

Executive Summary

Condat Corporation (Condat) retained Apex Companies, LLC (Apex) to retest air emissions from the Calcium Line Baghouse at the Condat facility in Saline, Michigan.

The purpose of the testing was to (1) retest air emissions from the unit following initial testing on December 5, 2019 and (2) compare results to the Michigan Air Pollution Control Rule 290 and 291 exemptions presented below.

Rule 290

(ii) Any emission unit for which the CO₂ equivalent emissions are not more than 6,250 tons per month, the uncontrolled or controlled emissions of all other air contaminants are not more than 1,000 or 500 pounds per month, respectively, and all of the following criteria are met:

(A) For toxic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials that are listed in R 336.1122(f) as not contributing appreciably to the formation of ozone, with initial threshold screening levels greater than or equal to 0.04 micrograms per cubic meter and less than 2.0 micrograms per cubic meter, the total uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively.

(B) For toxic air contaminants with initial risk screening levels greater than or equal to 0.04 micrograms per cubic meter, the total uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively.

(C) The emission unit shall not emit any toxic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials that are listed in R 336.1122(f) as not contributing appreciably to the formation of ozone, with an initial threshold screening level or initial risk screening level less than 0.04 micrograms per cubic meter.

(D) For total mercury, the uncontrolled or controlled emissions shall not exceed 0.01 pounds per month.

(E) For lead, the uncontrolled or controlled emissions shall not exceed 16.7 pounds per month.

Rule 291

(2) The requirement of R 336.1201(1) to obtain a permit to install does not apply to any emission unit in which potential emissions meet the conditions listed in subdivisions (a) to (d) of this subrule and table 23 for all air contaminants listed. In addition, records shall be maintained in accordance with subdivisions (e) and (f) of this subrule.

(a) The combined potential emissions of all toxic air contaminants with screening levels greater than or equal to 0.04 micrograms per cubic meter and less than 2 micrograms per cubic meter shall not exceed 0.12 tons per year.

(b) The combined potential emissions of all toxic air contaminants with screening levels greater than or equal to 0.005 micrograms per cubic meter and less than 0.04 micrograms per cubic meter shall not exceed 0.06 tons per year.

(c) The combined potential emissions of all toxic contaminants with screening levels less than 0.005 micrograms per cubic meter shall not exceed 0.006 tons per year.

(d) The emission unit has no potential emissions of asbestos and/or subtilisin proteolytic enzymes.

(e) A description of the emission unit shall be maintained throughout the life of the unit.

(f) Documentation and/or calculations identifying the quality, nature, and quantity of the air contaminant emissions are maintained in sufficient detail to demonstrate that the potential emissions are less than those listed in subdivisions (a) to (d) of this subrule and Table 23. Such documentation shall include the toxic air contaminant screening level applicable at the time of installation and/or modification of the emission unit.

The testing followed United States Environmental Protection Agency (USEPA) Reference Methods 1 through 5, 18, TO-11A, National Institute for Occupational Safety and Health (NIOSH) Method 1501, NIOSH 2000 and Occupational Safety and Health Administration Method 52.

Based on a limited review of the requirements, the results indicate the following (see summary in table below):

- The Calcium Baghouse emission source does not qualify for the Rule 290 exemption for a permit to install or for the Rule 291 permit to install based on *de minimis* emissions.

Detailed results are presented in Tables 1 through 7 after the Tables Tab of this report. The following tables summarize the results of the testing conducted on January 20 and 21, 2021.

Calcium Baghouse Results

Parameters	Units	Run 1	Run 2	Run 3	Average	Limit
PM	lb/month [†]	691	190	54	312	500^a
PM	ton/year [‡]	4.1	1.1	0.3	1.8	10^b
Carcinogenic VOCs	lb/month [†]	20	25	11	18	10^c
Total VOCs	ton/year [‡]	1.7	2.0	0.90	1.5	0.12^d

lb/month: pound per month

ton/year: ton per year

Carcinogenic VOCs: sum of acetaldehyde and formaldehyde emissions.

Total VOCs: sum of acetaldehyde, acrolein, ethylbenzene, formaldehyde, and methanol emissions.

[†] Assuming 24-hour production for 31 days

[‡] Assuming 24-hour production for 365 days

^a Michigan Air Pollution Control Rule R 336.1290(a)(ii)

^b Michigan Air Pollution Control Rule R 336.1291 Table 23

^c Michigan Air Pollution Control Rule R 336.1290(a)(ii)(B)

^d Michigan Air Pollution Control Rule R 336.1291(a)

1.0 Introduction

1.1 Summary of Test Program

Condat Corporation (Condat) retained Apex Companies, LLC (Apex) to retest air emissions from the Calcium Line Baghouse at the Condat facility in Saline, Michigan.

The purpose of the testing was to (1) retest air emissions from the unit following initial testing on December 5, 2019 and (2) compare results to the Michigan Air Pollution Control Rule 290 and 291 exemptions presented below.

