119	170.976	-0.020	9.590	-0.601
SPC__003169.LAB	11/29/23	10:38:37.830	157.143	-0.019	9.064	-0.470
SPC__003170.LAB	11/29/23	10:39:41.948	138.047	0.025	7.225	-0.339
SPC__003171.LAB	11/29/23	10:40:45.858	67.542	0.029	5.083	-0.220
SPC__003172.LAB	11/29/23	10:41:49.573	49.888	-0.000	4.852	-0.250
SPC__003173.LAB	11/29/23	10:42:53.522	49.909	0.003	4.847	-0.339
SPC__003174.LAB	11/29/23	10:43:57.490	49.927	0.006	4.851	-0.271
SPC__003175.LAB	11/29/23	10:45:01.307	49.815	0.013	4.849	-0.321
SPC__003176.LAB	11/29/23	10:46:05.212	49.899	0.005	4.848	-0.292
SPC__003177.LAB	11/29/23	10:47:09.125	23.829	0.025	2.379	0.742

Buzzi Unicem
Maryneal TX
Main Stack; Raw Mill On and Off
HCN Analyte Spikes

	Raw Mill Status	**On**	**On**	**On**	**Off**	**Off**	**Off**	**Off**
	Date	**11/30/23**	**11/30/23**	**11/30/23**	**11/30/23**	**11/30/23**	**11/30/23**	**11/30/23**
	Time	**09:08-09:24**	**10:27-10:39**	**11:42-11:56**	**13:39-13:57**	**15:12-15:23**	**16:46-16:58**	**18:31-18:51**
		Main Pre 2	**Main Post 2**	**Main Post 3**	**Main Pre 4**	**Main Post 4**	**Main Post 5**	**Main Post 6**
		HCN	**HCN**	**HCN**	**HCN**	**HCN**	**HCN**	**HCN**
Cs	Spike Direct, ppm	49.92	49.92	49.92	49.92	49.92	49.92	49.92
	SF6 Tracer Direct, ppm	4.84	4.84	4.84	4.84	4.84	4.84	4.84
SF6	Diluted SF6 Tracer, ppm	0.420	0.499	0.476	0.466	0.474	0.482	0.450
	Diluted SF6 Tracer, ppm	0.407	0.462	0.427	0.445	0.454	0.461	0.417
	Average Diluted SF6 Tracer, ppm	0.414	0.481	0.452	0.456	0.464	0.472	0.434
DF	Dilution Ratio	11.69	10.06	10.71	10.61	10.42	10.25	11.15
	Total, ppm	10.955	11.425	11.060	13.559	14.073	14.432	13.608
	Total, ppm	10.938	11.290	10.732	13.438	14.019	14.364	13.398
Ct	Average Total, ppm	10.947	11.358	10.896	13.499	14.046	14.398	13.503
	Pre Spike Native , ppm	7.915	7.571	7.147	9.645	10.596	11.052	10.394
	Pre Spike Native , ppm	7.597	7.503	6.992	9.597	10.474	11.064	10.121
	Post Spike Native , ppm	7.488	7.750	7.687	9.886	10.950	10.615	10.319
	Post Spike Native , ppm	7.647	7.425	7.789	9.809	10.725	10.762	10.213
Cn	Average Native , ppm	7.662	7.562	7.404	9.734	10.686	10.873	10.262
	Spike Recovery	**92.3%**	**91.7%**	**89.7%**	**99.5%**	**91.5%**	**94.2%**	**93.0%**
	CTS Direct (CC426155)							
	Ethylene Expected (ppm)	75.47		75.47				75.47
	Ethylene Measured (ppm)	73.85		73.86				73.81
	CTS Error	**-2.1%**		**-2.1%**				**-2.2%**

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
Pre Run 2 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__003653.LAB	11/30/23	09:06:49.691	8.614	-0.076	-0.009
SPC__003654.LAB	11/30/23	09:07:53.558	7.915	-0.159	-0.010
SPC__003655.LAB	11/30/23	09:08:57.221	7.597	-0.165	-0.007
SPC__003656.LAB	11/30/23	09:10:01.009	8.417	-0.179	0.165
SPC__003657.LAB	11/30/23	09:11:05.018	12.389	-0.183	0.589
SPC__003658.LAB	11/30/23	09:12:08.818	11.962	-0.164	0.535
SPC__003659.LAB	11/30/23	09:13:12.721	10.955	-0.175	0.420
SPC__003660.LAB	11/30/23	09:14:16.770	10.938	-0.154	0.407
SPC__003661.LAB	11/30/23	09:15:20.779	9.460	-0.170	0.190
SPC__003662.LAB	11/30/23	09:16:24.617	7.698	-0.166	-0.004
SPC__003663.LAB	11/30/23	09:17:28.327	4.351	-0.088	0.147
SPC__003664.LAB	11/30/23	09:18:32.432	0.178	-0.039	0.005
SPC__003665.LAB	11/30/23	09:19:36.136	0.177	-0.020	0.003
SPC__003666.LAB	11/30/23	09:20:40.096	7.235	-0.059	-0.007
SPC__003667.LAB	11/30/23	09:21:43.959	8.068	-0.205	-0.008
SPC__003668.LAB	11/30/23	09:22:47.875	7.488	-0.185	-0.007
SPC__003669.LAB	11/30/23	09:23:51.774	7.647	-0.201	-0.007
SPC__003670.LAB	11/30/23	09:24:55.773	7.706	-0.213	-0.007

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
Post Run 2 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__003727.LAB	11/30/23	10:25:38.231	7.704	-0.206	-0.009
SPC__003728.LAB	11/30/23	10:26:42.135	7.571	-0.229	-0.008
SPC__003729.LAB	11/30/23	10:27:46.073	7.503	-0.192	-0.008
SPC__003730.LAB	11/30/23	10:28:49.930	7.766	-0.208	-0.003
SPC__003731.LAB	11/30/23	10:29:54.024	10.988	-0.187	0.441
SPC__003732.LAB	11/30/23	10:30:57.740	11.425	-0.212	0.499
SPC__003733.LAB	11/30/23	10:32:01.639	11.290	-0.218	0.462
SPC__003734.LAB	11/30/23	10:33:05.541	9.417	-0.144	0.311
SPC__003735.LAB	11/30/23	10:34:09.433	0.594	-0.077	0.010
SPC__003736.LAB	11/30/23	10:35:13.378	0.077	-0.038	-0.002
SPC__003737.LAB	11/30/23	10:36:17.244	0.564	-0.027	-0.003
SPC__003738.LAB	11/30/23	10:37:21.148	7.939	-0.091	-0.006
SPC__003739.LAB	11/30/23	10:38:25.052	7.750	-0.195	-0.004
SPC__003740.LAB	11/30/23	10:39:28.962	7.425	-0.209	-0.004

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
Post Run 3 CTS and HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__003807.LAB	11/30/23	11:52:08.233	7.147	-0.192	-0.003	2.744
SPC__003808.LAB	11/30/23	11:53:12.140	6.992	-0.175	-0.007	2.751
SPC__003809.LAB	11/30/23	11:54:16.171	7.978	-0.196	0.131	2.587
SPC__003810.LAB	11/30/23	11:55:19.933	11.513	-0.200	0.545	2.416
SPC__003811.LAB	11/30/23	11:56:24.218	11.060	-0.205	0.476	2.486
SPC__003812.LAB	11/30/23	11:57:27.780	10.732	-0.194	0.427	2.562
SPC__003813.LAB	11/30/23	11:58:31.979	8.274	-0.084	0.399	1.592
SPC__003814.LAB	11/30/23	11:59:35.886	0.416	-0.038	0.008	0.033
SPC__003815.LAB	11/30/23	12:00:39.432	0.172	-0.022	-0.008	-0.011
SPC__003816.LAB	11/30/23	12:01:43.471	2.855	-0.046	-0.003	0.932
SPC__003817.LAB	11/30/23	12:02:47.325	7.615	-0.093	-0.004	3.027
SPC__003818.LAB	11/30/23	12:03:51.154	7.687	-0.165	-0.004	2.978
SPC__003819.LAB	11/30/23	12:04:55.061	7.789	-0.215	-0.004	3.018
SPC__003820.LAB	11/30/23	12:05:58.994	7.597	-0.216	-0.004	2.851
SPC__003821.LAB	11/30/23	12:07:02.894	5.943	-0.114	-0.009	10.770
SPC__003822.LAB	11/30/23	12:08:06.790	-0.016	-0.041	-0.005	72.292
SPC__003823.LAB	11/30/23	12:09:11.005	-0.148	-0.026	-0.009	73.536
SPC__003824.LAB	11/30/23	12:10:14.655	-0.142	-0.014	-0.011	73.864
SPC__003825.LAB	11/30/23	12:11:18.662	-0.048	-0.005	-0.010	73.846
SPC__003826.LAB	11/30/23	12:12:22.480	-0.065	-0.023	-0.007	74.133
SPC__003827.LAB	11/30/23	12:13:26.274	0.736	-0.027	-0.010	67.215
SPC__003828.LAB	11/30/23	12:14:30.179	8.806	-0.096	-0.005	4.047

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill Off
Pre Run 4 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__003907.LAB	11/30/23	13:39:29.055	9.645	-0.175	-0.010
SPC__003908.LAB	11/30/23	13:40:32.962	9.598	-0.216	-0.009
SPC__003909.LAB	11/30/23	13:41:36.858	10.329	-0.164	0.088
SPC__003910.LAB	11/30/23	13:42:40.721	15.836	-0.196	0.847
SPC__003911.LAB	11/30/23	13:43:44.629	11.759	-0.169	0.243
SPC__003912.LAB	11/30/23	13:44:48.877	13.673	-0.167	0.493
SPC__003913.LAB	11/30/23	13:45:52.430	13.559	-0.176	0.466
SPC__003914.LAB	11/30/23	13:46:56.342	13.438	-0.193	0.445
SPC__003915.LAB	11/30/23	13:48:00.291	13.321	-0.192	0.406
SPC__003916.LAB	11/30/23	13:49:04.257	7.370	-0.110	0.130
SPC__003917.LAB	11/30/23	13:50:08.144	0.968	-0.036	0.004
SPC__003918.LAB	11/30/23	13:51:11.932	0.227	-0.020	-0.006
SPC__003919.LAB	11/30/23	13:52:15.850	2.280	-0.026	-0.003
SPC__003920.LAB	11/30/23	13:53:19.760	10.340	-0.137	-0.013
SPC__003921.LAB	11/30/23	13:54:23.690	9.954	-0.172	-0.011
SPC__003922.LAB	11/30/23	13:55:27.604	9.886	-0.165	-0.011
SPC__003923.LAB	11/30/23	13:56:31.515	9.809	-0.171	-0.010
SPC__003924.LAB	11/30/23	13:57:35.413	10.067	-0.166	-0.012

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill Off
Post Run 4 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__003994.LAB	11/30/23	15:12:23.934	10.596	-0.196	-0.010
SPC__003995.LAB	11/30/23	15:13:27.573	10.474	-0.205	-0.008
SPC__003996.LAB	11/30/23	15:14:31.355	12.848	-0.185	0.347
SPC__003997.LAB	11/30/23	15:15:35.688	14.073	-0.194	0.474
SPC__003998.LAB	11/30/23	15:16:39.508	14.019	-0.182	0.454
SPC__003999.LAB	11/30/23	15:17:43.316	13.169	-0.191	0.342
SPC__004000.LAB	11/30/23	15:18:47.034	0.615	-0.059	0.025
SPC__004001.LAB	11/30/23	15:19:50.926	0.148	-0.034	-0.000
SPC__004002.LAB	11/30/23	15:20:54.773	7.417	-0.092	-0.005
SPC__004003.LAB	11/30/23	15:21:58.704	10.950	-0.225	-0.011
SPC__004004.LAB	11/30/23	15:23:02.963	10.725	-0.230	-0.011

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill Off
Post Run 5 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C
SPC__004081.LAB	11/30/23	16:45:48.064	11.052	-0.239	-0.011
SPC__004082.LAB	11/30/23	16:46:52.004	11.064	-0.251	-0.008
SPC__004083.LAB	11/30/23	16:47:56.216	11.960	-0.257	0.165
SPC__004084.LAB	11/30/23	16:49:00.137	14.432	-0.201	0.482
SPC__004085.LAB	11/30/23	16:50:03.716	14.364	-0.200	0.461
SPC__004086.LAB	11/30/23	16:51:07.575	13.612	-0.204	0.349
SPC__004087.LAB	11/30/23	16:52:11.596	3.280	-0.064	0.138
SPC__004088.LAB	11/30/23	16:53:15.366	0.246	-0.015	0.002
SPC__004089.LAB	11/30/23	16:54:19.328	4.999	-0.048	-0.006
SPC__004090.LAB	11/30/23	16:55:23.562	11.376	-0.224	-0.010
SPC__004091.LAB	11/30/23	16:56:27.199	10.615	-0.241	-0.009
SPC__004092.LAB	11/30/23	16:57:31.081	10.762	-0.245	-0.008

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill Off
Post Run 6 HCN Analyte Spike

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__004179.LAB	11/30/23	18:31:07.393	10.394	-0.189	-0.008	3.109
SPC__004180.LAB	11/30/23	18:32:10.845	10.121	-0.219	-0.007	3.041
SPC__004181.LAB	11/30/23	18:33:14.862	11.066	-0.203	0.143	2.692
SPC__004182.LAB	11/30/23	18:34:18.678	13.774	-0.203	0.502	2.703
SPC__004183.LAB	11/30/23	18:35:22.859	13.608	-0.194	0.450	2.738
SPC__004184.LAB	11/30/23	18:36:26.454	13.398	-0.200	0.417	2.852
SPC__004185.LAB	11/30/23	18:37:30.468	4.400	-0.049	0.209	0.626
SPC__004186.LAB	11/30/23	18:38:34.287	0.228	-0.027	0.008	-0.050
SPC__004187.LAB	11/30/23	18:39:38.147	0.090	-0.014	-0.003	0.064
SPC__004188.LAB	11/30/23	18:40:42.431	0.075	-0.004	-0.000	0.005
SPC__004189.LAB	11/30/23	18:41:45.973	2.211	-0.016	-0.003	0.510
SPC__004190.LAB	11/30/23	18:42:49.916	10.542	-0.224	-0.009	3.214
SPC__004191.LAB	11/30/23	18:43:53.770	10.319	-0.202	-0.009	3.049
SPC__004192.LAB	11/30/23	18:44:57.717	10.213	-0.199	-0.015	3.073
SPC__004193.LAB	11/30/23	18:46:01.566	2.584	-0.098	-0.002	0.856
SPC__004194.LAB	11/30/23	18:47:05.662	0.139	-0.030	0.003	-0.055
SPC__004195.LAB	11/30/23	18:48:09.361	0.137	-0.015	0.005	-0.086
SPC__004196.LAB	11/30/23	18:49:13.258	0.122	-0.028	-0.003	10.430
SPC__004197.LAB	11/30/23	18:50:17.158	0.005	-0.013	-0.009	73.788
SPC__004198.LAB	11/30/23	18:51:21.066	0.082	-0.004	-0.008	73.840

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
CTS and HCN Direct

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__003645.LAB	11/30/23	08:58:18.068	29.847	-0.013	2.882	-0.025
SPC__003646.LAB	11/30/23	08:59:21.972	49.867	-0.030	4.835	-0.504
SPC__003647.LAB	11/30/23	09:00:25.885	49.970	-0.015	4.835	-0.460
SPC__003648.LAB	11/30/23	09:01:30.186	30.292	0.002	2.696	0.702

Buzzi Unicem; Maryneal TX
Main Stack, Raw Mill On
CTS and HCN Direct

Spectrum	Date	Time	HCN PCA 191c R1 191c	HF ppm (10) 191C	SF6 (10) 191C	Ethylene (100,3000) 191C
SPC__003564BKG.LAB	11/30/23	07:24:27.085	0.000	0.000	0.000	0.000
SPC__003565.LAB	11/30/23	07:25:37.733	0.014	-0.006	-0.001	-0.061
SPC__003566.LAB	11/30/23	07:26:41.371	-0.080	0.006	-0.020	43.985
SPC__003567.LAB	11/30/23	07:27:45.267	-0.228	0.009	-0.010	73.655
SPC__003568.LAB	11/30/23	07:28:49.515	-0.229	-0.022	-0.011	73.784
SPC__003569.LAB	11/30/23	07:29:53.185	0.009	-0.015	-0.012	73.918
SPC__003570.LAB	11/30/23	07:30:56.969	77.472	0.004	3.499	38.467
SPC__003571.LAB	11/30/23	07:32:00.868	193.908	-0.014	9.564	-0.537
SPC__003572.LAB	11/30/23	07:33:04.768	195.330	-0.015	9.546	-0.325
SPC__003573.LAB	11/30/23	07:34:08.677	196.749	0.007	9.535	-0.349
SPC__003574.LAB	11/30/23	07:35:12.623	197.175	-0.016	9.567	-0.452
SPC__003575.LAB	11/30/23	07:36:16.530	198.323	-0.017	9.561	-0.435
SPC__003576.LAB	11/30/23	07:37:20.478	198.512	-0.012	9.541	-0.516
SPC__003577.LAB	11/30/23	07:38:24.409	109.918	-0.035	4.944	4.122
SPC__003578.LAB	11/30/23	07:39:28.420	0.306	-0.009	-0.005	0.478
SPC__003579.LAB	11/30/23	07:40:32.184	0.162	-0.014	-0.002	0.488

Appendix C

Ion Chromatography Analytical Report Data

Deeco, Inc.

3404 Lake Woodard Drive
Raleigh, NC 27604

Project No: 23-3315
Buzzi Unicem

Hydrogen Fluoride & Chlorine

EPA Method 26A Analysis

Analytical Report
41721

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 41721
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

Katie Gattis, Quality Assurance Officer
December 27, 2023

Report Reviewed and Finalized by:

Ken Smith, Laboratory Director
December 27, 2023

SUMMARY OF RESULTS

Summary of Analysis

Summary of Method 26A Analysis

Element	MN-M26A-R1A e41721-1 Total mg	MN-M26A-R3A e41721-2 Total mg	MN-M26A-R4A e41721-3 Total mg
HF	< 0.228	< 0.265	< 0.237
Cl_2	< 0.154	< 0.167	< 0.167

Element	MN-M26A-R5A e41721-4 Total mg	MN-M26A-R6A e41721-5 Total mg	MN-M26A-R7A e41721-6 Total mg
HF	< 0.243	< 0.253	< 0.251
Cl_2	0.631	0.286	0.580

Element	MN-M26A-R1B e41721-7 Total mg	MN-M26A-R3B e41721-8 Total mg	MN-M26A-R4B e41721-9 Total mg
HF	< 0.254	< 0.259	< 0.224
Cl_2	< 0.148	< 0.193	< 0.156

Element	MN-M26A-R5B e41721-10 Total mg	MN-M26A-R6B e41721-11 Total mg	MN-M26A-R7B e41721-12 Total mg
HF	< 0.265	< 0.251	< 0.267
Cl_2	0.672	0.306	0.617

Element	MN-M26A-FBON e41721-13 Total mg	MN-M26A-FBOFF e41721-14 Total mg
HF	< 0.202	< 0.21
Cl_2	< 0.157	< 0.178

ANALYTICAL NARRATIVE

Element One Analytical Narrative

Client:	Deeco, Inc.	Element One #:	41721
Client ID:	23-3315 Buzzi Unicem	Analyst:	LAW
Method:	M26A	Dates Received:	12.11.23
Analytes:	HF, Cl_2	Dates Analyzed:	12.18-21.23

Summary of Analysis

The samples were prepared and analyzed according to Method 26A protocol. The samples were analyzed for fluoride and chloride on Metrohm 861/788 and 881/858 ion chromatograph systems.

