APEX COMPANIES, LLC

Testing of Cyclone, Sodium, Calcium, and Liquid Bay Air Emission Sources

CONDAT

Prepared for:
Condat Corporation
250 South Industrial Drive
Saline, Michigan 48176

Apex Project No. 11019-000120.00

February 6, 2020

Apex Companies, LLC
46555 Humboldt Drive, Suite 103
Novi, Michigan 48377

APEX

Table of Contents

Tables

Figures

Appendix

Tables

Figures

Appendices

Executive Summary

Condat Corporation retained Apex Companies, LLC to test air emissions from four sources at the Condat facility in Saline, Michigan. The purpose of the testing was to measure particulate matter (PM) and select volatile organic compound (VOC) emissions to evaluate whether certain permit-to-install requirements are applicable to these sources. The test results are compared to certain Michigan Department of Energy, Great Lakes, and Environment (EGLE) Rules 290 and 291 exemption requirements.

Apex tested the following emission sources:

- Cyclone
- Sodium Baghouse
- Calcium Baghouse
- Liquid Bay

The testing followed United States Environmental Protection Agency (USEPA) Reference Methods 1 through 5, 18, TO-11A, National Institute for Occupational Safety and Health Method 1501, and Occupational Safety and Health Administration Method 52. USEPA Method 320 was conducted in the event that USEPA Method 18 samples did not pass spike recovery requirements; the Method 320 results were not needed.

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

- The Sodium Baghouse and Liquid Bay emission sources qualify for the Rule 290 exemption for a permit to install.
- The Cyclone, Sodium Baghouse, and Liquid Bay qualify for the Rule 291 exemption for a permit to install based on de *minimis* emissions.

Emission Source	Does emission unit qualify for exemption from permit-to-install requirements?	
	Rule 290 Emission Units with Limited Emissions	Rule 291 Emission Units with *de minimis* Emissions
Cyclone	**No**	Yes
Sodium Baghouse	Yes	Yes
Calcium Baghouse	**No**	**No**
Liquid Bay	Yes	Yes

Condat is aware of a mechanical issue with the Calcium Baghouse after discussions with their third party maintenance company and intends to retest emissions from the Calcium Baghouse. Apex recommends that Condat review the results and rule applicability with EGLE.

Detailed results are presented in Tables 1 through 24 after the Tables Tab of this report. The following tables summarize the results of the testing conducted on December 3 through 6, 2019.

Cyclone Results

Parameters	Units	Run 1	Run 2	Run 3	Average	Limit
PM	lb/month†	81	29	16	**42**	**500[a]**
PM	ton/year‡	0.48	0.17	0.10	**0.25**	**10[b]**
Carcinogenic VOCs	lb/month†	10	18	5.6	**11**	**10[c]**
Total VOCs	ton/year‡	0.073	0.13	0.059	**0.088**	**0.12[d]**

lb/month: pound per month
ton/year: ton per year
Carcinogenic VOCs: sum of acetaldehyde and formaldehyde emissions.
Total VOC: sum of acetaldehyde, acrolein, ethylbenzene, 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)

Sodium Baghouse Results

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/month†	45	39	101	**61**	**500[a]**
PM	ton/year‡	0.26	0.23	0.59	**0.36**	**10[b]**
Carcinogenic VOCs	lb/month†	0.78	1.9	1.2	**1.3**	**10[c]**
Total VOCs	ton/year‡	0.066	0.071	0.068	**0.069**	**0.12[d]**

See footnotes in table above.

Calcium Baghouse Results

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/month†	877	917	910	**901**	**500[a]**
PM	ton/year‡	5.2	5.4	5.4	**5.3**	**10[b]**
Carcinogenic VOCs	lb/month†	10	19	10	**13**	**10[c]**
Total VOCs	ton/year‡	0.18	0.26	0.19	**0.21**	**0.12[d]**

See footnotes in table above.

Liquid Bay Results

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/month†	6.6	5.3	4.6	**5.5**	**500[a]**
PM	ton/year‡	0.039	0.031	0.027	**0.032**	**10[b]**
Carcinogenic VOCs	lb/month†	0.26	0.21	0.19	**0.22**	**10[c]**
Total VOCs	ton/year‡	0.0088	0.0085	0.0078	**0.0084**	**0.12[d]**

See footnotes in table above.

1.0 Introduction

1.1 Summary of Test Program

Condat Corporation retained Apex Companies, LLC to test air emissions from four sources at the Condat facility in Saline, Michigan. The purpose of the testing was to measure particulate matter (PM) and select volatile organic compound (VOC) emissions to evaluate whether certain Michigan Department of Energy, Great Lakes, and Environment (EGLE) permit-to-install requirements are applicable for these sources.

The test results are compared to certain EGLE Rule 290 and 291 permit-to-install exemption requirements presented below:

Rule 290

(ii) Any emission unit for which the CO_2 equivalent emissions are not more than 6,250 tons per months, 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.

Apex tested the following emission sources:

- Cyclone
- Sodium Baghouse
- Calcium Baghouse
- Liquid Bay

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, and Occupational Safety and Health Administration (OSHA) Method 52.

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

Table 1-1
Sources Tested, Parameters, and Test Dates

Source	Test Parameter	Test Date(s)
Cyclone	Particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	December 3, 2019
Sodium Baghouse	Particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	December 4, 2019
Calcium Baghouse	Particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	December 5, 2019
Liquid Bay	Particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	December 6, 2019

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. Ms. Katelyn Staley, Inventory Controller/HESQ with Condat, and Mr. Brant Shimko, Technical Manager with Condat, provided process coordination and recorded operating parameters. Mr. Tom Gasloli, with EGLE, witnessed the testing and verified production parameters were recorded.

Table 1-2
Key Contact Information

Client	Apex
Katelyn Staley Inventory Controller / HESQ **Condat Corporation** 250 South Industrial Drive Saline, Michigan 48176 Phone: 800.883.7876 x101 kstaley@condatcorp.com 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, 2nd Floor, South 525 West Allegan Street Lansing, Michigan 48933 Phone: 517.256.0880 kajiya-millsk@michigan.gov	Tom Gasloli **EGLE Air Quality Division** **Technical Programs Unit** Constitution Hall, 2nd Floor, South 525 West Allegan Street Lansing, Michigan 48933 Phone: 517.335.3122 tgasloli@michigan.gov

2.0 Source and Sampling Locations

2.1 Process Description

Condat Corporation operates two process lines, consisting of two mixers each, to manufacture and supply dry lubricant products. Process Line 1, which includes a 5,000-lb capacity mixer and a 2,000-lb mixer, is dedicated to sodium stearate-based products. Process Line 2, which includes two 1,750-lb mixers, is dedicated to calcium stearate-based products.

The general manufacturing steps are the following:

1. Load raw materials, such as fatty acids and caustic, via pipes and/or bags into a mixer.
2. Mix and heat the raw materials for approximately 3 hours.
3. Transfer the product to a cooling and holding area, where the product is stored for approximately 24 hours prior to further processing.
4. Transfer the cooled dry product to a vibrating hopper, where the product is gravity fed into hammermills.
5. Grind the product to a coarse granule using Hammermills in series.
6. Sift or mill the product to a specific grain size.
7. Convey the product to a bagging area and load into 55-gallon drums or supersacks.
8. Transfer the drums or supersacks to the warehouse, where they are prepared for shipment.

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

The Liquid Bay dust collector extracts from twelve blenders in Bay 2. The size of the blenders ranges from 330 to 10,000 gallons. Six of the blenders are for oil-based products (i.e. petroleum and vegetable), and the remaining six are for water based or water/oil containing products. The process is primarily blending of materials; the only reactions are acid-base neutralization. The quantity of powder raw materials used is minimal compared to the other processes.

Product identification numbers and batch sizes were recorded by Condat personnel during testing. Production data are included in Appendix E.

2.2 Control Equipment Description

The exhaust from the mixers is directed to a cyclone and baghouse. Process Line 1 vents to the Line 1 Sodium Stearate Baghouse and Process Line 2 vents to the Line 2 Calcium Stearate Baghouse.

2.3 Flue Gas Sampling Locations

2.3.1 Cyclone

Two sampling ports oriented at 90° to one another are located in a straight section of an 18.75-inch-internal-diameter duct. The sampling ports are located:

- Approximately 12 feet (7.7 duct diameters) from the nearest downstream disturbance.
- Approximately 15 feet (9.6 duct diameters) from the nearest upstream disturbance.

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

Figure 2-1. Cyclone Sampling Location

2.3.2 Sodium Baghouse

Two sampling ports oriented at 90° to one another are located in a straight section of a 28.75 inch-internal-diameter duct. The sampling ports are located:

- Approximately 14 feet (5.8 duct diameters) from the nearest downstream disturbance.
- Approximately 13 feet (5.4 duct diameters) from the nearest upstream disturbance.

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

Figure 2-2. Sodium Baghouse Sampling Location

2.3.3 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 2-3 presents a photograph of the Calcium Baghouse sampling location. Figure 3 in the Appendix depicts the Calcium Baghouse sampling ports and traverse point locations.

Figure 2-3. Calcium Baghouse Sampling Location

2.3.4 Liquid Bay

Two sampling ports oriented at 90° to one another are located in a straight section of a 16.5 inch-internal-diameter duct. The sampling ports are located:

- Approximately 21 feet (15.3 duct diameters) from the nearest downstream disturbance.
- Approximately 9 feet (6.5 duct diameters) from the nearest upstream disturbance.

The sampling ports are accessible via boom lift. Figure 2-4 presents a photograph of the Liquid Bay sampling location. Figure 4 in the Appendix depicts the Liquid Bay sampling ports and traverse point locations.

