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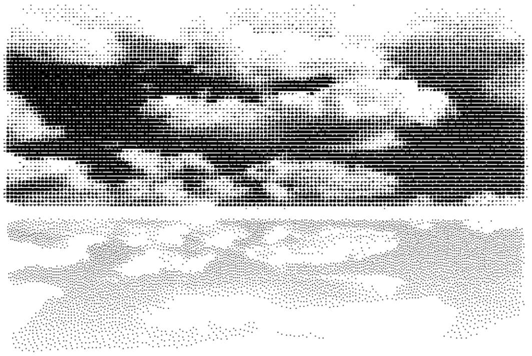


REPORT ON COMPLIANCE TESTING

Detroit Refinery
FCCU Charge Heater

Marathon Petroleum Company LP
1300 South Fort Street
Detroit, MI 48217
Client Reference No. 4101004604

CleanAir Project No. 13375-1
STAC Certificate No. 2007.002.0113.1217
Revision 0, Final Report
November 6, 2017

1. *PROJECT OVERVIEW*

Test Program Summary

Marathon Petroleum Company LP (MPC) contracted CleanAir Engineering (CleanAir) to successfully complete testing at the FCCU Charge Heater (EU11-FCCUCHARHTR-S1) at the Detroit Refinery, located in Detroit, Michigan. The objective of the test program was to perform particulate matter (PM), sulfur dioxide (SO_2) and sulfuric acid (H_2SO_4) testing to demonstrate compliance with the Michigan Department of Environmental Quality (DEQ) Permit No. MI-ROP-A9831-2012c.

A summary of the test program results is presented below. Section 2 Results provides a more detailed account of the test conditions and data analysis. Test program information, including the test parameters, on-site schedule and a project discussion, begins below Table 1-1.

Table 1-1:
Summary of Compliance Results

Source Constituent	Fuel Type	Sampling Method (USEPA)	Average Emission	Permit Limit[1]
FCCU Charge Heater Stack				
PM_{10} (lb/MMBtu)	Refinery gas & Disulfide off-gas	5 / 202	0.0110	N/A
H_2SO_4 (lb/MMBtu)	Refinery gas & Disulfide off-gas	ASTM Draft CCM	0.00546	N/A
SO_2 (lb/MMBtu)	Refinery gas & Disulfide off-gas	6C	0.148	N/A
PM_{10} (lb/MMBtu)	Refinery gas	5 / 202	0.0031	0.0076

[1] Permit limits obtained from MDEQ Renewable Operating Permit No. MI-ROP-A9831-2012c.

Test Program Details

Parameters

The test program included the following emissions measurements:

- total particulate matter less than 10 microns in diameter (PM_{10}), assumed equivalent to the sum of the following constituents:
  - filterable particulate matter (FPM)
  - condensable particulate matter (CPM)
- sulfur dioxide (SO_2)
- sulfuric acid mist (H_2SO_4)
- flue gas composition (e.g., O_2, CO_2, H_2O)
- flue gas temperature
- flue gas flow rate

The test program included PM_{10} testing while the unit utilized refinery gas (Run 1-3) and a refinery gas/disulfide off-gas blend (Runs 4-6) as its fuel gas.

Schedule

Testing was performed on September 26 through 28, 2017. The on-site schedule followed during the test program is outlined in Table 1-2.

Table 1-2:
Test Schedule

Run Number	Location	Method	Analyte	Date	Start Time	End Time
1	FCCU Charge Heater	USEPA Method 5/202	FPM/CPM	09/26/17	09:45	11:56
2	FCCU Charge Heater	USEPA Method 5/202	FPM/CPM	09/26/17	12:48	15:03
3	FCCU Charge Heater	USEPA Method 5/202	FPM/CPM	09/26/17	15:54	18:10
4	FCCU Charge Heater	USEPA Method 5/202	FPM/CPM	09/27/17	08:15	10:25
5	FCCU Charge Heater	USEPA Method 5/202	FPM/CPM	09/27/17	11:01	13:10
6	FCCU Charge Heater	USEPA Method 5/202	FPM/CPM	09/27/17	13:59	16:07
1	FCCU Charge Heater	USEPA Method 3A/6C	$O_2/CO_2/SO_2$	09/27/17	08:28	09:28
2	FCCU Charge Heater	USEPA Method 3A/6C	$O_2/CO_2/SO_2$	09/27/17	09:50	10:50
3	FCCU Charge Heater	USEPA Method 3A/6C	$O_2/CO_2/SO_2$	09/27/17	11:10	12:10
0	FCCU Charge Heater	Draft ASTM CCM	H_2SO_4	09/28/17	08:59	10:00
1	FCCU Charge Heater	Draft ASTM CCM	H_2SO_4	09/28/17	10:18	11:18
2	FCCU Charge Heater	Draft ASTM CCM	H_2SO_4	09/28/17	11:35	12:36
3	FCCU Charge Heater	Draft ASTM CCM	H_2SO_4	09/28/17	12:55	13:55