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	MN-M26A-R1A RPD	MN-M26A-R3A RPD	MN-M26A-R4A RPD
HF	NA	NA	NA
Cl_2	NA	NA	NA

Element	MN-M26A-R5A RPD	MN-M26A-R6A RPD	MN-M26A-R7A RPD
HF	NA	NA	NA
Cl_2	2.1%	0.0%	3.6%

Element	MN-M26A-R1B RPD	MN-M26A-R3B RPD	MN-M26A-R4B RPD
HF	NA	NA	NA
Cl_2	NA	NA	NA

Element	MN-M26A-R5B RPD	MN-M26A-R6B RPD	MN-M26A-R7B RPD
HF	NA	NA	NA
Cl_2	1.9%	1.0%	4.1%

Element	MN-M26A-FBON RPD	MN-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	MN-M26A-R4A Recovery	MN-M26A-R4B Recovery
HF	108%	108%
Cl_2	105%	100%

Element	RC-M26A-R3A Recovery	RC-M26A-R3B Recovery
HF	106%	106%
Cl_2	101%	101%

Second Source Calibration Verification

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

Element	DL 0.1mg/L Recovery	*QC 5.0mg/L Recovery
HF e41721 (1-14)	97%	101%
HF e41721 (15-28)	105%	100%
Cl_2 e41721 (1-14)	94%	107%
Cl_2 e41721 (15-28)	109%	102%

SAMPLE CUSTODY

DEECO, Inc

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

41721

Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem | Plant Location: Maryneal TX | Project Name: 23-3315

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
[signature]	12/1	[signature]	12.11-23	
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
MN-1A-H_2SO_4	11/29/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 434.0 mL	Element One
MN-1A-NaOH	11/29/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 308.5 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-1B-H_2SO_4	11/29/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 483.5 mL	Element One
MN-1B-NaOH	11/29/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 296.1 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-3A-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 504.1 mL	Element One
MN-3A-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 333.1 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-3B-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 492.8 mL	Element One
MN-3B-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 325.2 mL **Sodium thiosulfate NOT ADDED!**	Element One

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

DEECO, Inc

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

41721

Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem | Plant Location: Maryneal TX | Project Name: 23-3315

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
Brent Cook	12/11	Lisa Burke	12-11-23	
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
MN-4A-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 447.4 mL	Element One
MN-4A-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 333.6 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-4B-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 425.8 mL	Element One
MN-4B-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 312.2 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-5A-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 461.7 mL	Element One
MN-5A-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 333.8 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-5B-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 503.1 mL	Element One
MN-5B-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 358.9 mL **Sodium thiosulfate NOT ADDED!**	Element One

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41721

Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem | Plant Location: Maryneal TX | Project Name: 23-3315

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
[signature]	12/4	[signature]	12-11-23	
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
MN-6A-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 479.8 mL	Element One
MN-6A-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 338.3 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-6B-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 477.4 mL	Element One
MN-6B-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 311.5 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-7A-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 476.5 mL	Element One
MN-7A-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 352.3 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-7B-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 507.1 mL	Element One
MN-7B-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 337.5 mL **Sodium thiosulfate NOT ADDED!**	Element One

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Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem Plant Location: Maryneal TX Project Name: 23-3315

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
	12/1		12/1/23	
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
MN-FBON-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 384.3 mL	Element One
MN-FBON-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 313.8 mL **Sodium thiosulfate NOT ADDED!**	Element One
MN-FBOFF-H_2SO_4	11/30/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 399.1 mL	Element One
MN-FBOFF-NaOH	11/30/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 355.9 mL **Sodium thiosulfate NOT ADDED!**	Element One

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Raleigh, NC 27604
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41721

Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem | Plant Location: Festus MO | Project Name: 23-3317

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
[signature]	12/11	[signature]	12.11.23	
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
RC-1A-H_2SO_4	12/05/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 422.6 mL	Element One
RC-1A-NaOH	12/05/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 296.6 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-1B-H_2SO_4	12/05/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 498.6 mL	Element One
RC-1B-NaOH	12/05/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 297.1 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-2A-H_2SO_4	12/05/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 436.5 mL	Element One
RC-2A-NaOH	12/05/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 339.0 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-2B-H_2SO_4	12/05/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 436.0 mL	Element One
RC-2B-NaOH	12/05/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 324.8 mL **Sodium thiosulfate NOT ADDED!**	Element One

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Raleigh, NC 27604
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Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem | Plant Location: Festus MO | Project Name: 23-3317

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
	12/11		12-11-23	
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
RC-3A-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 482.2 mL	Element One
RC-3A-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 349.4 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-3B-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 469.8 mL	Element One
RC-3B-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 3343.6mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-4A-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 432.0 mL	Element One
RC-4A-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 347.0 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-4B-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 461.3 mL	Element One
RC-4B-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 341.0 mL **Sodium thiosulfate NOT ADDED!**	Element One

DEECO, Inc

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Raleigh, NC 27604
919-250-0285

41721

Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem | Plant Location: Festus MO | Project Name: 23-3317

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
[signature]	12/11	[signature]	12-11-23	
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
RC-5A-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 433.1 mL	Element One
RC-5A-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 282.2 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-5B-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 463.3 mL	Element One
RC-5B-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 329.1 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-6A-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 437.9 mL	Element One
RC-6A-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 328.5 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-6B-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 464.0 mL	Element One
RC-6B-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 346.4 mL **Sodium thiosulfate NOT ADDED!**	Element One

DEECO, Inc

41721

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

Date:	12/10/23
Lab:	Element One
Train:	EPA Method 26

Plant Name: Buzzi Unicem | Plant Location: Festus MO | Project Name: 23-3317

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Comments
[signature]	12/11	[signature]	12.11.23	
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
RC-FBON-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 419.0 mL	Element One
RC-FBON-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 341.0 mL **Sodium thiosulfate NOT ADDED!**	Element One
RC-FBOFF-H_2SO_4	12/06/23	Comp.	Fluoride ion as Hydrogen Fluoride	EPA Method 26A	0.1N H_2SO_4 and DI Rinses	Final Volume 420.7 mL	Element One
RC-FBOFF-NaOH	12/06/23	Comp.	Chloride ion as Chlorine (Cl_2)	EPA Method 26A	0.1N NaOH and DI Rinses	Final Volume 334.7 mL **Sodium thiosulfate NOT ADDED!**	Element One
	12/06/23						
	12/06/23						

ANALYTICAL DATA

Analytical Calculations

HF -

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

Where-

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

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

Beginning Volume--*Sample Submission*

1.053= Correction factor for hydrogen fluoride

Cl_2 -

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

Where-

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

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

Beginning Volume--*Sample Submission*

Analytical Calculations

Spike Recovery-

$$\textbf{Spike (\%)} = \frac{\textbf{(Spiked Result (µg/mL) – Sample Result (µg/mL))}}{\textbf{Spike Amount (µg/mL)}} \textbf{ X100}$$

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-

$$\textbf{RPD (\%)} = \frac{\textbf{(Duplicate Result (µg/mL) - Sample Result (µg/mL))}}{\textbf{Average (µg/mL)}} \textbf{ X100}$$

Where-

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

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

elementOne **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID 41721**

Analysis Due Date 12.20.23
QA/QC/Report Due Date 12.22.23

Client:	Deeco, Inc.
Project No	23-3315

Date Rec	12.11.23
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	MN-M26A-R1A	7	MN-M26A-R1B	13	MN-M26A-FBON
2	MN-M26A-R3A	8	MN-M26A-R3B	14	MN-M26A-FBOFF
3	MN-M26A-R4A	9	MN-M26A-R4B		
	MN-M26A-R4A Spike		MN-M26A-R4B Spike		
4	MN-M26A-R5A	10	MN-M26A-R5B		
5	MN-M26A-R6A	11	MN-M26A-R6B		
6	MN-M26A-R7A	12	MN-M26A-R7B		

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		434.0						308.5		
2		504.1						333.1		
3.S		449.4						333.6		
4		461.7						353.8		
5		479.8						338.3		
6		476.5						352.3		
7		483.5						296.1		
8		492.8						325.2		
9.S		425.8						312.2		
10		503.1						358.9		
11		497.9						311.5		
12		507.1						337.5		
13		384.3						313.8		
14		399.1						355.9		

Lab Communications

Rec Runs/FB: H2SO4; NaOH; No RB received---12.11.23 LLB

SS Page 1 of 2
SS by LAB
12/19/2023 11:40:15 AM

HF 15-28 121923 LW
HF Imp 1, 2, &3 Prep By / Date LAW 121823 1-14
Imp 4 & 5 Prep By / Date 12.19.23 LW 1-14
Labeled By/Date MH 12/12/23
ID Verification By/Date MH 12/12/23
BL2 K28 LW 122023

elementOne **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID 41721**

Analysis Due Date 12.20.23
QA/QC/Report Due Date 12.22.23

Client:	Deeco, Inc.
Project No	23-3315

Date Rec	12.11.23
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

15	RC-M26A-R1A	21	RC-M26A-R1B	27	RC-M26A-FBON
16	RC-M26A-R2A	22	RC-M26A-R2B	28	RC-M26A-FBOFF
17	RC-M26A-R3A	23	RC-M26A-R3B		
	RC-M26A-R3A Spike		RC-M26A-R3B Spike		
18	RC-M26A-R4A	24	RC-M26A-R4B		
19	RC-M26A-R5A	25	RC-M26A-R5B		
20	RC-M26A-R6A	26	RC-M26A-R6B		

Analyses Requested		
	Samples 15-28	HF
	Samples 15-28	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
15		472.6						296.6		
16		456.5						339.0		
17.S		482.2						349.4		
18		432.0						347.0		
19		433.1						282.2		
20		437.9						328.5		
21		498.6						297.1		
22		456.0						324.8		
23.S		469.8						343.6		
24		461.3						341.0		
25		463.3						329.1		
26		464.0						346.4		
27		419.0						341.0		
28		410.9						334.7		

Reagent Blanks

Lab ID	Fractions	BV, ml	FV, ml	Notes
	0.1 N H_2SO_4			
	0.1 N NaOH			
	DI H_2O			

SS Page 2 of 2
SS by LAB
12/19/2023 11:40:15 AM

HF Imp 1, 2, &3 Prep By / Date Lmw 12-18-23 1-14
Imp 4 & 5 Prep By / Date
Labeled By/Date KLM 12/12/23
ID Verification By/Date KLM 12/12/23

Metrohm 861/788 Ion Chromatograph System

elementOne **M26A-HF IC Data Sheet** **Lab ID #: 41721 (1-14)**

Client: Deeco
Date: 12.20.23
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			_2023-12-18_	12/18/2023 14:57
LRB	0.000	1	10	< 0.001		NA	_2023-12-18_	12/18/2023 15:16
LRB SPK	5.100	1	10	0.054	5.00	102%	_2023-12-18_	12/18/2023 15:34
LRB SPK	4.942	1	10	0.052	5.00	99%	_2023-12-18_	12/18/2023 15:53
41721-1	0.000	5	434.0	< 0.228			_2023-12-18_	12/18/2023 17:27
41721-1 DUP	0.000	5	434.0	< 0.228		NA	_2023-12-18_	12/18/2023 17:46
41721-2	0.000	5	504.1	< 0.265			_2023-12-18_	12/18/2023 20:34
41721-2 DUP	0.082	5	504.1	< 0.265		NA	_2023-12-18_	12/18/2023 20:53
41721-3	0.000	5	449.4	< 0.237			_2023-12-18_	12/18/2023 18:04
41721-3 DUP	0.000	5	449.4	< 0.237		NA	_2023-12-18_	12/18/2023 18:23
41731-3 SPK	5.429	5	449.4	12.84	5.00	109%	_2023-12-18_	12/18/2023 18:42
41721-3 SPK DUP	5.318	5	449.4	12.58	5.00	106%	_2023-12-18_	12/18/2023 19:00
41721-4	0.000	5	461.0	< 0.243			_2023-12-18_	12/18/2023 21:12
41721-4 DUP	0.000	5	461.7	< 0.243		NA	_2023-12-18_	12/18/2023 21:30
41721-5	0.000	5	479.8	< 0.253			_2023-12-18_	12/18/2023 21:49
41721-5 DUP	0.000	5	479.8	< 0.253		NA	_2023-12-18_	12/18/2023 22:08
41721-6	0.000	5	476.5	< 0.251			_2023-12-18_	12/18/2023 22:26
41721-6 DUP	0.000	5	476.5	< 0.251		NA	_2023-12-18_	12/18/2023 22:45
41721-7	0.000	5	483.5	< 0.254			_2023-12-18_	12/18/2023 23:04
41721-7 DUP	0.081	5	483.5	< 0.254		NA	_2023-12-18_	12/18/2023 23:23
41721-8	0.000	5	492.8	< 0.259			_2023-12-19_	12/19/2023 0:56
41721-8 DUP	0.079	5	492.8	< 0.259		NA	_2023-12-19_	12/19/2023 1:15
41721-9	0.073	5	425.8	< 0.224			_2023-12-19_	12/19/2023 1:34
41721-9 DUP	0.066	5	425.8	< 0.224		NA	_2023-12-19_	12/19/2023 1:53
41721-9 SPK	5.466	5	425.8	12.2	5.00	108%	_2023-12-19_	12/19/2023 2:11
41721-9 SPK DUP	5.459	5	425.8	12.2	5.00	108%	_2023-12-19_	12/19/2023 2:30
41721-10	0.097	5	503.1	< 0.265			_2023-12-19_	12/19/2023 2:49
41721-10 DUP	0.047	5	503.1	< 0.265		NA	_2023-12-19_	12/19/2023 3:07
41721-11	0.076	5	477.4	< 0.251			_2023-12-19_	12/19/2023 3:26
41721-11 DUP	0.073	5	477.4	< 0.251		NA	_2023-12-19_	12/19/2023 3:45
41721-12	0.094	5	507.1	< 0.267			_2023-12-19_	12/19/2023 5:19
41721-12 DUP	0.081	5	507.1	< 0.267		NA	_2023-12-19_	12/19/2023 5:37
41721-13 FB ON	0.000	5	384.3	< 0.202			_2023-12-19_	12/19/2023 5:56
41721-13 FB ON DUP	0.000	5	384.3	< 0.202		NA	_2023-12-19_	12/19/2023 6:15
41721-14 FB OFF	0.000	5	399.1	< 0.21			_2023-12-19_	12/19/2023 6:34
41721-14 FB OFF DUP	0.000	5	399.1	< 0.21		NA	_2023-12-19_	12/19/2023 6:52

HF Data 1 of 2

elementOne
e 41721-HF

Metrohm 861/788 Ion Chromatograph System

elementOne **M26A-HF IC Data Sheet** **Lab ID #: 41721 (1-14)**

Client: Deeco
Date: 12.20.23
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	0.000					_2023-12-18_	12/18/2023 11:12
0.1	0.102			2.0%	102%	_2023-12-18_	12/18/2023 11:31
1	0.962			-3.8%	96%	_2023-12-18_	12/18/2023 11:50
3	3.041			1.4%	101%	_2023-12-18_	12/18/2023 12:08
5	5.008			0.2%	100%	_2023-12-18_	12/18/2023 12:27
10	9.987			-0.1%	100%	_2023-12-18_	12/18/2023 12:46
0.1	0.110			10.0%	110%	_2023-12-19_	12/19/2023 8:45
1	0.932			-6.8%	93%	_2023-12-19_	12/19/2023 9:03
3	3.071			2.4%	102%	_2023-12-19_	12/19/2023 9:22
5	5.126			2.5%	103%	_2023-12-19_	12/19/2023 9:41
10	10.109			1.1%	101%	_2023-12-19_	12/19/2023 10:00
Correlation-	0.999788						
QC	5.028		5.00		101%	_2023-12-18_	12/18/2023 13:05
QC	4.832		5.00		97%	_2023-12-18_	12/18/2023 13:23
QC	4.819		5.00		96%	_2023-12-18_	12/18/2023 17:08
QC	5.178		5.00		104%	_2023-12-18_	12/18/2023 19:19
QC	4.933		5.00		99%	_2023-12-18_	12/18/2023 19:38
QC	5.176		5.00		104%	_2023-12-18_	12/18/2023 23:41
QC	5.199		5.00		104%	_2023-12-19_	12/19/2023 0:00
QC	10.104		5.00		202%	_2023-12-19_	12/19/2023 4:04
QC	5.117		5.00		102%	_2023-12-19_	12/19/2023 4:22
QC	5.089		5.00		102%	_2023-12-19_	12/19/2023 7:48
QC	5.084		5.00		102%	_2023-12-19_	12/19/2023 10:18
DL	0.097		0.10		97%	_2023-12-18_	12/18/2023 14:19
DL	0.110		0.10		110%	_2023-12-18_	12/18/2023 14:38
DL	0.105		0.10		105%	_2023-12-19_	12/19/2023 8:07
DL	0.110		0.10		110%	_2023-12-19_	12/19/2023 10:37
36738-5 QC DUP	6.651	1	6.96		101%	_2023-12-19_	12/19/2023 7:30
BLK	0.000					_2023-12-18_	12/18/2023 13:42
BLK	0.000					_2023-12-18_	12/18/2023 14:01
BLK	0.144					_2023-12-18_	12/18/2023 19:57
BLK	0.000					_2023-12-18_	12/18/2023 20:15
BLK	0.000					_2023-12-19_	12/19/2023 0:19
BLK	0.000					_2023-12-19_	12/19/2023 0:38
BLK	0.000					_2023-12-19_	12/19/2023 4:41
BLK	0.000					_2023-12-19_	12/19/2023 5:00
BLK	0.000					_2023-12-19_	12/19/2023 8:26
BLK	0.000					_2023-12-19_	12/19/2023 10:56

HF Data 2 of 2

elementOne
e 41721-HF

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** HF 41721 (1-14)

Date: 12.18.23 Column: IonPac AS14A Instrument: 861 / 788

Analyst: LMO Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-87-1

Batch name: 121823-41721 10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Regenerant: 100 mM H_3PO_4 Lot # 1C11-103-2

Flow Rate: 1.0 mL/min. Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
1	00			GC	manual	R²	
2	G1		F-	BBL305714	Symmetrical	.9998	
3	1.0						
4	30						
5	50						
6	100						
7	GC						
8	GC						
9	BLK						
10	BLK						
11	DL						
12	DL						
13	LRB						
14	LRB						
15	LRBT						
16	LRBT						
17	41721-1	Deeco	HF		—	5X	
18	-1D	↓	↓		—	↓	
19	-3				—		
20	-3D				—		
21	-3T				5.429		
22	-3TD	↓	↓		5.318	↓	
23	GC						
24	GC						
25	BLK						

Manual integrations noted by M

Curve IC Lot # 1C11-103-4 Comments: pg 1 of 3

Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** 230324-250 HF **IC NO2 Solution** 230842-250(HF)

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:_____ Time:_____ By:_____ QC Review- Date:_____ Time:_____ By:_____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** HF 41721 (1-14)

Date: 121823 Column: IonPac AS14A Instrument: 861/788
Analyst: LW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-821
Batch name: 12823-41721 10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Regenerant: 100 mM H_3PO_4 Lot # 1C11-103-2
Flow Rate: 1.0 mL/min. Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
26	BLK						
27	41721-2	Deeco	HF		—	5X	
28	-2D	↓	↓		—	↓	
29	-4				—		
30	-4D				—		
31	-5				—		
32	-5D				—		
33	-6				—		
34	-6D				—		
35	-7				—		
36	-7D	↓	↓		—	↓	
37	QC						
38	QC						
39	BLK						
40	BLK						
41	41721-8	Deeco	HF		—	5X	
42	-8D	↓	↓		—	↓	
43	-9				—		
44	-9D				—		
45	-9+				5466		
46	-9+D				5459		
47	-10				—		
48	-10D				—		
49	-11				—		
50	-11D	↓	↓		—	↓	

Manual integrations noted by M
Curve IC Lot #_____ Comments: pg 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_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:_____ Time:_____ By:_____ QC Review- Date:_____ Time:_____ By:_____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** HF 41721 (1-14)

Date: 12.18.23 Column: IonPac AS14A Instrument: 861 1788

Analyst: LW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# IC11-871

Batch name: 121823-41721 10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Regenerant: 100 mM H_3PO_4 Lot # IC1L1032

Flow Rate: 1.0 mL/min. Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
51	CC 100PPM						
52	CC 50PPM						
53	BLK						
54	BLK						
55	41721-12	Deeco	HF		—	5X	
56	-12D	↓	↓		—	↓	
57	-13 FBON				—		
58	-13 FBONDP				—		
59	-14 FBOFF				—		
60	-14 FBOFFDP	✓			—	↓	
61	360338-5-GC				5128	1X	TV=6.96
62	5-GC		✓		6.651	↓	
63	CC						
64	DL						
65	BLK						
66	0.1						
67	1.0						
68	3.0						
69	5.0						
70	10.0						
71	CC						
72	DL						
73	BLK						
74							
75							