Rule 290

(ii) Any emission unit for which the CO₂ equivalent emissions are not more than 6,250 tons per month, the uncontrolled or controlled emissions of all other air contaminants are not more than 1,000 or 500 pounds per month, respectively, and all of the following criteria are met:

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(B) For toxic air contaminants with initial risk screening levels greater than or equal to 0.04 micrograms per cubic meter, the total uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively.

(C) The emission unit shall not emit any toxic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials that are listed in R 336.1122(f) as not contributing appreciably to the formation of ozone, with an initial threshold screening level or initial risk screening level less than 0.04 micrograms per cubic meter.

(D) For total mercury, the uncontrolled or controlled emissions shall not exceed 0.01 pounds per month.

(E) For lead, the uncontrolled or controlled emissions shall not exceed 16.7 pounds per month.

Rule 291

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(a) The combined potential emissions of all toxic air contaminants with screening levels greater than or equal to 0.04 micrograms per cubic meter and less than 2 micrograms per cubic meter shall not exceed 0.12 tons per year.

(b) The combined potential emissions of all toxic air contaminants with screening levels greater than or equal to 0.005 micrograms per cubic meter and less than 0.04 micrograms per cubic meter shall not exceed 0.06 tons per year.

(c) The combined potential emissions of all toxic contaminants with screening levels less than 0.005 micrograms per cubic meter shall not exceed 0.006 tons per year.

(d) The emission unit has no potential emissions of asbestos and/or subtilisin proteolytic enzymes.

(e) A description of the emission unit shall be maintained throughout the life of the unit.

(f) Documentation and/or calculations identifying the quality, nature, and quantity of the air contaminant emissions are maintained in sufficient detail to demonstrate that the potential emissions are less than those listed in subdivisions (a) to (d) of this subrule and Table 23. Such documentation shall include the toxic air contaminant screening level applicable at the time of installation and/or modification of the emission unit.

The testing followed United States Environmental Protection Agency (USEPA) Reference Methods 1 through 5, 18, TO-11A, National Institute for Occupational Safety and Health (NIOSH) Method 1501, NIOSH 2000 and Occupational Safety and Health Administration Method 52.

Table 1-1 lists the emission source tested, parameters, and test dates.

**Table 1-1
Source Tested, Parameters, and Test Dates**

Source	Test Parameter(s)	Test Date(s)
Calcium Baghouse	Particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde, methanol	January 20, and 21, 2021

1.2 Key Personnel

The key personnel involved in this test program are listed in Table 1-2. Mr. David Kawasaki, Staff Consultant with Apex, led the emission testing program. Mr. Brant Shimko, Technical Manager with Condat, provided process coordination and recorded operating parameters. Ms. Lindsey Wells, with Michigan Department of Environment, Great Lakes, and Energy (EGLE), witnessed the testing and verified production parameters were recorded.

**Table 1-2
Key Contact Information**

Client	Apex
Brant Shimko Technical Manager Condat Corporation 250 South Industrial Drive Saline, Michigan 48176 Phone: 800.883.7876 x111 bshimko@condatcorp.com	David Kawasaki, QSTI Staff Consultant Apex Companies, LLC 46555 Humboldt Drive, Suite 103 Novi, Michigan 48377 Phone: 248.590.5134 david.kawasaki@apexcos.com
EGLE	
Karen Kajiya-Mills Technical Programs Unit Supervisor EGLE Air Quality Division Technical Programs Unit Constitution Hall, 2 nd Floor, South 525 West Allegan Street Lansing, Michigan 48933 Phone: 517.256.0880 kajiya-millsk@michigan.gov	Lindsey Wells Environmental Quality Analyst EGLE Air Quality Division Technical Programs Unit Constitution Hall, 2 nd Floor, South 525 West Allegan Street Lansing, Michigan 48909 Phone: 517.282.2345 wells18@michigan.gov

2.0 Source and Sampling Locations

2.1 Process Description

Condat Corporation operates four mixers and two process lines to manufacture and supply dry lubricant products. One processing line and two mixers, with 5,000- and 2,000-pound capacities, are dedicated to sodium stearate-based products. Another processing line and two other mixers, with 1,750-pound capacities, are dedicated to calcium stearate-based products. The general manufacturing processing steps consist of:

1. Loading raw materials, such as fatty acids and caustic via pipes and/or bags, into a mixer.
2. Mixing and heating the raw materials for approximately 3 hours.
3. Transferring the product to a cooling and holding area, where the product is stored for approximately 24-hours prior to processing.
4. Transferring the cooled dry product to a vibrating hopper, where the product is gravity fed into hammermills.
5. Hammermills in series grind the product to a coarse granule.
6. From the hammermills, the product is sifted or milled to achieve a specific grain size.
7. After the material has been sifted, it is conveyed to a bagging area. The material is then loaded into 55-gallon drums or supersacks.
8. The contained material is then transferred to the storage warehouse where it is prepared for shipment.

Air emissions from the mixing of raw materials and processing of dry product are controlled by baghouses.

Product identification numbers and batch sizes were recorded by Condat personnel during testing. Production data, along with a Chemical Process Description Document, prepared by Condat, are included in Appendix E.

2.2 Control Equipment Description

The exhaust from the mixers is directed to a cyclone and baghouse. Process Line 2 vents to the Line 2 Calcium Stearate Baghouse.

