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1.0 INTRODUCTION

1.1 Identification, Location and Dates of Tests

Environmental Stack Testing (EST) was retained by St. Marys Cement (SMC) to conduct an air emissions compliance test designed to quantify the concentration of tetra-, penta-, hexa-, hepta-, and octa-chlorinated dibenzo dioxins and furans (D&F) and particulate matter (PM) associated with the in-line kiln and raw mill stacks (SVMAIN and SVBYPASS stacks) at their facility located in Charlevoix, Michigan.

1.2 Purpose of Testing

The compliance test was conducted by SMC to satisfy the dioxin and furan (D&F) testing requirements described in the Michigan Department of Environmental Quality (MDEQ) Renewable Operating Permit (ROP) MI-ROP-B1559-2008 and the specifications contained in Title 40 CFR 63, Subpart LLL, "*National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry*". The compliance test results have been used to establish the temperatures associated with the kiln and raw mill particulate matter control devices, determine the appropriate dioxin and furan concentration limit of § 63.1343(b)(3) for the in-line kiln and raw mill, and demonstrate compliance with the appropriate D&F concentration limit.

The PM testing was performed to determine compliance with Michigan Renewable Operating Permit MI-ROP-B1559-2008.

1.3 Project Contact Information

Location	Contact
Test Facility	Mr. Cortney Schmidt 231-237-1342 ckschmidt@vcsmc.com
Test Company Representative	Mr. Pat Gillespie 616-361-6785 Environmentalstacktesting@gmail.com
State Representative	Mr. Jeremy Howe 231-876-4416 Howej1@michigan.gov
State Representative	Mr. Rob Dickman 231-876-4412 dickmanr@michigan.gov

2.0 SUMMARY OF RESULTS

The following table presents a summary of the D&F test results, with all D&F sample contents based upon the maximum sample TEQ values reported by the laboratory.

Dioxin and Furan Concentrations (ng TEQ/dscm and gr/dscf)

Test No. and Date	Average Inlet Temperature to the Control Device[1] (°F)	Sample Volume (dscm)	Test Sample D&F TEQ[2] (ng)	D&F Emission Concentration (ng TEQ/dscm and gr/dscf @ 7% O_2)	D&F Permit Limits (ng TEQ/dscm and gr/dscf @ 7% O_2)
SVMAIN Stack, Raw Mill Online					
No. 1 4-22-2014	238.2	3.639	0.0148	0.006/2.5E-12	NA
No. 2 4-22-2014	234.4	3.938	0.0203	0.007/3.1E-12	NA
No. 3 4-22-2014	231.2	3.590	0.0157	0.007/2.9E-12	NA
Averages	234.6	3.722	0.0169	0.007/2.8E-12	0.40/1.7E-10
SVBYPASS Stack, Raw Mill Online					
No. 1 4-22-2014	331.6	2.016	0.018	0.229/9.7E-11	NA
No. 2 4-22-2014	359.9	2.635	0.019	0.076/3.2E-11	NA
No. 3 4-22-2014	347.0	2.591	0.0209	0.097/4.1E-11	NA
Averages	346.2	2.414	0.0193	0.134/5.7E-11	0.40/1.7E-10
SVMAIN Stack, Raw Mill Off-Line					
No. 1 4-23-2014	381.9	2.538	0.102	0.08/3.3E-11	NA
No. 2 4/23/2014	372.8	3.077	0.116	0.08/3.5E-11	NA
No. 3 4-25-2014	365.7	3.053	0.171	0.11/4.8E-11	NA
Averages	373.5	2.889	0.130	0.09/3.9E-11	0.40/1.7E-10

dscm: dry standard cubic meters of sample volume
TEQ: Toxic Equivalency
Ng: nanograms
Gr/dscf: grains per dry standard cubic foot

(1) These temperatures are based upon the run average temperatures of the one-minute average values calculated during each of the test runs

(2) These TEQs are believed to be conservative, as they are based upon the maximum sample TEQ values reported by Maxxam Analytics International Corporation. The maximum TEQ values assume that individual dioxin and furan cogeners not detected in the samples are present at sample specific detection limits or maximum concentrations.

The following table presents a summary the PM test results:

Summary of Particulate Matter Emission Rates, Raw Mill Online

Source	Emission Rate Lbs/hr	Kiln Feed Rate Ton/hr	Emission Rate Lbs/Ton of dry feed	Allowable Limit Lbs/Ton of dry feed
SVMAIN				
Run 1	57.395	309.38	0.19	NA
Run 2	15.226	282.42	0.05	NA
Run 3	9.520	301.23	0.03	NA
Average	27.380	297.68	0.09	NA
SVBYPASS				
Run 1	2.054	309.38	0.007	NA
Run 2	0.803	282.42	0.003	NA
Run 3	1.550	301.23	0.005	NA
Average	1.469	297.68	0.005	NA
Combined Total	28.849	297.68	0.095	0.30

A minimum volume of 30 dry standard cubic feet (dscf) of stack gas was collected as specified in 40 CFR part 60 Subpart F *"Standards of Performance for Portland Cement Plants"* section 60.64 *"Test Methods and Procedures"*.

Please See Table 1 through Table 5 for detailed results of the sampling and analytical results.

3.0 DESCRIPTION OF SOURCES

The facility is based upon a dry process operation and acquires shale and limestone materials from a nearby quarry, as well as other locations, and purchases mill scale, slag, fly ash, bauxite, sand, iron ore, and gypsum.