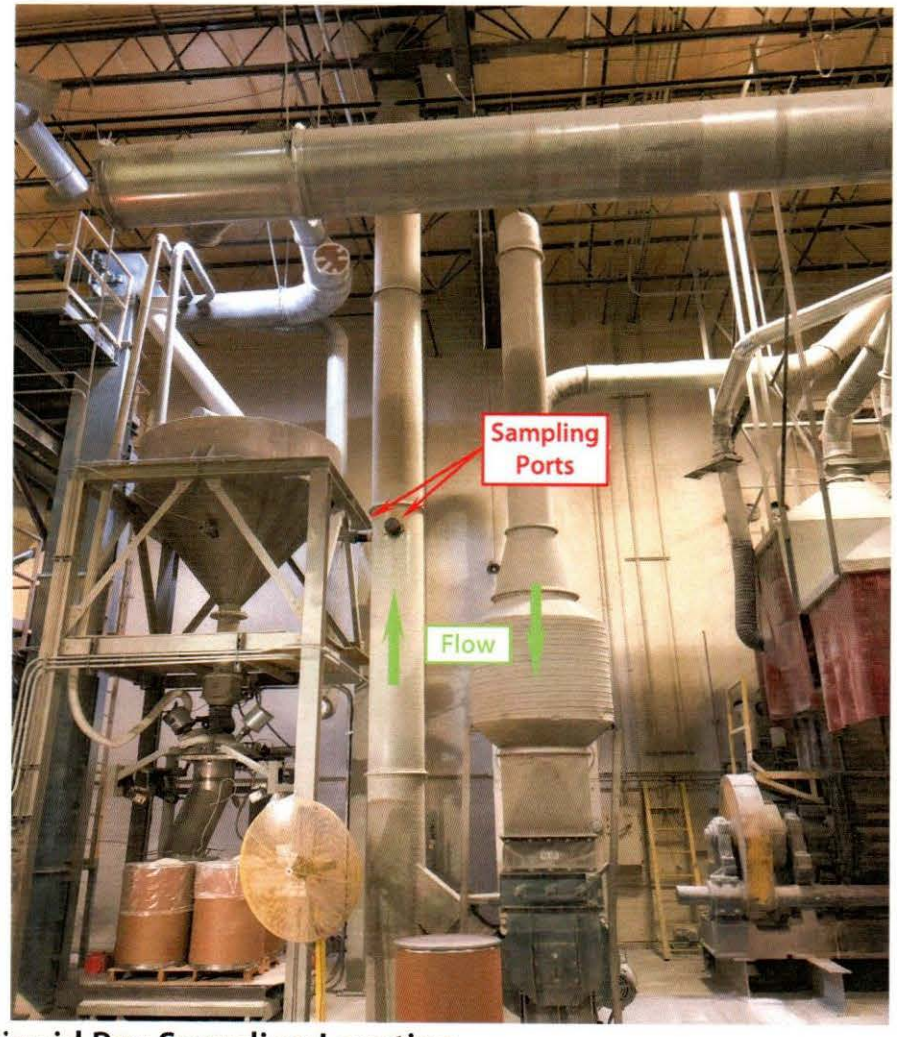


Figure 2-4. Liquid Bay Sampling Location

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 PM and select VOC emissions to evaluate permit applicability for these sources by comparing the results to certain Rule 290 or 291 exemption criterion presented below:

Rule 290

(ii) Any emission unit for which the CO_2 equivalent emissions are not more than 6,250 tons per months, 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.

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
Cyclone	Flowrate, molecular weight, moisture content, particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	USEPA 1, 2, 3, 4, 5, 18, 320, TO-11A NIOSH 1501, OSHA 52	Three 60-minute runs	Pitot tube, chemical absorption analyzer, gravimetric, gas dilution, Fourier Transform Infrared analyzer, high performance liquid chromatography, gas chromatography
Sodium Baghouse	Flowrate, molecular weight, moisture content, particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	USEPA 1, 2, 3, 4, 5, 18, 320, TO-11A NIOSH 1501, OSHA 52	Three 60-minute runs	Pitot tube, chemical absorption analyzer, gravimetric, gas dilution, Fourier Transform Infrared analyzer, high performance liquid chromatography, gas chromatography
Calcium Baghouse	Flowrate, molecular weight, moisture content, particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	USEPA 1, 2, 3, 4, 5, 18, 320, TO-11A NIOSH 1501, OSHA 52	Three 60-minute runs	Pitot tube, chemical absorption analyzer, gravimetric, gas dilution, Fourier Transform Infrared analyzer, high performance liquid chromatography, gas chromatography
Liquid Bay	Flowrate, molecular weight, moisture content, particulate matter, acetaldehyde, acrolein, ethylbenzene, formaldehyde	USEPA 1, 2, 3, 4, 5, 18, 320, TO-11A NIOSH 1501, OSHA 52	Three 60-minute runs	Pitot tube, chemical absorption analyzer, gravimetric, gas dilution, Fourier Transform Infrared analyzer, high performance liquid chromatography, 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 Rule 290 or 291.

Table 3-2
Pollutant Screening Levels

Pollutant	Carcinogenic?	ITSL ($\mu g/m^3$)	Second ITSL ($\mu g/m^3$)	IRSL ($\mu g/m^3$)	SRSL ($\mu g/m^3$)
Acetaldehyde	Yes[a]	9	-	0.5	0.5
Acrolein	No[a]	0.16	5	-	-
Ethylbenzene	No[a]	1,000	-	0.4	4
Formaldehyde	Yes[a]	30	-	0.08	0.8

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 October 21, 2019, Intent-to-Test Plan and the November 18, 2019 Amendment.

3.3 Summary of Results

The results of testing are presented in Tables 3-3 through 3-6. Detailed results are presented in the Appendix Tables 1 through 24 after the Tables Tab of this report. Sample calculations are presented in Appendix B.

Condat is aware of a mechanical issue with the Calcium Baghouse after discussions with their third party maintenance company and intends to retest emissions from the Calcium Baghouse.

[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
Cyclone Results Summary

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/hr	0.11	0.040	0.022	**0.057**	-
PM	lb/month†	81	29	16	**42**	**500[a]**
PM	ton/year‡	0.48	0.17	0.10	**0.25**	**10[b]**
Acetaldehyde	lb/hr	0.014	0.023	0.0071	**0.015**	-
Formaldehyde	lb/hr	0.00047	0.00087	0.00039	**0.00058**	-
Acrolein	lb/hr	<0.0019	<0.0021	<0.0016	**<0.0019**	-
Ethylbenzene	lb/hr	0.00071	0.0042	0.0045	**0.0031**	-
Total VOCs	lb/hr	0.017	0.030	0.014	**0.020**	-
Carcinogenic VOCs	lb/month†	10	18	5.6	**11**	**10[c]**
Total VOCs	ton/year‡	0.073	0.13	0.059	**0.088**	**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)

Table 3-4
Sodium Baghouse Results Summary

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/hr	0.060	0.052	0.14	**0.082**	-
PM	lb/month†	45	39	101	**61**	**500[a]**
PM	ton/year‡	0.26	0.23	0.59	**0.36**	**10[b]**
Acetaldehyde	lb/hr	0.00074	0.0020	0.0011	**0.0013**	-
Formaldehyde	lb/hr	0.00031	0.00050	0.00056	**0.00045**	-
Acrolein	lb/hr	<0.012	<0.012	<0.012	**<0.012**	-
Ethylbenzene	lb/hr	<0.0019	<0.0019	<0.0020	**<0.0019**	-
Total VOCs	lb/hr	0.015	0.016	0.016	**0.016**	-
Carcinogenic VOCs	lb/month†	0.78	1.9	1.2	**1.3**	**10[c]**
Total VOCs	ton/year‡	0.066	0.071	0.068	**0.069**	**0.12[d]**

See footnotes in table above.

Table 3-5
Calcium Baghouse Results Summary

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/hr	1.2	1.2	1.2	**1.2**	-
PM	lb/month†	877	917	910	**901**	**500[a]**
PM	ton/year‡	5.2	5.4	5.4	**5.3**	**10[b]**
Acetaldehyde	lb/hr	0.013	0.024	0.011	**0.016**	-
Formaldehyde	lb/hr	0.0012	0.0016	0.0023	**0.0017**	-
Acrolein	lb/hr	<0.024	<0.028	<0.025	**<0.026**	-
Ethylbenzene	lb/hr	<0.0043	0.0060	<0.0044	**0.0049**	-
Total VOCs	lb/hr	0.042	0.060	0.043	**0.048**	-
Carcinogenic VOCs	lb/month†	10	19	10	**13**	**10[c]**
Total VOCs	ton/year‡	0.18	0.26	0.19	**0.21**	**0.12[d]**

See footnotes in table above.

Table 3-6
Liquid Bay Results Summary

Parameters	Unit	Run 1	Run 2	Run 3	Average	Limit
PM	lb/hr	0.0088	0.0071	0.0062	**0.0074**	-
PM	lb/month†	6.6	5.3	4.6	**5.5**	**500[a]**
PM	ton/year‡	0.039	0.031	0.027	**0.032**	**10[b]**
Acetaldehyde	lb/hr	0.00015	0.00015	0.00011	**0.00014**	-
Formaldehyde	lb/hr	0.00019	0.00013	0.00015	**0.00016**	-
Acrolein	lb/hr	<0.0014	<0.0014	<0.0012	**<0.0013**	-
Ethylbenzene	lb/hr	<0.00030	<0.00030	<0.00027	**<0.00029**	-
Total VOCs	lb/hr	0.0020	0.0020	0.0018	**0.0019**	-
Carcinogenic VOCs	lb/month†	0.26	0.21	0.19	**0.22**	**10[c]**
Total VOCs	ton/year‡	0.0088	0.0085	0.0078	**0.0084**	**0.12[d]**

See footnotes in table above.

The extrapolated results for total VOCs (lb/month) for the Cyclone, Sodium Baghouse, and Calcium Baghouse exceeded the Rule 290 exemption limit of 10 lb/month of controlled emissions.[2]. In addition, the extrapolated results for particulate matter (lb/month) at the Calcium Baghouse exceeded the Rule 290 exemption limit of 500 lb/month of controlled emissions. Therefore, based on the test results. the Rule 290 exemption cannot be applied to the Cyclone, Sodium Baghouse, and Calcium Baghouse. The Liquid Bay qualifies for the Rule 290 exemption.

The extrapolated results for total VOCs (ton/year) at the Calcium Baghouse exceeded the Rule 291 exemption limit of 0.12 ton/year. Therefore, based on the test results, the Rule 291 exemption cannot be applied to the Calcium Baghouse. The Cyclone, Sodium Baghouse, and Liquid Bay qualify for the Rule 291 exemption.

---

[2] Apex considers the three baghouses (Cyclone, Sodium, and Calcium) and Liquid Bay dust collector to represent control units.

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	Four Emission Units	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	•	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

† 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. Figures 1 through 4 in the Appendix depict the source locations 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 locations. 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 were less than 20° at the sampling locations. 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 (CO_2) and oxygen (O_2) was measured by chemical absorption to within ±0.5%. The average CO_2 and O_2 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.

