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STATIONARY SOURCE TESTING
Ypsilanti Community Utilities Authority

PROJECT #: JQ1230.256

PREPARED FOR:
Ypsilanti Community Utilities Authority
2777 State Road
Ypsilanti, Michigan 48198

ISSUE DATE:
February 2017

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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

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**RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION**

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name Ypsilanti Community Utilities Authority County Washtenaw
Source Address 2777 State Street City Ypsilanti
AQD Source ID (SRN) B6237 ROP No. MI-ROP-B6237-2015 ROP Section No. C

Please check the appropriate box(es):

Annual Compliance Certification (Pursuant to Rule 213(4)(c))

Reporting period (provide inclusive dates): From _____ To _____

- 1. During the entire reporting period, this source was in compliance with ALL terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.
- 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, EXCEPT for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))

Reporting period (provide inclusive dates): From _____ To _____

- 1. During the entire reporting period, ALL monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.
- 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, EXCEPT for the deviations identified on the enclosed deviation report(s).

Other Report Certification

Reporting period (provide inclusive dates): From NA To NA

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

EMISSIONS TEST REPORT CERTIFICATION

This form shall certify that the testing was conducted in accordance with the
attached test plan and that the facility was operated in compliance with permit
conditions or at the maximum routine operating conditions for the facility.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Jeff Castro Director 734-484-4600
Name of Responsible Official (print or type) Title Phone Number

Jeff Castro 2.3.17
Signature of Responsible Official Date

* Photocopy this form as needed.

**EMISSION TEST REPORT
YPSILANTI COMMUNITY UTILITIES AUTHORITY
2777 STATE ROAD
YPSILANTI, MICHIGAN 48198
AUGUST MACK PROJECT NUMBER JQ1230.256**

INTRODUCTION

Ypsilanti Community Utilities Authority (YCUA) operates a municipal wastewater treatment plant in Ypsilanti, Michigan. As part of the wastewater treatment process, biosolids are accumulated and collected prior to discharge of the treated water into the Lower Rouge River. YCUA utilizes a Fluidized Bed Sewage Sludge (Biosolids) Incinerator (FBSSI) to incinerate sludge removed during the treatment process.

The State Plan for Implementation and Enforcement of Emission Guidelines and Compliance Times for Existing Sewage Sludge Incineration (SSI) Units (September 2015) applies to SSI sources that commenced operation on or before October 14, 2010. Rule 336.1972 requires compliance with 40 CFR Part 60, Subpart M. The purpose of this test program is to demonstrate continuing compliance with the Subpart M emission limits for particulate matter (PM), hydrogen chloride (HCl), carbon monoxide (CO), dioxins/furans (D/F), mercury, nitrogen oxides (NO_x), sulfur dioxide (SO₂), cadmium and lead. Mercury and CO testing satisfied the annual testing requirement of the Renewable Operating Permit (ROP) number MI-ROP-B6237-2015. Emissions testing was conducted on December 6 - 7, 2016.

Facility Info

Ypsilanti Community Utilities Authority (YCUA)
2777 State Road
Ypsilanti, Michigan 48198

State Registry Number (SRN): B6237
Permit Number: MI-ROP-B6237-2015

Contact Info

Source Contact

Luther Blackburn
Director of Wastewater Operations & Compliance
Ypsilanti Community Utilities Authority
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Anthony Henley Compliance Manager 317.916.3147 ahenley@augustmack.com	Breegan Andersen Compliance Manager 317.721.0696 bandersen@augustmack.com
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Test Company (Stack Test Group)

Bill J. Byczynski
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SUMMARY OF RESULTS

Process Operating Parameters

Operating parameters for the FBSSI are controlled by programmable logic controlled monitoring systems. Operating parameters were monitored throughout the testing and were recorded at 30-minute intervals. In addition, sludge samples were collected to determine the moisture content of the sludge during testing. Detailed field logs and process data used to establish minimum Subpart MMMM 4-hour averages are provided in Appendix A.

Emission Testing Results

Emissions testing results are summarized in Tables 1 through 7. Field calculations, quality assurance data, associated equipment calibration data and laboratory results are provided in Appendix B.