2.3 Flue Gas Sampling Location

2.3.1 Calcium Baghouse

Two sampling ports oriented at 90° to one another are located in a straight section of a 49 inch-internal-diameter duct. The sampling ports are located:

- Approximately 8 feet (1.7 duct diameters) from the nearest downstream disturbance.
- Approximately 17 feet (3.7 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via boom lift. Figure 2-1 presents a photograph of the Calcium Baghouse sampling location. Figure 1 in the Appendix depicts the Calcium Baghouse sampling ports and traverse point locations.

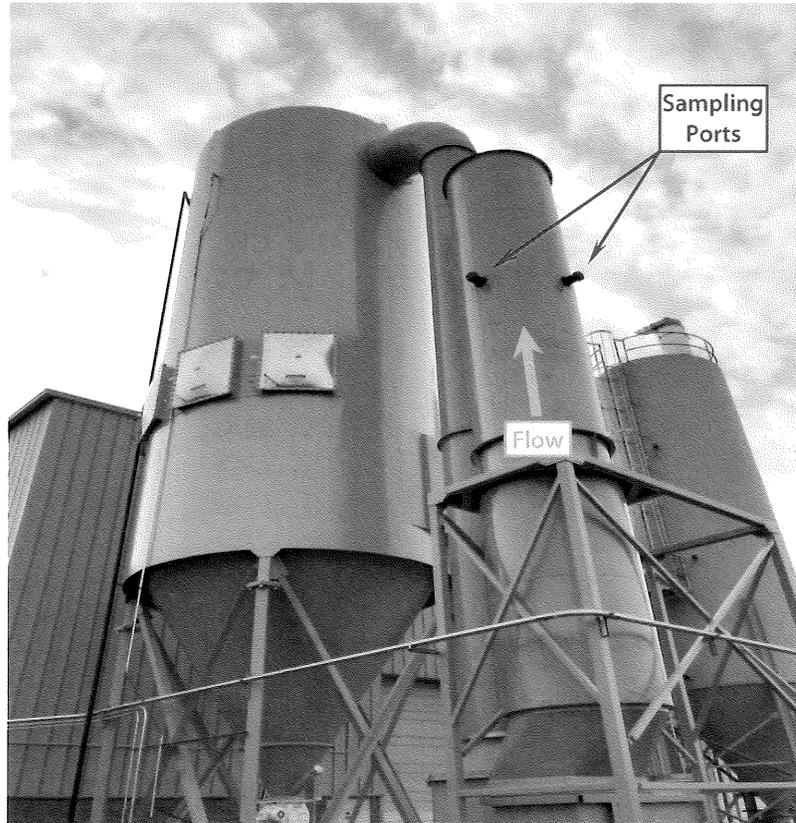


Figure 2-1. Calcium Baghouse Sampling Location

2.4 Process Sampling Locations

Process sampling was not required during this test program. A process sample is a sample that is analyzed for operational parameters, such as calorific value of a fuel (e.g., natural gas, coal), organic compound content (e.g., paint coatings), or composition (e.g., polymers).

3.0 Summary and Discussion of Results

3.1 Objectives and Test Matrix

The objective of the testing was to measure particulate matter (PM) and select volatile organic compound (VOC) emissions from the Calcium Line Baghouse to evaluate permit applicability for this source by comparing the results to Michigan Air Pollution Control Rule 290 or 291 exemption criterion presented below.

Rule 290

(ii) Any emission unit for which the CO₂ equivalent emissions are not more than 6,250 tons per month, the uncontrolled or controlled emissions of all other air contaminants are not more than 1,000 or 500 pounds per month, respectively, and all of the following criteria are met:

(A) For toxic air contaminants, excluding noncarcinogenic volatile organic compounds and noncarcinogenic materials that are listed in R 336.1122(f) as not contributing appreciably to the formation of ozone, with initial threshold screening levels greater than or equal to 0.04 micrograms per cubic meter and less than 2.0 micrograms per cubic meter, the total uncontrolled or controlled emissions shall not exceed 20 or 10 pounds per month, respectively.

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(D) For total mercury, the uncontrolled or controlled emissions shall not exceed 0.01 pounds per month.

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(d) The emission unit has no potential emissions of asbestos and/or subtilisin proteolytic enzymes.

(e) A description of the emission unit shall be maintained throughout the life of the unit.

(f) Documentation and/or calculations identifying the quality, nature, and quantity of the air contaminant emissions are maintained in sufficient detail to demonstrate that the potential emissions are less than those listed in subdivisions (a) to (d) of this subrule and Table 23. Such documentation shall include the toxic air contaminant screening level applicable at the time of installation and/or modification of the emission unit.

Table 3-1 summarizes the sampling and analytical matrix.

**Table 3-1
Sampling and Analytical Matrix**

Source	Sample/Type of Pollutant	Sampling Method	No. of Test Runs and Duration	Analytical Method
Calcium Baghouse	Flowrate, molecular weight, moisture content, particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde, methanol	USEPA 1, 2, 3, 4, 5, 18, TO-11A NIOSH 1501, 2000, OSHA 52	Three 180-minute runs	Pitot tube, chemical absorption analyzer, gravimetric, gas dilution, gas chromatography

Table 3-2 summarizes the screening levels of the pollutants monitored in this test as published by EGLE.¹ The screening levels were used to compare emissions to the applicable requirements of Michigan Air Pollution Control Rule 290 or 291.