Note: USEPA Method 5/202 Run 1-3 samples collected while source utilized refinery gas as its fuel gas.
USEPA Method 5/202 Run 4-6 samples collected while source utilized a refinery gas/disulfide off-gas blend as its fuel gas

Discussion

Test Scope Synopsis

FPM & PM_{10} Testing

A total of six (6) 120-minute EPA Method 5/202 test runs were performed; Runs 1-3 samples were collected while the unit utilized refinery gas as its fuel gas and Runs 4-6 samples were collected while the unit utilized a refinery gas/disulfide off-gas blend as its fuel gas. FPM/CPM emission results were calculated in units of pounds per million Btu (lb/MMBtu). The final results are expressed as the average of the three (3) valid runs for each fuel gas utilized.

PM_{10} is assumed equivalent to the sum of FPM less than 10 micrometers (μm) in diameter (FPM_{10}) and CPM. The Method 5/202 sample train yields a front-half, FPM result and a back-half, CPM result. The total PM result (FPM plus CPM) from Method 5/202 can be used as a worst-case estimation of total PM_{10} since Method 5 collects all FPM present in the flue gas (regardless of particle size).

SO_2 Testing

Minute-average data points for SO_2 (dry basis) were collected over a period of 60 minutes for each run utilizing EPA Method 6C. Minute-average data points for O_2 and CO_2 were also collected concurrently utilizing EPA Method 3A. SO_2 emission results were calculated in units of pounds per million Btu (lb/MMBtu). The final results are expressed as the average of the three (3) valid runs.

H_2SO_4 Testing

H_2SO_4 emissions were determined referencing the Draft ASTM Controlled Condensation Method (CCM).

Three (3) 60-minute Draft ASTM CCM test runs were performed. H_2SO_4 emission results were calculated in units of lb/MMBtu. The final results are expressed as the average of three (3) valid runs.

Prior to the first official test run, a 60-minute sample conditioning run (Run 0) was performed in order to minimize the absorption capacity of the front-half components of the sample train (upstream of the H_2SO_4-collecting portion of the sample train). The conditioning run was recovered in the same manner as the official test runs, but the condenser rinse and SAM filter were not analyzed.

Fuel Analysis

Emission results in units of dry volume-based concentration (lb/dscf, ppmdv) were converted into units of pound per million Btu (lb/MMBtu) by calculating a combined gas oxygen-based fuel factor (F_d) weighted for percent of fuel gas heat input (MMBtu/hr). Individual F_d factors for refinery gas, natural gas, and disulfide off-gas were calculated per EPA Method 19 specifications, from percent volume composition analytical data provided by MPC. Based on the heat input contributed by each fuel gas to the total heat input during each respective run, a combined F_d factor was then calculated.

Test Conditions

The unit was operated at the maximum normal operating capacity during each of the emissions compliance test runs. MPC was responsible for logging any relevant process-related data and providing it to CleanAir for inclusion in the test reports.

End of Section

2. RESULTS

This section summarizes the test program results. Additional results are available in the report appendices, specifically Appendix C Parameters.