SMC prepares the raw materials through pyro-processing that takes place in a kiln and raw mill (in-line kiln/raw mill). The raw materials are dried in the raw mill by recirculated gas from the kiln system. The materials are fed through a preheater/precalciner countercurrent to the hot gas stream from the flash furnace. After passing through the kiln, the raw materials are in the form of a clinker, which is milled with other constituents to form Portland cement.

The raw material conversion process area, referred to as the in-line kiln/raw mill, contains two process stacks identified as the SVMAIN and SVBYPASS stacks. Two baghouses control the particulate matter generated from the process operations.

4.0 REFERENCE TEST METHOD PROCEDURES

As required by the performance testing procedures of § 63.1349, the test program focused on two operating scenarios: 1) the kiln and raw mill both in operation and 2) the kiln in operation and raw mill off-line. Therefore, the test program consisted of triplicate SVMAIN and SVBYPASS test runs conducted simultaneously with the raw mill in operation, and triplicate SVMAIN test runs with the raw mill off-line.

The SVMAIN and SVBYPASS stack D&F concentrations were determined by applying the appropriate promulgated U.S. EPA Test Methods, as contained in Appendix A of 40 CFR 60. The following is a list of the test methods used during the performance test.

4.1 Traverse Points

U.S. EPA Method 1- *Sample and Velocity Traverses for Stationary Sources* was used to determine the minimum number of sampling points and to establish their locations within each exhaust duct. In applying Method 1, it is necessary to determine the distances between the test ports and the last flow disturbance prior to the test ports (B), and the distance between the test ports and the first flow disturbance following the test ports (A). By convention, these distances are typically divided by the stack diameter and expressed as duct diameters (D).

4.2 Stack Gas Velocity, Flow Rate, and Temperature

All exhaust stack gas velocity and temperature measurements were conducted in accordance with U.S. EPA Method 2 - *Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)* by measuring the delta P at each of the pre-determined traverse points using an S-type pitot tube connected to an appropriately sized inclined water column manometer and exhaust gas temperature with a "Type K" thermocouple.

4.3 Molecular Weight

The molecular weight was determined in accordance with U.S. EPA Method 3A *Determination of Oxygen and Carbon Dioxide Concentration in Emissions from Stationary Sources (Instrumental Analyzer Procedure)* The flue gas O_2 and CO_2 values were determined using a non-dispersive infrared (NDIR) analyzer to measure the absorption of specific wavelengths of infrared radiation (IR). While the exhaust gas is analyzed, the IR detector signal is processed and sent to a display on located on the analyzer. Once the exhaust gas values associated with each sample reached a constant level on the instrument, they were recorded and used to determine the average O_2 and CO_2 concentrations for each test run. Prior to testing the exhaust gas the analyzer was calibrated with the appropriate U.S. EPA Protocol 1 span gases.

4.4 Moisture Content

The stack gas moisture content was determined in accordance with U.S. EPA Method 4 *Determination of Moisture in Stack Gases* in conjunction with the U.S. EPA Method 5 and 23 sampling apparatuses. To determine the moisture content, stack gas was passed through a series of impingers, starting with a water knock-out followed by two impingers containing 100 milliliters of de-ionized water, another water knock-out, and a silica gel impinger. The impingers were contained in an ice bath to assure condensation of the flue gas stream moisture. After each test, the amount of water vapor collected was measured and used to calculate the percent moisture in the stack gas.

4.5 Particulate Matter

Particulate samples were withdrawn isokinetically from the source following the guidelines of U.S. EPA Method 5, *Determination of Particulate Emissions From Stationary Sources.* The sampling train consisted of a glass nozzle, a heated glass lined probe, a heated 83 mm glass fiber filter, a series of chilled impingers, and a metering console. The particulate samples were collected in the nozzle, probe and filters. At the conclusion of each test run, the filter was removed from the filter holder, visually inspected and placed into a separate petri dish, and the front half of the filter holder was rinsed with acetone into a separate sample bottle. Acetone and filter blanks were collected during the times that particulate testing occurred. At the laboratory, U.S. EPA Method 5 analytical procedures were used to analyze the samples for filterable particulate. The acetone rinses were evaporated and desiccated to dryness and the residue weighed to determine the amount of particulate collected. The filters were also desiccated to remove the uncombined water and then weighed to determine the amount of collected particulate. The filter catch and acetone rinses are reported as milligrams of filterable particulate, which is used to calculate an emission rate in pounds per hour (Lb/hr) which is then converted to pounds per ton of dry feed (Lbs/ton of dry feed).

4.6 DIOXIN AND FURAN

All D&F samples were obtained through the use of U.S. EPA Method 23 – *Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurns from Stationary Sources.* The Method 23 sample apparatus consists of a sample nozzle, heated sample probe equipped with an "S" type Pitot tube and temperature sensor, heated particulate filter, chilled water condenser, sorbent module, an impinger condenser system and a metering system.

After assembling the sample apparatus as discussed above, the D&F testing was conducted according to the procedures Method 23 and Subpart LLL, § 63.1349(b)(3). The sampling apparatus was operated as described in Section 4.1.5 of Method 23 (which is equivalent to Section 4.1.5 of Method 5).

As required by Subpart LLL, each test run was at least 180 minutes in duration and a minimum sample gas volume of 90 dscf (2.5 dscm) except for Run 1 of the SVBYPASS with the raw mill up. Mr. Jeremy Howe of the MDEQ was notified that EST did not collect the correct amount of gas volume however, the test was ran for 240 minutes. EST adjusting the testing to ensure the correct amount of gas volume was collected after Run 1.

Prior to initiating the sampling process, EST coordinated the testing activities with St. Marys personnel and verified that the process was operating near its normal operating capacity (approximately 300 ton/hour kiln feed rate).