Manual integrations noted by M

Curve IC Lot #_____ Comments: pg 30 of 73

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_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:_____ Time:_____ By:_____ QC Review- Date:_____ Time:_____ By:_____

Metrohm 861/788 Ion Chromatograph System

elementOne **M26A-HF IC Data Sheet** **Lab ID #: 41721 (15-28)**

Client: Deeco
Date: 12.22.23
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			_2023-12-19_	12/19/2023 21:14
LRB	0.000	1	10	< 0.001		NA	_2023-12-19_	12/19/2023 21:33
LRB SPK	5.044	1	10	0.053	5.00	101%	_2023-12-19_	12/19/2023 21:52
LRB SPK	5.013	1	10	0.053	5.00	100%	_2023-12-19_	12/19/2023 22:10
41721-15	0.036	5	422.6	< 0.222			_2023-12-19_	12/19/2023 22:29
41721-15 DUP	0.036	5	422.6	< 0.222		NA	_2023-12-19_	12/19/2023 22:48
41721-16	0.036	5	436.5	< 0.23			_2023-12-20_	12/20/2023 1:36
41721-16 DUP	0.035	5	436.5	< 0.23		NA	_2023-12-20_	12/20/2023 1:55
41721-17	0.032	5	482.2	< 0.254			_2023-12-19_	12/19/2023 23:07
41721-17 DUP	0.032	5	482.2	< 0.254		NA	_2023-12-19_	12/19/2023 23:25
41721-17 SPK	5.388	5	482.2	13.67	5.00	107%	_2023-12-19_	12/19/2023 23:44
41721-17 SPK DUP	5.234	5	482.2	13.28	5.00	104%	_2023-12-20_	12/20/2023 0:03
41721-18	0.033	5	432.0	< 0.227			_2023-12-20_	12/20/2023 2:14
41721-18 DUP	0.056	5	432.0	< 0.227		NA	_2023-12-20_	12/20/2023 2:33
41721-19	0.058	5	433.1	< 0.228			_2023-12-20_	12/20/2023 2:51
41721-19 DUP	0.066	5	433.1	< 0.228		NA	_2023-12-20_	12/20/2023 3:10
41721-20	0.050	5	437.9	< 0.23			_2023-12-20_	12/20/2023 3:29
41721-20 DUP	0.043	5	437.9	< 0.23		NA	_2023-12-20_	12/20/2023 3:48
41721-21	0.040	5	498.6	< 0.262			_2023-12-20_	12/20/2023 4:06
41721-21 DUP	0.048	5	498.6	< 0.262		NA	_2023-12-20_	12/20/2023 4:25
41721-22	0.094	5	436.0	< 0.229			_2023-12-20_	12/20/2023 5:59
41721-22 DUP	0.065	5	436.0	< 0.229		NA	_2023-12-20_	12/20/2023 6:17
41721-23	0.040	5	469.8	< 0.247			_2023-12-20_	12/20/2023 6:36
41721-23 DUP	0.039	5	469.8	< 0.247		NA	_2023-12-20_	12/20/2023 6:55
41721-23 SPK	5.355	5	469.8	13.24	5.00	106%	_2023-12-20_	12/20/2023 7:14
41721-23 SPK DUP	5.347	5	469.8	13.22	5.00	106%	_2023-12-20_	12/20/2023 7:32
41721-24	0.083	5	461.3	< 0.243			_2023-12-20_	12/20/2023 7:51
41721-24 DUP	0.037	5	461.3	< 0.243		NA	_2023-12-20_	12/20/2023 8:10
41721-25	0.077	5	463.3	< 0.244			_2023-12-20_	12/20/2023 8:29
41721-25 DUP	0.048	5	463.3	< 0.244		NA	_2023-12-20_	12/20/2023 8:47
41721-26	0.042	5	464.0	< 0.244			_2023-12-20_	12/20/2023 10:22
41721-26 DUP	0.000	5	464.0	< 0.244		NA	_2023-12-20_	12/20/2023 10:40
41721-27 FB ON	0.000	5	419.0	< 0.221			_2023-12-20_	12/20/2023 10:59
41721-27 FB ON DUP	0.000	5	419.0	< 0.221		NA	_2023-12-20_	12/20/2023 11:18
41721-28 FB OFF	0.000	5	420.7	< 0.221			_2023-12-20_	12/20/2023 11:36
41721-28 FB OFF DUP	0.000	5	420.7	< 0.221		NA	_2023-12-20_	12/20/2023 11:55

HF Data 1 of 2

elementOne
e 41721-HF

Metrohm 861/788 Ion Chromatograph System

elementOne **M26A-HF IC Data Sheet** **Lab ID #: 41721 (15-28**

Client: Deeco
Date: 12.22.23
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	0.000					_2023-12-19_	12/19/2023 17:29
0.1	0.104			4.0%	104%	_2023-12-19_	12/19/2023 17:48
1	0.934			-6.6%	93%	_2023-12-19_	12/19/2023 18:07
3	3.059			2.0%	102%	_2023-12-19_	12/19/2023 18:26
5	5.032			0.6%	101%	_2023-12-19_	12/19/2023 18:44
10	9.971			-0.3%	100%	_2023-12-19_	12/19/2023 19:03
0.1	0.105			5.0%	105%	_2023-12-20_	12/20/2023 13:48
1	0.927			-7.3%	93%	_2023-12-20_	12/20/2023 14:06
3	2.717			-9.4%	91%	_2023-12-20_	12/20/2023 14:25
5	5.119			2.4%	102%	_2023-12-20_	12/20/2023 14:44
10	10.251			2.5%	103%	_2023-12-20_	12/20/2023 15:03
Correlation-	0.999798						
QC	5.009		5.00		100%	_2023-12-19_	12/19/2023 19:22
QC	4.742		5.00		95%	_2023-12-19_	12/19/2023 19:41
QC	4.659		5.00		93%	_2023-12-20_	12/20/2023 0:22
QC	5.008		5.00		100%	_2023-12-20_	12/20/2023 0:40
QC	5.129		5.00		103%	_2023-12-20_	12/20/2023 4:44
QC	4.685		5.00		94%	_2023-12-20_	12/20/2023 5:03
QC	5.057		5.00		101%	_2023-12-20_	12/20/2023 9:06
QC	5.033		5.00		101%	_2023-12-20_	12/20/2023 9:25
QC	5.063		5.00		101%	_2023-12-20_	12/20/2023 12:51
QC	5.028		5.00		101%	_2023-12-20_	12/20/2023 15:21
DL	0.105		0.10		105%	_2023-12-19_	12/19/2023 20:37
DL	0.095		0.10		95%	_2023-12-19_	12/19/2023 20:55
DL	0.103		0.10		103%	_2023-12-20_	12/20/2023 13:10
DL	0.108		0.10		108%	_2023-12-20_	12/20/2023 15:40
36738-5 QC	6.720	1	6.96		102%	_2023-12-20_	12/20/2023 12:14
36738-5 QC DUP	6.765	1	6.96		102%	_2023-12-20_	12/20/2023 12:33
BLK	0.000					_2023-12-19_	12/19/2023 19:59
BLK	0.000					_2023-12-19_	12/19/2023 20:18
BLK	0.000					_2023-12-20_	12/20/2023 0:59
BLK	0.000					_2023-12-20_	12/20/2023 1:18
BLK	0.000					_2023-12-20_	12/20/2023 5:21
BLK	0.000					_2023-12-20_	12/20/2023 5:40
BLK	0.000					_2023-12-20_	12/20/2023 9:44
BLK	0.000					_2023-12-20_	12/20/2023 10:03
BLK	0.000					_2023-12-20_	12/20/2023 13:29
BLK	0.000					_2023-12-20_	12/20/2023 15:59

HF Data 2 of 2

elementOne
e 41721-HF

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41721 (15-28)

Date: 12.19.23 Column: IonPac AS14A Instrument: 861/788

Analyst: MW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# IC11-871

Batch name: 121923-41721 10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Regenerant: 100 mM H_3PO_4 Lot # ~~IC11-87~~ 104-2

Flow Rate: 1.0 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			QC	mwf	R1	
2	01		F-	BBCJ0574	Sigma/Aldrich	.9996	
3	1.0						
4	5.0						
5	50						
6	100						
7	QC						
8	QC						
9	BLK						
10	BLK						
11	DL						
12	DL						
13	LRB						
14	LRB						
15	LRBS						
16	LRBS						
17	41721-15	Deeco	HF		—	5X	
18	-15D	↓	↓		—	↓	
19	-17				—		
20	-17D				—		
21	-17S				5.388		
22	-17SD	↓	↓		5.234	↓	
23	QC						
24	QC						
25	BLK						

Manual integrations noted by M

Curve IC Lot # IC11-104-4 Comments: pg 1 of 3

Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** 2303029-250 HF **IC NO2 Solution** 2308942-250 HF

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: 12.20.23 Time: 4:37 By: MW QC Review- Date: ✓ Time: _____ By: _____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41724

Date: 12/19-23 Column: IonPac AS14A Instrument: 861 1788

Analyst: MD Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-87-1

Batch name: 121923-41721 10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Regenerant: 100 mM H_3PO_4 Lot # 1C11-104-2

Flow Rate: 1.0 mL/min. Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
26	Blk						
27	41721-16	Deeco	HF		—	5X	
28	-16D				—		
29	-18				—		
30	-18D				—		
31	-19				—		
32	-19D				—		
33	-20				—		
34	-20D				—		
35	-21				—		
36	-21D	↓	↓		—	↓	
37	QC						
38	QC						
39	Blk						
40	Blk						
41	41721-22	Deeco	HF		—	5X	
42	-22D				—		
43	-23				—		
44	-23D				—		
45	-23+				5355		
46	-23+D				5342		
47	-24				—		
48	-24D				—		
49	-25				—		
50	-25D	↓	↓		—	↓	

Manual integrations noted by M

Curve IC Lot #_____ Comments: QQ 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_4 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 **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41724

Date: 12.19.23 Column: IonPac AS14A Instrument: 861 / 788
Analyst: LMO Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# IC11-871
Batch name: 10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
121923-41721 Regenerant: 100 mM H_3PO_4 Lot # 141-104-2
Flow Rate: 1.0 mL/min. Method: 300/26A

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
51	CCV						
52	CCV						
53	BLK						
54	BLK						
55	41721-26	DEECO	HF		—	5X	
56	-26D				—		
57	-27FBOW				—		
58	-27FBOWD				—		
59	-28FBOFF				—		
60	-28FBOFFD				—	↓	
61	31738-S-CCV				6.220	1X	TV=6.96
62	S-CCV	↓	↓		6.265	↓	
63	CCV						
64	DI						
65	BLK						
66	0.1						
67	1.0						
68	3.0						
69	5.0						
70	10.0						
71	CCV						
72	DI						
73	BLK						
74							
75							

Manual integrations noted by M
Curve IC Lot #_____ Comments: pg 30 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_4 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:_____

Metrohm 881/858 Ion Chromatograph System

elementOne

M26A-Cl_2 IC Data Sheet

Lab ID #: 41721 (1-14)

Client: Deeco
Date: 12.20.23
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.

Sample ID	Cl^- µg/ml	Dilution	Final Vol, ml	Cl_2, Total mg	Spike, µg/ml	% RPD/ Recovery	File Name	Date Time
LRB	-0.013	1	10	< 0.001			-2dc57c8e:18c7d19aefa:-7919	12/18/2023 20:14
LRB	-0.026	1	10	< 0.001		NA	-2dc57c8e:18c7d19aefa:-7917	12/18/2023 20:38
LRB SPK	10.086	1	10	0.101	5.00	202%	-2dc57c8e:18c7d19aefa:-7915	12/18/2023 21:01
LRB SPK	10.090	1	10	0.101	5.00	202%	-2dc57c8e:18c7d19aefa:-7913	12/18/2023 21:25
41721-1	0.013	5	308.5	< 0.154			-2dc57c8e:18c7d19aefa:-78f9	12/19/2023 2:30
41721-1 DUP	0.010	5	308.5	< 0.154		NA	-2dc57c8e:18c7d19aefa:-78f7	12/19/2023 2:54
41721-2	0.006	5	333.1	< 0.167			-2dc57c8e:18c7d19aefa:-78f5	12/19/2023 3:17
41721-2 DUP	-0.045	5	333.1	< 0.167		NA	-2dc57c8e:18c7d19aefa:-78f3	12/19/2023 3:41
41721-3	-0.010	5	333.6	< 0.167			-2dc57c8e:18c7d19aefa:-78f1	12/19/2023 4:04
41721-3 DUP	-0.028	5	333.6	< 0.167		NA	-2dc57c8e:18c7d19aefa:-78ef	12/19/2023 4:28
41721-3 SPK	5.285	5	333.6	8.8	5.00	106%	-2dc57c8e:18c7d19aefa:-78ed	12/19/2023 4:51
41721-3 SPK DUP	5.221	5	333.6	8.71	5.00	104%	-2dc57c8e:18c7d19aefa:-78eb	12/19/2023 5:15
41721-4	0.374	5	333.8	0.624			-2dc57c8e:18c7d19aefa:-78e1	12/19/2023 7:12
41721-4 DUP	0.382	5	333.8	0.638		2.1%	-2dc57c8e:18c7d19aefa:-78df	12/19/2023 7:36
41721-5	0.169	5	338.3	0.286			-2dc57c8e:18c7d19aefa:-784c	12/19/2023 7:59
41721-5 DUP	0.169	5	338.3	0.286		0.0%	-2dc57c8e:18c7d19aefa:-784a	12/19/2023 8:23
41721-6	0.323	5	352.3	0.569			-2dc57c8e:18c7d19aefa:-7848	12/19/2023 8:46
41721-6 DUP	0.335	5	352.3	0.590		3.6%	-2dc57c8e:18c7d19aefa:-7846	12/19/2023 9:10
41721-7	0.021	5	296.1	< 0.148			-2dc57c8e:18c7d19aefa:-7844	12/19/2023 9:33
41721-7 DUP	0.012	5	296.1	< 0.148		NA	-2dc57c8e:18c7d19aefa:-7842	12/19/2023 9:57
41721-8	-0.026	5	385.2	< 0.193			-2dc57c8e:18c7d19aefa:-77d9	12/19/2023 10:20
41721-8 DUP	-0.029	5	385.2	< 0.193		NA	-2dc57c8e:18c7d19aefa:-77d7	12/19/2023 10:44
41721-9	-0.035	5	312.2	< 0.156			-2dc57c8e:18c7d19aefa:-7704	12/19/2023 12:41
41721-9 DUP	-0.034	5	312.2	< 0.156		NA	-2dc57c8e:18c7d19aefa:-7702	12/19/2023 13:04
41721-9 SPK	4.953	5	312.2	7.73	5.00	99%	-2dc57c8e:18c7d19aefa:-7700	12/19/2023 13:28
41721-9 SPK DUP	5.064	5	312.2	7.90	5.00	101%	-2dc57c8e:18c7d19aefa:-76fe	12/19/2023 13:51
41721-10	0.371	5	358.9	0.666			-2dc57c8e:18c7d19aefa:-74f7	12/19/2023 14:15
41721-10 DUP	0.378	5	358.9	0.678		1.9%	-2dc57c8e:18c7d19aefa:-74f5	12/19/2023 14:38
41721-11	0.197	5	311.5	0.307			-2dc57c8e:18c7d19aefa:-74f3	12/19/2023 15:02
41721-11 DUP	0.195	5	311.5	0.304		1.0%	-2dc57c8e:18c7d19aefa:-74f1	12/19/2023 15:25
41721-12	0.358	5	337.5	0.604			-2dc57c8e:18c7d19aefa:-74ef	12/19/2023 15:49
41721-12 DUP	0.373	5	337.5	0.629		4.1%	-2dc57c8e:18c7d19aefa:-74ed	12/19/2023 16:12
41721-13 FBON	0.008	5	313.8	< 0.157			-2dc57c8e:18c7d19aefa:-74e3	12/19/2023 18:10
41721-13 FBON DUP	0.039	5	313.8	< 0.157		NA	-2dc57c8e:18c7d19aefa:-74e1	12/19/2023 18:34
41721-14 FB OFF	0.070	5	355.9	< 0.178			-2dc57c8e:18c7d19aefa:-74df	12/19/2023 18:57
41721-14 FB OFF DUI	0.084	5	355.9	< 0.178		NA	-2dc57c8e:18c7d19aefa:-74dd	12/19/2023 19:21

Cl_2-Data 1 of 2

elementOne
e 41721-Cl_2

Metrohm 881/858 Ion Chromatograph System

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M26A-Cl_2 IC Data Sheet

Lab ID #: 41721 (1-14)

Client: Deeco
Date: 12.20.23
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.

Standards	Cl^- µg/ml	Dilution	QC µg/ml	%Relative Error	% Recovery	File Name	Date Time
0	0.000					-2dc57c8e:18c7d19aefa:-7503	12/18/2023 15:32
0.1	0.107			7.0%	107%	-2dc57c8e:18c7d19aefa:-7501	12/18/2023 15:56
1	0.912			-8.8%	91%	-2dc57c8e:18c7d19aefa:-74ff	12/18/2023 16:19
3	2.980			-0.7%	99%	-2dc57c8e:18c7d19aefa:-74fd	12/18/2023 16:43
5	5.149			3.0%	103%	-2dc57c8e:18c7d19aefa:-74fb	12/18/2023 17:06
10	9.948			-0.5%	99%	-2dc57c8e:18c7d19aefa:-74f9	12/18/2023 17:30
0.1	0.107			7.0%	107%	-2dc57c8e:18c7d19aefa:-74d1	12/19/2023 21:42
1	1.014			1.4%	101%	-2dc57c8e:18c7d19aefa:-74cf	12/19/2023 22:05
3	3.097			3.2%	103%	-2dc57c8e:18c7d19aefa:-74cd	12/19/2023 22:29
5	5.162			3.2%	103%	-2dc57c8e:18c7d19aefa:-74cb	12/19/2023 22:52
10	9.782			-2.2%	98%	-2dc57c8e:18c7d19aefa:-74c9	12/19/2023 23:16
Correlation-	0.999771						
QC	5.336		5.00		107%	-2dc57c8e:18c7d19aefa:-7925	12/18/2023 17:53
QC	5.264		5.00		105%	-2dc57c8e:18c7d19aefa:-7923	12/18/2023 18:17
QC	5.208		5.00		104%	-2dc57c8e:18c7d19aefa:-7905	12/19/2023 0:09
QC	5.205		5.00		104%	-2dc57c8e:18c7d19aefa:-7903	12/19/2023 0:33
QC	5.256		5.00		105%	-2dc57c8e:18c7d19aefa:-78e9	12/19/2023 5:38
QC	5.322		5.00		106%	-2dc57c8e:18c7d19aefa:-78e7	12/19/2023 6:02
QC	5.319		5.00		106%	-2dc57c8e:18c7d19aefa:-770c	12/19/2023 11:07
QC	5.020		5.00		100%	-2dc57c8e:18c7d19aefa:-770a	12/19/2023 11:31
QC	5.365		5.00		107%	-2dc57c8e:18c7d19aefa:-74eb	12/19/2023 16:36
QC	5.406		5.00		108%	-2dc57c8e:18c7d19aefa:-74e9	12/19/2023 17:00
QC	5.310		5.00		106%	-2dc57c8e:18c7d19aefa:-74d7	12/19/2023 20:31
QC	5.366		5.00		107%	-2dc57c8e:18c7d19aefa:-74c7	12/19/23 23:39
DL	0.094		0.10		94%	-2dc57c8e:18c7d19aefa:-791d	12/18/2023 19:27
DL	0.090		0.10		90%	-2dc57c8e:18c7d19aefa:-791b	12/18/2023 19:51
DL	0.095		0.10		95%	-2dc57c8e:18c7d19aefa:-74d5	12/19/2023 20:55
DL	0.106		0.10		106%	-2dc57c8e:18c7d19aefa:-74c5	12/20/2023 0:03
40034-7 QC	3.938	20	78.0		101%	-2dc57c8e:18c7d19aefa:-74db	12/19/2023 19:44
40034-7 QC DUP	3.919	20	78.0		100%	-2dc57c8e:18c7d19aefa:-74d9	12/19/2023 20:08
BLK	0.000					-2dc57c8e:18c7d19aefa:-7921	12/18/2023 18:40
BLK	0.000					-2dc57c8e:18c7d19aefa:-791f	12/18/2023 19:04
BLK	0.000					-2dc57c8e:18c7d19aefa:-7901	12/19/2023 0:56
BLK	0.000					-2dc57c8e:18c7d19aefa:-78ff	12/19/2023 1:20
BLK	0.020					-2dc57c8e:18c7d19aefa:-78e5	12/19/2023 6:25
BLK	0.000					-2dc57c8e:18c7d19aefa:-78e3	12/19/2023 6:49
BLK	0.000					-2dc57c8e:18c7d19aefa:-7708	12/19/2023 11:54
BLK	0.000					-2dc57c8e:18c7d19aefa:-7706	12/19/2023 12:18
BLK	0.000					-2dc57c8e:18c7d19aefa:-74e7	12/19/2023 17:23
BLK	0.000					-2dc57c8e:18c7d19aefa:-74e5	12/19/2023 17:47
BLK	0.000					-2dc57c8e:18c7d19aefa:-74d3	12/19/2023 21:18
BLK	0.000					-2dc57c8e:18c7d19aefa:-74c3	12/20/2023 0:26

elementOne

Cl_2-Data 2 of 2

e 41721-Cl_2

41707
41721

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

Date: 12.18.23 Column: IonPac AS14A Instrument: 881/858
Analyst: CW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-87-1
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Batch name: 121823-41707 Regenerant: 100mM H_3PO_4 Lot # 1C11-103-2
Flow Rate: 1.0 mL/min. Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
1	0.0			QC	MANP	R2	
2	0.1		Cl-	4868559	R2CLA	.999471	
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	LRBS) 10ppm Spk						
16	LRBS)						
17	41707-1		Cl2		3.191	10X	
18	-1D				3.192		
19	-3				0.162		
20	-3D				0.159		
21	-3+) 10ppm Spk				10.212		
22	-3+D)				10.153		
23	QC						
24	QC						
25	BLK						