Table 2-1:
FCCU Charge Heater – PM & PM_{10} Emissions, Refinery Gas

Run No.		1	2	3	Average
Date (2017)		Sep 26	Sep 26	Sep 26	
Start Time (approx.)		09:45	12:48	15:54	
Stop Time (approx.)		11:56	15:03	18:10	
Process Conditions					
P_2	Charge rate (bpd)	33,001	33,050	33,009	**33,020**
F_d	Oxygen-based F-factor (dscf/MMBtu)	8,358	8,358	8,358	**8,358**
H_i	Actual heat input (MMBtu/hr)	50.0	48.8	48.7	**49.2**
Gas Conditions					
O_2	Oxygen (dry volume %)	5.6	6.8	5.2	**5.9**
CO_2	Carbon dioxide (dry volume %)	9.2	8.4	9.5	**9.0**
T_s	Sample temperature (°F)	473	433	460	**456**
B_w	Actual water vapor in gas (% by volume)	14.8	13.4	14.1	**14.1**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	26,100	23,100	23,400	**24,200**
Q_s	Volumetric flow rate, standard (scfm)	14,700	13,600	13,400	**13,900**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	12,500	11,800	11,500	**11,900**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	72.26	68.62	69.09	**69.99**
%I	Isokinetic sampling (%)	99.3	99.9	103.4	**100.8**
Laboratory Data					
m_{FPM}	Total FPM (g)	0.00366	0.00287	0.00305	
m_{CPM}	Total CPM (g)	0.00662	0.00434	0.00530	
m_{Part}	Total particulate matter (as PM_{10}) (g)	0.01027	0.00722	0.00835	
FPM Results					
C_{sd}	Particulate Concentration (lb/dscf)	1.12E-07	9.23E-08	9.74E-08	**1.00E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.0837	0.0654	0.0671	**0.0721**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00127	0.00114	0.00108	**0.00117**
CPM Results					
C_{sd}	Particulate Concentration (lb/dscf)	2.02E-07	1.40E-07	1.69E-07	**1.70E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.151	0.0988	0.117	**0.122**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00231	0.00173	0.00188	**0.00197**
Total Particulate Matter (as PM_{10}) Results					
C_{sd}	Particulate Concentration (lb/dscf)	3.13E-07	2.32E-07	2.66E-07	**2.71E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.235	0.164	0.184	**0.194**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00358	0.00287	0.00296	**0.00314**

Table 2-2:
FCCU Charge Heater – PM & PM_{10} Emissions, Refinery Gas/Disulfide Off-gas Blend

Run No.		4	5	6	Average
Date (2017)		Sep 27	Sep 27	Sep 27	
Start Time (approx.)		08:15	11:01	13:59	
Stop Time (approx.)		10:25	13:10	16:07	
Process Conditions					
P_2	Charge rate (bpd)	32,997	33,002	32,998	**32,999**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,144	9,178	9,200	**9,174**
H_i	Actual heat input (MMBtu/hr)	52.3	52.3	52.1	**52.2**
Gas Conditions					
O_2	Oxygen (dry volume %)	5.0	4.5	5.3	**4.9**
CO_2	Carbon dioxide (dry volume %)	9.4	9.6	9.4	**9.5**
T_s	Sample temperature (°F)	522	514	510	**515**
B_w	Actual water vapor in gas (% by volume)	14.2	15.0	14.5	**14.6**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	26,800	26,600	25,200	**26,200**
Q_s	Volumetric flow rate, standard (scfm)	14,300	14,300	13,700	**14,100**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	12,300	12,200	11,700	**12,100**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	77.58	74.69	70.60	**74.29**
%I	Isokinetic sampling (%)	108.4	105.3	103.8	**105.8**
Laboratory Data					
m_{FPM}	Total FPM (g)	0.00790	0.00860	0.00874	
m_{CPM}	Total CPM (g)	0.01223	0.02149	0.03211	
m_{Part}	Total particulate matter (as PM_{10}) (g)	0.02013	0.03009	0.04085	
FPM Results					
C_{sd}	Particulate Concentration (lb/dscf)	2.24E-07	2.54E-07	2.73E-07	**2.50E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.166	0.186	0.191	**0.181**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00270	0.00297	0.00337	**0.00301**
CPM Results					
C_{sd}	Particulate Concentration (lb/dscf)	3.48E-07	6.35E-07	1.00E-06	**6.62E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.257	0.464	0.703	**0.474**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00418	0.00742	0.0124	**0.00799**
Total Particulate Matter (as PM_{10}) Results					
C_{sd}	Particulate Concentration (lb/dscf)	5.72E-07	8.88E-07	1.28E-06	**9.12E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.422	0.649	0.895	**0.655**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00688	0.0104	0.0157	**0.0110**