**Table 3-2
Pollutant Screening Levels**

Pollutant	Carcinogenic? ^a	ITSL (µg/m ³)	Second ITSL (µg/m ³)	IRSL (µg/m ³)	SRSL (µg/m ³)
Acetaldehyde	Yes	9	-	0.5	5
Acrolein	No	0.16	5	-	-
Ethylbenzene	No	1,000	-	0.4	4
Formaldehyde	Yes	30	-	0.08	0.8
Methanol	No	20,000	28,000	-	-

ITSL: Initial Threshold Screening Level

IRSL: Initial Risk Screening Level

SRSL: Secondary Risk Screening Level

^a The National Institute for Occupational Safety and Health (NIOSH) Occupational Cancer Carcinogen List
<https://www.cdc.gov/niosh/topics/cancer/npotocca.html>

3.2 Field Test Changes and Issues

Communication between Condat, Apex, and EGLE allowed the testing to be completed as proposed in the December 17, 2020, Intent-to-Test Plan.

3.3 Summary of Results

The results of testing are presented in Table 3-3. Detailed results are presented in Appendix Tables 1 through 7 after the Tables Tab of this report. Sample calculations are presented in Appendix B.

¹ Michigan Air Toxics System Initial Threshold Screening Level/Initial Risk Screening Level (ITSL/IRSL) Toxics Screening Level Query Results. <https://www.egle.state.mi.us/itslirsl/results.asp>

**Table 3-3
Calcium Baghouse Results Summary**

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/hr	0.9	0.3	0.1	0.4	-
PM	lb/month [†]	691	190	54	312	500^a
PM	ton/year [‡]	4.1	1.1	0.3	1.8	10^b
Acetaldehyde	lb/hr	0.026	0.031	0.013	0.023	-
Formaldehyde	lb/hr	0.0015	0.0020	0.0013	0.0016	-
Acrolein	lb/hr	<0.010	<0.011	<0.010	<0.010	-
Ethylbenzene	lb/hr	<0.0023	<0.0023	<0.0023	<0.0023	-
Methanol	lb/hr	0.36	0.41	<0.18	0.32	-
Total VOCs	lb/hr	0.40	0.45	0.21	0.35	-
Carcinogenic VOCs	lb/month [†]	20	25	11	18	10^c
Total VOCs	ton/year [‡]	1.7	2.0	0.90	1.5	0.12^d

lb/month: pound per month

ton/year: ton per year

Total VOC: sum of acetaldehyde, acrolein, ethylbenzene, and formaldehyde emissions.

Carcinogenic VOCs: sum of acetaldehyde and formaldehyde emissions.

[†] Assuming 24-hour production for 31 days

[‡] Assuming 24-hour production for 365 days

^a Michigan Air Pollution Control Rule R 336.1290(a)(ii)

^b Michigan Air Pollution Control Rule R 336.1291 Table 23

^c Michigan Air Pollution Control Rule R 336.1290(a)(ii)(B)

^d Michigan Air Pollution Control Rule R 336.1291(a)

The extrapolated results for carcinogenic VOCs (lb/month) exceeded the Michigan Air Pollution Control Rule 290 exemption limit of 10 lb/month of controlled emissions². Therefore, based on the test results, the Michigan Air Pollution Control Rule 290 exemption cannot be applied to the Calcium Baghouse.

The extrapolated results for total VOCs (ton/year) exceeded the Michigan Air Pollution Control Rule 291 exemption limit of 0.12 ton/year. Therefore, based on the test results, the Michigan Air Pollution Control Rule 291 exemption cannot be applied to the Calcium Baghouse.

² Apex considers the Calcium baghouse to represent a control unit.

4.0 Sampling and Analytical Procedures

Apex measured emissions in accordance with USEPA, NIOSH, and OSHA sampling methods. Table 4-1 presents the emissions test parameters and sampling methods.

4.1 Emission Test Methods

**Table 4-1
Emission Testing Methods**

Parameter	Calcium Line Baghouse	USEPA Reference	
		Method	Title
Sampling ports and traverse points	•	1	Sample and Velocity Traverses for Stationary Sources
Velocity and flowrate	•	2	Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)
Molecular weight	•	3	Gas Analysis for the Determination of Dry Molecular Weight
Moisture content	•	4	Determination of Moisture Content in Stack Gases
Particulate matter	•	5	Determination of Particulate Matter Emissions from Stationary Sources
Acetaldehyde, acrolein, ethylbenzene, formaldehyde, methanol	•	18	Measurement of Gaseous Organic Compound Emissions by Gas Chromatography
Acetaldehyde, formaldehyde	•	TO-11A†	Determination of Formaldehyde in Ambient Air Using Adsorbent Cartridge Followed by High performance Liquid Chromatography (HPLC) [Active Sampling Methodology]
Acrolein	•	OSHA 52†	Acrolein
Ethylbenzene	•	NIOSH 1501†	Hydrocarbons, aromatic
Methanol	•	NIOSH 2000†	Methanol

† Method analytical procedures were used in conjunction with USEPA Method 18 sampling

4.1.1 Volumetric Flowrate (USEPA Methods 1 and 2)

USEPA Method 1, "Sample and Velocity Traverses for Stationary Sources," was used to evaluate the sampling locations and the number of traverse points for sampling. Figure 1 in the Appendix depicts the source location and traverse points.

USEPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)," was used to measure flue gas velocity and calculate volumetric flowrates. S-type Pitot tubes and thermocouple assemblies, calibrated in accordance with Method 2, Section 10.0, were used during testing. Because the dimensions of the Pitot tubes met the requirements outlined in Method 2, Section 10.1, and are within the specified limits, the baseline Pitot

tube coefficient of 0.84 (dimensionless) was assigned. The digital manometer and thermometer are calibrated using calibration standards that are traceable to National Institute of Standards and Technology (NIST). Pitot tube inspection sheets are included in Appendix A.

Cyclonic Flow Check. Apex evaluated whether cyclonic flow was present at the sampling location. Cyclonic flow is defined as a flow condition with an average null angle greater than 20°. The direction of flow can be determined by aligning the Pitot tube to obtain zero (null) velocity head reading—the direction would be parallel to the Pitot tube face openings or perpendicular to the null position. By measuring the angle of the Pitot tube face openings in relation to the stack walls when a null angle is obtained, the direction of flow is measured. If the absolute average of the flow direction angles is greater than 20°, the flue gas is considered to be cyclonic at that sampling location and an alternative location should be selected.

The average of the measured traverse point flue gas velocity null angles was less than 20° at the sampling location. The measurements indicate the absence of cyclonic flow.

Field data sheets are included in Appendix C. Computer-generated field data sheets are included in Appendix D.

4.1.2 Molecular Weight (USEPA Method 3)

USEPA Method 3, "Gas Analysis for the Determination of Dry Molecular Weight," was used to determine the molecular weight of the flue gas. Flue gas was extracted from the stack through a probe and directed into a Fyrite® gas analyzer. The concentrations of carbon dioxide (CO₂) and oxygen (O₂) was measured by chemical absorption to within ±0.5%. The average CO₂ and O₂ results of the grab samples was used to calculate molecular weight.

4.1.3 Moisture Content (USEPA Method 4)

Prior to testing, the moisture content was estimated using measurements from previous testing, psychrometric charts, and/or water saturation vapor pressure tables. These data were used in conjunction with preliminary velocity head pressure and temperature data to calculate flue gas velocity, nozzle size, and to establish the isokinetic sampling rate for the Method 5 sampling. For each sampling run, moisture content of the flue gases was measured using the reference method outlined in Section 2 of USEPA Method 4, "Determination of Moisture Content in Stack Gases" in conjunction with the performance of USEPA Method 5.

4.1.4 Filterable Particulate Matter (USEPA Method 5)

USEPA Method 5, "Determination of Particulate Emissions from Stationary Sources," was used to measure the filterable "front-half" particulate matter emissions. The "front half" refers to the filterable particulate mass collected from the nozzle, probe, and filter. Figure 4-1 depicts the USEPA Method 5 sampling train. Apex's modular isokinetic stack sampling system consists of the following:

- A stainless steel or glass button-hook nozzle.
- A heated (248±25°F) stainless steel or glass-lined probe.
- A desiccated and pre-weighed 83-millimeter-diameter glass fiber filter (manufactured to at least 99.95% efficiency (<0.05 % penetration) for 0.3-micron dioctyl phthalate smoke particles) in a heated (248±25°F) filter box.
- A set of four impingers with the configuration shown in Table 4-2.
- A sampling line.
- An Environmental Supply® control case equipped with a pump, dry-gas meter, and calibrated orifice.

Table 4-2
USEPA Method 5 Impinger Configuration

Impinger Order (Upstream to Downstream)	Impinger Type	Impinger Contents	Contents
1	Modified	Water	~100 grams
2	Greenburg Smith	Water	~100 grams
3	Modified	Empty	0 grams
4	Modified	Silica desiccant	~300 grams

Prior to testing, a preliminary velocity traverse was performed and a nozzle size was calculated that would allow isokinetic sampling at an average rate of approximately 0.75 cubic feet per minute (cfm). Apex selected a pre-cleaned nozzle that has an inner diameter that approximates the calculated ideal value. The nozzle was inspected and measured with calipers across three cross-sectional chords to evaluate the inside diameter; rinsed and brushed with acetone; and connected to the sample probe.

The impact and static pressure openings of the Pitot tube were leak-checked at or above a velocity head of 3.0 inches of water for more than 15 seconds. The sampling train was leak-checked by capping the nozzle tip and applying a vacuum of approximately 5 inches of water to the sampling train. The dry-gas meter was then monitored (for approximately 1 minute) to measure that the sample train leak rate is less than 0.02 cubic feet per minute (cfm). The probe and filter heaters were turned on, and the sample probe was inserted into the sampling port to begin sampling.