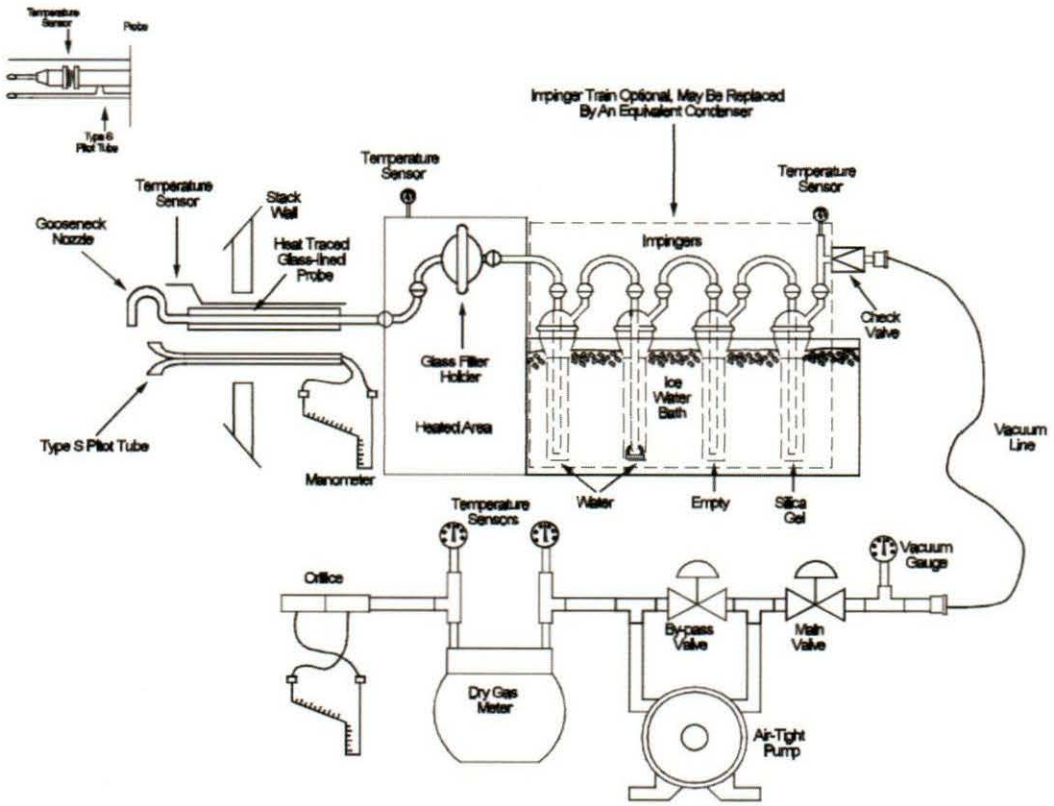


Figure 4-1. USEPA Method 5 Sampling Train

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

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, NIOSH 1501, and OSHA 52.

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 60-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 ±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 60-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.

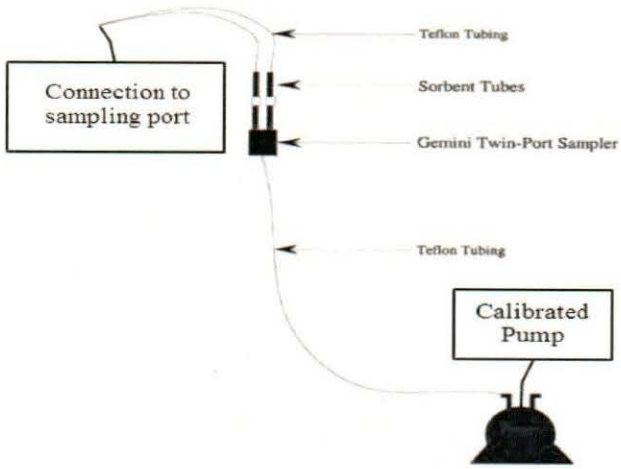


Figure 4-2. USEPA Method 18 Sampling Train

4.2 Process Data

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

- Raw material process weights and rates
- Dry material process weights and rates
- Baghouse pulse cleaning performed prior to testing and collection hopper weight
- Type of material manufactured

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
Cyclone					
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 ≥ recorded during test	Valid
Sampling vacuum (in Hg)	1	1	1		
Sodium 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 ≥ recorded during test	Valid
Sampling vacuum (in Hg)	1	1	1		
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 ≥ recorded during test	Valid
Sampling vacuum (in Hg)	1	1	1		
Liquid Bay					
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 ≥ recorded during test	Valid
Sampling vacuum (in Hg)	1	1 to 3	1 to 3		

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
7	0.999 (10/30/2019)	0.963 (1/3/2020)	0.036	±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 ±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 QA/QC Problems

Equipment audits and QA/QC procedures demonstrate sample collection accuracy and compliance for the test runs.

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 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

David Kawasaki, QSTI
Staff Consultant
Apex Companies, LLC
david.kawasaki@apexcos.com
248.590.5134

Derek R. Wong, Ph.D., P.E.
National Account Manager
Apex Companies, LLC
derek.wong@apexcos.com
248.875.7581

Tables

Table 1 - Cyclone Particulate Matter Results

Facility		Condat Corporation			
Source Designation		Cyclone			
Test Date		Dec 3, 2019	Dec 3, 2019	Dec 3, 2019	
Meter/Nozzle Information		**Run 1**	**Run 2**	**Run 3**	**Average**
Meter Temperature, T_m	°F	82	91	97	90
Meter Pressure, P_m	in Hg	29.00	28.99	28.99	29.00
Measured Sample Volume, V_m	ft^3	40.36	39.47	40.88	40.24
Sample Volume, V_m	std ft^3	38.07	36.59	37.52	37.39
Sample Volume, V_m	std m^3	1.08	1.04	1.06	1.06
Condensate Volume, V_w	std ft^3	1.32	2.67	3.58	2.52
Gas Density, ρ_s	std lb/ft^3	0.0739	0.0730	0.0724	0.0731
Total weight of sampled gas	lb	2.912	2.864	2.794	2.856
Nozzle Size, A_n	ft^2	0.0004974	0.0004974	0.0004974	0.0004974
Isokinetic Variation, I	%	99	103	109	104
Stack Data					
Average Stack Temperature, T_s	°F	100	116	121	112
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	28.84	28.84	28.84	28.84
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	28.48	28.10	27.89	28.16
Stack Gas Specific Gravity, G_s		0.98	0.97	0.96	0.97
Percent Moisture, B_{ws}	%	3.34	6.80	8.72	6.29
Water Vapor Volume (fraction)		0.033	0.068	0.087	0.063
Pressure, P_s	in Hg	28.90	28.90	28.90	28.90
Average Stack Velocity, V_s	ft/sec	24.39	23.98	24.07	24.15
Area of Stack	ft^2	1.92	1.92	1.92	1.92
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	2,806	2,758	2,769	2,778
Flowrate	ft^3/min, standard wet	2,558	2,443	2,431	2,477
Flowrate	ft^3/min, standard dry	2,472	2,277	2,219	2,323
Flowrate	m^3/min, standard dry	70	64	63	66
Collected Mass					
Acetone Wash	mg	9.2	4.5	2.5	5.4
Filter	mg	3.50	<0.30	<0.30	1.4
Total Filterable Particulate Matter (FPM)	mg	12.7	4.8	2.8	6.8
Concentration					
Particulate Matter (FPM)	mg/dscf	0.33	0.13	0.075	0.18
Particulate Matter (FPM)	grain/dscf	0.0051	0.0020	0.0012	0.0028
Mass Emission Rate					
Particulate Matter (FPM)	lb/hr	0.11	0.040	0.022	0.057
Particulate Matter (FPM)	lb/month	81	29	16	42
Particulate Matter (FPM)	ton/yr	0.48	0.17	0.10	0.25

APEX

Table 2
Cyclone VOC Results
Condat Corporation
Saline, Michigan
Sampling Date: December 3, 2019
Apex Project No. 11019-000120.00

Parameter	Run 1	Run 2	Run 3	Average
Sample Start and End Time	9:11	11:29	13:06	
Sample Duration (min)	60	60	60	
Acetaldehyde Mass Emission Rate (lb/hr)	**0.014**	**0.023**	**0.0071**	**0.015**
Formaldehyde Mass Emission Rate (lb/hr)	**0.00047**	**0.00087**	**0.00039**	**0.00058**
Acrolein Mass Emission Rate (lb/hr)	**<0.0019**	**<0.0021**	**<0.0016**	**<0.0019**
Ethylbenzene Mass Emission Rate (lb/hr)	**0.00071**	**0.0042**	**0.0045**	**0.0031**
Total Speciated VOC Mass Emission Rate (lb/hr)	**0.017**	**0.030**	**0.014**	**0.020**
Carcinogenic VOC Mass Emission Rate (lb/month)†	**10**	**18**	**5.6**	**11**
Total Speciated VOC Mass Emission Rate (ton/year)‡	**0.073**	**0.13**	**0.059**	**0.088**

lb/hr pound per hour
lb/month pound per month
ton/year ton per year
† assuming 24 hour production for 31 days
‡ assuming 24 hour production for 365 days

Table 3

Cyclone Acetaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 3, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:11		11:29		13:06		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	2,558		2,443		2,431		2,477
Ambient Temperature (°F)	69		69		69		69
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.71
Atmospheric Pressure (in Hg)	28.9		29.8		29.8		29.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	200.8	230.3	177.6	224.2	189.3	160.5	197.1
Post-Sampling Flowrate (cc/min)	220.5	240.5	165.5	207.1	187.5	160.9	197.0
Sampling Flowrate Pre-test to Post-test Change (%)	9.8	4.4	6.9	7.6	1.0	0.25	5.0
Average Sampling Flowrate (cc/min)	210.7	235.4	171.6	215.7	188.4	160.7	197.1
Average Sampling Flowrate (dry standard l/min)	0.198	0.221	0.166	0.209	0.183	0.156	0.189
Sample Volume (l, dry standard)	11.9	13.3	10.0	12.6	11.0	9.4	11.3
Sorbent Tube							
Acetaldehyde Mass (µg)	14	29	21	30	7.1	19	20
Acetaldehyde Spike Mass (µg)	-	12	-	12	-	12	12
Acetaldehyde Concentration (mg/dscm)	1.2	-	2.1	-	0.65	-	1.3
Acetaldehyde Spike Recovery (R)	-	1.11	-	0.30	-	1.08	**0.83**
Total							
Acetaldehyde Mass in Sorbent Tube (µg)†	17		25		8.5		17
Acetaldehyde Concentration (mg/dscm)†	1.4		2.5		0.78		1.6
Acetaldehyde Mass Emission Rate (lb/hr)†	**0.014**		**0.023**		**0.0071**		**0.015**

† Corrected for spike recovery following USEPA Method 18

Table 4

Cyclone Formaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 3, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:11		11:29		13:06		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	2,558		2,443		2,431		2,477
Ambient Temperature (°F)	69		69		69		69
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.71
Atmospheric Pressure (in Hg)	28.9		29.8		29.8		29.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	200.8	230.3	177.6	224.2	189.3	160.5	197.1
Post-Sampling Flowrate (cc/min)	220.5	240.5	165.5	207.1	187.5	160.9	197.0
Sampling Flowrate Pre-test to Post-test Change (%)	9.8	4.4	6.9	7.6	1.0	0.25	5.0
Average Sampling Flowrate (cc/min)	210.7	235.4	171.6	215.7	188.4	160.7	197.1
Average Sampling Flowrate (dry standard l/min)	0.198	0.221	0.166	0.209	0.183	0.156	0.189
Sample Volume (l, dry standard)	11.9	13.3	10.0	12.6	11.0	9.4	11.3
Sorbent Tube							
Formaldehyde Mass (µg)	0.52	3.3	0.84	3.7	0.42	3.0	2.0
Formaldehyde Spike Mass (µg)	-	3	-	3	-	3	3
Formaldehyde Concentration (mg/dscm)	0.044	-	0.084	-	0.038	-	0.055
Formaldehyde Spike Recovery (R)	-	0.91	-	0.88	-	0.88	**0.89**
Total							
Formaldehyde Mass in Sorbent Tube (µg)†	0.58		0.94		0.47		0.67
Formaldehyde Concentration (mg/dscm)†	0.049		0.095		0.043		0.062
Formaldehyde Mass Emission Rate (lb/hr)†	**0.00047**		**0.00087**		**0.00039**		**0.00058**

† Corrected for spike recovery following USEPA Method 18.