Manual integrations noted by M
Curve IC Lot # 1C11-104-1 Sodium Thiosulfate Lot # 1C11-73-4 Comments: pg 1 of 4
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** 2303024-250 HPS
QC: Spike 50 uL from 1000 ug/mL Br Std. to 10mL sample; lot #'s listied above.
Submitted for QC- Date: 12.2023 Time: 8:30 By: CW QC Review- Date: ✓ Time: By:

41707

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41721

Date: 12.1823 Column: IonPac AS14A Instrument: 881/858

Analyst: LWS Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-87-1

10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Batch name: 121823-41707 Regenerant: 100mM H_3PO_4 Lot # 1C11-103-2

Flow Rate: 1.0 mL/min. Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
26	BLK						
27	41707-2		Cl_2		1.417	10X	
28	-2D				1.472	↓	
29	41721-1				—	5X	
30	-1D				—		
31	-2				—		
32	-2D				—		
33	-3				—		
34	-3D				—		
35	-3+				5.285		
36	-3+D		↓		5221	↓	
37	QC						
38	QC						
39	BLK						
40	BLK						
41	41721-4		Cl_2		0.374	5X	
42	-4D				0382		
43	-5				0.169		
44	-5D				6169		
45	-6				6.323		
46	-6D				0.335		
47	-7				—		
48	-7D				—		
49	-8				—		
50	-8D		↓		—	↓	

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 listied above.

Submitted for QC- Date:_____ Time:_____ By:_____ QC Review- Date:_____ Time:_____ By:_____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41707 41721

Date: 121823 Column: IonPac AS14A Instrument: 881/858

Analyst: LW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1CII-871

10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Batch name: 121823-41707 Regenerant: 100mM H_3PO_4 Lot # 1CII-103-2

Flow Rate: 1.0 mL/min. Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
51	CC						
52	GC						
53	BLK						
54	BLK						
55	41721-9				—	5X	
56	-9D				—	↓	
57	-9+				4.953		
58	-9+D				5.064		
59	-10				0.371		
60	-10D				0.378		
61	-11				0.197		
62	-11D				0.195		
63	-12				0.358		
64	-12D				0.373	↓	
65	CC						
66	GC						
67	BLK						
68	BLK						
69	41721-13FB FBON				—	5X	
70	-13FB BPMND				—	↓	
71	-14FBOFF				—		
72	-14FBOFFD				—	↓	
73	40034-7 - GC				3.938	20X	TV=78.0
74	-7 - GC				3.919	↓	
75	CC						

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 listied above.

Submitted for QC- Date:_____ Time:_____ By:_____ QC Review- Date:_____ Time:_____ By:_____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41707

Date: 12.18.23 Column: IonPac AS14A Instrument: 881858

Analyst: LW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-87-1

10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Batch name: 121823-41707 Regenerant: 100mM H_3PO_4 Lot # 1C11-103-2

Flow Rate: 1.0 mL/min. Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
76	DL						
77	BLK						
78	0.1						
79	1.0						
80	3.0						
81	5.0						
82	10.0						
83	GC						
84	DL						
85	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:_____

881/858
Ion Chromatograph System

elementOne

M26A-Cl_2 IC Data Sheet

Lab ID #: 41721 (15-28)

Client: Deeco
Date: 12.22.23
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.
1.000

Sample ID	Cl^- µg/ml	Dilution	Final Vol, ml	Cl_2, Total mg	Spike, µg/ml	% RPD/ Recovery	File Name	Date Time
LRB	-0.003	1	10	< 0.001			-2dc57c8e:18c7d19aefa:-6f6d	12/20/2023 14:26
LRB	0.004	1	10	< 0.001		NA	-2dc57c8e:18c7d19aefa:-6f8b	12/20/2023 14:50
LRB SPK	5.137	1	10	0.051	5.00	103%	-2dc57c8e:18c7d19aefa:-6f69	12/20/2023 15:13
LRB SPK	5.242	1	10	0.052	5.00	105%	-2dc57c8e:18c7d19aefa:-6f67	12/20/2023 15:37
41721-15	-0.021	5	296.6	< 0.148			-2dc57c8e:18c7d19aefa:-6f65	12/20/2023 16:00
41721-15 DUP	0.020	5	296.6	< 0.148		NA	-2dc57c8e:18c7d19aefa:-6f63	12/20/2023 16:24
41721-16	0.008	5	339.0	< 0.17			-2dc57c8e:18c7d19aefa:-6f51	12/20/2023 19:55
41721-16 DUP	-0.013	5	339.0	< 0.17		NA	-2dc57c8e:18c7d19aefa:-6f4f	12/20/2023 20:19
41721-17	0.034	5	349.4	< 0.175			-2dc57c8e:18c7d19aefa:-6f61	12/20/2023 16:47
41721-17 DUP	0.016	5	349.4	< 0.175		NA	-2dc57c8e:18c7d19aefa:-6f5f	12/20/2023 17:11
41721-17 SPK	5.057	5	349.4	8.83	5.00	100%	-2dc57c8e:18c7d19aefa:-6f5d	12/20/2023 17:34
41721-17 SPK DUP	5.065	5	349.4	8.85	5.00	101%	-2dc57c8e:18c7d19aefa:-6f5b	12/20/2023 17:58
41721-18	0.023	5	347.0	< 0.174			-2dc57c8e:18c7d19aefa:-6f4d	12/20/2023 20:42
41721-18 DUP	0.037	5	347.0	< 0.174		NA	-2dc57c8e:18c7d19aefa:-6f4b	12/20/2023 21:06
41721-19	0.092	5	282.2	< 0.141			-2dc57c8e:18c7d19aefa:-6f49	12/20/2023 21:29
41721-19 DUP	0.090	5	282.2	< 0.141		NA	-2dc57c8e:18c7d19aefa:-6f47	12/20/2023 21:53
41721-20	0.058	5	328.5	< 0.164			-2dc57c8e:18c7d19aefa:-6f45	12/20/2023 22:16
41721-20 DUP	0.077	5	328.5	< 0.164		NA	-2dc57c8e:18c7d19aefa:-6f43	12/20/2023 22:40
41721-21	-0.029	5	297.1	< 0.149			-2dc57c8e:18c7d19aefa:-6dfe	12/20/2023 23:03
41721-21 DUP	-0.052	5	297.1	< 0.149		NA	-2dc57c8e:18c7d19aefa:-6dfc	12/20/2023 23:27
41721-22	-0.016	5	324.8	< 0.162			-2dc57c8e:18c7d19aefa:-6df2	12/21/2023 1:24
41721-22 DUP	-0.016	5	324.8	< 0.162		NA	-2dc57c8e:18c7d19aefa:-6df0	12/21/2023 1:48
41721-23	-0.016	5	343.6	< 0.172			-2dc57c8e:18c7d19aefa:-6dee	12/21/2023 2:11
41721-23 DUP	-0.019	5	343.6	< 0.172		NA	-2dc57c8e:18c7d19aefa:-6dec	12/21/2023 2:35
41721-23 SPK	4.922	5	343.6	8.46	5.00	99%	-2dc57c8e:18c7d19aefa:-6dea	12/21/2023 2:58
41721-23 SPK DUP	5.125	5	343.6	8.80	5.00	103%	-2dc57c8e:18c7d19aefa:-6de8	12/21/2023 3:22
41721-24	-0.053	5	341.0	< 0.171			-2dc57c8e:18c7d19aefa:-6de6	12/21/2023 3:45
41721-24 DUP	0.011	5	341.0	< 0.171		NA	-2dc57c8e:18c7d19aefa:-6de4	12/21/2023 4:09
41721-25	-0.029	5	329.1	< 0.165			-2dc57c8e:18c7d19aefa:-6de2	12/21/2023 4:32
41721-25 DUP	-0.014	5	329.1	< 0.165		NA	-2dc57c8e:18c7d19aefa:-6de0	12/21/2023 4:56
41721-26	0.005	5	346.4	< 0.173			-2dc57c8e:18c7d19aefa:-6dd6	12/21/2023 6:53
41721-26 DUP	-0.011	5	346.4	< 0.173		NA	-2dc57c8e:18c7d19aefa:-6dd4	12/21/2023 7:17
41721-27 FB ON	-0.029	5	341.0	< 0.171			-2dc57c8e:18c7d19aefa:-6dd2	12/21/2023 7:40
41721-27 FB ON DUP	0.014	5	341.0	< 0.171		NA	-2dc57c8e:18c7d19aefa:-6dd0	12/21/2023 8:04
41721-28 FB OFF	0.055	5	334.7	< 0.167			-2dc57c8e:18c7d19aefa:-6dce	12/21/2023 8:27
41721-28 FB OFF DUP	0.019	5	334.7	< 0.167		NA	-2dc57c8e:18c7d19aefa:-6dcc	12/21/2023 8:50

881/858
Ion Chromatograph System

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M26A-Cl_2 IC Data Sheet

Lab ID #: 41721 (15-28)

Client: Deeco
Date: 12.22.23
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.
1.000

Standards	Cl^- µg/ml	Dilution	QC µg/ml	%Relative Error	% Recovery	File Name	Date Time
0	0.000					-2dc57c8e:18c7d19aefa:-6d07	12/20/2023 9:44
0.1	0.106			6.0%	106%	-2dc57c8e:18c7d19aefa:-6d05	12/20/2023 10:08
1	0.924			-7.6%	92%	-2dc57c8e:18c7d19aefa:-6d03	12/20/2023 10:32
3	2.989			-0.4%	100%	-2dc57c8e:18c7d19aefa:-6d01	12/20/2023 10:55
5	5.131			2.6%	103%	-2dc57c8e:18c7d19aefa:-6cff	12/20/2023 11:19
10	9.949			-0.5%	99%	-2dc57c8e:18c7d19aefa:-6cfd	12/20/2023 11:42
0.1	0.109			9.0%	109%	-2dc57c8e:18c7d19aefa:-6cf5	12/21/2023 11:11
1	0.969			-3.1%	97%	-2dc57c8e:18c7d19aefa:-6cf3	12/21/2023 11:35
3	2.949			-1.7%	98%	-2dc57c8e:18c7d19aefa:-6cf1	12/21/2023 11:58
5	5.140			2.8%	103%	-2dc57c8e:18c7d19aefa:-6cef	12/21/2023 12:22
10	10.294			2.9%	103%	-2dc57c8e:18c7d19aefa:-6ced	12/21/2023 12:45
Correlation-	0.999798						
QC	5.110		5.00		102%	-2dc57c8e:18c7d19aefa:-6f79	12/20/2023 12:06
QC	5.181		5.00		104%	-2dc57c8e:18c7d19aefa:-6f77	12/20/2023 12:29
QC	5.149		5.00		103%	-2dc57c8e:18c7d19aefa:-6f59	12/20/2023 18:21
QC	5.114		5.00		102%	-2dc57c8e:18c7d19aefa:-6f57	12/20/2023 18:45
QC	5.105		5.00		102%	-2dc57c8e:18c7d19aefa:-6dfa	12/20/2023 23:50
QC	5.208		5.00		104%	-2dc57c8e:18c7d19aefa:-6df8	12/21/2023 0:14
QC	5.092		5.00		102%	-2dc57c8e:18c7d19aefa:-6dde	12/21/2023 5:19
QC	5.149		5.00		103%	-2dc57c8e:18c7d19aefa:-6ddc	12/21/2023 5:43
QC	5.157		5.00		103%	-2dc57c8e:18c7d19aefa:-6cfb	12/21/2023 10:01
QC	5.230		5.00		105%	-2dc57c8e:18c7d19aefa:-6ceb	12/21/2023 13:09
DL	0.109		0.10		109%	-2dc57c8e:18c7d19aefa:-6f71	12/20/2023 13:39
DL	0.100		0.10		100%	-2dc57c8e:18c7d19aefa:-6f6f	12/20/2023 14:03
DL	0.094		0.10		94%	-2dc57c8e:18c7d19aefa:-6cf9	12/21/2023 10:24
40034-7 QC	3.801	20	78.0		97%	-2dc57c8e:18c7d19aefa:-6dca	12/21/2023 9:14
40034-7 QC DUP	3.844	20	78.0		99%	-2dc57c8e:18c7d19aefa:-6dc8	12/21/2023 9:37
BLK	0.000					-2dc57c8e:18c7d19aefa:-6f75	12/20/2023 12:53
BLK	0.000					-2dc57c8e:18c7d19aefa:-6f73	12/20/2023 13:16
BLK	0.000					-2dc57c8e:18c7d19aefa:-6f55	12/20/2023 19:08
BLK	0.000					-2dc57c8e:18c7d19aefa:-6f53	12/20/2023 19:32
BLK	0.000					-2dc57c8e:18c7d19aefa:-6df6	12/21/2023 0:37
BLK	0.000					-2dc57c8e:18c7d19aefa:-6df4	12/21/2023 1:01
BLK	-0.039					-2dc57c8e:18c7d19aefa:-6dda	12/21/2023 6:06
BLK	0.000					-2dc57c8e:18c7d19aefa:-6dd8	12/21/2023 6:30
BLK	0.000					-2dc57c8e:18c7d19aefa:-6cf7	12/21/2023 10:48
BLK	0.000					-2dc57c8e:18c7d19aefa:-6ce7	12/21/2023 13:56

Cl_2-Data 2 of 2

elementOne
e 41721-Cl_2

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41721 (15-28)

Date: 12/20/23 Column: IonPac AS14A Instrument: 8811858
Analyst: LW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# IC11 – 87.1
10mL Conc. Eluent Diluted to FV=1L with filtered UPDI
Batch name: 12/20/23-41721 Regenerant: 100mM H_3PO_4 Lot # IC11-104-2
Flow Rate: 1.0 mL/min. Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
1	0.0			GC	manual	R2	
2	0.1		Cl-	4308359	KICA	499788	
3	1.0						
4	3.0						
5	5.0						
6	10.0						
7	GC						
8	GC						
9	BLK						
10	BLK						
11	DL						
12	DL						
13	LRB						
14	LRB						
15	LRB+						
16	LRB+						
17	41721-15	Deeco	Cl2		—	5X	
18	-15	↓	↓		—	↓	
19	-17				—		
20	-17D				—		
21	-17+				5.057		
22	-17+D	↓	↓		5.065	↓	
23	GC						
24	GC						
25	BLK						

Manual integrations noted by M
Curve IC Lot # IC11-105-1 Sodium Thiosulfate Lot # IC11-73-4 Comments: pg 1 of 3
Spike 50 uL from 1000 ug/mL Std. to 10mL sample Lot #'s: **IC ME Solution** 230207A-250 bpl
QC: Spike 50 uL from 1000 ug/mL Br Std. to 10mL sample; lot #'s listed above.
Submitted for QC- Date: 12/21/23 Time: 3:28 By: LW QC Review- Date: _____ Time: _____ By: _____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41721 (15-28)

Date: 12/19/23 (20) Column: IonPac AS14A Instrument: 881/858

Analyst: WJ Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-87-1

10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Batch name: 121923-41721 (20) Regenerant: 100mM H_3PO_4 Lot # 1C11-104-2

Flow Rate: 1.0 mL/min. Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
26	BLK						
27	41721-16	Deeco	Cl2		—	5X	
28	-16D	↓	↓		—	↓	
29	-18				—		
30	-18D				—		
31	-19				—		
32	-19D				—		
33	-20				—		
34	-20D				—		
35	-21				—		
36	-21D	↓	↓		—	↓	
37	QC						
38	QC						
39	BLK						
40	BLK						
41	41721-22	Deeco	Cl2		—	5X	
42	-22D	↓	↓		—	↓	
43	-23				—		
44	-23D				—		
45	-23+				4.922		
46	-23+D				5.125		
47	-24				—		
48	-24D				—		
49	-25				—		
50	-25D	↓	↓		—	↓	

Manual integra

Curve IC Lot #_____ Sodium Thiosulfate Lot #_____ Comments: pg 2 of 3

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:_____

elementOne **IC Sample Sheet/Digestion Worksheet** **Lab ID #:** 41721 (15-28)

Date: 12.19.23 (20) Column: IonPac AS14A Instrument: 881/858

Analyst: LW Conc. Eluent: 8.0 mM Na_2CO_3/ 1.0mM $NaHCO_3$ Lot# 1C11-871

10mL Conc. Eluent Diluted to FV=1L with filtered UPDI

Batch name: 12.19.23 (20)-41721 Regenerant: 100mM H_3PO_4 Lot # 1C11-164-2

Flow Rate: 1.0 mL/min. Method: 26A NaOH

AS LOC.	Sample ID	Client	Analyte	Results (ug/mL)	Results (ug/mL)	Dilution	Wt (g) / FV (mL)
51	GC						
52	GC						
53	BLK						
54	BLK						
55	41721-26	Deeco	Cl_2		—	5X	
56	-26D	↓	↓		—	↓	
57	-27 FBON				—		
58	-27 FB ON D				—		
59	-28 FB OFF				—		
60	-28 FB OFF D	↓			—	↓	
61	100347 - GC				3.801	20X	TV=78.0
62	7 - GC		↓		3844	↓	
63	GC						
64	DL						
65	BLK						
66	0.1						
67	1.0						
68	30						
69	5.0						
70	10.0						
71	GC						
72	DL						
73	BLK						