Table 2-3:
FCCU Charge Heater – SO_2 Emissions

Run No.		1	2	3	Average
Date (2017)		Sep 27	Sep 27	Sep 27	
Start Time (approx.)		08:28	09:50	11:10	
Stop Time (approx.)		09:28	10:50	12:10	
Process Conditions					
P_2	Charge rate (bpd)	32,982	32,989	33,000	**32,990**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,134	9,167	9,177	**9,159**
H_i	Actual heat input (MMBtu/hr)	52.5	52.1	52.2	**52.2**
Gas Conditions					
O_2	Oxygen (dry volume %)	4.7	4.5	4.6	**4.6**
CO_2	Carbon dioxide (dry volume %)	9.8	9.9	9.9	**9.9**
B_w	Actual water vapor in gas (% by volume)[1]	14.2	14.2	15.0	**14.5**
Sulfur Dioxide Results					
C_{sd}	Concentration (ppmdv)	68.2	80.4	79.8	**76.1**
C_{sd}	Concentration (lb/dscf)	1.13E-05	1.34E-05	1.33E-05	**1.27E-05**
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	0.133	0.156	0.156	**0.148**

[1] Moisture data used for ppmwv to ppmdv correction obtained from nearly-concurrent M5/202 runs.

Table 2-4:
FCCU Charge Heater – H_2SO_4 Emissions

Run No.		**1**	**2**	**3**	**Average**
Date (2017)		Sep 28	Sep 28	Sep 28	
Start Time (approx.)		10:18	11:35	12:55	
Stop Time (approx.)		11:18	12:36	13:55	
Process Conditions					
P_2	Charge rate (bpd)	33,018	33,013	33,016	**33,015**
F_d	Oxygen-based F-factor (dscf/MMBtu)	9,176	9,174	9,165	**9,172**
H_i	Actual heat input (MMBtu/hr)	53.9	54.1	54.7	**54.3**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.1	7.3	8.4	**7.6**
CO_2	Carbon dioxide (dry volume %)	8.3	8.1	7.4	**7.9**
T_s	Sample temperature (°F)	534	534	531	**533**
B_w	Actual water vapor in gas (% by volume)	12.8	12.9	14.3	**13.3**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	28.85	28.63	28.52	**28.67**
Laboratory Data (Ion Chromatography)					
m_n	Total H_2SO_4 collected (mg)	4.8896	5.0488	4.8271	
Sulfuric Acid Vapor (H_2SO_4) Results					
C_{sd}	H_2SO_4 Concentration (lb/dscf)	3.74E-07	3.89E-07	3.73E-07	**3.79E-07**
C_{sd}	H_2SO_4 Concentration (ppmdv)	1.47	1.53	1.47	**1.49**
E_{Fd}	H_2SO_4 Rate - Fd-based (lb/MMBtu)	0.00519	0.00548	0.00572	**0.00546**

End of Section

3. DESCRIPTION OF INSTALLATION

Process Description

MPC's facility in Detroit, Michigan, produces refined petroleum products from crude oil. MPC must continue to demonstrate that select process units are in compliance with permitted emission limits.

The FCCU Charge Heater (EU11-FCCUCHARHTR-S1) preheats the feed to the FCCU. The unit can be fired by a combination of refinery fuel gas, disulfide off-gas, and natural gas. Emissions are vented to the atmosphere via the FCCU Charge Heater Stack (SV11-H1), where testing was performed.

Test Location

The sample point locations were determined by EPA Methods 1 and 6C specifications. Table 3-1 presents the sampling information for the test location described in this report. The figures shown on pages 9 and 10 represent the layout of the test location.