The following is a brief summary of the sample recovery methods employed after each test run was complete. As the accuracy of Method 23 is highly dependent upon proper sample recovery and the careful prevention of sample contamination, the following methods were strictly followed.

1. As soon as the probe was removed from the stack test port, it was sealed with Teflon tape or / aluminum foil and the test port was sealed. When the probe had cooled down, all external particulate matter near the tip of the probe was wiped off. The probe was then removed from the sampling apparatus and both ends were sealed off with aluminum foil. The inlet to the sampling apparatus was also sealed off with Teflon tape, a ground glass cap, or aluminum foil.

2. The probe and impinger assembly was transferred to the cleanup area in the sampling trailer for recovery. Prior to and during the disassembly of the sampling apparatus, the various apparatus components were inspected for abnormal conditions such as broken filters or colored impinger liquid.

3. The following is a description of the procedures used to recover the D&F sample from the sampling apparatus for subsequent laboratory analysis at Maxxam Analytics International Corporation (Maxxam):

    a) Container 1 – This container was used for the glass fiber filter. The filter was extracted from the holder using a clean pair of tweezers and placed in the container. After the filter had been transferred, the container was carefully sealed and labeled.

    b) Adsorbent Module – The module was removed from the sampling apparatus, tightly capped at both ends, labeled, covered with aluminum foil, and stored in either a refrigerator or iced cooler for later transport to Maxxam.

    c) Container 2 – The material deposited in the nozzle, probe and the front half of the filter holder was quantitatively recovered by brushing while rinsing three times with acetone and then rinsing the probe three times with toluene. All of these rinses were collected in a container labeled as Container Number 2. The back half of the filter holder and the connecting line between the filter and condenser were also washed three times with acetone, and the connecting line was then be soaked with three separate portions of toluene for five minutes per soak. As a separate condenser and adsorbent trap were used in the sample apparatus, the condenser was rinsed in the same manner as the connecting line. All rinses were collected in the container, the final liquid level was marked on the container, and the container was sealed and labeled. The liquid level of the sample was clearly marked on the sample container after it was sealed.

d) Impingers 1, 2, 3, and 4 – As described in Section 3.4 of this report, the water collected in the first four impingers was measured to within ± 1 ml with a graduated cylinder. The volume was then recorded and used to determine the associated water mass collected in the first four impingers. After the measurements had been taken, the impinger liquid was discarded and replaced with fresh D.I. water.

e) Impinger 5 – The silica gel and the impinger were weighed to the nearest 0.5 grams and the weight was recorded. The gel was also examined to determine if it was spent, its condition was noted, and it was replaced if necessary.

Once each test run was completed, the samples were placed in a refrigerator or an insulated cooler packed with ice and padding materials for subsequent shipping to the laboratory for analysis consisting of the analytical procedures contained within Method 23, specifically separation through high-resolution gas chromatography and measurement through high resolution mass spectrometry. Maxxam then determined the D&F toxic equivalent (TEQ) associated with each sample. Maxxam followed all appropriate Method 23 analysis procedures, calibration procedures, quality control and assurance procedures, and calculation procedures

4.7 D&F Concentration

While the Method 23 tests were being conducted, the dry sample gas volume associated with each D&F sample was measured through the use of a dry gas meter. Following sample recoveries, the samples were sent to Maxxam for a determination of the total D&F content of each sample in units of picograms Toxic Equivalents (TEQs).

Essentially, dioxins and furans represent a wide range of compounds that encompass about 210 individual compounds (referred to as cogeners). Of these various cogeners, only 17 are thought to have dioxin-like toxicity (i.e., they have chlorine substitutions in, at least, the 2, 3, 7, and 8 positions). In the Method 23 analytical procedure, the concentration of each of the 17 specific cogeners of interest is quantified.

In order to calculate a cumulative toxicity to describe the risks associated with the 17 cogeners, the U.S. EPA has developed a method to describe the combined toxicity of a dioxin and furan sample. The method utilizes factors, referred to as Toxic Equivalency Factors (TEFs), to adjust the amount of cogeners in a given sample based upon the relative toxicity of the 17 individual cogeners. The TEFs range between 0.001 and 1.0 and are directly multiplied with the sample content of each of the cogeners. The results of these multiplication procedures are then summed to yield a sample composite Toxic Equivalent for the mixture of cogeners. The TEQ is expressed in terms of total weight (consistent with the units associated with the cogeners).

4.8 Subpart LLL D&F Emission Limits & Corrected D&F Concentrations

The Subpart LLL D&F emission limit is expressed as 0.40 nanograms TEQ at 7% excess oxygen. As discussed in the introduction, the duality of the dioxin and furan concentration limit is associated with the inlet temperature to the particulate matter control device.

During each of the test runs, SMC personnel were responsible for monitoring and collecting various process data. Specifically, SMC was asked to monitor and record the kiln and raw mill feed rates and the temperatures at the inlets to each control device during the periods of each Method 5 and 23 test run. Pursuant to § 63.1349(b)(3), the temperature data was to be collected and manipulated as follows.

1. The inlet temperature to the appropriate control devices was measured continuously during the entire period of each test run. The continuous temperature records collected are included in this final report.

2. The control device inlet temperatures were measured at least once per 15-second interval and averaged into one-minute values for each test run.

3. The average temperature has been calculated for each of the test runs for the purpose of determining an average inlet temperature for each of the testing scenarios (Main stack - Raw Mill Up; Bypass stack – Raw Mill Up; Main stack – Raw Mill Down).

5.0 Quality Assurance

The following is a brief description of a few of the QA procedures associated with the D&F test program.