Manual integra

Curve IC Lot #_____ Sodium Thiosulfate Lot #_____ Comments: Pg 30F3

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

Buzzi Unicem Maryneal TX Kiln 4 Main Stack Mill On Run 1 Date/Time	Kiln4: CLINKER_PROD (TNHR) Expression Value
11/29/2023 14:50	150.9
11/29/2023 14:51	150.9
11/29/2023 14:52	151.0
11/29/2023 14:53	150.9
11/29/2023 14:54	150.9
11/29/2023 14:55	150.9
11/29/2023 14:56	151.0
11/29/2023 14:57	150.9
11/29/2023 14:58	150.9
11/29/2023 14:59	150.9
11/29/2023 15:00	150.9
11/29/2023 15:01	150.9
11/29/2023 15:02	150.9
11/29/2023 15:03	150.9
11/29/2023 15:04	151.0
11/29/2023 15:05	150.9
11/29/2023 15:06	150.9
11/29/2023 15:07	150.9
11/29/2023 15:08	150.9
11/29/2023 15:09	150.9
11/29/2023 15:10	150.9
11/29/2023 15:11	151.0
11/29/2023 15:12	150.9
11/29/2023 15:13	150.9
11/29/2023 15:14	150.9
11/29/2023 15:15	150.9
11/29/2023 15:16	150.9
11/29/2023 15:17	150.8
11/29/2023 15:18	150.9
11/29/2023 15:19	150.9
11/29/2023 15:20	151.0
11/29/2023 15:21	150.9
11/29/2023 15:22	150.9
11/29/2023 15:23	150.9
11/29/2023 15:24	150.9
11/29/2023 15:25	150.9
11/29/2023 15:26	150.9
11/29/2023 15:27	150.9
11/29/2023 15:28	150.9
11/29/2023 15:29	150.9
11/29/2023 15:30	150.9
11/29/2023 15:31	150.9
11/29/2023 15:32	150.9
11/29/2023 15:33	150.9
11/29/2023 15:34	150.9
11/29/2023 15:35	150.9
11/29/2023 15:36	150.9
11/29/2023 15:37	151.0
11/29/2023 15:38	150.9
11/29/2023 15:39	150.9
11/29/2023 15:40	150.9
11/29/2023 15:41	150.9
11/29/2023 15:42	151.0
11/29/2023 15:43	150.9
11/29/2023 15:44	150.9
11/29/2023 15:45	150.9
11/29/2023 15:46	151.0
11/29/2023 15:47	150.9
11/29/2023 15:48	151.0
11/29/2023 15:49	150.9
11/29/2023 15:50	151.0
11/29/2023 15:51	150.9
11/29/2023 15:52	150.9
11/29/2023 15:53	150.9
11/29/2023 15:54	150.9
11/29/2023 15:55	150.9
11/29/2023 15:56	150.9
Average	**150.9**

Buzzi Unicem Maryneal TX Kiln 4 Main Stack Mill On Run 2 Date/Time	Kiln4: CLINKER_PROD (TNHR) Expression Value
11/30/2023 09:20	138.3
11/30/2023 09:21	138.4
11/30/2023 09:22	138.3
11/30/2023 09:23	138.2
11/30/2023 09:24	138.2
11/30/2023 09:25	138.3
11/30/2023 09:26	138.3
11/30/2023 09:27	138.2
11/30/2023 09:28	135.7
11/30/2023 09:29	135.0
11/30/2023 09:30	135.1
11/30/2023 09:31	135.2
11/30/2023 09:32	135.1
11/30/2023 09:33	135.2
11/30/2023 09:34	135.1
11/30/2023 09:35	135.2
11/30/2023 09:36	135.1
11/30/2023 09:37	135.0
11/30/2023 09:38	135.1
11/30/2023 09:39	135.2
11/30/2023 09:40	135.1
11/30/2023 09:41	135.1
11/30/2023 09:42	135.1
11/30/2023 09:43	135.1
11/30/2023 09:44	135.1
11/30/2023 09:45	135.1
11/30/2023 09:46	135.1
11/30/2023 09:47	135.1
11/30/2023 09:48	135.1
11/30/2023 09:49	135.1
11/30/2023 09:50	135.0
11/30/2023 09:51	135.1
11/30/2023 09:52	135.1
11/30/2023 09:53	135.1
11/30/2023 09:54	135.1
11/30/2023 09:55	135.2
11/30/2023 09:56	135.2
11/30/2023 09:57	135.0
11/30/2023 09:58	135.1
11/30/2023 09:59	135.1
11/30/2023 10:00	133.0
11/30/2023 10:01	128.9
11/30/2023 10:02	129.0
11/30/2023 10:03	128.9
11/30/2023 10:04	128.9
11/30/2023 10:05	128.9
11/30/2023 10:06	128.9
11/30/2023 10:07	128.9
11/30/2023 10:08	128.9
11/30/2023 10:09	128.9
11/30/2023 10:10	128.9
11/30/2023 10:11	129.0
11/30/2023 10:12	128.9
11/30/2023 10:13	128.9
11/30/2023 10:14	128.9
11/30/2023 10:15	128.9
11/30/2023 10:16	128.9
11/30/2023 10:17	128.9
11/30/2023 10:18	128.9
11/30/2023 10:19	128.9
11/30/2023 10:20	128.9
11/30/2023 10:21	128.9
11/30/2023 10:22	128.9
11/30/2023 10:23	128.9
11/30/2023 10:24	128.9
11/30/2023 10:25	128.9
11/30/2023 10:26	128.9
Average	**133.1**

Date/Time	Kiln4: CLINKER_PROD (TNHR) Expression Value
11/30/2023 10:45	129.0
11/30/2023 10:46	128.9
11/30/2023 10:47	128.9
11/30/2023 10:48	129.0
11/30/2023 10:49	128.9
11/30/2023 10:50	128.9
11/30/2023 10:51	128.9
11/30/2023 10:52	129.0
11/30/2023 10:53	128.9
11/30/2023 10:54	128.9
11/30/2023 10:55	129.0
11/30/2023 10:56	128.9
11/30/2023 10:57	128.9
11/30/2023 10:58	128.9
11/30/2023 10:59	128.9
11/30/2023 11:00	128.9
11/30/2023 11:01	128.9
11/30/2023 11:02	128.9
11/30/2023 11:03	128.9
11/30/2023 11:04	128.9
11/30/2023 11:05	128.9
11/30/2023 11:06	128.9
11/30/2023 11:07	128.9
11/30/2023 11:08	128.9
11/30/2023 11:09	128.9
11/30/2023 11:10	128.9
11/30/2023 11:11	129.0
11/30/2023 11:12	128.9
11/30/2023 11:13	128.9
11/30/2023 11:14	128.9
11/30/2023 11:15	128.9
11/30/2023 11:16	128.9
11/30/2023 11:17	129.0
11/30/2023 11:18	128.9
11/30/2023 11:19	132.0
11/30/2023 11:20	132.1
11/30/2023 11:21	132.0
11/30/2023 11:22	132.0
11/30/2023 11:23	131.9
11/30/2023 11:24	132.0
11/30/2023 11:25	132.0
11/30/2023 11:26	132.0
11/30/2023 11:27	132.0
11/30/2023 11:28	131.9
11/30/2023 11:29	131.9
11/30/2023 11:30	131.9
11/30/2023 11:31	132.1
11/30/2023 11:32	132.0
11/30/2023 11:33	131.9
11/30/2023 11:34	132.0
11/30/2023 11:35	132.1
11/30/2023 11:36	132.0
11/30/2023 11:37	132.0
11/30/2023 11:38	132.1
11/30/2023 11:39	132.0
11/30/2023 11:40	132.1
11/30/2023 11:41	131.9
11/30/2023 11:42	132.1
11/30/2023 11:43	131.9
11/30/2023 11:44	131.9
11/30/2023 11:45	132.1
11/30/2023 11:46	132.1
11/30/2023 11:47	131.9
11/30/2023 11:48	132.1
11/30/2023 11:49	132.0
11/30/2023 11:50	131.9
11/30/2023 11:51	132.0
Average	**130.4**

Buzzi Unicem Maryneal TX Kiln 4 Main Stack Mill On Run 3 Date/Time	Kiln4: CLINKER_PROD (TNHR) Expression Value
11/30/2023 10:45	129.0
11/30/2023 10:46	128.9
11/30/2023 10:47	128.9
11/30/2023 10:48	129.0
11/30/2023 10:49	128.9
11/30/2023 10:50	128.9
11/30/2023 10:51	128.9
11/30/2023 10:52	129.0
11/30/2023 10:53	128.9
11/30/2023 10:54	128.9
11/30/2023 10:55	129.0
11/30/2023 10:56	128.9
11/30/2023 10:57	128.9
11/30/2023 10:58	128.9
11/30/2023 10:59	128.9
11/30/2023 11:00	128.9
11/30/2023 11:01	128.9
11/30/2023 11:02	128.9
11/30/2023 11:03	128.9
11/30/2023 11:04	128.9
11/30/2023 11:05	128.9
11/30/2023 11:06	128.9
11/30/2023 11:07	128.9
11/30/2023 11:08	128.9
11/30/2023 11:09	128.9
11/30/2023 11:10	128.9
11/30/2023 11:11	129.0
11/30/2023 11:12	128.9
11/30/2023 11:13	128.9
11/30/2023 11:14	128.9
11/30/2023 11:15	128.9
11/30/2023 11:16	128.9
11/30/2023 11:17	129.0
11/30/2023 11:18	128.9
11/30/2023 11:19	132.0
11/30/2023 11:20	132.1
11/30/2023 11:21	132.0
11/30/2023 11:22	132.0
11/30/2023 11:23	131.9
11/30/2023 11:24	132.0
11/30/2023 11:25	132.0
11/30/2023 11:26	132.0
11/30/2023 11:27	132.0
11/30/2023 11:28	131.9
11/30/2023 11:29	131.9
11/30/2023 11:30	131.9
11/30/2023 11:31	132.1
11/30/2023 11:32	132.0
11/30/2023 11:33	131.9
11/30/2023 11:34	132.0
11/30/2023 11:35	132.1
11/30/2023 11:36	132.0
11/30/2023 11:37	132.0
11/30/2023 11:38	132.1
11/30/2023 11:39	132.0
11/30/2023 11:40	132.1
11/30/2023 11:41	131.9
11/30/2023 11:42	132.1
11/30/2023 11:43	131.9
11/30/2023 11:44	131.9
11/30/2023 11:45	132.1
11/30/2023 11:46	132.1
11/30/2023 11:47	131.9
11/30/2023 11:48	132.1
11/30/2023 11:49	132.0
11/30/2023 11:50	131.9
11/30/2023 11:51	132.0
Average	**130.4**

Buzzi Unicem Maryneal TX Kiln 4 Main Stack Mill Off Run 1 Date/Time	Kiln4: CLINKER_PROD (TNHR) Expression Value
11/30/2023 14:05	128.9
11/30/2023 14:06	129.0
11/30/2023 14:07	128.9
11/30/2023 14:08	128.9
11/30/2023 14:09	128.9
11/30/2023 14:10	128.9
11/30/2023 14:11	129.0
11/30/2023 14:12	128.8
11/30/2023 14:13	128.9
11/30/2023 14:14	128.9
11/30/2023 14:15	128.8
11/30/2023 14:16	128.9
11/30/2023 14:17	128.9
11/30/2023 14:18	128.9
11/30/2023 14:19	128.9
11/30/2023 14:20	128.9
11/30/2023 14:21	128.9
11/30/2023 14:22	129.0
11/30/2023 14:23	128.9
11/30/2023 14:24	128.9
11/30/2023 14:25	128.9
11/30/2023 14:26	128.9
11/30/2023 14:27	128.9
11/30/2023 14:28	128.9
11/30/2023 14:29	128.9
11/30/2023 14:30	128.9
11/30/2023 14:31	129.0
11/30/2023 14:32	129.0
11/30/2023 14:33	129.0
11/30/2023 14:34	128.9
11/30/2023 14:35	128.9
11/30/2023 14:36	129.0
11/30/2023 14:37	128.9
11/30/2023 14:38	129.0
11/30/2023 14:39	128.9
11/30/2023 14:40	128.9
11/30/2023 14:41	128.9
11/30/2023 14:42	128.9
11/30/2023 14:43	128.9
11/30/2023 14:44	128.9
11/30/2023 14:45	128.9
11/30/2023 14:46	129.0
11/30/2023 14:47	128.9
11/30/2023 14:48	128.9
11/30/2023 14:49	128.9
11/30/2023 14:50	129.0
11/30/2023 14:51	128.9
11/30/2023 14:52	129.0
11/30/2023 14:53	129.0
11/30/2023 14:54	128.9
11/30/2023 14:55	128.9
11/30/2023 14:56	128.9
11/30/2023 14:57	128.9
11/30/2023 14:58	128.9
11/30/2023 14:59	129.0
11/30/2023 15:00	128.9
11/30/2023 15:01	128.9
11/30/2023 15:02	128.9
11/30/2023 15:03	128.9
11/30/2023 15:04	128.9
11/30/2023 15:05	128.9
11/30/2023 15:06	128.9
11/30/2023 15:07	128.9
11/30/2023 15:08	129.0
11/30/2023 15:09	128.9
11/30/2023 15:10	128.9
11/30/2023 15:11	128.9
Average	**128.9**

Buzzi Unicem Maryneal TX Kiln 4 Main Stack Mill Off Run 2 Date/Time	Kiln4: CLINKER_PROD (TNHR) Expression Value
11/30/2023 15:39	129.0
11/30/2023 15:40	128.9
11/30/2023 15:41	128.9
11/30/2023 15:42	128.9
11/30/2023 15:43	128.9
11/30/2023 15:44	128.9
11/30/2023 15:45	128.9
11/30/2023 15:46	128.9
11/30/2023 15:47	128.9
11/30/2023 15:48	129.0
11/30/2023 15:49	128.9
11/30/2023 15:50	129.0
11/30/2023 15:51	128.9
11/30/2023 15:52	128.9
11/30/2023 15:53	128.9
11/30/2023 15:54	128.9
11/30/2023 15:55	128.9
11/30/2023 15:56	128.9
11/30/2023 15:57	128.9
11/30/2023 15:58	128.9
11/30/2023 15:59	129.0
11/30/2023 16:00	128.9
11/30/2023 16:01	128.9
11/30/2023 16:02	129.0
11/30/2023 16:03	128.9
11/30/2023 16:04	128.9
11/30/2023 16:05	128.9
11/30/2023 16:06	129.0
11/30/2023 16:07	128.9
11/30/2023 16:08	129.0
11/30/2023 16:09	128.9
11/30/2023 16:10	128.9
11/30/2023 16:11	129.0
11/30/2023 16:12	128.9
11/30/2023 16:13	128.9
11/30/2023 16:14	128.9
11/30/2023 16:15	128.9
11/30/2023 16:16	128.9
11/30/2023 16:17	129.0
11/30/2023 16:18	128.9
11/30/2023 16:19	129.0
11/30/2023 16:20	128.9
11/30/2023 16:21	128.9
11/30/2023 16:22	128.9
11/30/2023 16:23	128.9
11/30/2023 16:24	129.0
11/30/2023 16:25	128.9
11/30/2023 16:26	128.9
11/30/2023 16:27	128.9
11/30/2023 16:28	128.9
11/30/2023 16:29	128.9
11/30/2023 16:30	129.0
11/30/2023 16:31	128.9
11/30/2023 16:32	129.0
11/30/2023 16:33	129.0
11/30/2023 16:34	128.9
11/30/2023 16:35	129.0
11/30/2023 16:36	128.9
11/30/2023 16:37	128.9
11/30/2023 16:38	128.9
11/30/2023 16:39	129.0
11/30/2023 16:40	129.0
11/30/2023 16:41	128.9
11/30/2023 16:42	128.9
11/30/2023 16:43	128.9
11/30/2023 16:44	128.9
11/30/2023 16:45	128.9
Average	**128.9**

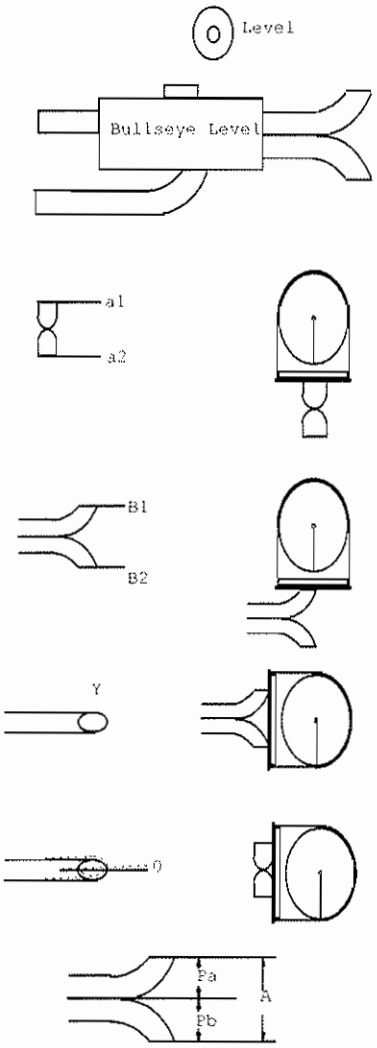
Buzzi Unicem Maryneal TX Kiln 4 Main Stack Mill Off Run 3 Date/Time	Kiln4: CLINKER_PROD (TNHR) Expression Value
11/30/2023 17:25	128.9
11/30/2023 17:26	128.9
11/30/2023 17:27	128.9
11/30/2023 17:28	128.9
11/30/2023 17:29	128.9
11/30/2023 17:30	128.9
11/30/2023 17:31	128.9
11/30/2023 17:32	128.9
11/30/2023 17:33	128.9
11/30/2023 17:34	128.9
11/30/2023 17:35	129.0
11/30/2023 17:36	128.9
11/30/2023 17:37	128.9
11/30/2023 17:38	128.9
11/30/2023 17:39	129.0
11/30/2023 17:40	128.9
11/30/2023 17:41	128.9
11/30/2023 17:42	129.0
11/30/2023 17:43	128.9
11/30/2023 17:44	128.9
11/30/2023 17:45	128.9
11/30/2023 17:46	129.0
11/30/2023 17:47	128.9
11/30/2023 17:48	129.0
11/30/2023 17:49	129.0
11/30/2023 17:50	129.0
11/30/2023 17:51	129.0
11/30/2023 17:52	128.9
11/30/2023 17:53	128.9
11/30/2023 17:54	129.0
11/30/2023 17:55	128.9
11/30/2023 17:56	128.9
11/30/2023 17:57	128.9
11/30/2023 17:58	128.9
11/30/2023 17:59	128.9
11/30/2023 18:00	128.9
11/30/2023 18:01	129.0
11/30/2023 18:02	128.9
11/30/2023 18:03	128.9
11/30/2023 18:04	128.9
11/30/2023 18:05	128.9
11/30/2023 18:06	129.0
11/30/2023 18:07	128.9
11/30/2023 18:08	128.9
11/30/2023 18:09	129.0
11/30/2023 18:10	128.9
11/30/2023 18:11	128.9
11/30/2023 18:12	128.9
11/30/2023 18:13	128.9
11/30/2023 18:14	128.9
11/30/2023 18:15	128.9
11/30/2023 18:16	128.9
11/30/2023 18:17	128.9
11/30/2023 18:18	128.9
11/30/2023 18:19	129.0
11/30/2023 18:20	128.9
11/30/2023 18:21	128.9
11/30/2023 18:22	128.9
11/30/2023 18:23	129.0
11/30/2023 18:24	128.9
11/30/2023 18:25	128.9
11/30/2023 18:26	128.9
11/30/2023 18:27	129.0
11/30/2023 18:28	128.9
11/30/2023 18:29	128.9
11/30/2023 18:30	128.9
11/30/2023 18:31	128.9
Average	**128.9**

Appendix E

Calibration Documents

Probe or Pitot No:	5A

Pitot Tube Inspection Sheet



Date	01/03/23
Tube Assembly Level?	Yes
Ports Damaged?	No
-10 deg < a1 < +10 deg	2
-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)	0.951
Z = A (sin y) < 0.125"?	yes
W = A (sin 0) < 0.031"?	yes
Pa =	0.475
Pb =	0.476
Tube Diameter (Dt) =	0.376
Pa = Pb +- 0.063"?	yes
(1.05 x Dt)?	0.3948
(1.50 x Dt)?	0.564
(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	01/03/23
Barometeric Pressure?	29.52	Ambient Temperature?	68

Source	Reference Temp, F	Thermocouple Temp, F	Absolute Temp Difference
cold air	37	38	-0.20%
medium air	215	215	0.00%
hot air	325	325	0.00%