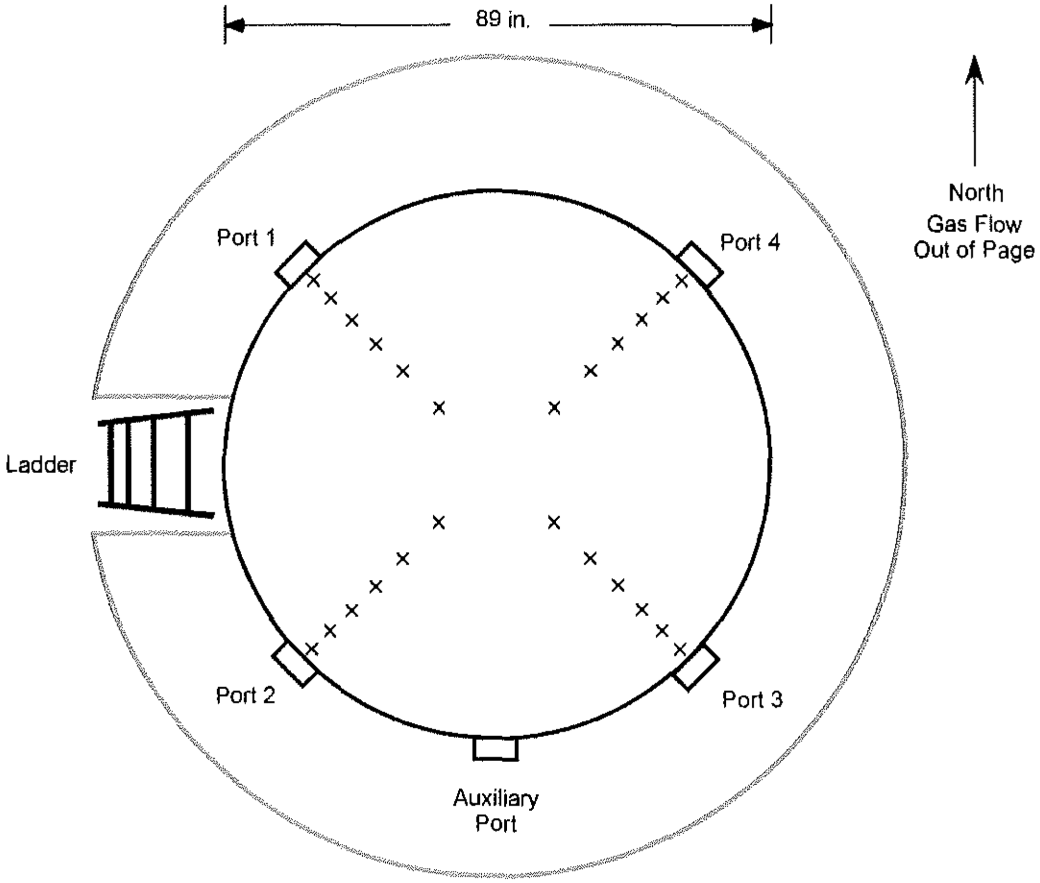
Table 3-1:
Sampling Point Information

Source Constituent	Method (USEPA)	Run No.	Ports	Points per Port	Minutes per Point	Total Minutes	Figure
FCCU Charge Heater Stack							
FPM / CPM	5 / 202	1-6	4	6	5	120	3-1
H_2SO_4	Draft ASTM CCM	1-3	1	1	60	60	N/A[1]
O_2 / CO_2 / SO_2	3A / 6C	Strat. Check	1	3	5	15	3-2
O_2 / CO_2 / SO_2	3A / 6C	1-3	1	1	60	60	3-2[2]

[1] Draft ASTM CCM sampling occured at a single point near the center of the duct.

[2] Sample points used for Runs 1-3 were determined by the stratification check. The stratification check resulted in single point testing.

Figure 3-1: PM_{10} Sample Point Layout (EPA Method 1)