All glass components of the sample apparatus upstream and including the adsorbent module were carefully cleaned prior to assembling the apparatus (as described in Section 3A of the *"Manual of Analytical Methods for the Analysis of Pesticides in Human and Environmental Samples"*).

Rather than assembling the adsorbent trap in the field, the trap was pre-assembled by Maxxam in a clean room, reducing the risk of contamination. The adsorbent trap was filled with 20 to 40 grams of XAD-2 resin and glass wool was tightly packed in both ends to help retain the adsorbent. Prior to incorporation into the sampling apparatus, the trap was sealed with Teflon tape or aluminum foil to reduce the risk of contamination.

Each filter was inspected against light to detect irregularities or pinhole leaks. If the filter passed the inspection, it was packed flat in a clean glass container or wrapped in aluminum foil until it was used in the sampling apparatus.

All sample apparatus openings that could have potentially led to sample contamination remained sealed just prior to assembly or until the sampling was about to commence.

One hundred ml. of distilled and deionized water was placed in the second and third impingers, the first and fourth impingers remained empty, and 200 to 300 hundred grams of silica gel was transferred to the fifth impinger. The weight of the fifth impinger plus the silica gel was weighed to the nearest tenth of a gram and recorded.

The adsorbent module and condenser coil recirculation pump were turned on and monitored to ensure proper operation. The sampling process was not initiated until it had been verified that the adsorbent module gas entry temperature was less than 20°C. During testing, the sample gas temperature was monitored to ensure that it never exceeded 20°C.

NOTE: If at any time the sample gas temperature had exceeded 20°C, the XAD-2 resin would have been replaced (thermal resin decomposition occurs at temperatures above 50°C).

Prior to sampling, a leak check was conducted on the sampling apparatus by pulling a vacuum of at least 10 inches of mercury and verifying that the leak rate was less than 0.02 cfm or 4% of the average sampling rate (whichever was less). A leak check was also performed at the conclusion of each sampling run. The post leak check was conducted by pulling a vacuum equal to or greater than the maximum value reached during the sampling run. If the leak rate was less than 4% of the average sampling rate or 0.02 cfm (whichever was less), the results of the test run were deemed acceptable (i.e., the leak rate was acceptable).

After each test run recovery was completed, the sample containers were labeled to identify the sampling date and run number, the sample type (filter, XAD module, Acetone/Toluene rinses), the sample source (Main or Bypass stack), and whether the raw mill was operating or shut down.

Chain-of-custody (COC) forms were prepared for each of the D&F samples (filter, rinses, and XAD modules). The COC forms help to identify the samples, relate pertinent sample information, and list the desired analytical procedures to be performed by the laboratory (i.e., Method 23 analysis). Field quality assurance/quality control procedures included one field blank for the filter, rinse container, and XAD module

6.0 SUMMARY OF RESULTS

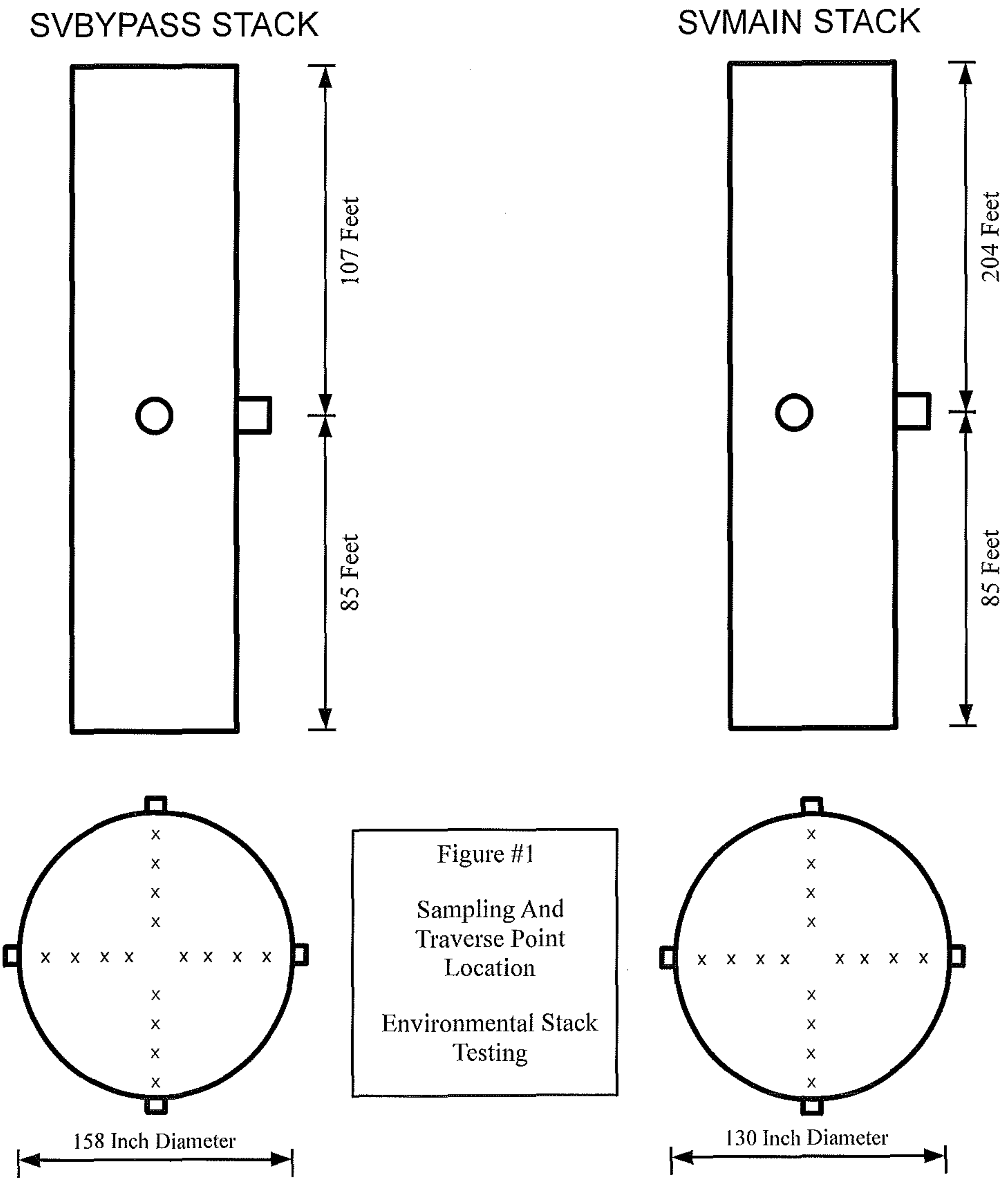
The results of all testing is presented in Tables 1 through 5. Tables 1through 3 illustrate the D&F results. Tables 4 and 5 illustrate the PM results.