APEX

Table 5

Cyclone Acrolein Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 3, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:11		11:29		13:06		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	2,558		2,443		2,431		2,477
Ambient Temperature (°F)	69		69		69		69
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.71
Atmospheric Pressure (in Hg)	28.9		29.8		29.8		29.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	113.6	98.6	83.5	74.6	126.4	105.7	100.4
Post-Sampling Flowrate (cc/min)	98.0	88.5	97.9	83.6	110.5	95.8	95.7
Sampling Flowrate Pre-test to Post-test Change (%)	13.7	10.2	17.3	12.1	12.6	9.4	12.5
Average Sampling Flowrate (cc/min)	105.8	93.6	90.7	79.1	118.5	100.8	98.1
Average Sampling Flowrate (dry standard l/min)	0.099	0.088	0.088	0.077	0.115	0.098	0.094
Sample Volume (l, dry standard)	6.0	5.3	5.3	4.6	6.9	5.9	5.6
Sorbent Tube							
Acrolein Mass (µg)	<1.4	5.8	<1.4	6.1	<1.4	5.7	3.6
Acrolein Spike Mass (µg)	-	4	-	4	-	4	4.0
Acrolein Concentration (mg/dscm)	<0.23	-	<0.27	-	<0.20	-	<0.23
Acrolein Spike Recovery (R)	-	1.14	-	1.22	-	1.13	**1.16**
Total							
Acrolein Mass in Sorbent Tube (µg)†	<1.2		<1.2		<1.2		<1.2
Acrolein Concentration (mg/dscm)†	<0.20		<0.23		<0.17		<0.20
Acrolein Mass Emission Rate (lb/hr)†	**<0.0019**		**<0.0021**		**<0.0016**		**<0.0019**

† Corrected for spike recovery following USEPA Method 18.

Table 6

Cyclone Ethylbenzene Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 3, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:11		11:29		13:06		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	2,558		2,443		2,431		2,477
Ambient Temperature (°F)	69		69		69		69
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.7
Atmospheric Pressure (in Hg)	28.9		29.8		29.8		29.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	170.6	170.6	179.1	168.1	176.3	163.0	171.3
Post-Sampling Flowrate (cc/min)	175.7	173.5	182.0	159.8	177.2	161.8	171.7
Sampling Flowrate Pre-test to Post-test Change (%)	3.0	1.7	1.6	4.9	0.5	0.7	2.1
Average Sampling Flowrate (cc/min)	173.2	172.1	180.5	164.0	176.7	162.4	171.5
Average Sampling Flowrate (dry standard l/min)	0.163	0.162	0.175	0.159	0.172	0.158	0.2
Sample Volume (l, dry standard)	9.8	9.7	10.5	9.5	10.3	9.5	9.9
Sorbent Tube							
Ethylbenzene Mass (µg)	0.59	5.0	3.5	6.7	3.7	6.3	4.3
Ethylbenzene Spike Mass (µg)	-	5	-	5	-	5	5
Ethylbenzene Concentration (mg/dscm)	0.06	-	0.33	-	0.36	-	0.3
Ethylbenzene Spike Recovery (R)	-	0.88	-	0.70	-	0.58	**0.72**
Total							
Ethylbenzene Mass in Sorbent Tube (µg)†	0.82		4.8		5.1		3.6
Ethylbenzene Concentration (mg/dscm)†	0.078		0.46		0.49		0.34
Ethylbenzene Mass Emission Rate (lb/hr)†	**0.00071**		**0.0042**		**0.0045**		**0.0031**

† Corrected for spike recovery following USEPA Method 18.

Table 7 -Sodium Baghouse Particulate Matter Results

Facility		Condat Corporation			
Source Designation		Sodium Baghouse			
Test Date		Dec 4, 2019	Dec 4, 2019	Dec 4, 2019	
Meter/Nozzle Information		**Run 1**	**Run 2**	**Run 3**	**Average**
Meter Temperature, T_m	°F	91	96	96	94
Meter Pressure, P_m	in Hg	28.61	28.61	28.61	28.61
Measured Sample Volume, V_m	ft^3	42.63	42.14	41.81	42.20
Sample Volume, V_m	std ft^3	39.00	38.20	37.96	38.38
Sample Volume, V_m	std m^3	1.10	1.08	1.07	1.09
Condensate Volume, V_w	std ft^3	0.47	0.26	0.16	0.30
Gas Density, ρ_s	std lb/ft^3	0.0745	0.0747	0.0747	0.0746
Total weight of sampled gas	lb	2.942	2.872	2.918	2.910
Nozzle Size, A_n	ft^2	0.0003142	0.0003142	0.0003142	0.0003142
Isokinetic Variation, I	%	100	98	96	98
Stack Data					
Average Stack Temperature, T_s	°F	89	89	91	90
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	28.84	28.84	28.84	28.84
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	28.71	28.77	28.80	28.76
Stack Gas Specific Gravity, G_s		0.99	0.99	0.99	0.99
Percent Moisture, B_{ws}	%	1.19	0.67	0.41	0.76
Water Vapor Volume (fraction)		0.012	0.007	0.004	0.008
Pressure, P_s	in Hg	28.47	28.47	28.47	28.47
Average Stack Velocity, V_s	ft/sec	38.31	38.02	38.47	38.27
Area of Stack	ft^2	4.51	4.51	4.51	4.51
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	10,363	10,285	10,405	10,351
Flowrate	ft^3/min, standard wet	9,487	9,405	9,494	9,462
Flowrate	ft^3/min, standard dry	9,374	9,342	9,455	9,390
Flowrate	m^3/min, standard dry	265	265	268	266
Collected Mass					
Acetone Wash	mg	1.6	1.3	3.8	2.2
Filter	mg	<0.30	<0.30	<0.30	0.30
Total Filterable Particulate Matter (FPM)	mg	1.9	1.6	4.1	2.5
Concentration					
Particulate Matter (FPM)	mg/dscf	0.049	0.042	0.11	0.066
Particulate Matter (FPM)	grain/dscf	0.00075	0.00065	0.0017	0.0010
Mass Emission Rate					
Particulate Matter (FPM)	lb/hr	0.060	0.052	0.14	0.082
Particulate Matter (FPM)	lb/month	45	39	101	61
Particulate Matter (FPM)	ton/yr	0.26	0.23	0.59	0.36

Table 8

Sodium Baghouse VOC Results

Condat Corporation

Saline, Michigan

Sampling Date: December 4, 2019

Apex Project No. 11019-000120.00

Parameter	Run 1	Run 2	Run 3	Average
Sample Start and End Time	8:44	10:33	12:49	
Sample Duration (min)	60	60	60	
Acetaldehyde Mass Emission Rate (lb/hr)	**0.00074**	**0.0020**	**0.0011**	**0.0013**
Formaldehyde Mass Emission Rate (lb/hr)	**0.00031**	**0.00050**	**0.00056**	**0.00045**
Acrolein Mass Emission Rate (lb/hr)	**<0.012**	**<0.012**	**<0.012**	**<0.012**
Ethylbenzene Mass Emission Rate (lb/hr)	**<0.0019**	**<0.0019**	**<0.0020**	**<0.0019**
Total Speciated VOC Mass Emission Rate (lb/hr)	**0.015**	**0.016**	**0.016**	**0.016**
Carcinogenic VOC Mass Emission Rate (lb/month)†	**0.78**	**1.9**	**1.2**	**1.3**
Total Speciated VOC Mass Emission Rate (ton/year)‡	**0.066**	**0.071**	**0.068**	**0.069**

lb/hr pound per hour

lb/month pound per month

ton/year ton per year

† assuming 24 hour production for 31 days

‡ assuming 24 hour production for 365 days

APEX

Table 9

Sodium Baghouse Acetaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 4, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	8:44		10:33		12:49		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	9,487		9,405		9,494		9,462
Ambient Temperature (°F)	70		70		70		70
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.73
Atmospheric Pressure (in Hg)	28.5		28.5		28.5		28.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	161.1	131.3	197.0	195.3	195.8	188.2	178.1
Post-Sampling Flowrate (cc/min)	165.6	131.6	198.6	194.1	209.8	199.4	183.2
Sampling Flowrate Pre-test to Post-test Change (%)	2.8	0.2	0.8	0.6	7.1	6.0	2.9
Average Sampling Flowrate (cc/min)	163.4	131.5	197.8	194.7	202.8	193.8	180.6
Average Sampling Flowrate (dry standard l/min)	0.151	0.122	0.183	0.180	0.187	0.179	0.167
Sample Volume (l, dry standard)	9.1	7.3	11.0	10.8	11.2	10.7	10.0
Sorbent Tube							
Acetaldehyde Mass (µg)	0.26	14	0.72	14	0.39	14	7.2
Acetaldehyde Spike Mass (µg)	-	12	-	12	-	12	12
Acetaldehyde Concentration (mg/dscm)	0.029	-	0.066	-	0.035	-	0.043
Acetaldehyde Spike Recovery (R)	-	1.15	-	1.11	-	1.14	**1.13**
Total							
Acetaldehyde Mass in Sorbent Tube (µg)†	0.23		0.64		0.34		0.40
Acetaldehyde Concentration (mg/dscm)†	0.021		0.058		0.031		0.037
Acetaldehyde Mass Emission Rate (lb/hr)†	**0.00074**		**0.0020**		**0.0011**		**0.0013**

† Corrected for spike recovery following USEPA Method 18.