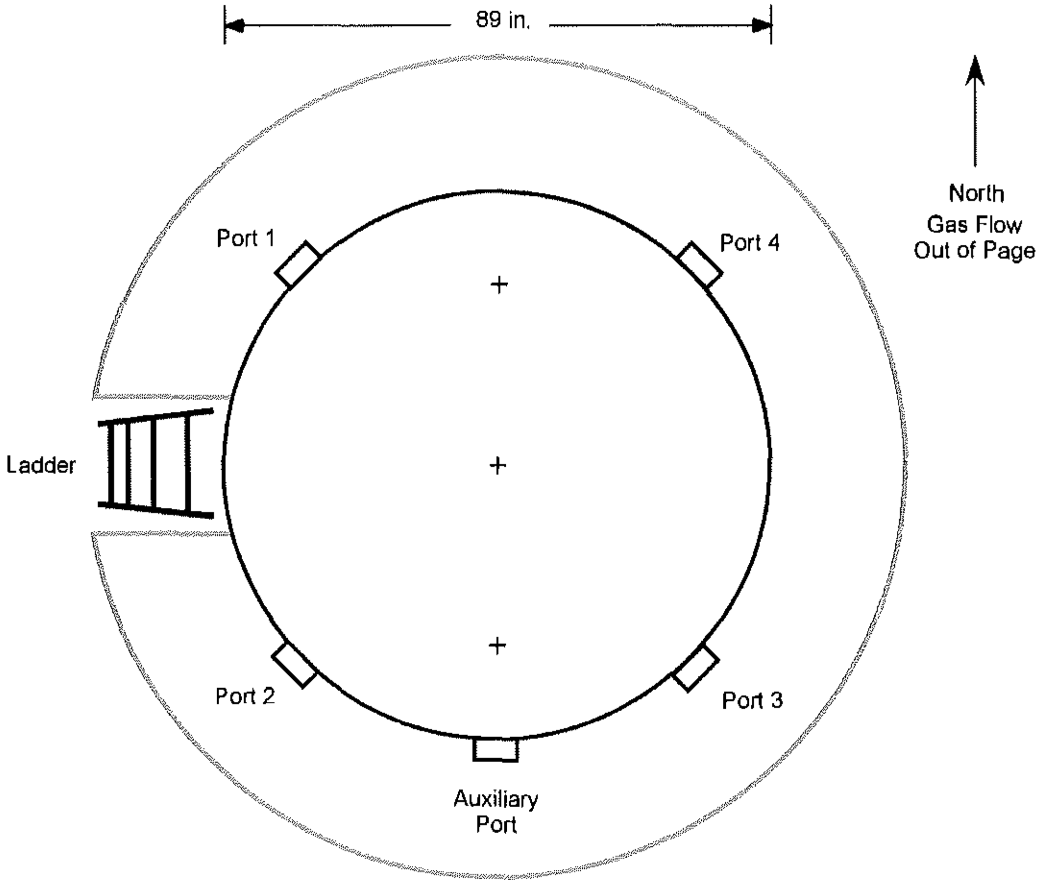


Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	35.6	31.7
2	25.0	22.3
3	17.7	15.8
4	11.8	10.5
5	6.7	6.0
6	2.1	1.9

Duct diameters upstream from flow disturbance (A): 2.7 Limit: 0.5

Duct diameters downstream from flow disturbance (B): 2.3 Limit: 2.0

Figure 3-2:
SO2, O_2 & CO_2 Sample Point Layout (EPA Method 6C)



Strat Check Points

Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
1	83.3	74.2
2	50.0	44.5
3	16.7	14.8

Sample Point

Sampling Point	% of Stack Diameter	Port to Point Distance (inches)
2	50.0	44.5

Duct diameters upstream from flow disturbance (A): 2.7	Limit: 0.5
Duct diameters downstream from flow disturbance (B): 2.3	Limit: 2.0

End of Section

4. METHODOLOGY

Procedures and Regulations

The test program sampling measurements followed procedures and regulations outlined by the United States Environmental Protection Agency (USEPA) and the DEQ. These methods appear in detail in Title 40 of the CFR and at https://www.epa.gov/emc. Appendix A includes diagrams of the sampling apparatus, as well as specifications for sampling, recovery and analytical procedures.

CleanAir follows specific QA/QC procedures outlined in the individual methods and in USEPA "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source-Specific Methods," EPA/600/R-94/038C. Appendix D contains additional QA/QC measures, as outlined in CleanAir's internal Quality Manual.

Title 40 CFR Part 60, Appendix A

Method 1	"Sample and Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"
Method 3	"Gas Analysis for the Determination of Dry Molecular Weight"
Method 3A	"Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 4	"Determination of Moisture Content in Stack Gases"
Method 5	"Determination of Particulate Matter Emissions from Stationary Sources"
Method 6C	"Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)"
Method 19	"Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide and Nitrogen Oxide Emission Rates"

Title 40 CFR Part 51, Appendix M

Method 202	"Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources"

CTM-013 (Mod.)/Draft ASTM Controlled Condensation Method (Draft ASTM CCM)

"Determination of Sulfur Oxides Including Sulfur Dioxide, Sulfur Trioxide and Sulfuric Acid Vapor and Mist from Stationary Sources Using a Controlled Condensation Sampling Apparatus"

Methodology Discussion

PM and PM_{10} Testing – USEPA Method 5/202

The front-half (Method 5 portion) of the sampling train consisted of a glass nozzle, glass liner and filter holder heated to 248°F ± 25°F and a quartz fiber filter. Flue gas samples were extracted isokinetically per Method 5 requirements.