In regards to the Subpart LLL D&F concentration limit, all D&F concentrations associated with the stack test were less than the Subpart LLL limit of 0.40 nanograms per dscm (1.7E-10 gr/dscf) at 7% oxygen.

The Main stack complies with the Subpart LLL D&F concentration limit while the raw mill is both on and off-line. Additionally, the Bypass stack complies with the D&F limits while the raw mill is online (the concentration limit does not apply while the raw mill is off-line).

Relative to the limit described in MI-ROP-B1559-2008, the Main and Bypass exhaust stacks are in compliance with the particulate matter emission rate of 0.30 pound per ton (Lb/Ton) of dry feed, with a combined emission rate of 0.095 Lb/Ton of dry feed.

FIGURES



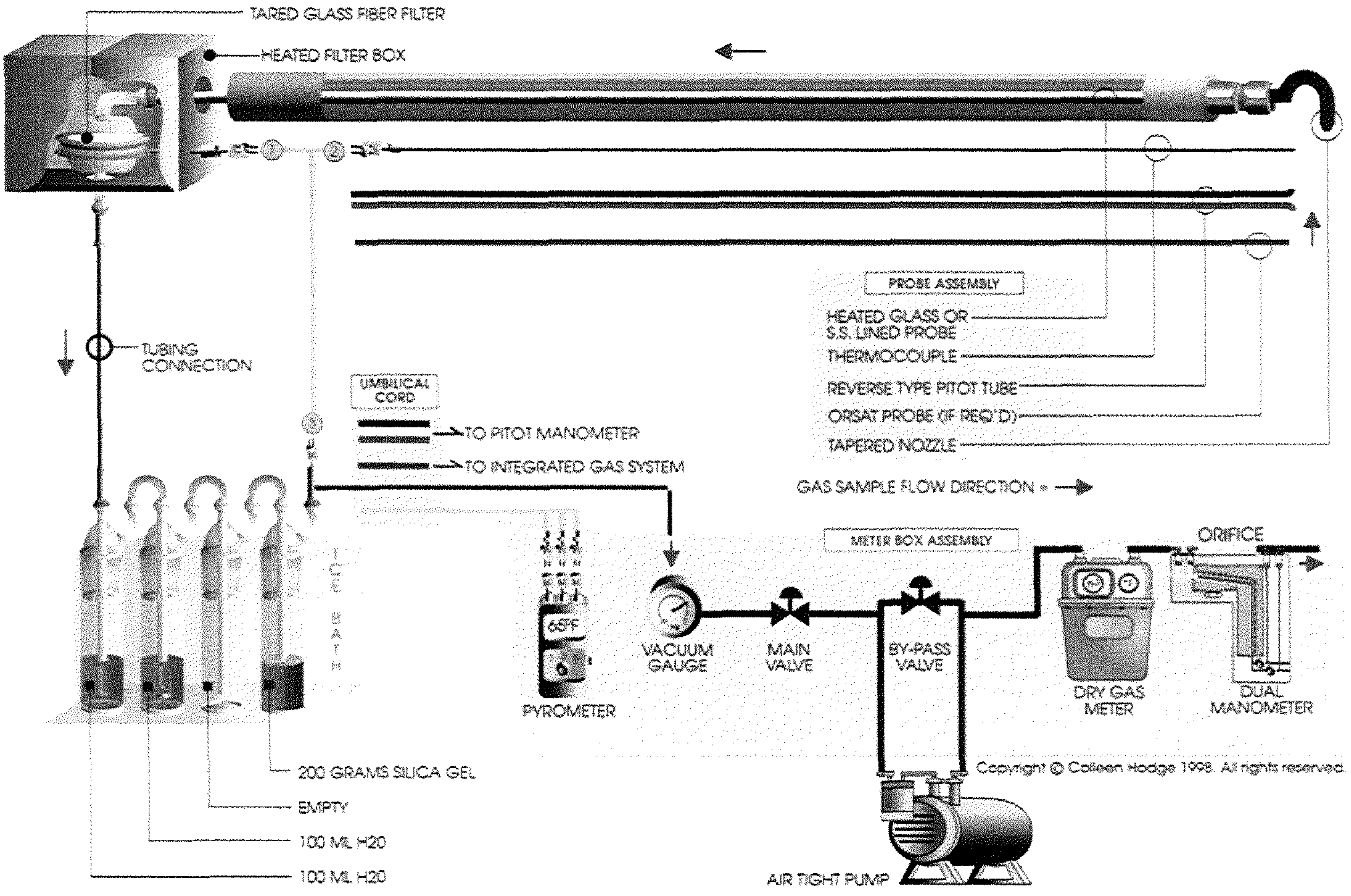
SVBYPASS STACK

SVMAIN STACK

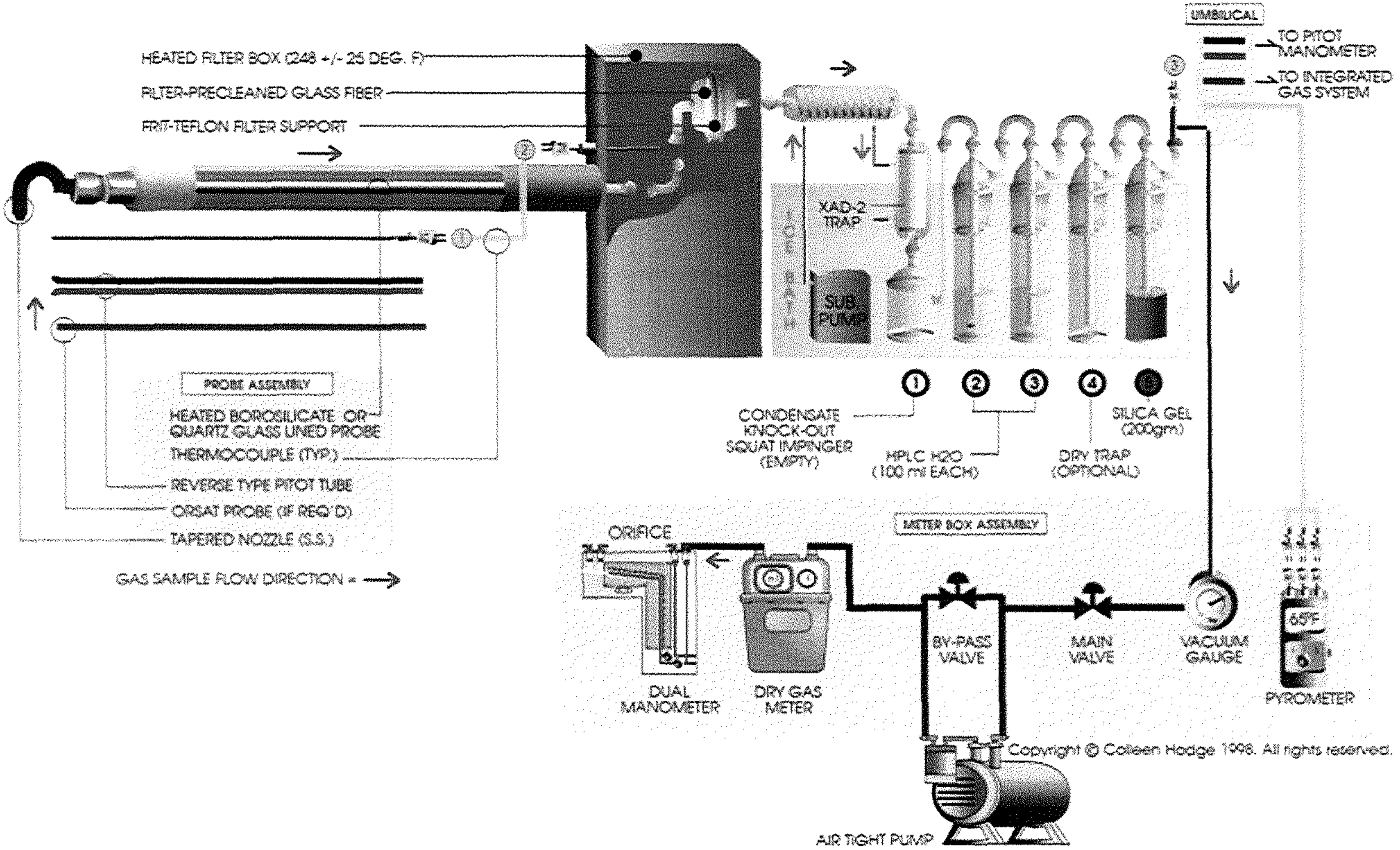
Figure #1

Sampling And Traverse Point Location

Environmental Stack Testing



U.S. EPA Method 5 Sampling Train



U.S. EPA Method 23 Sampling Train

TABLES

Table 1
SVMAIN
Raw Mill Online
Method 23 Dioxin & Furan Anlytical Results
Test Dates: April 22 and April 24, 2014