Table 10

Sodium Baghouse Formaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 4, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	8:44		10:33		12:49		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	9,487		9,405		9,494		9,462
Ambient Temperature (°F)	70		70		70		70
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.73
Atmospheric Pressure (in Hg)	28.5		28.5		28.5		28.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	161.1	131.3	197.0	195.3	195.8	188.2	178.1
Post-Sampling Flowrate (cc/min)	165.6	131.6	198.6	194.1	209.8	199.4	183.2
Sampling Flowrate Pre-test to Post-test Change (%)	2.8	0.2	0.8	0.6	7.1	6.0	2.9
Average Sampling Flowrate (cc/min)	163.4	131.5	197.8	194.7	202.8	193.8	180.6
Average Sampling Flowrate (dry standard l/min)	0.151	0.122	0.183	0.180	0.187	0.179	0.167
Sample Volume (l, dry standard)	9.1	7.3	11.0	10.8	11.2	10.7	10.0
Sorbent Tube							
Formaldehyde Mass (µg)	0.094	3.0	0.15	3.1	0.17	3.0	1.6
Formaldehyde Spike Mass (µg)	-	3	-	3	-	3	3
Formaldehyde Concentration (mg/dscm)	0.0	-	0.0	-	0.0	-	0.0
Formaldehyde Spike Recovery (R)	-	0.97	-	0.98	-	0.95	**0.97**
Total							
Formaldehyde Mass in Sorbent Tube (µg)[†]	0.10		0.15		0.18		0.14
Formaldehyde Concentration (mg/dscm)[†]	0.0088		0.014		0.016		0.013
Formaldehyde Mass Emission Rate (lb/hr)[†]	**0.00031**		**0.00050**		**0.00056**		**0.00045**

[†] Corrected for spike recovery following USEPA Method 18.

APEX

Table 11

Sodium Baghouse Acrolein Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 4, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	8:44		10:33		12:49		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	9,487		9,405		9,494		9,462
Ambient Temperature (°F)	70		70		70		70
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.73
Atmospheric Pressure (in Hg)	28.5		28.5		28.5		28.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	85.0	102.5	88.0	99.8	84.9	85.2	90.9
Post-Sampling Flowrate (cc/min)	89.6	97.5	91.9	99.9	93.7	90.3	93.8
Sampling Flowrate Pre-test to Post-test Change (%)	5.4	4.9	4.5	0.1	10.3	6.0	5.2
Average Sampling Flowrate (cc/min)	87.3	100.0	89.9	99.9	89.3	87.8	92.4
Average Sampling Flowrate (dry standard l/min)	0.081	0.092	0.083	0.092	0.083	0.081	0.085
Sample Volume (l, dry standard)	4.8	5.5	5.0	5.5	5.0	4.9	5.1
Sorbent Tube							
Acrolein Mass (µg)	<1.4	4.3	<1.4	5.2	<1.4	5.1	3.1
Acrolein Spike Mass (µg)	-	4	-	4	-	4	4.0
Acrolein Concentration (mg/dscm)	<0.29	-	<0.28	-	<0.28	-	<0.28
Acrolein Spike Recovery (R)	-	0.67	-	0.91	-	0.93	**0.84**
Total							
Acrolein Mass in Sorbent Tube (µg)†	<1.7		<1.7		<1.7		<1.7
Acrolein Concentration (mg/dscm)†	<0.34		<0.33		<0.34		<0.34
Acrolein Mass Emission Rate (lb/hr)†	**<0.012**		**<0.012**		**<0.012**		**<0.012**

† Corrected for spike recovery following USEPA Method 18.

Table 12

Sodium Baghouse Ethylbenzene Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 4, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	8:44		10:33		12:49		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	9,487		9,405		9,494		9,462
Ambient Temperature (°F)	70		70		70		70
Saturated Partial Pressure of Water Vapor (in Hg)	0.7		0.7		0.7		0.7
Atmospheric Pressure (in Hg)	28.5		28.5		28.5		28.5
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	180.4	168.5	193.8	207.8	170.3	156.0	179.5
Post-Sampling Flowrate (cc/min)	179.7	166.2	196.0	199.5	174.3	161.0	179.4
Sampling Flowrate Pre-test to Post-test Change (%)	0.4	1.4	1.1	4.0	2.4	3.2	2.1
Average Sampling Flowrate (cc/min)	180.0	167.4	194.9	203.7	172.3	158.5	179.4
Average Sampling Flowrate (dry standard l/min)	0.166	0.155	0.180	0.188	0.159	0.147	0.2
Sample Volume (l, dry standard)	10.0	9.3	10.8	11.3	9.6	8.8	10.0
Sorbent Tube							
Ethylbenzene Mass (µg)	<0.45	5.0	<0.45	4.5	<0.45	4.6	2.6
Ethylbenzene Spike Mass (µg)	-	5	-	5	-	5	5
Ethylbenzene Concentration (mg/dscm)	<0.045	-	<0.042	-	<0.047	-	<0.045
Ethylbenzene Spike Recovery (R)	-	0.92	-	0.81	-	0.84	**0.85**
Total							
Ethylbenzene Mass in Sorbent Tube (µg)†	<0.53		<0.53		<0.53		<0.53
Ethylbenzene Concentration (mg/dscm)†	<0.053		<0.053		<0.055		<0.054
Ethylbenzene Mass Emission Rate (lb/hr)†	**<0.0019**		**<0.0019**		**<0.0020**		**<0.0019**

† Corrected for spike recovery following USEPA Method 18.

Table 13 - Calcium Baghouse Particulate Matter Results

Source Designation		Condat Corporation Calcium Baghouse			
Test Date		Dec 5, 2019	Dec 5, 2019	Dec 5, 2019	
Meter/Nozzle Information		**Run 1**	**Run 2**	**Run 3**	**Average**
Meter Temperature, T_m	°F	42	45	46	45
Meter Pressure, P_m	in Hg	29.10	29.10	29.11	29.11
Measured Sample Volume, V_m	ft^3	39.44	39.64	39.82	39.63
Sample Volume, V_m	std ft^3	40.30	40.27	40.34	40.30
Sample Volume, V_m	std m^3	1.14	1.14	1.14	1.14
Condensate Volume, V_w	std ft^3	0.33	0.49	0.29	0.37
Gas Density, ρ_s	std lb/ft^3	0.0746	0.0745	0.0747	0.0746
Total weight of sampled gas	lb	3.032	3.038	3.097	3.056
Nozzle Size, A_n	ft^2	0.0003142	0.0003142	0.0003142	0.0003142
Isokinetic Variation, I	%	102	104	101	102
Stack Data					
Average Stack Temperature, T_s	°F	77	82	83	81
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	28.84	28.84	28.84	28.84
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	28.75	28.71	28.76	28.74
Stack Gas Specific Gravity, G_s		0.99	0.99	0.99	0.99
Percent Moisture, B_{ws}	%	0.81	1.20	0.72	0.91
Water Vapor Volume (fraction)		0.008	0.012	0.007	0.009
Pressure, P_s	in Hg	28.98	28.98	28.98	28.98
Average Stack Velocity, V_s	ft/sec	36.93	36.86	37.61	37.13
Area of Stack	ft^2	13.10	13.10	13.10	13.10
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	29,014	28,965	29,548	29,176
Flowrate	ft^3/min, standard wet	27,621	27,324	27,844	27,596
Flowrate	ft^3/min, standard dry	27,397	26,995	27,644	27,345
Flowrate	m^3/min, standard dry	776	764	783	774
Collected Mass					
Acetone Wash	mg	7.0	9.3	7.6	8.0
Filter	mg	6.10	4.60	5.90	5.5
Total Filterable Particulate Matter (FPM)	mg	13.1	13.9	13.5	13.5
Concentration					
Particulate Matter (FPM)	mg/dscf	0.33	0.35	0.33	0.33
Particulate Matter (FPM)	grain/dscf	0.0050	0.0053	0.0052	0.0052
Mass Emission Rate					
Particulate Matter (FPM)	lb/hr	1.2	1.2	1.2	1.2
Particulate Matter (FPM)	lb/month	877	917	910	901
Particulate Matter (FPM)	ton/yr	5.2	5.4	5.4	5.3

Table 14

Calcium Baghouse VOC Results

Condat Corporation

Saline, Michigan

Sampling Date: December 5, 2019

Apex Project No. 11019-000120.00

Parameter	Run 1	Run 2	Run 3	Average
Sample Start and End Time	9:20	10:55	12:28	
Sample Duration (min)	60	60	60	
Acetaldehyde Mass Emission Rate (lb/hr)	**0.013**	**0.024**	**0.011**	**0.016**
Formaldehyde Mass Emission Rate (lb/hr)	**0.0012**	**0.0016**	**0.0023**	**0.0017**
Acrolein Mass Emission Rate (lb/hr)	**<0.024**	**<0.028**	**<0.025**	**<0.026**
Ethylbenzene Mass Emission Rate (lb/hr)	**<0.0043**	**0.0060**	**<0.0044**	**0.0049**
Total Speciated VOC Mass Emission Rate (lb/hr)	**0.042**	**0.060**	**0.043**	**0.048**
Carcinogenic VOC Mass Emission Rate (lb/month)†	**10**	**19**	**10**	**13**
Total Speciated VOC Mass Emission Rate (ton/year)‡	**0.18**	**0.26**	**0.19**	**0.21**

lb/hr pound per hour

lb/month pound per month

ton/year ton per year

† assuming 24 hour production for 31 days

‡ assuming 24 hour production for 365 days

Table 15

Calcium Baghouse Acetaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 5, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:20		10:55		12:28		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	27,621		27,324		27,844		27,596
Ambient Temperature (°F)	33		33		33		33
Saturated Partial Pressure of Water Vapor (in Hg)	0.2		0.2		0.2		0.19
Atmospheric Pressure (in Hg)	29.0		29.0		29.0		29.0
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	198.3	187.6	221.5	178.1	185.0	192.4	193.8
Post-Sampling Flowrate (cc/min)	214.2	209.5	231.4	189.1	194.9	200.1	206.5
Sampling Flowrate Pre-test to Post-test Change (%)	8.0	11.7	4.5	6.2	5.4	4.0	6.6
Average Sampling Flowrate (cc/min)	206.2	198.6	226.5	183.6	190.0	196.3	200.2
Average Sampling Flowrate (dry standard l/min)	0.213	0.205	0.234	0.189	0.196	0.202	0.206
Sample Volume (l, dry standard)	12.8	12.3	14.0	11.4	11.8	12.1	12.4
Sorbent Tube							
Acetaldehyde Mass (µg)	1.8	15	3.7	17	1.4	15	9.0
Acetaldehyde Spike Mass (µg)	-	12	-	12	-	12	12
Acetaldehyde Concentration (mg/dscm)	0.14	-	0.26	-	0.12	-	0.17
Acetaldehyde Spike Recovery (R)	-	1.11	-	1.17	-	1.13	**1.13**
Total							
Acetaldehyde Mass in Sorbent Tube (µg)†	1.6		3.3		1.2		2.0
Acetaldehyde Concentration (mg/dscm)†	0.12		0.23		0.11		0.15
Acetaldehyde Mass Emission Rate (lb/hr)†	**0.013**		**0.024**		**0.011**		**0.016**

† Corrected for spike recovery following USEPA Method 18.