The back-half (Method 202 portion) of the sampling train is designed to mimic ambient conditions and collect only the particles that would truly form CPM in the atmosphere by minimizing the sulfur dioxide (SO_2) and NO_X interferences observed with earlier versions of the method, in which flue gas was bubbled through cold water, and SO_2 and NO_X were absorbed and partially oxidized before they could be purged out with nitrogen (N_2).

Flue gas exiting the front-half heated filter passed through a coiled condenser and dry impinger system jacketed by water continually circulated at ambient temperature. Moisture was removed from the flue gas without bubbling through the condensed water. Flue gas then passed through a tetrafluoroethane (TFE) membrane filter at ambient temperature. The temperature of the flue gas at the exit of the filter was directly measured with an in-line thermocouple and maintained in the temperature range of 65°F to 85°F.

After exiting the ambient filter, the flue gas passed through two (2) additional impingers surrounded by ice in a "cold" section of the impinger bucket. The moisture collected in these impingers were not analyzed for CPM and was only collected to determine the flue gas moisture and thoroughly dry the gas. The sample gas then flowed into a calibrated dry gas meter where the collected sample gas volume was determined.

The front-half portion of the sample train (nozzle, probe and heated filter) was recovered per Method 5 requirements, using acetone as the recovery solvent. The back-half of the sample train (heated filter outlet, condenser, dry impingers and TFE membrane filter) was recovered per Method 202 requirements. The impinger train was purged with N_2 at a rate of 14 liters per minute (lpm) for one (1) hour following each test run and prior to recovery.

A field train blank was assembled, purged and recovered as if it were an actual test sample; analysis of the field train blank was used to blank-correct the test run results. Reagent blanks were also collected to quantify background contamination. All samples and blanks were returned to CleanAir Analytical Services for gravimetric analysis. Method 202 samples were maintained at a temperature < 85°F during transport to the laboratory.

O_2, CO_2 and SO_2 Testing – USEPA Methods 3A and 6C

Reference method O_2 and CO_2 emissions were determined using a paramagnetic/NDIR analyzer per EPA Method 3A. Reference method SO_2 emissions were determined using a UV absorption analyzer per EPA Method 6C.

Sample gas was extracted at a constant rate, conditioned to remove moisture, and delivered to an analyzer bank which measured concentration on a dry basis (units of %dv or ppmdv).

Calibration error checks were performed by introducing zero N_2, high range and mid-range calibration gases to the inlet of each analyzer during calibration error checks. Bias checks were performed before and after each sampling run by introducing calibration gas to the inlet of the sampling system's heated filter. Per Methods 3A and 6C, the average results for each run were drift-corrected.

H_2SO_4 Testing – Draft ASTM CCM

A gas sample was extracted from the source at a constant flow rate from the source using a quartz-lined probe maintained at a temperature of 650°F ± 25°F (depending on the required probe length) and a quartz fiber filter maintained at the same temperature as the probe to remove particulate matter.

The sample then passed through a glass coil condenser for collection of sulfuric acid vapor and/or mist. A second quartz fiber filter (referred to as the sulfuric acid mist (SAM) filter) was located at the condenser outlet for the collection of residual SAM not collected by the condenser. The condenser temperature was regulated by a water jacket and the SAM filter was regulated by a closed oven. Both the water jacket and SAM filter oven were maintained at 140°F ± 9°F. After exiting the SAM filter, the sample gas continued through a series of four (4) glass knock-out jars; two (2) containing water, one (1) empty and one (1) containing silica gel for residual moisture removal. The exit temperature from the knock-out jar set was maintained below 68°F. The sample gas then flowed into a dry gas meter, where the collected sample gas volume was determined by means of a calibrated, dry gas meter or an orifice-based flow meter.

The H_2SO_4-collecting portion of the sample train (condenser and SAM filter) was recovered into a single fraction using deionized (DI) H_2O as the recovery/extraction solvent; any H_2SO_4 disassociates into sulfate ion (SO_4^{2-}) and is stabilized in the H_2O matrix until analysis.

Samples and blanks were returned to CleanAir Analytical Services for ion chromatography (IC) analysis.

End of Section