Ice was placed around the impingers, and the probe and filter temperatures were allowed to stabilize at 248 ± 25 °F before each sample run. After the desired operating conditions were coordinated with the facility, testing was initiated.

Stack parameters (e.g., flue velocity, temperature) were monitored to establish the isokinetic sampling rate within 100 ± 10 % for the duration of the test. Data was recorded at each of the traverse points.

At the conclusion of a test run and the post-test leak check, the sampling train was disassembled and the impingers and filter were transported to the recovery area. The filter was recovered using tweezers and placed in a Petri dish. The Petri dish was immediately labeled and sealed with Teflon tape. The nozzle, probe, and the front half of the filter holder assembly were brushed and, at a minimum, triple-rinsed with acetone to recover particulate matter. The acetone rinses were collected in pre-cleaned sample containers.

At the end of a test run, the mass of liquid collected in each impinger was measured using a scale to within ± 0.5 grams; these masses were used to calculate the moisture content of the flue gas. The contents of the impinger train were discarded after the mass was measured.

Apex labeled each container with the test number, test location, and test date, and marked the level of liquid on the outside of the container. Immediately after recovery, the sample containers were stored. The sample containers were transported to Bureau Veritas Laboratories in Mississauga, Ontario, Canada for analysis. The laboratory analytical results are included in Appendix F.

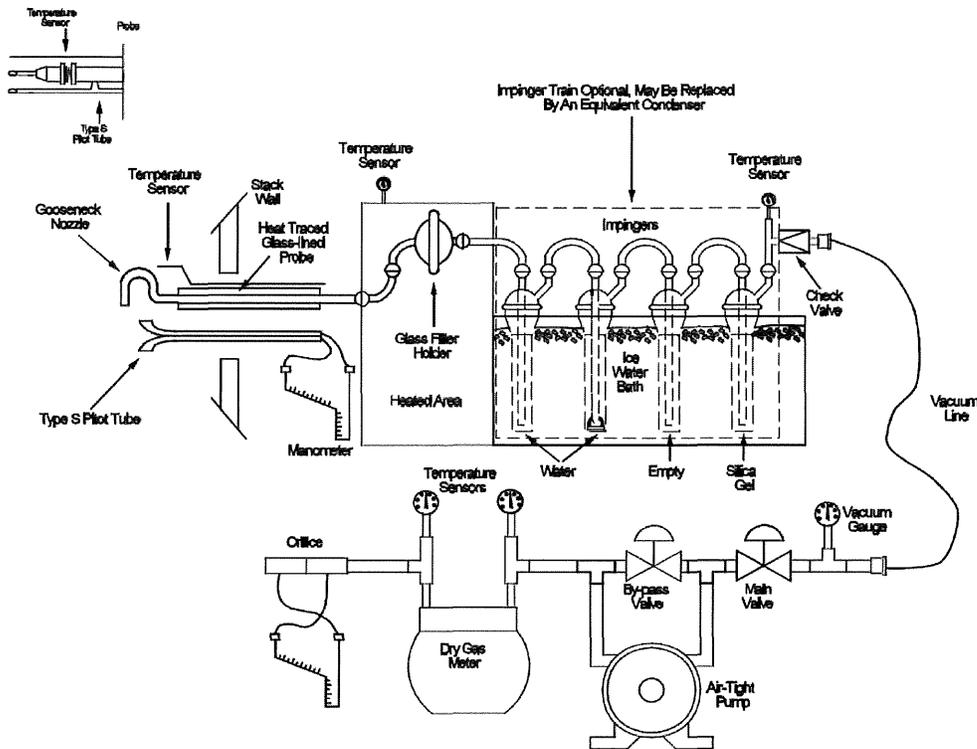


Figure 4-1. USEPA Method 5 Sampling Train

4.1.5 Volatile Organic Compounds (USEPA Methods 18 and TO-11A, OSHA 52, NIOSH 1501, and NIOSH 2000)

USEPA Method 18, "Measurement of Gaseous Organic Compound Emissions by Gas Chromatography," was used to measure select volatile organic compound concentrations. The sampling and analytical procedures followed guidelines in USEPA Method TO-11A, OSHA 52, NIOSH 1501, and NIOSH 2000.

Treated sorbent tubes were used to sample the compound of interest. The mass collected on the sampling media was measured using gas chromatography with flame ionization detector.

The sampling trains consisted of flue gas at the exhaust duct being drawn through sorbent tubes containing an absorptive material. The sorbent tubes were inserted into critical orifices (Gemini® twin-port sampler), which controlled the flowrate, and was connected to a sampling pump.

The USEPA Method 18 sampling train was set at a constant flowrate for a 180-minute test run. The set flowrate varied depending on the analytical method, detection limit, and compound of interest.

Prior to testing, the flowrate through each sorbent tube was measured using a BIOS International DryCal® calibrator. The critical orifices were adjusted to ensure the sample flowrate is within $\pm 20\%$ of the target sampling rate. The pre-test flowrates were recorded on a test run data sheet. After the sampling rate was verified, the sampling train was positioned to sample the flue gas.