Test Run	**Run 1**	**Run 2**	**Run 3**	Averages
Test Run Date	**4/22/2014**	4/22/2014	**4/24/2014**	----
Test Run Time Period	**1216-1614**	**1804-2035**	**755-1720**	----
Exhaust Gas Conditions				
Oxygen Concentration (% by volume)	10.50	10.30	10.80	**10.53**
Carbon Dioxide Concentration (% by volume)	15.80	16.50	14.90	**15.73**
Exhaust Gas Temperature (°F)	259.4	261.0	258.0	**259.5**
Inner Stack Diameter (inches)	130.0	130.0	130.0	**130.0**
Exhaust Gas Velocity (feet per second)	78.3	78.3	78.7	**78.4**
Exhaust Gas Moisture Content (%)	10.9	10.8	10.7	**10.8**
Exhaust Gas Flow Rate (ACFM)	433,046	433,009	435,144	**433,733**
Exhaust Gas Flow Rate (SCFM)	309,474	311,006	314,286	**311,589**
Exhaust Gas Flow Rate (DSCFM)	275,645	277,455	280,742	**277,947**
Ambient Conditions				
Temperature, Start of Test Run (°F)	68	68	68	**68**
Barometric Pressure, Start of Test Run (inches Hg)	29.19	29.39	29.46	**29.35**
Sample Data and Results				
Sample Volume (DSCM at measured O_2)	3.639	3.938	3.590	**3.722**
Minimum Sample D/F Content (picograms)	15.59	21.85	17.73	**18.39**
Minimum D/F Conc. (ng/DSCM at measured O_2)	0.004	0.006	0.005	***0.005***
Minimum D/F Concentration (ng/DSCM at 7% O_2)	0.006	0.007	0.007	***0.007***
Maximum Sample D/F Content (picograms)	16.06	21.85	17.70	**18.54**
Maximum D/F Conc. (ng/DSCM at measured O_2)	***0.004***	***0.006***	***0.005***	***0.005***
Maximum D/F Concentration (ng/DSCM at 7% O_2)	***0.006***	***0.007***	***0.007***	***0.007***
Maximum D/F Concentration (gr/dscf at 7% O_2)	***2.5E-12***	***3.1E-12***	***2.9E-12***	***2.8E-12***

Table 2
SVBYPASS Stack
Raw Mill Online
Method 23 Dioxin & Furan Anlytical Results
Test Dates: April 22 through 24, 2014

Test Run	**Run 1**	**Run 2**	**Run 3**	**Averages**
Test Run Date	**4/22/2014**	**4/22&23/2014**	**4/24/2014**	——
Test Run Time Period	**1216-1645**	**1804-2035, 1251-1439**	**0755-0833, 1112-1246, 1629-1720**	——
Exhaust Gas Conditions				
Oxygen Concentration (% by volume)	19.80	19.50	19.60	**19.63**
Carbon Dioxide Concentration (% by volume)	1.40	1.50	1.50	**1.47**
Exhaust Gas Temperature (°F)	195.0	219.0	211.0	**208.3**
Inner Stack Diameter (inches)	158.0	158.0	158.0	**158.0**
Exhaust Gas Velocity (feet per second)	8.3	8.7	6.7	**7.9**
Exhaust Gas Moisture Content (%)	1.1	1.0	0.6	**0.9**
Exhaust Gas Flow Rate (ACFM)	67,710	71,015	54,330	**64,352**
Exhaust Gas Flow Rate (SCFM)	53,226	54,285	42,072	**49,861**
Exhaust Gas Flow Rate (DSCFM)	52,660	53,759	41,818	**49,412**
Ambient Conditions				
Temperature, Start of Test Run (°F)	68	68	68	**68**
Barometric Pressure, Start of Test Run (inches Hg)	29.19	29.39	29.46	**29.35**
Sample Data and Results				
Sample Volume (DSCM at measured O_2)	2.016	2.635	2.591	**2.414**
Minimum Sample D/F Content (picograms)	18.83	20.23	23.40	**20.82**
Minimum D/F Conc. (ng/DSCM at measured O_2)	***0.009***	***0.00768***	***0.009***	***0.00868***
Minimum D/F Concentration (ng/DSCM at 7% O_2)	***0.118***	***0.0762***	***0.097***	***0.09694***
Maximum Sample D/F Content (picograms)	36.52	20.23	23.40	**26.71**
Maximum D/F Conc. (ng/DSCM at measured O_2)	***0.018***	***0.008***	***0.009***	***0.012***
Maximum D/F Concentration (ng/DSCM at 7% O_2)	***0.229***	***0.076***	***0.097***	***0.134***
Maximum D/F Concentration (gr/dscf at 7% O_2)	***9.7E-11***	***3.2E-11***	***4.1E-11***	***5.7E-11***

Table 3
SVMAIN Stack
Raw Mill Off-line
Method 23 Dioxin & Furan Anlytical Results
Test Date: April 23 and April 25, 2014

Test Run	**Run 1**	**Run 2**	**Run 3**	**Averages**
Test Run Date	**4/23/2014**	**4/23/2014**	**4/25/2014**	—
Test Run Time Period	**0832-1142**	**1752-2057**	**0724-1031**	—
Exhaust Gas Conditions				
Oxygen Concentration (% by volume)	8.30	8.70	8.40	**8.47**
Carbon Dioxide Concentration (% by volume)	20.50	19.60	19.60	**19.90**
Exhaust Gas Temperature (°F)	365.0	364.0	359.0	**362.7**
Inner Stack Diameter (inches)	130.0	130.0	130.0	**130.0**
Exhaust Gas Velocity (feet per second)	80.2	80.2	74.6	**78.3**
Exhaust Gas Moisture Content (%)	14.6	12.6	13.6	**13.6**
Exhaust Gas Flow Rate (ACFM)	379,155	407,308	402,441	**396,301**
Exhaust Gas Flow Rate (SCFM)	238,139	255,953	251,251	**248,448**
Exhaust Gas Flow Rate (DSCFM)	203,409	223,581	217,007	**214,666**
Ambient Conditions				
Temperature, Start of Test Run (°F)	68	68	68	**68**
Barometric Pressure, Start of Test Run (inches Hg)	29.46	29.46	29.09	**29.34**
Sample Data and Results				
Sample Volume (DSCM at measured O$_2$)	3.538	3.077	3.053	**2.889**
Minimum Sample D/F Content (picograms)	179.52	222.20	307.23	**236.31**
Minimum D/F Conc. (ng/DSCM at measured O$_2$)	***0.071***	***0.072***	***0.101***	***0.081***
Minimum D/F Concentration (ng/DSCM at 7% O$_2$)	***0.078***	***0.082***	***0.112***	***0.091***
Maximum Sample D/F Content (picograms)	179.53	222.23	307.23	**236.33**
Maximum D/F Conc. (ng/DSCM at measured O$_2$)	***0.071***	***0.072***	***0.101***	***0.081***
Maximum D/F Concentration (ng/DSCM at 7% O$_2$)	***0.078***	***0.082***	***0.112***	***0.091***
Maximum D/F Concentration (gr/dscf at 7% O$_2$)	***3.3E-11***	***3.5E-11***	***4.8E-11***	***3.9E-11***