TABLE 1
Summary of Particulate Matter (PM) and HCl Results (mg/dscm)

Test	Test Duration (min)	PM Results (mg/dscm @ 7% O ₂)	PM Subpart MMMM Limit (mg/dscm)	HCl Results (ppm at 7% O ₂)	HCl Subpart MMMM Limit (ppm)
Test #1	120	1.5	18	<0.06	0.51
Test #2	120	1.8	18	<0.06	0.51
Test #4	120	2.7	18	<0.07	0.51
Average	120	2.0	18	<0.06	0.51

TABLE 2
Summary of Particulate Matter (PM) and HCl Results (lb/ton)

Test	Test Duration (min)	PM Results (lb/ton)*	PM ROP Limit (lb/ton)	HCl Results (lb/ton)*	HCl ROP Limit (lb/ton)
Test #1	120	0.04	0.35	<0.002	0.8
Test #2	120	0.03	0.35	<0.002	0.8
Test #4	120	0.06	0.35	<0.002	0.8
Average	120	0.04	0.35	<0.002	0.8

*Based on average sludge feed rate during two day test period.

TABLE 3
Summary of Dioxin/Furans Results

Test	Test Duration (min)	Dioxin/Furans Results (ng/dscm at 7% O ₂ TMB)	Dioxin/Furans Subpart MMMM Limit (ng/dscm)
Test #1	120	0.072	1.2
Test #2	120	0.073	1.2
Test #3	120	0.070	1.2
Average	120	0.072	1.2

Note: TMB = Total Mass Basis

TABLE 4
Summary of 2, 3, 7, 8 TCDD Results

Test	Test Duration (min)	2,3,7,8 TCDD Results (lb/ton)*	2,3,7,8 TCDD ROP Limit (lb/ton)
Test #1	120	7.91E-11	1.4E-9
Test #2	120	5.75E-11	1.4E-9
Test #3	120	4.85E-11	1.4E-9
Average	120	6.17E-11	1.4E-9

*Based on average sludge feed rate during two day test period.

TABLE 5
Summary of Mercury, Cadmium, and Lead Results (mg/dscm)

Test	Test Duration (min)	Mercury Results (mg/dscm @ 7% O ₂)	Mercury Subpart MMMM Limit (mg/dscm)	Cadmium Results (mg/dscm @ 7% O ₂)	Cadmium Subpart MMMM Limit (mg/dscm)	Lead Results (mg/dscm at 7% O ₂)	Lead Subpart MMMM Limit (mg/dscm)
Test #2	120	0.0104	0.037	<0.0003	0.0016	0.0006	0.0074
Test #3	120	0.0121	0.037	<0.0003	0.0016	0.0007	0.0074
Test #4	120	0.0097	0.037	<0.0003	0.0016	0.0007	0.0074
Average	120	0.0107	0.037	<0.0003	0.0016	0.0006	0.0074

TABLE 6
Summary of Mercury and Cadmium Results (lb/ton)

Test	Test Duration (min)	Mercury Results (lb/ton)*	Mercury ROP Limit (lb/ton)	Mercury Results (gram/24-hr)**	Mercury ROP Limit (gram/24-hr)	Cadmium Results (lb/ton)*	Cadmium ROP Limit (lb/ton)
Test #2	120	1.90E-4	6.9E-4	5.21	3200	<5.32E-6	8.5E-3
Test #3	120	2.28E-4	6.9E-4	6.26	3200	<5.68E-6	8.5E-3
Test #4	120	1.86E-4	6.9E-4	5.08	3200	<5.36E-6	8.5E-3
Average	120	2.01E-4	6.9E-4	5.52	3200	<5.46E-6	8.5E-3

*Based on average sludge feed rate during two day test period.

** Based on extrapolation of hourly emission rate to 24 hours.

TABLE 7
Summary of Carbon Monoxide (CO), Nitrous Oxide (NO_x), & Sulfur Dioxide (SO₂) Results

Test	Test Duration (min)	CO Results (ppmvd @ 7% O ₂)	CO Subpart MMMM Limit (ppmvd)	CO ROP Limit (ppmvd)	NO _x Results (ppmvd at 7% O ₂)	NO _x Subpart MMMM Limit (ppmvd)	SO ₂ Results (ppmvd at 7% O ₂)	SO ₂ Subpart MMMM Limit (ppmvd)
Test #2	60	4.3	64	100	54.6	150	7.4	15
Test #3	60	9.8	64	100	65.2	150	7.1	15
Test #4	60	9.8	64	100	69.5	150	7.3	15
Average	60	8.0	64	100	63.1	150	7.3	15

SOURCE DESCRIPTION

Description

Ypsilanti Community Utilities Authority (YCUA) operates a municipal wastewater treatment plant in Ypsilanti, Michigan under the permit number ROP B6237-2015. As part of the wastewater treatment, biosolids are accumulated and collected prior to discharge of the treated water into the Lower Rouge River. YCUA utilizes a Fluidized Bed Sewage Sludge (Biosolids) Incinerator (FBSSI) to incinerate sludge removed during the treatment process.