APEX

Table 16

Calcium Baghouse Formaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 5, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:20		10:55		12:28		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	27,621		27,324		27,844		27,596
Ambient Temperature (°F)	33		33		33		33
Saturated Partial Pressure of Water Vapor (in Hg)	0.2		0.2		0.2		0.19
Atmospheric Pressure (in Hg)	29.0		29.0		29.8		29.3
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	198.3	187.6	221.5	178.1	185.0	192.4	193.8
Post-Sampling Flowrate (cc/min)	214.2	209.5	231.4	189.1	194.9	200.1	206.5
Sampling Flowrate Pre-test to Post-test Change (%)	8.0	11.7	4.5	6.2	5.4	4.0	6.6
Average Sampling Flowrate (cc/min)	206.2	198.6	226.5	183.6	190.0	196.3	200.2
Average Sampling Flowrate (dry standard l/min)	0.213	0.205	0.234	0.189	0.201	0.208	0.208
Sample Volume (l, dry standard)	12.8	12.3	14.0	11.4	12.1	12.5	12.5
Sorbent Tube							
Formaldehyde Mass (µg)	0.14	3.0	0.21	3.0	0.25	3.1	1.6
Formaldehyde Spike Mass (µg)	-	3	-	3	-	3	3
Formaldehyde Concentration (mg/dscm)	0.011	-	0.015	-	0.021	-	0.016
Formaldehyde Spike Recovery (R)	-	0.96	-	0.94	-	0.95	**0.95**
Total							
Formaldehyde Mass in Sorbent Tube (µg)[†]	0.15		0.22		0.26		0.21
Formaldehyde Concentration (mg/dscm)[†]	0.012		0.016		0.022		0.016
Formaldehyde Mass Emission Rate (lb/hr)[†]	**0.0012**		**0.0016**		**0.0023**		**0.0017**

[†] Corrected for spike recovery following USEPA Method 18.

Table 17

Calcium Baghouse Acrolein Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 5, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:20		10:55		12:28		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	27,621		27,324		27,844		27,596
Ambient Temperature (°F)	33		33		33		33
Saturated Partial Pressure of Water Vapor (in Hg)	0.2		0.2		0.2		0.19
Atmospheric Pressure (in Hg)	29.0		29.0		29.8		29.3
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	95.1	80.8	77.3	87.3	88.0	84.4	85.5
Post-Sampling Flowrate (cc/min)	102.6	85.5	85.4	94.5	91.8	85.8	90.9
Sampling Flowrate Pre-test to Post-test Change (%)	8.0	5.8	10.5	8.2	4.3	1.7	6.4
Average Sampling Flowrate (cc/min)	98.8	83.2	81.4	90.9	89.9	85.1	88.2
Average Sampling Flowrate (dry standard l/min)	0.102	0.086	0.084	0.094	0.095	0.090	0.092
Sample Volume (l, dry standard)	6.1	5.1	5.0	5.6	5.7	5.4	5.5
Sorbent Tube							
Acrolein Mass (µg)	<1.4	5.6	<1.4	4.9	<1.4	5.6	3.4
Acrolein Spike Mass (µg)	-	4	-	4	-	4	4.0
Acrolein Concentration (mg/dscm)	<0.23	-	<0.28	-	<0.24	-	<0.25
Acrolein Spike Recovery (R)	-	1.11	-	0.83	-	1.07	**1.00**
Total							
Acrolein Mass in Sorbent Tube (µg)†	<1.4		<1.4		<1.4		<1.4
Acrolein Concentration (mg/dscm)†	<0.23		<0.28		<0.24		<0.25
Acrolein Mass Emission Rate (lb/hr)†	**<0.024**		**<0.028**		**<0.025**		**<0.026**

† Corrected for spike recovery following USEPA Method 18.

APEX

Table 18

Calcium Baghouse Ethylbenzene Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 5, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	9:20		10:55		12:28		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (scfm)	27,621		27,324		27,844		27,596
Ambient Temperature (°F)	33		33		33		33
Saturated Partial Pressure of Water Vapor (in Hg)	0.2		0.2		0.2		0.2
Atmospheric Pressure (in Hg)	29.0		29.0		29.0		29.0
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	179.7	171.3	216.2	201.8	176.2	183.5	188.1
Post-Sampling Flowrate (cc/min)	186.6	188.5	234.6	222.6	185.5	188.5	201.0
Sampling Flowrate Pre-test to Post-test Change (%)	3.8	10.0	8.5	10.3	5.3	2.7	6.8
Average Sampling Flowrate (cc/min)	183.2	179.9	225.4	212.2	180.8	186.0	194.6
Average Sampling Flowrate (dry standard l/min)	0.189	0.186	0.232	0.219	0.187	0.192	0.2
Sample Volume (l, dry standard)	11.3	11.1	13.9	13.1	11.2	11.5	12.0
Sorbent Tube							
Ethylbenzene Mass (µg)	<0.45	5.1	0.62	5.4	<0.45	5.2	2.9
Ethylbenzene Spike Mass (µg)	-	5	-	5	-	5	5
Ethylbenzene Concentration (mg/dscm)	<0.040	-	0.044	-	<0.040	-	0.041
Ethylbenzene Spike Recovery (R)	-	0.93	-	0.96	-	0.95	**0.95**
Total							
Ethylbenzene Mass in Sorbent Tube (µg)†	<0.47		0.65		<0.47		0.53
Ethylbenzene Concentration (mg/dscm)†	<0.042		0.058		<0.042		0.047
Ethylbenzene Mass Emission Rate (lb/hr)†	**<0.0043**		**0.0060**		**<0.0044**		**0.0049**

† Corrected for spike recovery following USEPA Method 18.

APEX

Table 19 - Liquid Bay Particulate Matter Results

Facility		Condat Corporation			
Source Designation		Liquid Bay			
Test Date		Dec 6, 2019	Dec 6, 2019	Dec 6, 2019	
Meter/Nozzle Information		**Run 1**	**Run 2**	**Run 3**	**Average**
Meter Temperature, T_m	°F	93	93	94	93
Meter Pressure, P_m	in Hg	29.43	29.45	29.45	29.44
Measured Sample Volume, V_m	ft^3	46.33	48.44	48.78	47.85
Sample Volume, V_m	std ft^3	43.50	45.47	45.75	44.91
Sample Volume, V_m	std m^3	1.23	1.29	1.30	1.27
Condensate Volume, V_w	std ft^3	0.23	0.15	0.34	0.24
Gas Density, ρ_s	std lb/ft^3	0.0747	0.0748	0.0747	0.0747
Total weight of sampled gas	lb	3.267	3.411	3.512	3.397
Nozzle Size, A_n	ft^2	0.0009393	0.0009393	0.0009393	0.0009393
Isokinetic Variation, I	%	91	98	101	97
Stack Data					
Average Stack Temperature, T_s	°F	109	102	102	105
Molecular Weight Stack Gas-dry, M_d	lb/lb-mole	28.84	28.84	28.84	28.84
Molecular Weight Stack Gas-wet, M_s	lb/lb-mole	28.78	28.81	28.76	28.78
Stack Gas Specific Gravity, G_s		0.99	0.99	0.99	0.99
Percent Moisture, B_{ws}	%	0.53	0.32	0.75	0.53
Water Vapor Volume (fraction)		0.005	0.003	0.007	0.005
Pressure, P_s	in Hg	29.30	29.30	29.30	29.30
Average Stack Velocity, V_s	ft/sec	15.70	14.92	14.74	15.12
Area of Stack	ft^2	1.48	1.48	1.48	1.48
Exhaust Gas Flowrate					
Flowrate	ft^3/min, actual	1,398	1,329	1,313	1,347
Flowrate	ft^3/min, standard wet	1,270	1,223	1,208	1,233
Flowrate	ft^3/min, standard dry	1,263	1,219	1,199	1,227
Flowrate	m^3/min, standard dry	36	35	34	35
Collected Mass					
Acetone Wash	mg	2.0	1.7	1.5	1.7
Filter	mg	<0.30	<0.30	<0.30	0.30
Total Filterable Particulate Matter (FPM)	mg	2.3	2.0	1.8	2.0
Concentration					
Particulate Matter (FPM)	mg/dscf	0.053	0.044	0.039	0.045
Particulate Matter (FPM)	grain/dscf	0.00082	0.00068	0.00061	0.00070
Mass Emission Rate					
Particulate Matter (FPM)	lb/hr	0.0088	0.0071	0.0062	0.0074
Particulate Matter (FPM)	lb/month	7	5	5	5
Particulate Matter (FPM)	ton/yr	0.039	0.031	0.027	0.032

Table 20
Liquid Bay VOC Results
Condat Corporation
Saline, Michigan
Sampling Date: December 6, 2019
Apex Project No. 11019-000120.00

Parameter	Run 1	Run 2	Run 3	Average
Sample Start and End Time	10:21	11:43	13:05	
Sample Duration (min)	60	60	60	
Acetaldehyde Mass Emission Rate (lb/hr)	**0.00015**	**0.00015**	**0.00011**	**0.00014**
Formaldehyde Mass Emission Rate (lb/hr)	**0.00019**	**0.00013**	**0.00015**	**0.00016**
Acrolein Mass Emission Rate (lb/hr)	**<0.0014**	**<0.0014**	**<0.0012**	**<0.0013**
Ethylbenzene Mass Emission Rate (lb/hr)	**<0.00030**	**<0.00030**	**<0.00027**	**<0.00029**
Total Speciated VOC Mass Emission Rate (lb/hr)	**0.0020**	**0.0020**	**0.0018**	**0.0019**
Carcinogenic VOC Mass Emission Rate (lb/month)†	**0.26**	**0.21**	**0.19**	**0.22**
Total Speciated VOC Mass Emission Rate (ton/year)‡	**0.0088**	**0.0085**	**0.0078**	**0.0084**

lb/hr pound per hour
lb/month pound per month
ton/year ton per year
† assuming 24 hour production for 31 days
‡ assuming 24 hour production for 365 days

Table 21

Liquid Bay Acetaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 6, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	10:21		11:43		13:05		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (dscfm)	1,270		1,223		1,208		1,233
Ambient Temperature (°F)	88		88		89		88
Saturated Partial Pressure of Water Vapor (in Hg)	1.3		1.3		1.4		1.34
Atmospheric Pressure (in Hg)	29.3		29.3		29.3		29.3
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	158.4	169.9	143.8	178.4	161.1	171.1	163.8
Post-Sampling Flowrate (cc/min)	154.1	163.9	150.6	179.4	161.2	173.1	163.7
Sampling Flowrate Pre-test to Post-test Change (%)	2.7	3.5	4.7	0.56	0.050	1.2	2.1
Average Sampling Flowrate (cc/min)	156.3	166.9	147.2	178.9	161.2	172.1	163.8
Average Sampling Flowrate (dry standard l/min)	0.141	0.150	0.133	0.161	0.145	0.155	0.147
Sample Volume (l, dry standard)	8.4	9.0	8.0	9.7	8.7	9.3	8.8
Sorbent Tube							
Acetaldehyde Mass (µg)	0.29	14	0.28	13	0.22	13	6.8
Acetaldehyde Spike Mass (µg)	-	12	-	12	-	12	12
Acetaldehyde Concentration (mg/dscm)	0.034	-	0.035	-	0.025	-	0.032
Acetaldehyde Spike Recovery (R)	-	1.14	-	1.05	-	1.06	**1.09**
Total							
Acetaldehyde Mass in Sorbent Tube (µg)†	0.27		0.26		0.20		0.24
Acetaldehyde Concentration (mg/dscm)†	0.032		0.031		0.024		0.029
Acetaldehyde Mass Emission Rate (lb/hr)†	**0.00015**		**0.00015**		**0.00011**		**0.00014**

† Corrected for spike recovery following USEPA Method 18.