Windtunnel Calibration

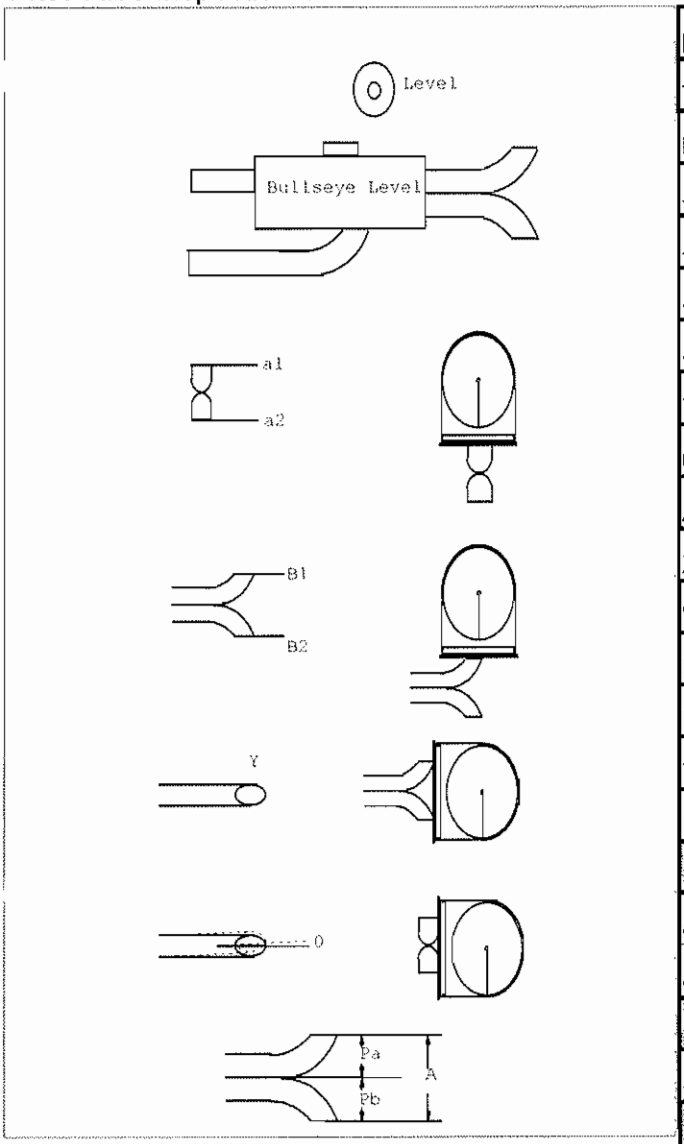
Pitot Reading	Reference (0.99)	5A S-Type Pitot	Cp
ΔP_1	0.31	0.44	0.84
ΔP_2	0.31	0.43	0.85
ΔP_3	0.31	0.43	0.85
		Average Pitot Tube Calibration Factor--->	**0.85**

Thermocouple Calibration Check (EPA ALT-011 Procedure), performed on 1/3/23

Source	Ref. Temp. F	Thermocouple Temp. F	± 2 deg F?
Ambient	68	66.9	Yes

Probe or Pitot No: **5B**

Pitot Tube Inspection Sheet



Date	01/03/23
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)	0.94
Z = A (sin y) < 0.125"?	yes
W = A (sin 0) < 0.031"?	yes
Pa =	0.47
Pb =	0.47
Tube Diameter (Dt) =	0.376
Pa = Pb +- 0.063"?	yes
(1.05 x Dt)?	0.3948
(1.50 x Dt)?	0.564
(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	01/03/23
Barometeric Pressure?	29.52	Ambient Temperature?	69.9

Source	Reference Temp, F	Thermocouple Temp, F	Absolute Temp Difference
cold air	37	38	-0.20%
medium air	215	215	0.00%
hot air	325	324	0.13%

Windtunnel Calibration

Pitot Reading	Reference (0.99)	5B 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 1/3/23

Source	Ref. Temp. F	Thermocouple Temp. F	± 2 deg F?
Ambient	69.9	69.4	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: 12/28/21 | METER SERIAL #: M5-15 | BAROMETRIC PRESSURE (in Hg): INITIAL 30.03, FINAL 30.03, AVG (P_{bar}) 30.03

METER PART #: M5-15 | CRITICAL ORIFICE SET SERIAL #: 14315

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) 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	353.924	359.213	5.289	75	62	65	62	62	62.75	10.00	0.8	5.3733	5.3168	0.989		1.62
	2	0.4094	18	359.213	364.553	5.340	76	65	66	62	63	64	10.00	0.8	5.4122	5.3119	0.981		1.62
	3					0.000						0							
																AVG =	0.985	1.09	
19	1	0.5047	18	364.553	371.213	6.660	76	66	70	63	65	66	10.00	1.3	6.7325	6.5483	0.973		1.72
	2	0.5047	18	371.213	377.910	6.697	76	70	72	65	66	68.25	10.00	1.3	6.7411	6.5483	0.971		1.72
	3					0.000						0							
																AVG =	0.972	-0.29	
23	1	0.6426	18	377.910	386.465	8.555	77	70	74	66	68	69.5	10.00	2.1	8.6078	8.3298	0.968		1.71
	2	0.6426	18	386.465	395.066	8.601	77	74	75	68	69	71.5	10.00	2.1	8.6215	8.3298	0.966		1.71
	3					0.000						0							
																AVG =	0.967	-0.81	
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 = 0.975

AVERAGE $\Delta H_@$ = 1.68

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H \div 13.6)}{Tm}$$

= 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

Potentiometer Check, °F (per manufacturer procedure)

0	@ 0 F
496	@ 500 F
1000	@ 1000 F

Avg Absolute Difference = 0.1%

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.

				INITIAL	FINAL	AVG (P_{bar})
DATE:	12_8_22	METER SERIAL #:	M5-21	BAROMETRIC PRESSURE (in Hg):	29.99	29.99	29.99
METER PART #:	M5-21	CRITICAL ORIFICE SET SERIAL #:	14315				

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) 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	58.501	63.745	5.244	67	69	69	69	69	69	10.00	0.86	5.2584	5.3499	1.017		1.69
	2	0.4094	18	63.811	69.109	5.298	67	69	70	69	69	69.25	10.00	0.86	5.3100	5.3499	1.008		1.69
	3					0.000						0							
																AVG =	1.012	2.83	
19	1	0.5047	18	69.109	75.825	6.716	68	70	71	69	70	70	10.00	1.3	6.7289	6.5890	0.979		1.69
	2	0.5047	18	75.825	82.595	6.770	67	70	72	69	70	70.25	10.00	1.3	6.7798	6.5953	0.973		1.68
	3					0.000						0							
																AVG =	0.976	-0.87	
23	1	0.6426	18	82.595	91.263	8.668	67	70	74	69	70	70.75	10.00	2.1	8.6894	8.3973	0.966		1.68
	2	0.6426	18	91.263	99.971	8.708	67	72	76	70	70	72	10.00	2.1	8.7089	8.3973	0.964		1.68
	3					0.000						0							
																AVG =	0.965	-1.96	
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 = 0.985

AVERAGE $\Delta H_@$ = 1.69

(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

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

Avg Absolute Difference = 0.1%

Company: **Buzzi Unicem; Maryneal TX**
Source: **Main Stack; Raw Mill Off**
Job ID: **23-3315**
Train Type: **EPA Method 26A**

Alt-009 Alternate Post Test Calibration Data

	5A 11/30/23 1405-1511	5B 11/30/23 1405-1511	6A 30-Nov-23 1539-1645	6B 30-Nov-23 1539-1645	7A 30-Nov-23 1725-1831	7B 30-Nov-23 1725-1831	M5-15 Averages	M5-21 Averages
Vm	44.671	43.937	45.804	44.587	45.736	45.342		
Tm	538	542.3	538.1	541.3	538.1	542.3		
Pb	27.43	27.43	27.43	27.43	27.43	27.43		
Havg	1.48	1.46	1.51	1.51	1.52	1.54		
H@	1.68	1.69	1.68	1.69	1.68	1.69		
Md	31.3	31.3	31.26	31.26	31.248	31.248		
(Havg)^0.5	1.2135534	1.20637998	1.22591897	1.22591897	1.22999959	1.23974091		
Run Time, Min	60	60	60	60	60	60		
Calculated Gamma (Yqa)	0.956	0.967	0.942	0.968	0.947	0.963	0.948	0.966
Meter Gamma	0.975	0.985	0.975	0.985	0.975	0.985	0.975	0.985
% difference from Actual Y	1.99%	1.85%	3.37%	1.75%	2.89%	2.19%	2.75%	1.93%

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:	E04NI77E15A3796	Reference Number:	122-401833216-1
Cylinder Number:	EB0066680	Cylinder Volume:	151.1 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22020	Valve Outlet:	590
Gas Code:	CO,CO2,O2,BALN	Certification Date:	Jun 23, 2020

Expiration Date: Jun 23, 2028

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	63.68 PPM	G1	+/- 0.5% NIST Traceable	06/23/2020
CARBON DIOXIDE	10.00 %	10.01 %	G1	+/- 0.6% NIST Traceable	06/22/2020
OXYGEN	12.00 %	11.82 %	G1	+/- 0.9% NIST Traceable	06/22/2020
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	13060638	CC414571	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 14, 2025
NTRM	98051109	SG9168283BAL	9.507 % OXYGEN/NITROGEN	+/- 0.7%	Oct 06, 2021

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	May 28, 2020
Horiba VIA510 CO 1G46EA07	Nondispersive Infrared (NDIR)	Jun 18, 2020
Horiba MPA510 O2 41499150042	Paramagnetic	May 28, 2020

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				

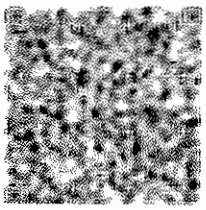
CALIBRATION STANDARDS

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: 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		

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CERTIFICATE OF ACCURACY: *GMACS-c Calibration Standard*

"SAY LABORATORY

CUSTOMER INFORMATION

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

Work Order #: 160-402845895-1
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	199.1 PPM	5.7 PPM	2.9 %
Sulfur Hexafluoride	10.0 PPM	0.07 PPM	0.7 %
Nitrogen	Balance		

CYLINDER #:	CC768233	AIRGAS PART #:	X03NI99C15AC0Y6
CYLINDER TYPE:	150A Aluminum	CERTIFICATION DATE:	8-Sep-2023
CGA:	350 SS	EXPIRATION DATE:	8-Mar-2024
CYLINDER PRESSURE:	2000 psig	MIXTURE DEW POINT:	N/A

CERTIFICATION DATA

BLENDING PROCESS: GravStat™ Gravimetry

COMPONENT	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
Hydrogen Cyanide	200.40 PPM	3.0 PPM	1.5 %
lfur Hexafluoride	10.01 PPM	0.07 PPM	0.7 %

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

COMPONENT	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
Hydrogen Cyanide	197.9 PPM	4.9 PPM	2.5 %

REFERENCE STANDARD: GMPS-c 200 PPM Hydrogen Cyanide
CYLINDER NUMBER: CC768217
EXPIRATION DATE: 2/27/2024

COMPONENT	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
Hydrogen Cyanide	197.1 PPM	4.8 PPM	2.4 %

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:	200.40 PPM	3.0 PPM	1.5 %
ANALYSIS RESULT:	197.9 PPM	4.9 PPM	2.5 %
INTERLOCK RESULT:	199.1 PPM	5.7 PPM	2.9 %

COMMENTS / 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

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an Air Liquide company

CERTIFICATE OF ACCURACY: *GMACS-c Calibration Standard*

ASSAY 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	AIRGAS PART #:	X03NI99C15AC0W8
CYLINDER TYPE:	150A Aluminum	CERTIFICATION DATE:	7-Sep-2023
CGA:	350 SS	EXPIRATION DATE:	7-Mar-2024
CYLINDER PRESSURE:	2000 psig	MIXTURE DEW POINT:	N/A

CERTIFICATION DATA

BLENDING PROCESS: GravStat™ Gravimetry

COMPONENT	CONCENTRATION	UNCERTAINTY (Abs)	UNCERTAINTY (Rel)
Hydrogen Cyanide	50.02 PPM	0.9 PPM	1.8 %
lfur 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 %

COMMENTS / 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

Client: Buzzi Maryneal TX
Test Location: Main Stack; Stratification Check
Date: Nov 29, 2023 Start Time: 14:50:05
Run number 1
One Minute Averages

	Reference O2 %,dry	Plant O2 %,dry
2:51:03 PM	10.8	11.5
2:52:03 PM	10.7	11.4
2:53:03 PM	10.8	11.4
2:54:03 PM	10.8	11.4
2:55:03 PM	10.8	11.5
2:56:03 PM	10.7	11.5
Point A	10.8	11.4
2:57:03 PM	10.8	11.5
2:58:03 PM	10.8	11.5
2:59:03 PM	10.8	11.4
3:00:03 PM	10.8	11.5
3:01:03 PM	10.8	11.4
3:02:03 PM	10.8	11.5
Point B	10.8	11.5
3:03:03 PM	10.8	11.5
3:04:03 PM	10.8	11.4
3:05:03 PM	10.8	11.4
3:06:03 PM	10.8	11.5
3:07:03 PM	10.8	11.3
3:08:03 PM	10.8	11.4
Point C	10.8	11.4
Average	10.8	11.4

Date/Time	Kiln4: O2 (PCT) Raw Value
11/29/2023 14:50	11.45
11/29/2023 14:51	11.43
11/29/2023 14:52	11.42
11/29/2023 14:53	11.40
11/29/2023 14:54	11.45
11/29/2023 14:55	11.45
11/29/2023 14:56	11.47
11/29/2023 14:57	11.50
11/29/2023 14:58	11.36
11/29/2023 14:59	11.45
11/29/2023 15:00	11.40
11/29/2023 15:01	11.53
11/29/2023 15:02	11.48
11/29/2023 15:03	11.40
11/29/2023 15:04	11.43
11/29/2023 15:05	11.50
11/29/2023 15:06	11.31
11/29/2023 15:07	11.42

Buzzi Unicem, Maryneal TX
Main Stack
Pretest

Spectrum	Date	Time	HCN PCA 191c R1 191c	SF6 (10) 191C	Ethylene (100,3000) 191C	HF ppm (10) 191C	SNR 2500	sBeam @ 2500
SPC__000830BKG.LAB	11/14/23	06:57:22.688	0.000	0.000	0.000	0.000	NaN	1.41
SPC__000831.LAB	11/14/23	06:58:33.020	-0.004	-0.001	-0.037	0.011	6779.16	1.42
SPC__000832BKG.LAB	11/14/23	07:01:13.650	0.000	0.000	0.000	0.000	5353.34	1.42
SPC__000833.LAB	11/14/23	07:02:24.028	-0.064	0.003	-0.062	0.018	5553.53	1.42
SPC__000834.LAB	11/14/23	07:03:28.036	-0.154	-0.000	0.013	0.007	4837.84	1.42
SPC__000835.LAB	11/14/23	07:04:32.104	0.035	0.001	-0.014	0.003	5479.59	1.42
SPC__000836BKG.LAB	11/14/23	07:07:39.052	0.000	0.000	0.000	0.000	5734.58	1.42
SPC__000837.LAB	11/14/23	07:08:49.639	-0.051	-0.001	-0.019	-0.002	6223.51	1.42
SPC__000838.LAB	11/14/23	07:09:53.338	-0.032	-0.003	0.027	-0.000	5809.30	1.42
SPC__000839.LAB	11/14/23	07:10:57.234	0.046	-0.000	-0.014	-0.017	3759.60	1.42
SPC__000840.LAB	11/14/23	07:12:01.138	-0.011	-0.001	-0.102	0.016	4373.66	1.42
SPC__000841.LAB	11/14/23	07:13:05.164	0.080	-0.001	-0.068	0.002	5347.95	1.42
SPC__000842.LAB	11/14/23	07:14:08.941	0.059	-0.001	-0.051	-0.012	5012.46	1.42
SPC__000843.LAB	11/14/23	07:15:12.843	-0.029	-0.002	-0.084	-0.006	4706.13	1.42
	Standard Deviation x 3		**0.156**	**0.002**		**0.032**		
		Averages					**5033.23**	**1.42**
SPC__003144.LAB	11/29/23	10:07:23.437	-0.070	-0.009	73.818	0.009	3771.37	1.25
SPC__003145.LAB	11/29/23	10:08:27.783	-0.180	-0.008	74.579	0.010	4602.22	1.25
SPC__003146.LAB	11/29/23	10:09:31.168	-0.255	-0.011	74.391	0.004	3362.83	1.25
SPC__003147.LAB	11/29/23	10:10:35.067	-0.286	-0.016	74.456	-0.005	3721.81	1.25
Ethylene Calibration Transfer Standard (CC426155; 75.47 ppm)					**74.475**			
SPC__003163.LAB	11/29/23	10:32:14.551	195.980	9.583	-0.647	-0.007	NaN	1.25
SPC__003164.LAB	11/29/23	10:33:18.264	196.278	9.585	-0.465	-0.017	4782.81	1.25
SPC__003165.LAB	11/29/23	10:34:22.223	196.975	9.583	-0.523	-0.015	5254.76	1.25
SPC__003166.LAB	11/29/23	10:35:26.094	197.038	9.580	-0.445	-0.014	5634.48	1.25
SPC__003167.LAB	11/29/23	10:36:30.150	197.342	9.580	-0.500	-0.009	5809.63	1.25
HCN Standard (CC768233; 199.1 ppm HCN/10.0 ppm SF6)			**196.908**	**9.582**				
SPC__003172.LAB	11/29/23	10:41:49.573	49.888	4.852	-0.442	-0.014	4728.10	1.25
SPC__003173.LAB	11/29/23	10:42:53.522	49.909	4.847	-0.380	-0.005	4092.51	1.25
SPC__003174.LAB	11/29/23	10:43:57.490	49.927	4.851	-0.391	-0.016	3563.85	1.25
SPC__003175.LAB	11/29/23	10:45:01.307	49.815	4.849	-0.423	-0.020	4533.18	1.25
SPC__003176.LAB	11/29/23	10:46:05.212	49.899	4.848	-0.380	-0.004	3854.17	1.25
HCN Standard (CC768222; 49.9 ppm HCN/5.0 ppm SF6)			**49.887**	**4.849**				

Analysis Validation Report

Sample Filename: F:\Maryneal\November 29\SPC__003269.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
HCN (200) PCA 191C 191C	8.65	0.38	-	0.28	0.34	0.46	0.46	-	0.17	-	-	0-200	-	Good
HF PPM (10) 191C	-0.06	0.25	0.05	0.04	0.07	0.45	0.45	0.07	0.22	0.02	0.02	0-10	-	Close to DL
SF6 (10) 191C	-0.01	0.02	-	0	0	0.02	0.02	-	0.01	-	-	0-10	-	Check it!
ETHYLENE (100,3000) 191C	2.92	1.79	0.33	0.17	0.29	3.11	3.11	1.08	1.55	0.75	0.11	0-3000	-	Close to DL
H2O% (40) 191C	13.76	0.17	-	0.01	0.02	0.33	0.33	-	0.28	-	-	0-40	-	Good
CO2% (40) 191C	13.46	0.18	-	0.01	0.02	0.25	0.25	-	0.27	-	-	0-40	-	Good
HCL PPM (100) 191C	1.23	0.58	0.05	0.15	0.28	1.05	1.05	0.06	0.41	0.01	0.02	0-100	-	Check it!
SO2 (1000) 191C	12.1	1.13	0.37	0.14	0.27	2.17	2.17	0.79	0.82	0.42	0.12	0-1000	-	Good
NO (350,3000) 191C	129.08	4.15	0.22	0.26	0.35	5.69	5.69	0.45	2.62	0.23	0.07	0-3000	-	Good
NH3 (300) 191C (1OF2)	1.04	1.33	0.03	0.12	0.2	2.25	2.25	0.15	1.19	0.11	0.01	0-300	-	Check it!
CO (500) 191C (1OF2)	161.72	4.99	-	0.2	0.43	10.18	10.18	-	3.23	-	-	0-500	-	Good
CO% (1) 191C (2OF2)	0.02	0	0	0	0	0	0	0	0	0	0	0-1	-	Good
FORMALDEHYDE (70) 191C	5.44	1.09	0.28	0.2	0.24	1.32	1.32	0.33	0.75	0.04	0.09	0-70	-	Good
ACETALDEHYDE (1000) 191C	2.22	2.41	0.23	0.35	0.38	2.63	2.63	0.59	2	0.35	0.08	0-1000	-	Close to DL
CH4 (250) 191C (1OF2)	4.96	1.19	0.05	0.26	0.7	3.15	3.15	0.06	0.8	0.01	0.02	0-250	-	Good
PROPANE (100) 191C	1.17	0.75	0.42	0.12	0.14	0.89	0.89	0.72	0.72	0.3	0.14	0-100	-	Close to DL
HBR (100) 180C	-0.19	4.9	0.17	0.68	1.39	9.96	9.96	0.19	4.24	0.02	0.06	0-100	-	Close to DL
NO2 (150) 191C (1OF2)	-0.1	0.34	0.04	0.02	0.03	0.35	0.35	0.05	0.31	0.01	0.01	0-150	-	Close to DL
NO2 (2000) 191C (2OF2)	-0.16	5	2.03	0.88	1.12	6.36	6.36	3.81	4.15	1.78	0.68	0-2000	-	Close to DL
N2O (100,200,300) 191C	0.31	0.17	0.05	0.04	0.05	0.19	0.19	0.07	0.12	0.02	0.02	0-300	-	Close to DL
NH3 (3000) 191C (2OF2)	2.21	12.94	0.35	1.19	2.25	24.41	24.41	0.44	11.91	0.09	0.12	0-3000	-	Close to DL
CH4 (3000) 191C (2OF2)	4.45	7.43	0.34	1.1	1.81	12.24	12.24	0.61	6.25	0.27	0.11	0-3000	-	Check it!
ACETYLENE (1000) 191C	0.62	1.89	0.15	0.31	0.37	2.29	2.29	0.21	1.58	0.06	0.05	0-1000	-	Close to DL
PROPYLENE (200,1000) 191C	1.78	4.28	0.19	0.43	0.5	5.01	5.01	0.49	3.81	0.3	0.06	0-1000	-	Close to DL
COS (100) 150C	0.61	0.17	0.02	0.02	0.02	0.23	0.23	0.02	0.14	0	0.01	0-100	-	Check it!
ETHANE (500) 191C	1.17	1.22	0.32	0.2	0.22	1.36	1.36	0.54	1	0.22	0.11	0-500	-	Close to DL
H2SO4 (50) 150C	0.02	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	0.8	0.48	0.14	0.14	0.16	0.55	0.55	0.17	0.33	0.03	0.05	0-10	-	Close to DL
SO3 (150) 191C	-3.51	0.38	0.7	0.03	0.04	0.41	0.41	1.14	1.14	0.44	0.23	0-150	-	Close to DL