As part of the wastewater treatment, biosolids are accumulated and collected prior to discharge of the treated water into the Lower Rouge River. YCUA utilizes the FBSSI to incinerate sludge removed during the treatment process. Sludge is introduced into the incinerator using conveyors and pumps. Two dewatered sewage sludge bins are located in the solids building. Dewatered cake from nine belt filter presses is stored in the feed bins before being pumped to the incinerator. Two pumps are connected to each of the feed bins. The feed bin extraction screw conveyors feed the pumps, and the pumps transfer the dewatered sludge to the incinerator. High-pressure ball valves installed in the piping system control the flow of sludge to the incinerator.

The FBSSI uses an advanced air pollution control system, consisting of a venturi scrubber, a multistage impingement tray scrubber, a wet electrostatic precipitator, and a granular activated carbon absorber bed.

Raw Materials and Finished Products

The FBSSI unit incinerates sewage sludge (maximum permitted capacity = 6,300 pounds/hour). During testing, the FBSSI unit was operated at approximately 80% of their permitted capacity at an average of 5,033 pounds per hour. Detailed sewage sludge feed can be found in Appendix A.

Operation Type (Batch/Continuous)

This is a continuous process.

Operating Parameters

Control equipment parameters are controlled by programmable logic controlled monitoring systems. Operating parameters were monitored throughout the testing and were recorded at 30-minute intervals. In addition, sludge samples were collected to determine the moisture content of the sludge during testing. A summary of the observed

operating parameters used to establish minimum 4-hour averages are provided in Appendix A.

SAMPLING & ANALYTICAL PROCEDURES

Reference Methods

All testing was conducted in accordance with USEPA Reference Methods, unless noted otherwise. Each parameter tested consisted of three (3) sampling runs. A summary of the test methods and minimum sampling volume is shown in Table 8 below.

TABLE 8
Summary of Test Methods for December 6-7, 2016

Method #	Applicability	Minimum Sample Volume	Compliance Limit/ Minimum Detection Limit
1	Sample and Velocity Traverses for Stationary Sources	<i>Methods 1-4 will be run in conjunction with each sampling train. Run duration, sample volume and detection limits will vary based on pollutants being sampled.</i>	
2	Determination of Stack Gas Velocity and Volumetric Flow		
3	Gas Analysis for the Determination of Dry Molecular Weight		
4	Determination of Moisture Content in Stack Gases		
5	Determination of Particulate Emissions from Stationary Sources	1 dscm per run	18 mg/ dscm
6C	Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)	N/A	15 ppm (by dry volume)
7E	Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)	N/A	150 ppm (by dry volume)
10	Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)	N/A	64 ppm (by dry volume)
23	Determination of Polychlorinated Dibenzo-p-Dioxins (PCDD's) and Polychlorinated Dibenzofurans (PCDF's) from Stationary Sources	1 dscm per run	1.2 ng/ dscm (total mass) 0.10 ng/ dscm (TEQ)
26A	Determination of Halogen Emissions from Stationary Sources	≥ 2 dscm per run	0.51 ppm (by dry volume)
29	Determination of Metal Emissions from Stationary Sources	1 dscm per run	0.0016 mg/ dscm (Cd) 0.0074 mg/ dscm (Pb) 0.037 mg/ dscm (Hg)

Sampling Train Schematics

The sampling trains were set up according to the procedures of USEPA Reference Methods. The sampling train schematics are shown in Figures 1, 2, 3 and 4, respectively.