Flue gas was sampled into the sorbent tubes for 180-minutes per test run. At the conclusion of each test run, the flowrate was measured using the BIOS International DryCal® calibrator. The average of the pre- and post-test flowrates was used to calculate total sample volume for the test duration. The sample media was then capped and placed in a chilled cooler for storage. The samples were transported to Bureau Veritas Laboratories in Novi, Michigan, for analysis using gas chromatography with flame ionization detector.

Spiked sorbent tubes were used in this test program. The spike recovery calculation compares the concentration measured by the unspiked and spiked sorbent tubes and corrects the results based on the fraction of spiked compound recovered. The spike recovery must be between 70 and 130 percent of the expected spike mass.

Figure 4-2 depicts the USEPA Method 18 sampling train.

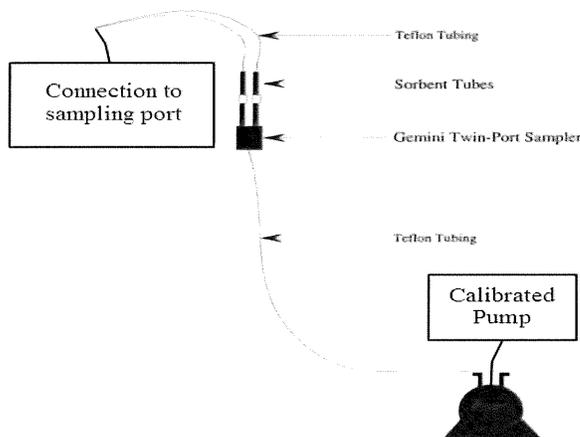


Figure 4-2. USEPA Method 18 Sampling Train

4.2 Process Data

The following parameters were recorded by Condat personnel during the testing and are included in Appendix E.

- Mixing temperature
- Baghouse pressure drop
- Raw material input weight and final product weight
- Production rate
- Type of material manufactured

The following documents are also included in Appendix E:

- Safety Data Sheets for all raw materials used in the manufacturing process
- Chemical Process Description Document, prepared by Condat

5.0 Quality Assurance and Quality Control

5.1 QA/QC Procedures

Equipment used in this emissions test program passed Quality Assurance (QA) and Quality Control (QC) procedures. Refer to Appendix A for equipment calibrations. Before testing, the sampling equipment was cleaned, inspected, and calibrated according to procedures outlined in the applicable USEPA sampling method and USEPA's "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods."

5.2 QA/QC Audits

Onsite QA/QC procedures (i.e., Pitot tube inspections, nozzle size verifications, leak check, calculation of isokinetic sampling rates, calibrations) were performed in accordance with the respective USEPA sampling methods. Equipment inspection and calibration measurements are presented in Appendix A.

Offsite QA audits include dry-gas meter and thermocouple calibrations.

5.2.1 Sampling Train QA/QC

The sampling trains described in Section 4.1 were audited for measurement accuracy and data reliability. Table 5-1 summarizes the QA/QC audits conducted on each sampling train.

**Table 5-1
USEPA Method 5 Sampling Train QA/QC**

	Run 1	Run 2	Run 3	Method Requirement	Comment
Calcium Baghouse					
Sampling train post-test leak check	0 ft ³ for 1 min at 5 in Hg	0 ft ³ for 1 min at 5 in Hg	0 ft ³ for 1 min at 5 in Hg	<0.020 ft ³ for 1 minute at a vacuum \geq recorded during test	Valid
Sampling vacuum (in Hg)	1	1	1		

5.2.2 Dry-Gas Meter QA/QC

Table 5-2 summarizes the dry-gas meter calibration checks in comparison to the acceptable USEPA tolerance. Complete dry-gas meter calibrations are included in Appendix A.

**Table 5-2
Dry-Gas Meter Calibration QA/QC**

Dry-Gas Meter	Pre-test DGM Calibration Factor	Post-test DGM Calibration Factor	Difference Between Pre- and Post-test Calibrations	Acceptable Tolerance	Comment
2	0.998 (1/19/2021)	0.994 (2/25/2021)	-0.004	± 0.05	Valid

5.2.3 Thermocouple QA/QC

Temperature measurements using thermocouples and digital pyrometers were compared to a reference temperature prior to testing to evaluate accuracy of the equipment. The thermocouples and pyrometers measured temperature within $\pm 1.5\%$ of the reference temperatures and were within USEPA acceptance criteria. Thermocouple calibration sheets are included in Appendix A.

5.3 Data Reduction and Validation

The emissions testing Project Manager and/or the QA/QC Officer validated computer spreadsheets. The computer spreadsheets were used to ensure that field calculations were accurate. Random inspection of the field data sheets was conducted to verify data have been recorded appropriately. At the completion of a test, the raw field data were entered into computer spreadsheets to provide applicable onsite emissions calculations. The computer data were checked against the raw field sheets for accuracy during review of the report.