Analysis Validation Report

Sample Filename: F:\Maryneal\November 29\SPC__003270.LAB

Filename for noise: F:\Midlothian on Rental\November 14\SPC__000837.LAB
Interferences Filenames: C:\Midlothian on Rental\November 15\SPC__001463.LAB
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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
HCN (200) PCA 191C 191C	8.64	0.47	-	0.28	0.34	0.57	0.57	-	0.18	-	-	0-200	-	Good
HF PPM (10) 191C	-0.02	0.24	0.05	0.04	0.07	0.43	0.43	0.07	0.21	0.02	0.02	0-10	-	Close to DL
SF6 (10) 191C	-0.01	0.02	-	0	0	0.02	0.02	-	0.02	-	-	0-10	-	Check it!
ETHYLENE (100,3000) 191C	2.89	1.8	0.33	0.17	0.29	3.14	3.14	1.08	1.57	0.75	0.11	0-3000	-	Close to DL
H2O% (40) 191C	13.67	0.17	-	0.01	0.02	0.33	0.33	-	0.27	-	-	0-40	-	Good
CO2% (40) 191C	13.62	0.19	-	0.01	0.02	0.26	0.26	-	0.27	-	-	0-40	-	Good
HCL PPM (100) 191C	1.13	0.52	0.05	0.15	0.28	0.96	0.96	0.06	0.36	0.01	0.02	0-100	-	Check it!
SO2 (1000) 191C	10.37	1.13	0.37	0.14	0.27	2.18	2.18	0.79	0.81	0.42	0.12	0-1000	-	Good
NO (350,3000) 191C	135.44	4.2	0.22	0.26	0.35	5.76	5.76	0.45	2.75	0.23	0.07	0-3000	-	Good
NH3 (300) 191C (1OF2)	1.07	1.36	0.03	0.12	0.2	2.3	2.3	0.15	1.21	0.11	0.01	0-300	-	Check it!
CO (500) 191C (1OF2)	168.94	5.15	-	0.2	0.43	10.49	10.49	-	3.38	-	-	0-500	-	Good
CO% (1) 191C (2OF2)	0.02	0	0	0	0	0	0	0	0	0	0	0-1	-	Good
FORMALDEHYDE (70) 191C	5.24	1.09	0.28	0.2	0.24	1.32	1.32	0.33	0.76	0.04	0.09	0-70	-	Good
ACETALDEHYDE (1000) 191C	2.21	2.41	0.23	0.35	0.38	2.62	2.62	0.59	2	0.35	0.08	0-1000	-	Close to DL
CH4 (250) 191C (1OF2)	4.83	1.19	0.05	0.26	0.7	3.14	3.14	0.06	0.8	0.01	0.02	0-250	-	Good
PROPANE (100) 191C	1.2	0.74	0.42	0.12	0.14	0.88	0.88	0.72	0.72	0.3	0.14	0-100	-	Close to DL
HBR (100) 180C	-0.02	4.99	0.17	0.68	1.39	10.15	10.15	0.19	4.34	0.02	0.06	0-100	-	Close to DL
NO2 (150) 191C (1OF2)	-0.09	0.34	0.04	0.02	0.03	0.35	0.35	0.05	0.31	0.01	0.01	0-150	-	Close to DL
NO2 (2000) 191C (2OF2)	-0.1	4.94	2.03	0.88	1.12	6.29	6.29	3.81	4.09	1.78	0.68	0-2000	-	Close to DL
N2O (100,200,300) 191C	0.33	0.17	0.05	0.04	0.05	0.2	0.2	0.07	0.13	0.02	0.02	0-300	-	Close to DL
NH3 (3000) 191C (2OF2)	1.62	12.96	0.35	1.19	2.25	24.45	24.45	0.44	11.94	0.09	0.12	0-3000	-	Close to DL
CH4 (3000) 191C (2OF2)	4.36	7.55	0.34	1.1	1.81	12.43	12.43	0.61	6.36	0.27	0.11	0-3000	-	Check it!
ACETYLENE (1000) 191C	0.54	1.9	0.15	0.31	0.37	2.3	2.3	0.21	1.6	0.06	0.05	0-1000	-	Close to DL
PROPYLENE (200,1000) 191C	1.51	4.33	0.19	0.43	0.5	5.08	5.08	0.49	3.87	0.3	0.06	0-1000	-	Close to DL
COS (100) 150C	0.61	0.17	0.02	0.02	0.02	0.23	0.23	0.02	0.14	0	0.01	0-100	-	Check it!
ETHANE (500) 191C	1.24	1.21	0.32	0.2	0.22	1.36	1.36	0.54	0.99	0.22	0.11	0-500	-	Close to DL
H2SO4 (50) 150C	0.02	0.15	0.04	0.05	0.05	0.17	0.17	0.29	0.29	0.25	0.01	0-50	-	Close to DL
MEOH (10) 191C	0.78	0.47	0.14	0.14	0.16	0.54	0.54	0.17	0.33	0.03	0.05	0-10	-	Close to DL
SO3 (150) 191C	-3.51	0.38	0.7	0.03	0.04	0.41	0.41	1.14	1.14	0.44	0.23	0-150	-	Close to DL

Calibration Generated: 3:08 PM 12/29/2023

Gas ID: HCN (200) PCA 191C 191c

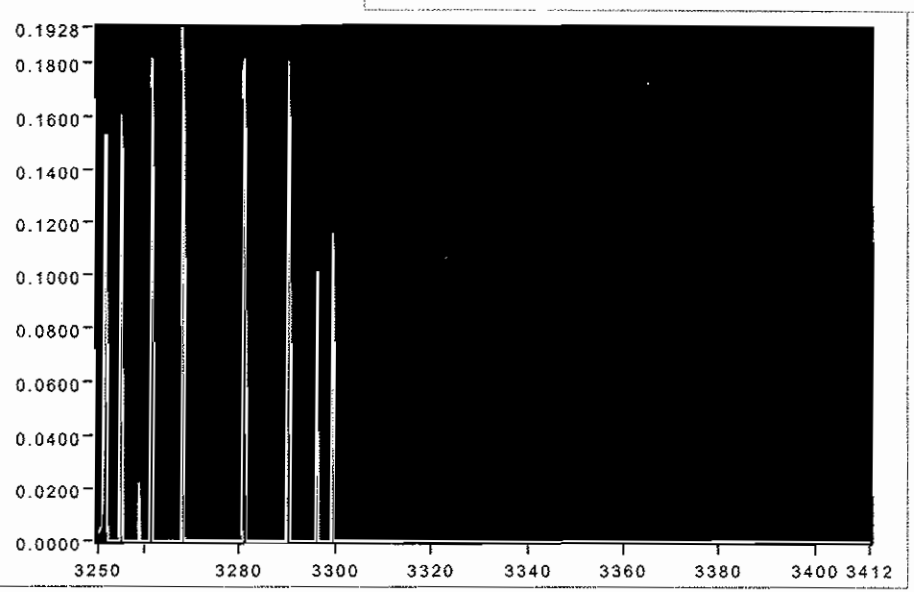
LRF Path: C:\OLT\Methods R3\Cement-coal-EGU method 191C\HCN (200) PCA 191C 191c_18.lrf

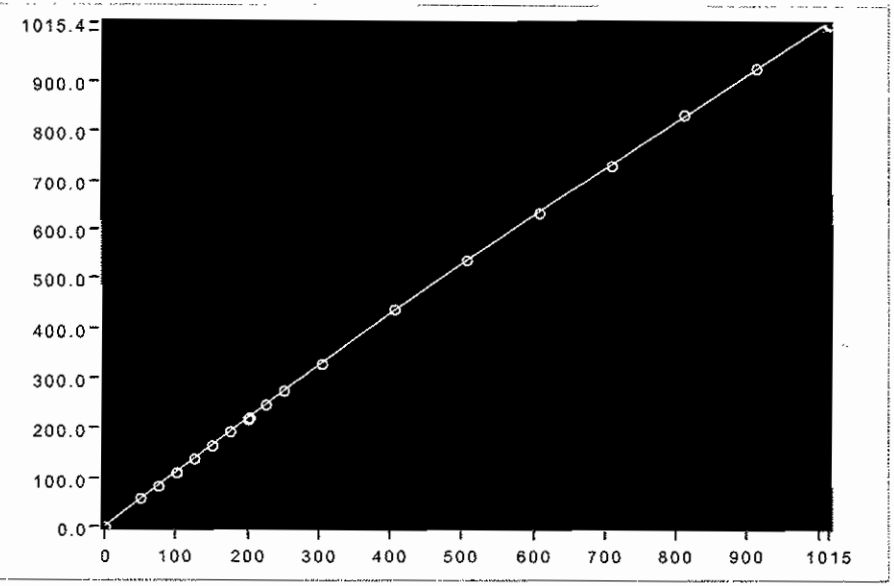
Lo Alarm: NaN

Hi Alarm: NaN

Span: Offse ,00000

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	58.224
HCN (200) PCA 191C (14.79ppm, 5.11	191.194	0.977	75.577	75.505	82.698
HCN (200) PCA 191C (19.72ppm, 5.11	191.202	0.977	100.769	100.670	109.924
HCN (200) PCA 191C (19.87ppm, 5.11	191.196	0.978	101.536	101.566	110.865
HCN (200) PCA 191C (24.65ppm, 5.11	191.204	0.977	125.962	125.832	138.998
HCN (200) PCA 191C (29.58ppm, 5.11	191.209	0.977	151.154	150.999	165.056
HCN (200) PCA 191C (34.51ppm, 5.11	191.225	0.977	176.346	176.168	193.807
HCN (200) PCA 191C (39.44ppm, 5.11	191.217	0.977	201.538	201.349	218.561
HCN (200) PCA 191C (39.74ppm, 5.11	191.194	0.978	203.071	203.055	221.567
HCN (200) PCA 191C (44.37ppm, 5.11	191.203	0.977	226.731	226.500	246.999
HCN (200) PCA 191C (49.30ppm, 5.11	191.199	0.977	251.923	251.691	274.819
HCN (200) PCA 191C (59.61ppm, 5.11	191.221	0.978	304.607	304.577	328.275
HCN (200) PCA 191C (79.48ppm, 5.11	191.195	0.977	406.143	405.954	437.656
HCN (200) PCA 191C (99.35ppm, 5.11	191.258	0.977	507.679	507.181	537.974
HCN (200) PCA 191C (119.22ppm, 5.11	191.209	0.977	609.214	608.643	634.405
HCN (200) PCA 191C (139.09ppm, 5.11	191.246	0.977	710.750	709.953	733.320
HCN (200) PCA 191C (158.96ppm, 5.11	191.263	0.977	812.286	811.364	836.755
HCN (200) PCA 191C (178.83ppm, 5.11	191.221	0.977	913.821	913.339	928.309
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	:22 AM 06/26/2012	Gas ID	HF ppm (10) 191C	Lo Alarm	NaN	Span	Offse J0000
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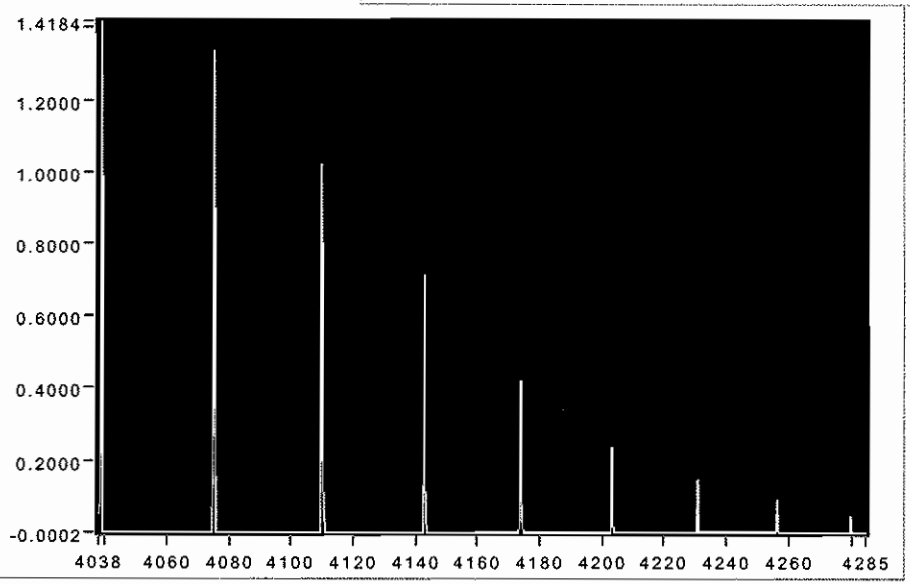

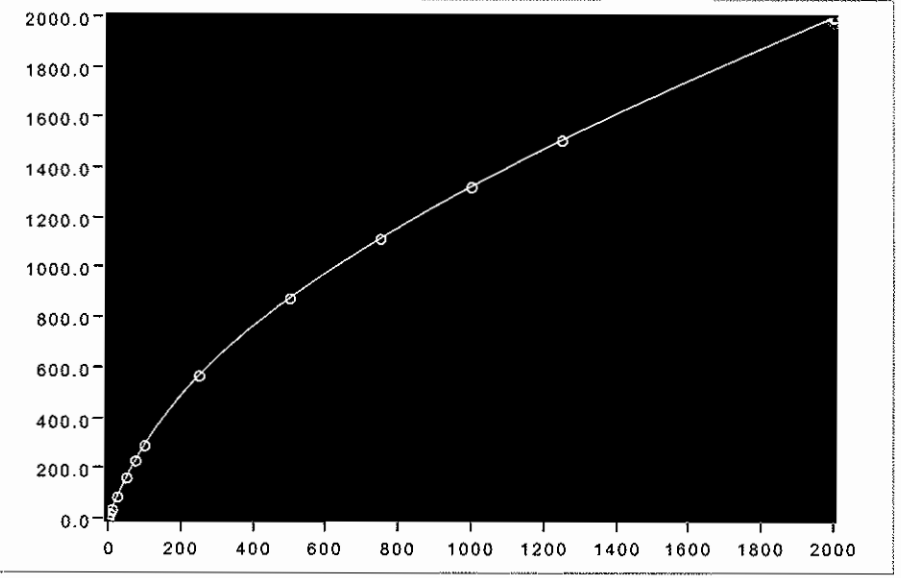

Cal Spectra	Temp (C)	Pres (atm)	Conc (ppm-m)	Actual	Calc'd
HF 96 MNB-fz 1ppm-m (1ppm, 1.000m,	191.000	1.000	1.000	1.000	3.620
HF 96 MNB-fz 5ppm-m (5ppm, 1.000m,	191.000	1.000	5.000	5.000	17.914
HF 96 MNB-fz 10ppm-m (10ppm, 1.000m	191.000	1.000	10.000	10.000	35.375
HF 96 MNB-fz 25ppm-m (25ppm, 1.000r	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: ☒

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 Generated: .2:50 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

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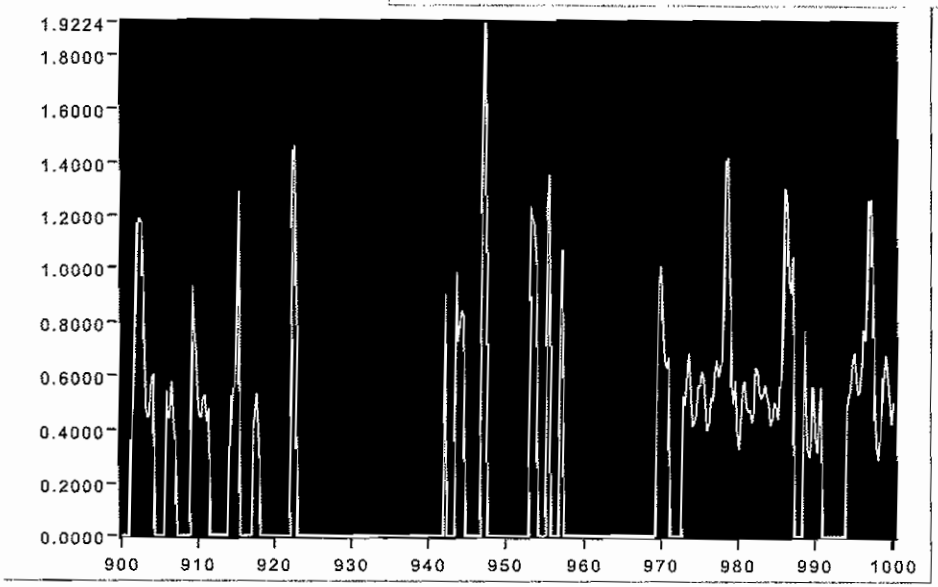
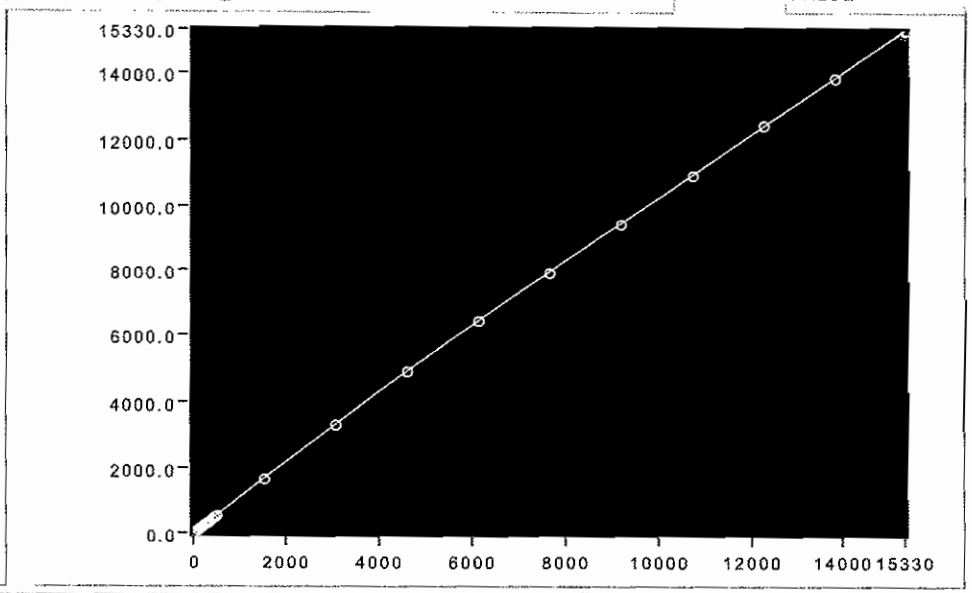
Hi Alarm: NaN