Figure 1: Method 26A Sampling Train

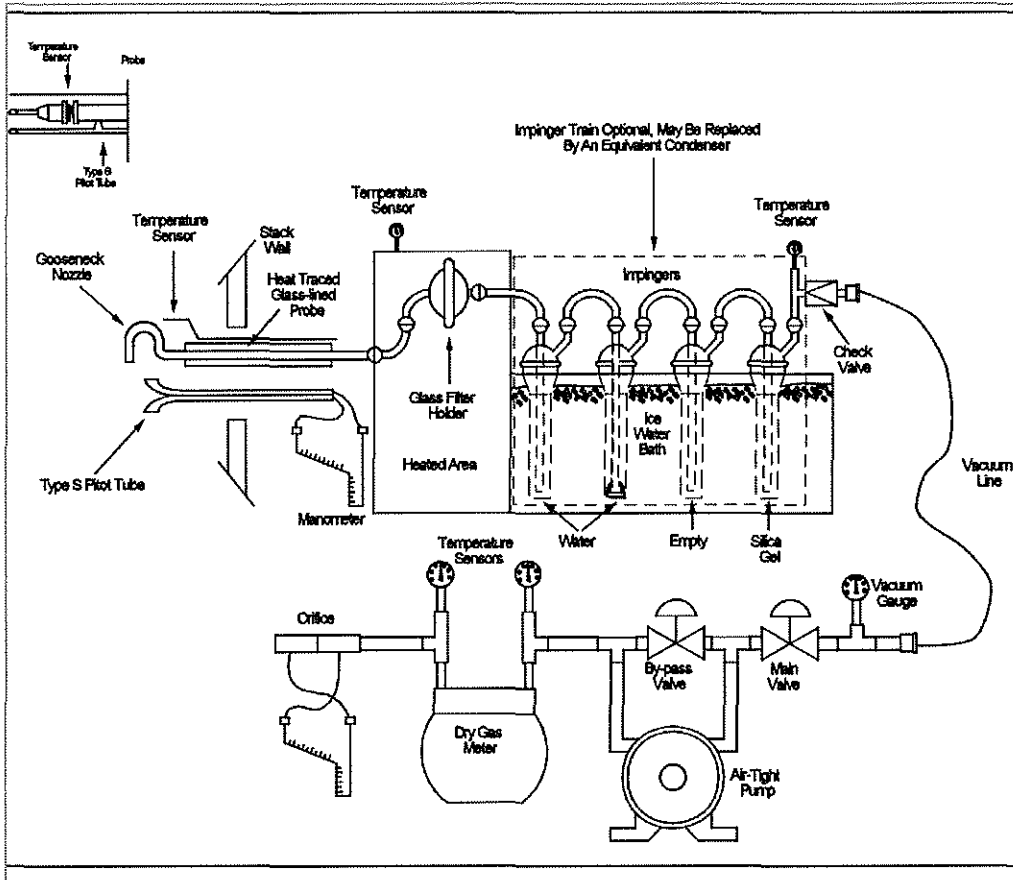


Figure 2: Method 6C/7E/10 Sampling Train