APEX

Table 22

Liquid Bay Formaldehyde Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 6, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	10:21		11:43		13:05		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (dscfm)	1,270		1,223		1,208		1,233
Ambient Temperature (°F)	88		88		89		88
Saturated Partial Pressure of Water Vapor (in Hg)	1.3		1.3		1.4		1.34
Atmospheric Pressure (in Hg)	29.3		29.3		29.3		29.3
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	158.4	169.9	143.8	178.4	161.1	171.1	163.8
Post-Sampling Flowrate (cc/min)	154.1	163.9	150.6	179.4	161.2	173.1	163.7
Sampling Flowrate Pre-test to Post-test Change (%)	2.7	3.5	4.7	0.56	0.050	1.2	2.1
Average Sampling Flowrate (cc/min)	156.3	166.9	147.2	178.9	161.2	172.1	163.8
Average Sampling Flowrate (dry standard l/min)	0.141	0.150	0.133	0.161	0.145	0.155	0.147
Sample Volume (l, dry standard)	8.4	9.0	8.0	9.7	8.7	9.3	8.8
Sorbent Tube							
Formaldehyde Mass (µg)	0.33	3.3	0.22	3.1	0.27	3.1	1.7
Formaldehyde Spike Mass (µg)	-	3	-	3	-	3	3
Formaldehyde Concentration (mg/dscm)	0.039	-	0.028	-	0.031	-	0.033
Formaldehyde Spike Recovery (R)	-	0.98	-	0.94	-	0.94	**0.95**
Total							
Formaldehyde Mass in Sorbent Tube (µg)[†]	0.35		0.23		0.28		0.29
Formaldehyde Concentration (mg/dscm)[†]	0.041		0.029		0.033		0.034
Formaldehyde Mass Emission Rate (lb/hr)[†]	**0.00019**		**0.00013**		**0.00015**		**0.00016**

[†] Corrected for spike recovery following USEPA Method 18.

APEX

Table 23

Liquid Bay Acrolein Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 6, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	10:21		11:43		13:05		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (dscfm)	1,270		1,223		1,208		1,233
Ambient Temperature (°F)	88		88		89		88
Saturated Partial Pressure of Water Vapor (in Hg)	1.3		1.3		1.4		1.34
Atmospheric Pressure (in Hg)	29.3		29.3		29.3		29.3
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	85.2	80.7	87.0	91.6	103.7	104.5	92.1
Post-Sampling Flowrate (cc/min)	98.4	90.8	89.4	88.1	97.1	116.3	96.7
Sampling Flowrate Pre-test to Post-test Change (%)	15.5	12.5	2.7	3.8	6.4	11.3	8.7
Average Sampling Flowrate (cc/min)	91.8	85.8	88.2	89.9	100.4	110.4	94.4
Average Sampling Flowrate (dry standard l/min)	0.083	0.077	0.079	0.081	0.090	0.099	0.085
Sample Volume (l, dry standard)	5.0	4.6	4.8	4.9	5.4	5.9	5.1
Sorbent Tube							
Acrolein Mass (µg)	<1.4	5.3	<1.4	5.4	<1.4	5.3	3.4
Acrolein Spike Mass (µg)	-	4	-	4	-	4	4.0
Acrolein Concentration (mg/dscm)	<0.28	-	<0.29	-	<0.26	-	<0.28
Acrolein Spike Recovery (R)	-	1.00	-	0.99	-	0.94	**0.98**
Total							
Acrolein Mass in Sorbent Tube (µg)†	<1.4		<1.4		<1.5		<1.5
Acrolein Concentration (mg/dscm)†	<0.29		<0.30		<0.28		<0.29
Acrolein Mass Emission Rate (lb/hr)†	**<0.0014**		**<0.0014**		**<0.0012**		**<0.0013**

† Corrected for spike recovery following USEPA Method 18.

APEX

Table 24

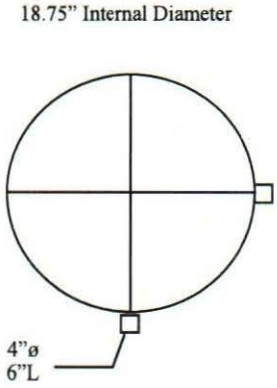
Liquid Bay Ethylbenzene Results

Condat Corporation
Saline, Michigan
Apex Project No. 11019-000120.00
Sampling Date: December 6, 2019

Parameter	Run 1		Run 2		Run 3		Average
	1 Normal	1 Spike	2 Normal	2 Spike	3 Normal	3 Spike	
Sampling Start Time	10:21		11:43		13:05		
Sample Duration (min)	60		60		60		60
Sampling Conditions							
Stack Flowrate (dscfm)	1,270		1,223		1,208		1,233
Ambient Temperature (°F)	88		88		89		88
Saturated Partial Pressure of Water Vapor (in Hg)	1.3		1.3		1.4		1.3
Atmospheric Pressure (in Hg)	29.3		29.3		29.3		29.3
Sampling Rate							
Pre-Sampling Flowrate (cc/min)	171.1	185.6	174.0	203.9	193.5	183.5	185.3
Post-Sampling Flowrate (cc/min)	186.1	201.4	167.8	206.5	179.3	197.5	189.8
Sampling Flowrate Pre-test to Post-test Change (%)	8.8	8.5	3.6	1.3	7.3	7.6	6.2
Average Sampling Flowrate (cc/min)	178.6	193.5	170.9	205.2	186.4	190.5	187.5
Average Sampling Flowrate (dry standard l/min)	0.161	0.174	0.154	0.185	0.167	0.171	0.2
Sample Volume (l, dry standard)	9.7	10.5	9.2	11.1	10.0	10.3	10.1
Sorbent Tube							
Ethylbenzene Mass (µg)	<0.45	4.7	<0.45	4.8	<0.45	4.2	2.5
Ethylbenzene Spike Mass (µg)	-	5	-	5	-	5	5
Ethylbenzene Concentration (mg/dscm)	<0.047	-	<0.049	-	<0.045	-	<0.047
Ethylbenzene Spike Recovery (R)	-	0.84	-	0.85	-	0.75	**0.81**
Total							
Ethylbenzene Mass in Sorbent Tube (µg)†	<0.60		<0.60		<0.60		<0.60
Ethylbenzene Concentration (mg/dscm)†	<0.062		<0.062		<0.060		<0.062
Ethylbenzene Mass Emission Rate (lb/hr)†	**<0.00030**		**<0.00030**		**<0.00027**		**<0.00029**

† Corrected for spike recovery following USEPA Method 18.

Figures



Traverse Point	Distance From Stack Wall (inches)
1	1.3
2	4.7
3	14.1
4	17.5

	Distance From Ports to Nearest Upstream Bend/ Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
Cyclone	15 feet (9.6 diameter)	12 feet (7.7 diameter)

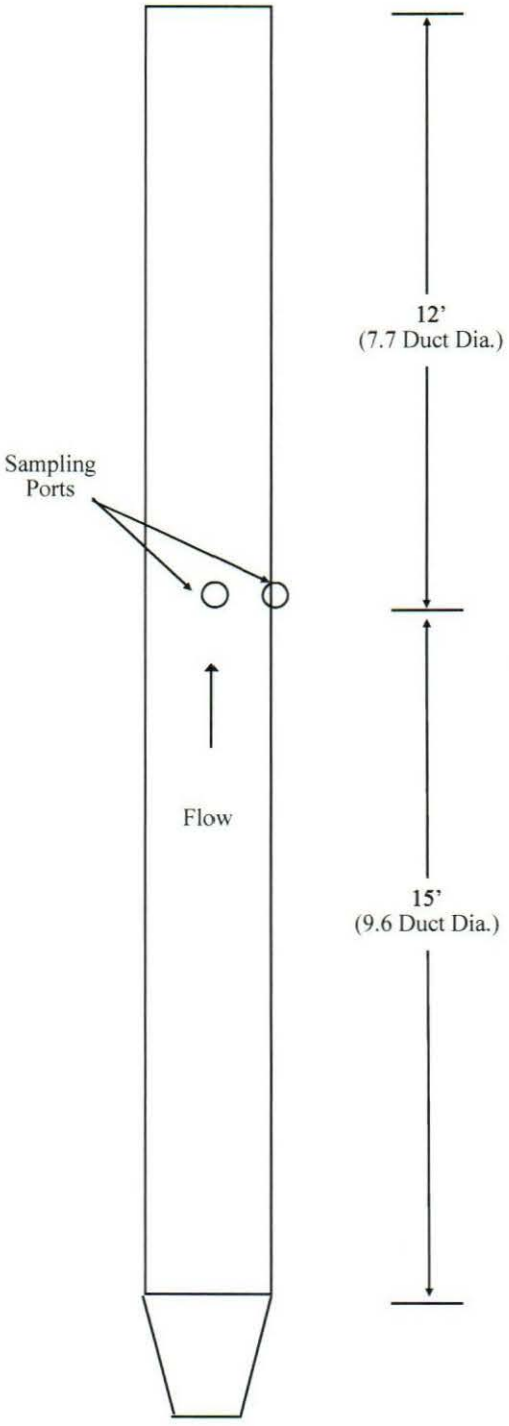


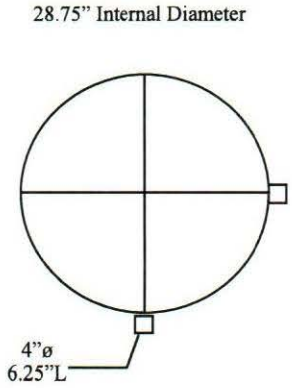
Figure 1
Cyclone Sampling Ports and Traverse Point Locations