5.4 Sample Identification and Custody

The Apex project manager was responsible for the handling and procurement of the data collected in the field. The project manager ensured the data sheets are accounted for and completed in their entirety. Applicable Chain of Custody procedures followed guidelines outlined within ASTM D4840-99 (Reapproved 2010), "Standard Guide for Sample Chain-of-Custody Procedures." Detailed sampling and recovery procedures are described in Section 4.1. For each sample collected (i.e., impinger), sample identification and custody procedures were completed as follows:

- Containers were sealed to prevent contamination.
- Containers were labeled with test number, location, and test date.
- The level of fluid was marked on the outside of the sample containers to indicate if leakage occurred prior to receipt of the samples by the laboratory.
- Containers were placed in a cooler for storage, if necessary.
- Samples were logged using guidelines outlined in ASTM D4840-99(Reapproved 2010).
- Samples were transported to the laboratory under chain of custody.

Chains of custody and laboratory analytical results are included in Appendix F.

5.5 QA/QC Problems

The USEPA Method 18 spike recovery requirement was not met for the methanol sorbent tube samples. The method requires a spike recovery of 70% to 130% for a set of samples to be considered valid. The average spike recovery of the methanol samples was 38%. The laboratory did not report breakthrough in the samples. The spike recovery factor was still used to correct sample results, following USEPA Method 18, which accounts for low recovery. Because the methanol samples represent a significant portion of the total speciated VOCs measured in the Calcium Baghouse, results were included in the total VOC calculations. These results should be used with caution, but can still provide an estimate of methanol emissions.

The spike recovery of all other samples met the 70% to 130% recovery requirement. No breakthrough was reported in the sample media.

6.0 Limitations

The information and opinions rendered in this report are exclusively for use by Condat Corporation. Apex Companies, LLC will not distribute or publish this report without consent of Condat Corporation except as required by law or court order. The information and opinions are given in response to a limited assignment and should be implemented only in light of that assignment. Apex Companies, LLC accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

Submitted by:
Apex Companies, LLC

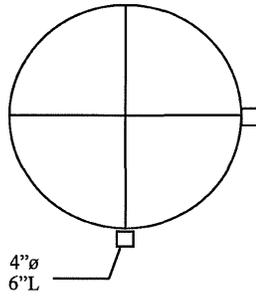


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49" Internal Diameter



Traverse Point	Distance From Stack Wall (inches)
1	1.0
2	3.3
3	5.8
4	8.7
5	12.3
6	17.4
7	31.6
8	36.8
9	40.3
10	43.2
11	45.7
12	48.0

	Distance From Ports to Nearest Upstream Bend/ Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
Calcium Baghouse	17 feet (3.7 diameter)	8 feet (1.7 diameter)

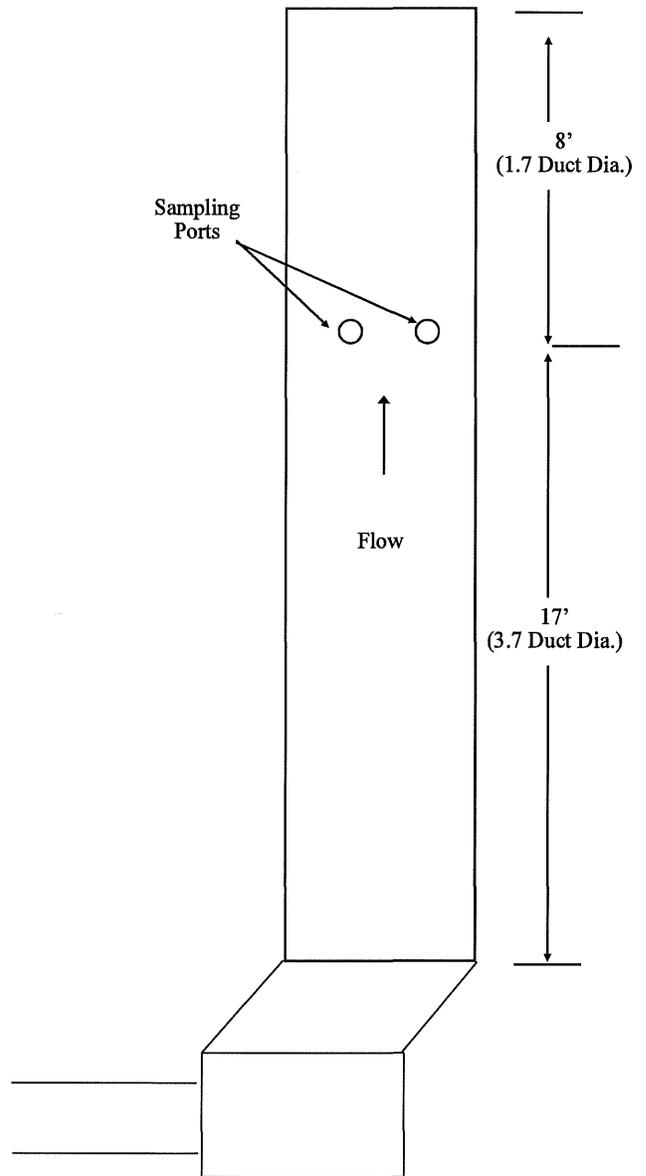


Figure 1
Calcium Baghouse Sampling Ports
and Traverse Point Locations



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