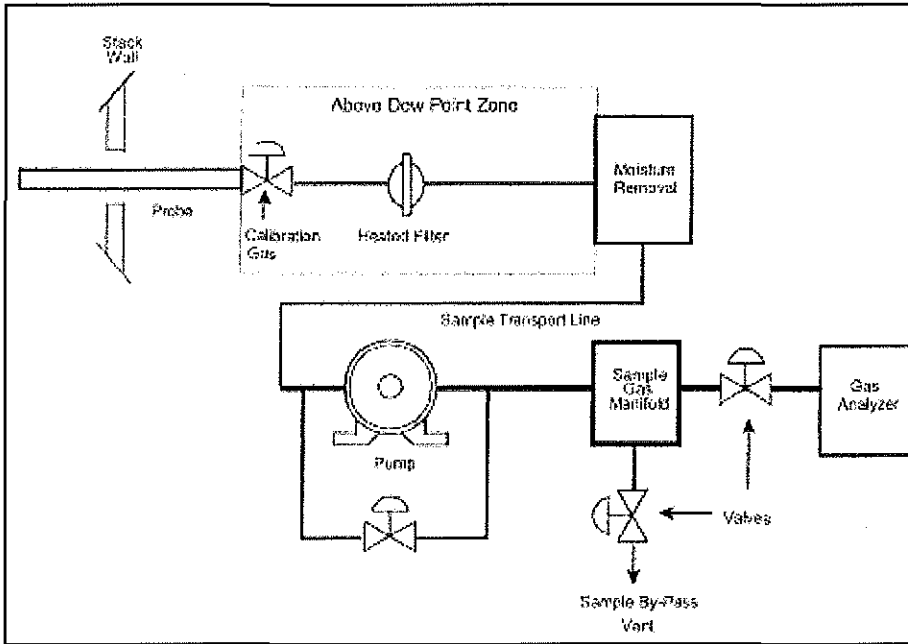


Figure 3: Method 5/29 Sampling Train

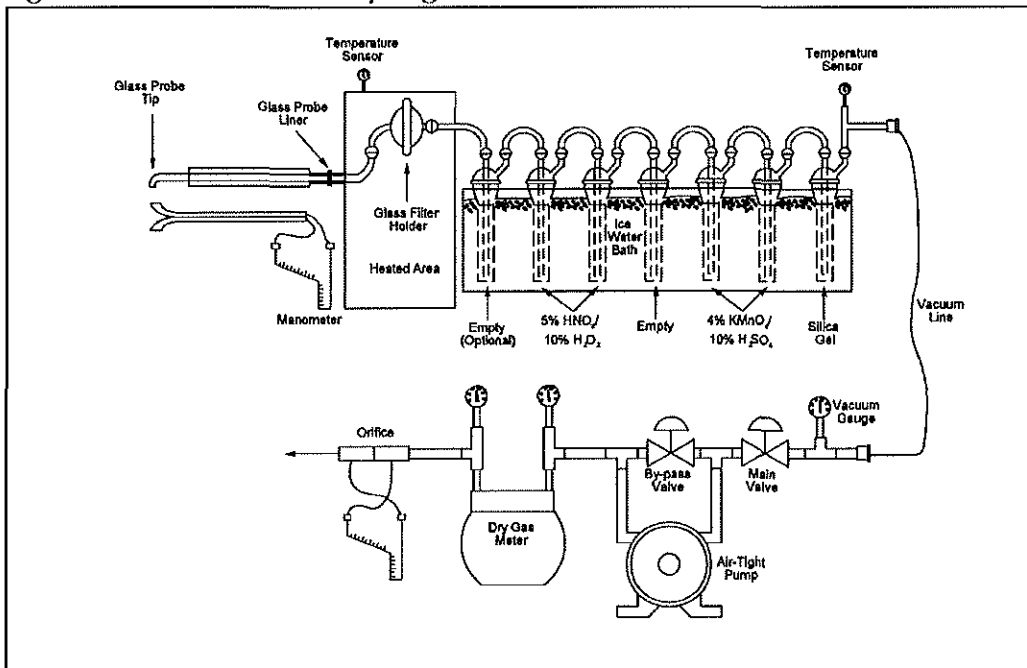
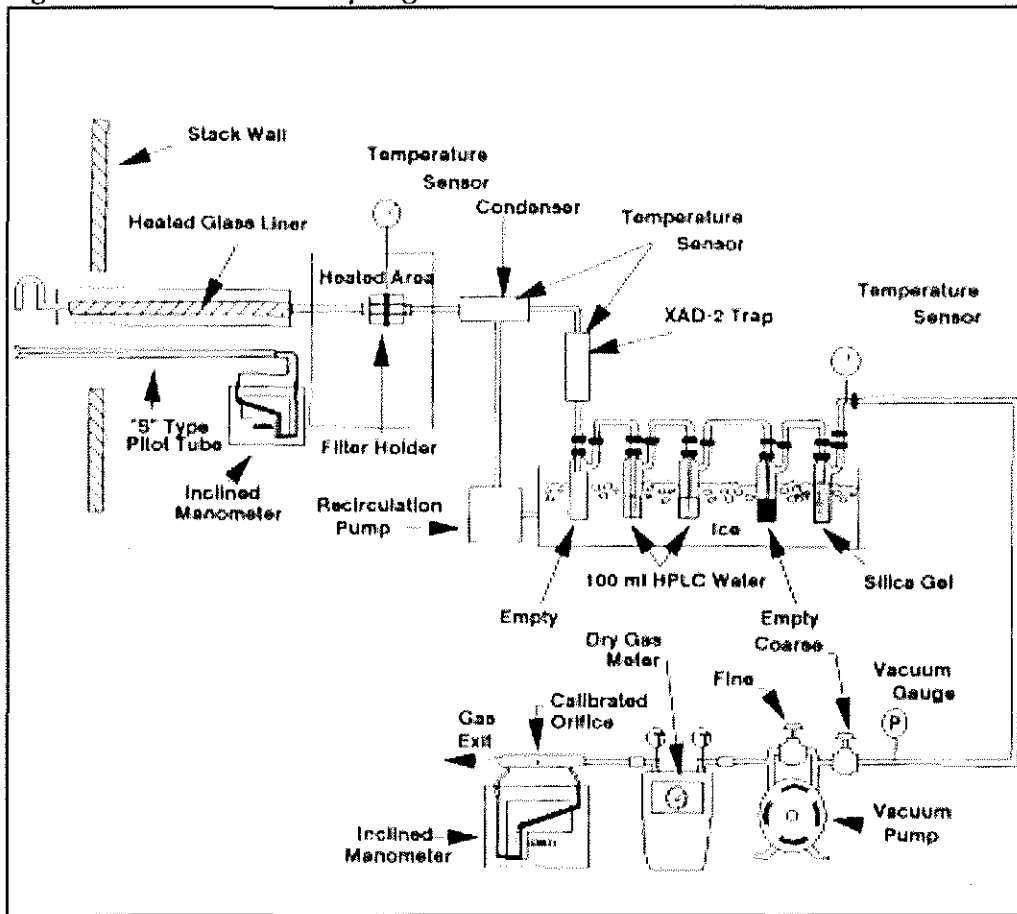