Span: Offse[illegible] J00000

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: [illegible]:34 PM 07/09/2012

Gas ID: SF6 (10) 191C

LRF Path: C:\OLT\Methods R3\Cement-coal-EGU method 191C\SF6 (10) 191C_0.lrf

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Hi Alarm: NaN

Span: [illegible]

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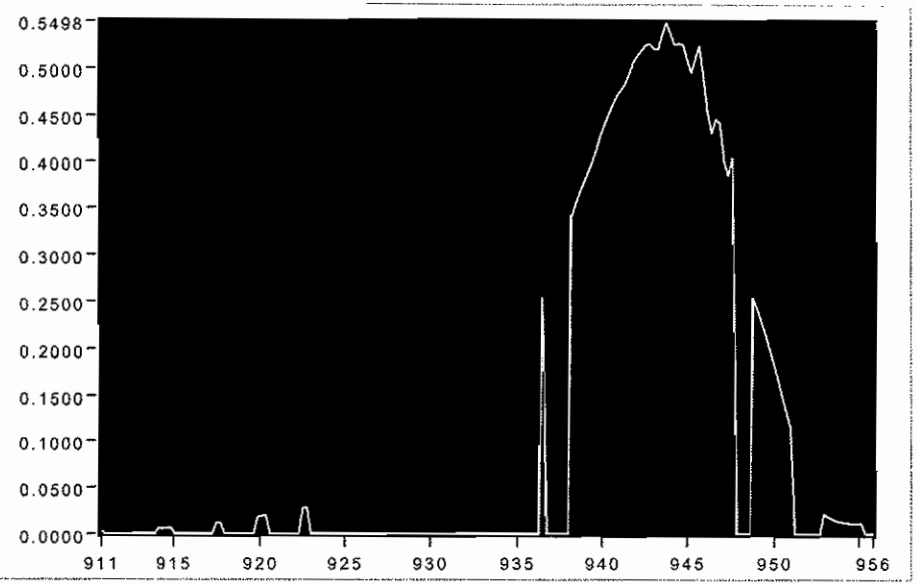
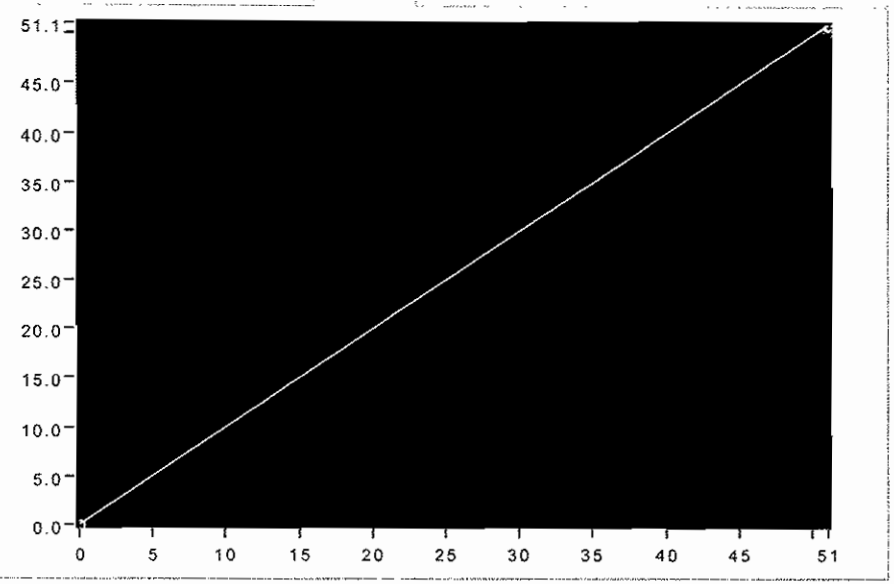
Mutations: FALSE





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
Lee Harris	Sample Recovery Technician
Gage Mayer	Sampling Technician
Antonio Pineda	Buzzi 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 Buzzi Unicem USA, Inc. Maryneal Cement Plant 202 CR 306 Maryneal, TX 79535

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

October 10, 2023

Copy # 1

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LIST OF TABLES

LIST OF FIGURES

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 are included in the RTR 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

Buzzi Unicem USA, Inc.
Maryneal Cement Plant
202 CR 306
Maryneal, TX 79535

Antonio Pineda
Office: 610-882-5038
Mobile: 610-704-3592
E-Mail Antonio.Pineda@buzziunicemusa.com

1.3 PROCESS OF INTEREST

Maryneal is a 1.1 million ton per year rated cement pyro-processing system. The plant operates one dry-process rotary kiln (Kiln #4) that has a preheater/precalciner (PH/PC). It consists of a ThyssenKrupp Industrial Solution PREPOL AS Calciner. An in-line raw mill provides kiln feed to the system. The gases from the kiln process exhaust out of a main kiln stack.

1.4 AIR POLLUTION CONTROL EQUIPMENT

The Maryneal facility kiln has a Selective Non-Catalytic Reduction System (SNCR) for NOx control, a Dry Sorbent Injection (DSI) system for acid gas control, and a baghouse to control particulate matter (PM).

1.5 EMISSION POINTS AND SAMPLING LOCATIONS

The Kiln Stack will be the only location sampled for the RTR program. Details of this sampling location are provided in Section 4.

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 5.

1.7 EXPECTED TEST DATES

The test is currently scheduled for the week of November 27, 2023. A detailed test schedule is provided in Table 3-1.

1.8 TEST PROGRAM ORGANIZATION

The test program organizational chart is presented in Figure 1.1.

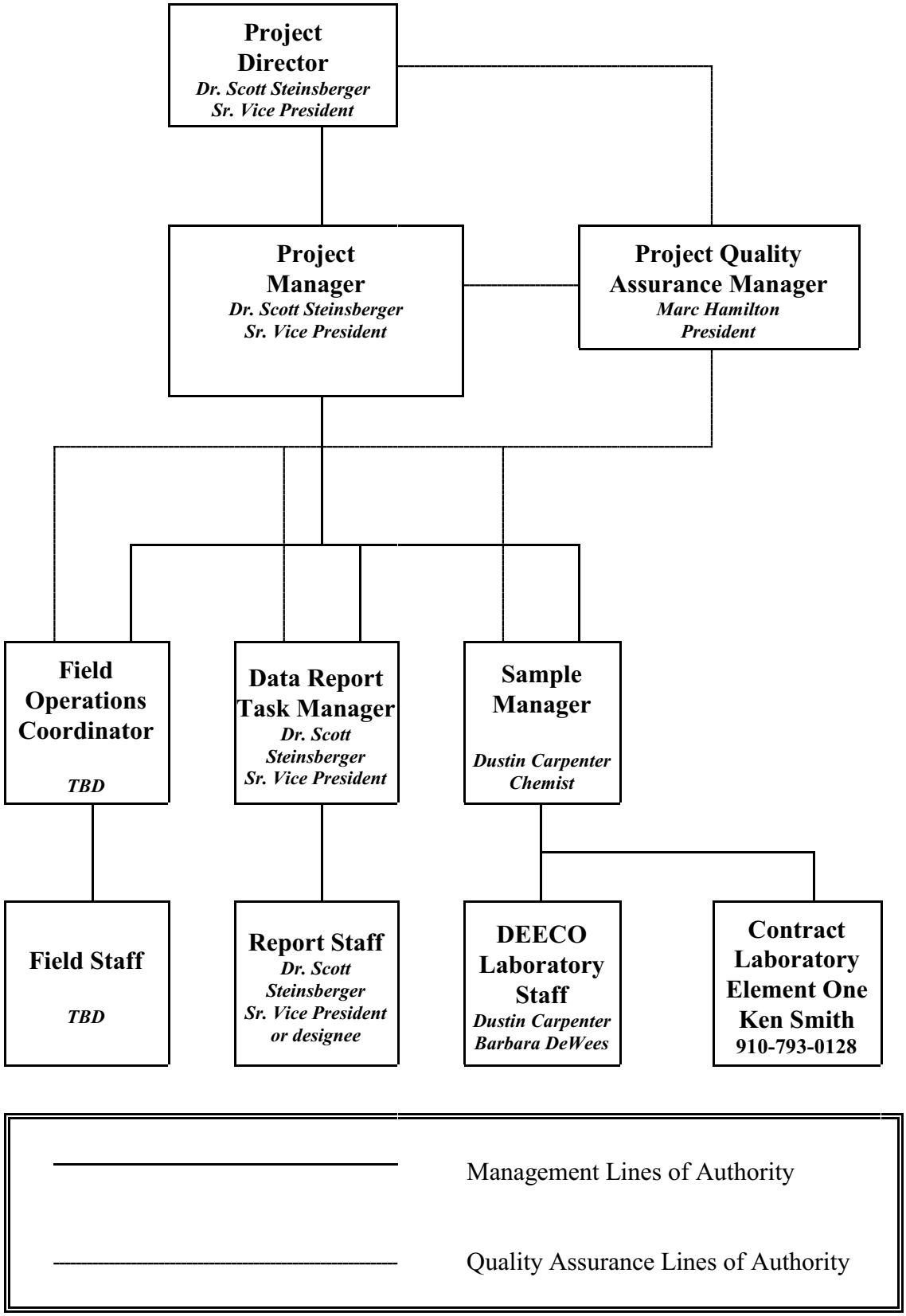


Figure 1.1 Organizational Chart

2.0 SOURCE DESCRIPTION

2.1 PROCESS DESCRIPTION

Buzzi Unicem's Maryneal plant operates one dry-process, rotary kiln with a preheater/precalciner (PH/PC) to produce portland cement at their facility in Maryneal, TX.

Kiln feed is introduced at the top of the kiln's preheater tower, while fuel is introduced at the burning zone or discharge end of the rotary kiln. Fuel is also introduced at the calciner burner located toward the bottom of the preheater tower. Natural gas and petroleum coke are used as the fuels in the production process. Exhaust gases from the kiln are drafted into a common duct with an induced-draft fan and ultimately vent to a baghouse.

The raw mill at the facility is an in-line mill (as defined in 40 CFR 63.1341) since a portion of the exhaust gases from the kiln system is used for processing raw materials in the mill. In the mill, raw materials are combined and ground. Kiln exhaust gas is used to dry the materials during grinding, which provides for greater fuel efficiency in the kiln system. Prepared feed is can either be stored in silos or directly fed to the kiln system.

In addition to the main baghouse and stack, exhaust gases from the clinker cooling process vent to three clinker cooler baghouses. Two of the clinker cooler baghouses vent to a combined common stack and the other to a single exhaust stack.

Stack gases from the kiln system are mainly composed of combustion products, carbon dioxide from calcination, excess air, and particulate matter. To remove the PM, exhaust gases from the kiln are routed through a fabric filter dust collector (i.e., the main baghouse. Once cleaned, the exhaust gases from the baghouse discharge to the atmosphere through a single exhaust stack.

2.2 CONTROL EQUIPMENT DESCRIPTION

Airflows from the kiln are routed through a fabric filter dust collection (i.e., the main baghouse). Once cleaned, the exhaust gases from the baghouse discharge to the atmosphere through a single exhaust stack. The system uses lime injection and SNCR for additional emissions control.

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

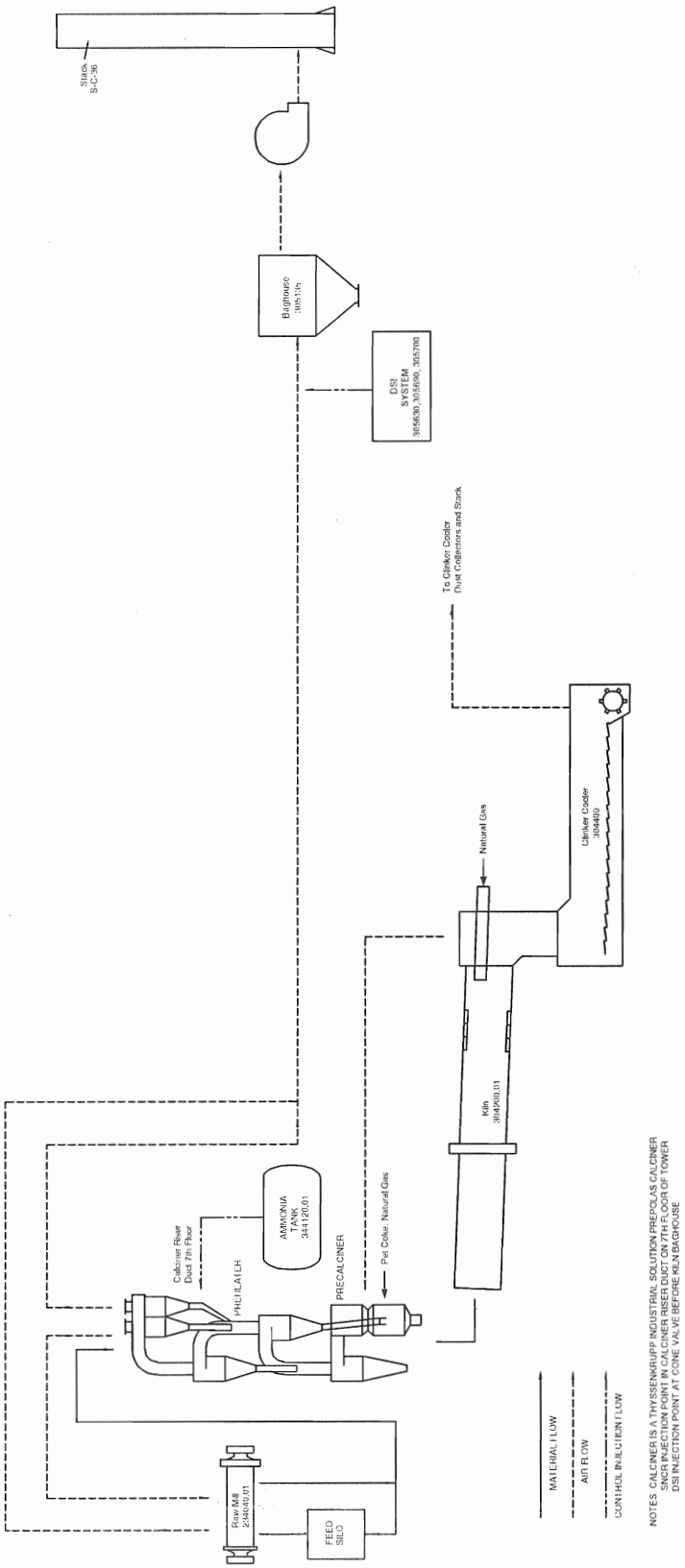


Figure 2.1 Maryneal Process Schematic

3.0 TEST PROGRAM

3.1 OBJECTIVES

An air emissions sampling and analytical program will be conducted on the Kiln Stack at the Buzzi Unicem USA Inc. cement facility located in Maryneal TX. 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 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.

Testing will be conducted under representative process and control system operating conditions. This facility has an inline raw mill and testing will be performed while operating in the "Mill On" and "Mill Off" conditions.

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 FOR BUZZI UNICEM USA, INC, MARYNEAL TX

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 (Raw Mill On or Off, depending on production)						
Stack	3	O_2/CO_2	EPA Method 3A	60	Paramagnetic (O2) NDIR (CO2)	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 (Raw Mill On or Off, depending on production)						
Stack	3	O_2/CO_2	EPA Method 3A	60	Paramagnetic (O2) NDIR (CO2)	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 4 Contingency Day/Demobilization						

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

3.3 TEST COORDINATION

Mr. Antonio Pineda, Corporate Environmental Engineer, 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.

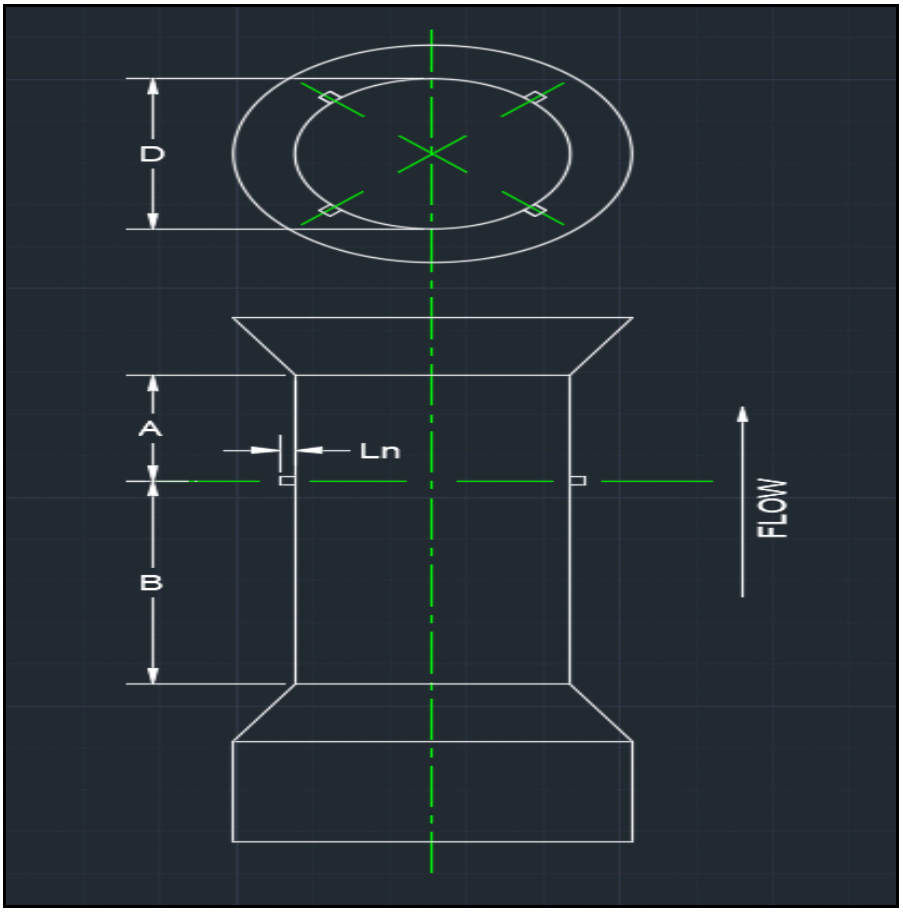
4.0 SAMPLING LOCATION DESCRIPTIONS

4.1 SAMPLING LOCATION DESCRIPTION

The measurement site for the Kiln Stack is located in a vertically-oriented round duct. The duct has an inside diameter of 141.25". The nearest upstream disturbance is a duct breaching (from the ID fan) located about 579 inches (~4.1 diameters) from the sampling ports. The nearest downstream disturbance is the stack outlet at about1893 inches (~13.4 diameters) from the sampling ports.

This sampling location meets the minimum specifications for selection of a measurement site as outlined in EPA Method 1. Four (4) test ports are located at equidistant positions (every 90°) around the duct. A schematic of the stack sampling location is shown in Figure 4.1. 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 Stack test location.

For the Kiln Stack, a total of 24 velocity/isokinetic traverse points will be used, with six points on each of the four ports. An S-type pitot tube is used in accordance with EPA Method 2 to measure the flue gas velocity. Gas temperatures are measured using calibrated Type K thermocouples and digital readout devices. These measurements are performed in accordance with the procedures in EPA Methods 2, 5, and 26A .



Stack Diameter (D) = 141.25”
Distance to nearest upstream disturbance (A) = 579”, 4.1 Duct Diameters
Distance to nearest downstream disturbance (B) = 1893”, 13.4 Duct Diameters
Sampling Ports Available = 4
Ports Diameter = 6”
Length of ports Ln = 6.25”

Figure 4.1 Schematic of Kiln 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, a fourth empty 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 (2^{nd} 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 1^{st} knockout, H_2SO_4 impingers, and 2^{nd} 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.

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.

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 2°F 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 ± 5.4°F. 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 ≤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.