Table 4
SVMAIN
Method 5 Particulate Matter Anlytical Results
Test Dates: April 23 and April 24, 2014

Test Run	Run 1	Run 2	Run 3	Averages
Test Run Date	**4/23/2014**	**4/24/2014**	**4/24/2014**	-----
Test Run Time Period	**13:49-17:01,7:37-8:29**	**11:12-15:57**	**16:38-18:14**	-----
Stack Conditions				
Nozzle (inches)	0.198	0.198	0.198	0.198
Delta P (inH20)	1.40	1.32	1.47	1.40
Delta H (inH20)	1.58	1.54	1.70	1.61
Stack Temp (°F)	256	256	256	256
Oxygen (%)	10.6	10.8	10.1	10.5
Carbon Dioxide (%)	16.1	14.9	16.3	15.8
Moisture (%)	10.76	10.42	10.62	10.60
Mol Weight, Dry	31.0	30.8	31.0	30.9
Mol Weight, Wet	29.6	29.5	29.6	29.6
Stack Press (inH20)	-0.81	-0.81	-0.81	-0.81
Stack Area (ft2)	92.18	92.18	92.18	92.18
Stack Vel (ft/sec)	76.99	75.09	79.15	77.08
Stack Flow (wacfm)	425,799	415,264	437,764	426,276
Stack Flow (wscfm)	309,027	301,049	315,362	308,479
Stack Flow (dscfm)	275,767	269,684	281,871	275,774
Test Results - Total Particulate Matter				
Sample Gas Vol (dscf)	64.817	55.824	59.128	59.923
Sample Gas Vol (dscm)	1.836	1.581	1.674	1.697
Isokinetics (%)	101.3	101.4	102.7	101.8
Filter (mg)	40.2	9.3	3.1	17.5
Probe Rinse (mg)	61.8	14.5	12.0	29.4
Total (mg)	102.0	23.8	15.1	47.0
Filterable (lbs/hr)	57.395	15.226	9.520	27.380
Filterable (gr/dscf)	0.0243	0.0066	0.0039	0.0116
Filterable (gr/dscf @7%O2)	0.0328	0.0091	0.0051	0.0156
Filterable (mg/dscm @7%O2)	74.9967	20.7467	11.6073	35.7836
Filterable (mg/dscf @7%O2)	2.1237	0.5875	0.3287	1.0133
Fuel Input (tons of dry feed/hr)	309.38	282.42	301.23	297.68
Filterable (lbs/ton of dry feed)	0.19	0.05	0.03	0.09
Allowable Limit (lbs/ton of dry feed)				0.30

Table 5
SVBYPASS
Method 5 Particulate Matter Anlytical Results
Test Dates: April 23 & 24, 2014

Test Run	**Run 1**	**Run 2**	**Run 3**	**Averages**
Test Run Date	**4/23/2014**	**4/24/2014**	**4/24/2014**	-----
Test Run Time Period	**13:49-17:01, 7:37-8:29**	**11:12-15:57**	**16:38-18:14**	-----
Stack Conditions				
Nozzle (inches)	0.502	0.502	0.502	0.502
Delta P (inH20)	0.01	0.01	0.01	0.01
Delta H (inH20)	0.86	0.70	0.63	0.73
Stack Temp (°F)	212	207	217	212
Oxygen (%)	19.5	19.6	19.6	19.6
Carbon Dioxide (%)	1.6	1.5	1.4	1.5
Moisture (%)	0.76	0.92	0.91	0.86
Mol Weight, Dry	29.0	29.0	29.0	29.0
Mol Weight, Wet	29.0	28.9	28.9	28.9
Stack Press (inH20)	0.02	0.02	0.02	0.02
Stack Area (ft2)	132.73	132.73	132.73	132.73
Stack Vel (ft/sec)	7.52	6.63	6.07	6.74
Stack Flow (wacfm)	59,850	52,808	48,350	53,669
Stack Flow (wscfm)	46,339	41,190	36,901	41,476
Stack Flow (dscfm)	45,989	40,812	36,566	41,122
Test Results - Total Particulate Matter				
Sample Gas Vol (dscf)	47.668	37.645	35.565	40.293
Isokinetics (%)	100.1	101.2	106.7	102.7
Filter (mg)	15.8	5.3	11.1	10.7
Probe Rinse (mg)	0.3	0.3	0.3	0.3
Total (mg)	16.1	5.6	11.4	11.0
Filterable (lbs/hr)	2.054	0.803	1.550	1.469
Filterable (gr/dscf)	0.0052	0.0023	0.0049	0.0042
Filterable (gr/dscf @7%O2)	0.0517	0.0245	0.0529	0.0431
Filterable (mg/dscm @7%O2)	118.4236	56.1703	121.0344	98.5428
Filterable (mg/dscf @7%O2)	3.3534	1.5906	3.4273	2.7904
Fuel Input (tons of dry feed/hr)	309.38	282.42	301.23	297.68
Filterable (lbs/ton of dry feed)	0.007	0.003	0.005	0.005
Allowable Limit (lbs/ton of dry feed)				0.300