Figure 4: Method 23 Sampling Train



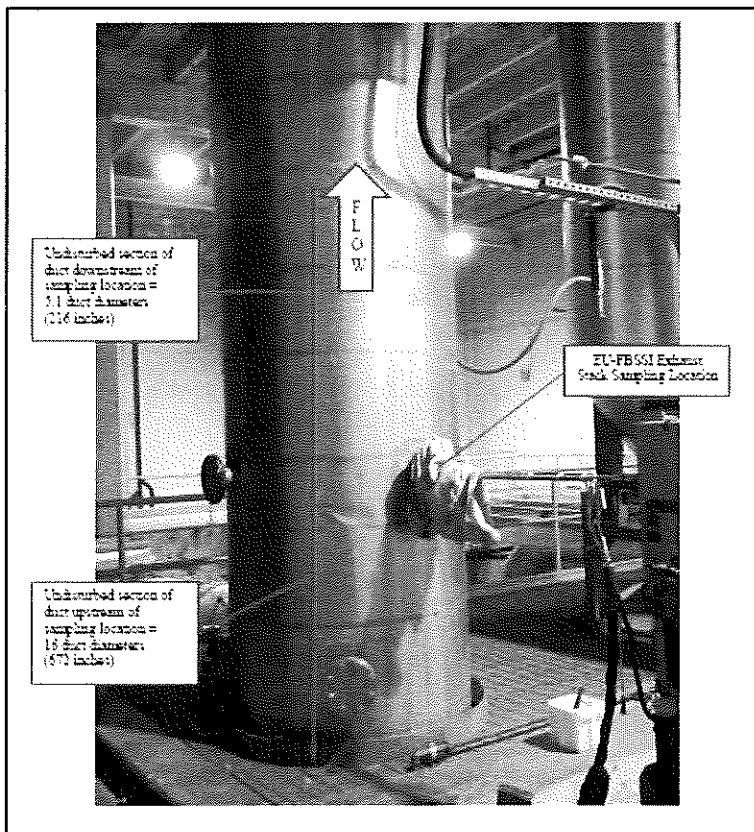
Quality Assurance / Quality Control (QA/QC)

Sampling equipment calibration and leak checks were performed in accordance with the applicable USEPA Reference Methods. Standard chain of custody procedures were followed. For HCl testing, one equipment blank was collected and sent to the laboratory for analysis. Additionally, the laboratory conducted one reagent blank for HCl. Audit samples were obtained and analyzed for lead, cadmium, mercury, and HCl. Audit samples for D/F are not currently required by USEPA. Audit samples for CO, NO_x and SO₂ are not be required since the instrumental analyzer methods were used for testing. Additional QA/QC information is included in Appendix B.

Stack Description/Schematic

The FBSSI exhaust stack is 42 inches in diameter and has two 4-inch \varnothing sampling ports. The ports are located 18 feet (5.1 duct diameters) from the nearest downstream disturbance and 56 feet (16 duct diameters) upstream from the nearest disturbance. A diagram of the testing location is provided in Figure 5 below.

Figure 5: Testing Location/Dimensions



Flue Gas Conditions

The flue gas conditions from emissions testing are provided below. Detailed flue gas conditions are provided in Appendix B.

Average Exhaust Temperature = 135.27 °F

Average Exhaust Moisture = 5.06%

Average Exhaust Velocity = 29.06 FPM

Average Exhaust Volume = 15,987 ACFM

TEST RESULTS & DISCUSSION

Results

As summarized in Tables 1 and 2, the PM and HCl results from testing conducted on December 6-7, 2016 show YCUA is in compliance with the Subpart M and ROP emission limits. As summarized in Table 3 and 4, the dioxins/furans results from testing conducted on December 6-7, 2016 show YCUA is in compliance with the Subpart M and ROP emission limits. As summarized in Table 5 and 6, the mercury, cadmium, and lead results from testing conducted on December 6-7, 2016 show YCUA is in compliance with the Subpart M and ROP emission limits, as applicable. As summarized in Table 7, the CO, NO_x, and SO₂ results from testing conducted on December 6-7, 2016 show YCUA is in compliance with the Subpart M and ROP emission limits, as applicable. Field calculations, quality assurance data, associated equipment calibration data and laboratory results for emissions testing are provided in Appendix B.

Variations from Normal Sampling Procedures

YCUA modified the sample time for HCl emissions testing from 60 minutes in length to 120 minutes in length. This was to ensure the detection limit was reached for HCl.

An equipment malfunction occurred on December 7, 2016 during the third PM and HCl test run, the first metals, and the first CO, NO_x, and SO₂ test runs. Sludge was feeding into the incinerator at an abnormal rate due to a valve malfunction. YCUA opted to re-sample all of the above mentioned parameters due to the abnormal operating conditions. For compliance determination, YCUA is averaging test runs one, two and four for PM and HCl, test runs two, three, and four for metals, and test runs two, three, and four for

CO, NO_x, and SO₂. Test data during the upset period is included in Appendix B, per the request of MDEQ.

CERTIFICATION

A certification by the responsible official, is included in Appendix C.

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APPENDIX G

TESTING RESULTS DURING INCINERATOR UPSET

STACK TEST GROUP, INC.
Air Quality Services

Metals Sampling Train Calculations

Client: YCUA
Project No: 16-2875
Date: 12/07/16
Source: Sludge Incinerator Exhaust

Test No: T1
Start Time: 08:30 AM
Finish Time: 10:35 AM
Pitot Cal. Factor: 0.84
Meter Calibration Factor: 0.959
Stack Length, inches: 0
Stack Width, inches: 0
Stack Diameter, inches: 41
Nozzle Diameter, inches: 0.292
Barometric Pressure, inches Hg: 29.29
Static Pressure in Stack, Inches H2O: 0.52
Duration of Sample, minutes: 120
Meter Start Volume: 69.000
Meter Final Volume: 162.270
Average Meter Pressure, Inches H2O: 1.5100
Average Meter Temperature, degrees F: 105.2
Average Sqrt. Velocity Pressure: 0.5006
Stack Gas Temperature, degrees F: 135.3
% Carbon Dioxide: 13.5
% Oxygen: 4.8
% Carbon Monoxide: 0.0
Liquid Volume Collected, milliliters: 95.0

Sample Train Calculations

Meter Volume, Actual: 93.270
Meter Volume, STP: 82.077
Volume of Water Vapor Condensed: 4.472
Total Gas Sampled: 86.548
% Moisture: 5.17
Area of Stack, Square Feet: 9.17
% Excess Air at Test Location: 28.6
Molecular Weight dry, lb/lb-Mole: 30.35
Molecular Weight wet, lb/lb-Mole: 29.71
Absolute Stack Gas Pressure, in Hg: 29.33
Isokinetic, %: 100.1

Velocity and Flow Calculations

Average Stack Gas Velocity FPS: 29.71
Stack Gas Flow Rate, ACFM: 16,346
Stack Gas Flow Rate, SCFM: 14,214
Stack Gas Flow Rate, DSCF/HR: 808,733
Stack Gas Flow Rate, DSCFM: 13,479

Cadmium Calculations:

Cadmium Concentration, ug: <0.60
Cadmium Concentration, Mg: <0.0006
Grains Per DSCF: <1.13E-07
LBS/DSCF: <1.61E-11
LBS/HR: <1.30E-05
mg/dscm @ 7% O2: <0.0002

Lead Calculations:

Lead Concentration, ug: 1.20
Lead Concentration, Mg: 0.0012
Grains Per DSCF: 2.26E-07
LBS/DSCF: 3.22E-11
LBS/HR: 2.61E-05
mg/dscm @ 7% O2: 0.0004

Mercury Calculations:

Mercury Concentration, ug: 30.60
Mercury Concentration, Mg: 0.0306
Grains Per DSCF: 5.75E-06
LBS/DSCF: 8.22E-10
LBS/HR: 6.65E-04
mg/dscm @ 7% O2: 0.0114

STACK TEST GROUP, INC.
Air Quality Services

Particulate/HCL Sampling Train Calculations

Client:	YCUA
Project No:	16-2875
Date:	12/07/16
Source:	Sludge Incinerator Exhaust

Test No:	T3
Start Time:	08:30 AM
Finish Time:	10:34 AM
Pitot Cal. Factor:	0.84
Meter Calibration Factor:	1.006
Stack Length, inches:	0
Stack Width, inches:	0
Stack Diameter, inches:	41
Nozzle Diameter, inches:	0.289
Barometric Pressure, inches Hg:	29.29
Static Pressure in Stack, Inches H2O:	0.43
Duration of Sample, minutes:	120
Meter Start Volume:	638.760
Meter Final Volume:	724.900
Average Meter Pressure, Inches H2O:	1.6500
Average Meter Temperature, degrees F:	105.92
Average Sqrt. Velocity Pressure:	0.5044
Stack Gas Temperature, degrees F:	141.42
% Carbon Dioxide:	11.5
% Oxygen:	7.2
% Carbon Monoxide:	0.0
Liquid Volume Collected, milliliters:	85
Total Weight of PM, (Front 1/2) Mg:	3.7

Sample Train Calculations

Meter Volume, Actual:	86.140
Meter Volume, STP:	79.447
Volume of Water Vapor Condensed:	4.001
Total Gas Sampled:	83.448
% Moisture:	4.79
Area of Stack, Square Feet:	9.17
% Excess Air at Test Location:	50.5
Molecular Weight dry, lb/lb-Mole:	30.13
Molecular Weight wet, lb/lb-Mole:	29.55
Absolute Stack Gas Pressure, in Hg:	29.32
Isokinetic, %:	98.0

Velocity and Flow Calculations

Average Stack Gas Velocity FPS:	30.18
Stack Gas Flow Rate, ACFM:	16,605
Stack Gas Flow Rate, SCFM:	14,286
Stack Gas Flow Rate, DSCF/HR:	816,079
Stack Gas Flow Rate, DSCFM:	13,601

Front 1/2 Particulate Calculations:

Grains Per DSCF:	0.0007
LBS/DSCF:	1.03E-07
LBS/HR:	0.08
mg/dscm @ 7% O2:	1.7

HCl Calculations:

HCl Concentration, mg:	<0.27
Grains Per DSCF:	<5.24E-05
LBS/DSCF:	<7.49E-09
LBS/HR:	<0.006
PPM:	<0.08
HCL, ppmv @ 7% O2:	<0.08

STACK TEST GROUP, INC.
Air Quality Services

Nox/SO2/CO Sampling Train Calculations

Client: YCUA
Project No: 16-2875
Date: 12/07/16
Source: Sludge Incinerator Exhaust

Test No: T1
Start Time: 08:50 AM
Finish Time: 09:50 AM

NOx Calculations:

Oxygen, %: 4.8
NOx, ppmv: 69.2
NOx, ppmv @ 7% O2: 59.7

CO Calculations:

CO, ppmv: 45.7 *
CO, ppmv @ 7% O2: 39.5

SO2 Calculations:

SO2, ppmv: 11.1
SO2, ppmv @ 7% O2: 9.6

* This number is not accurate because of changing the CO Analyzer scales from 100 to 10000 during testing.
The plant had a upset during testing