APEX

Condat Corporation
250 South Industrial Drive
Saline, Michigan

Project No. 11019-000120.00

Last Revision: December 30, 2019



Traverse Point	Distance From Stack Wall (inches)
1	0.7
2	2.4
3	4.2
4	6.5
5	9.8
6	18.9
7	22.3
8	24.6
9	26.4
10	28.0

	Distance From Ports to Nearest Upstream Bend/ Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
Sodium Baghouse	13 feet (5.4 diameter)	14 feet (5.8 diameter)

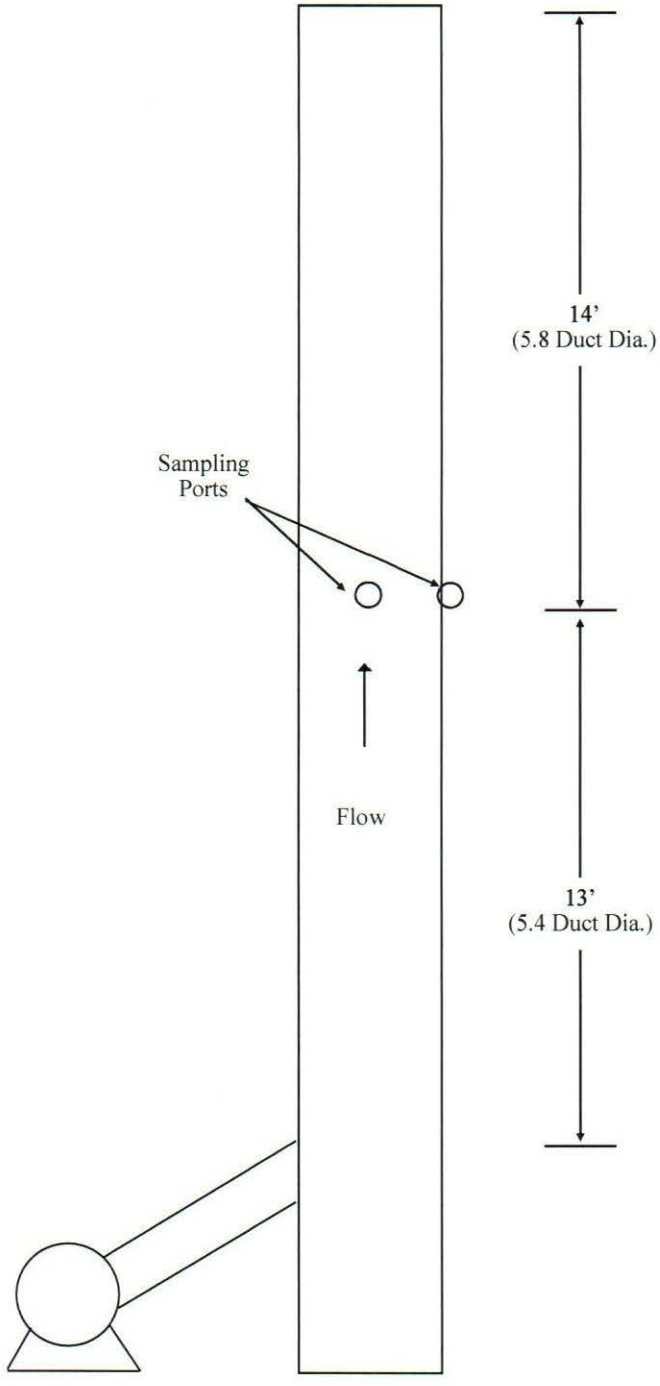


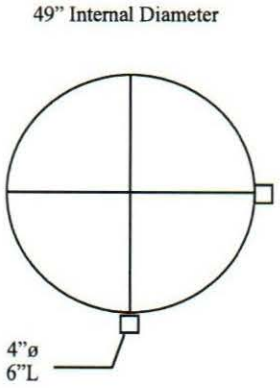
Figure 2
Sodium Baghouse Sampling Ports and Traverse Point Locations

APEX

Condat Corporation
250 South Industrial Drive
Saline, Michigan

Project No. 11019-000120.00

Last Revision: December 30, 2019



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)

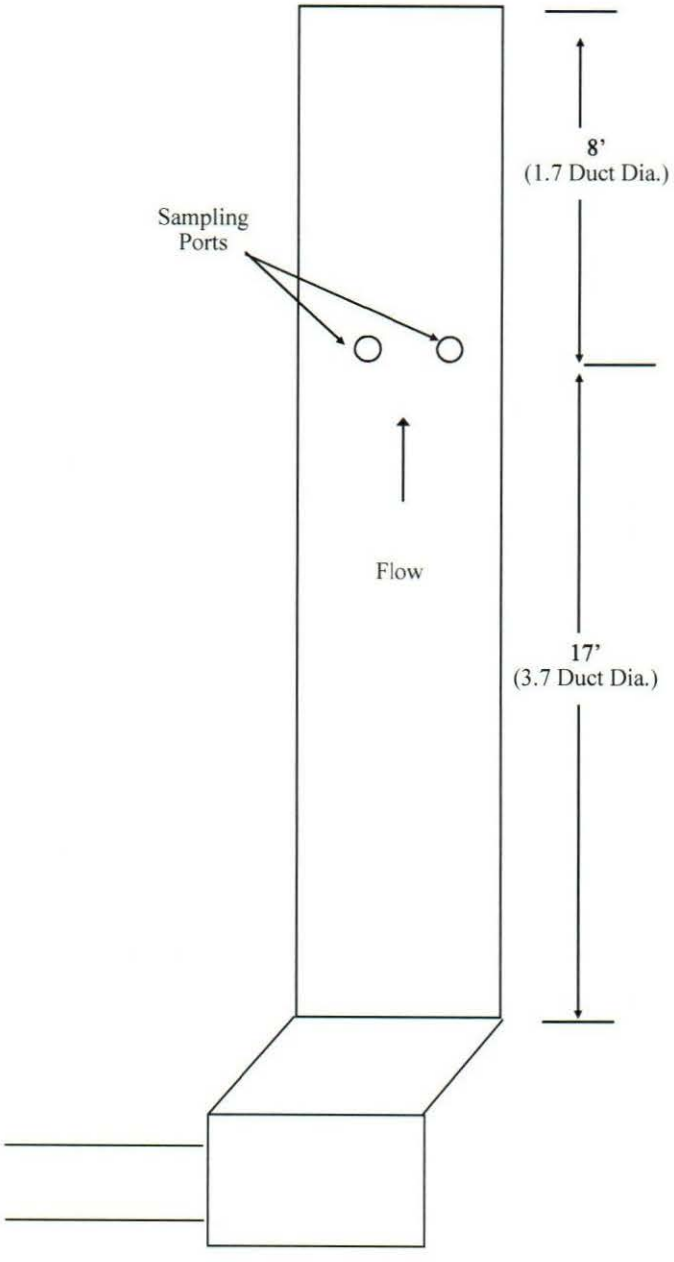


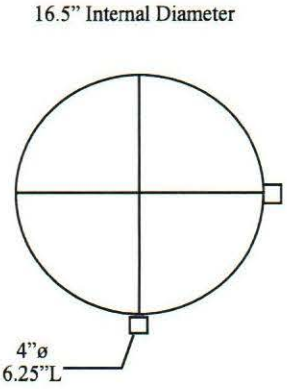
Figure 3
Calcium Baghouse Sampling Ports and Traverse Point Locations

APEX

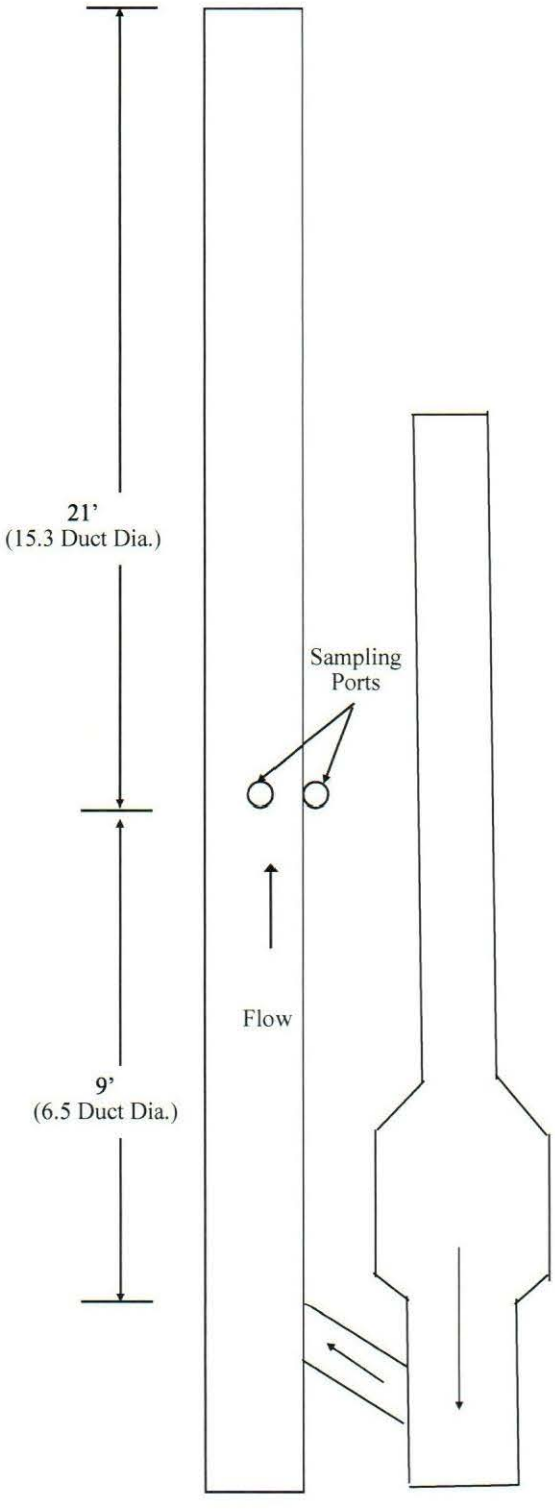
Condat Corporation
250 South Industrial Drive
Saline, Michigan

Project No. 11019-000120.00

Last Revision: December 30, 2019



Traverse Point	Distance From Stack Wall (inches)
1	0.5
2	1.7
3	3.2
4	5.3
5	11.2
6	13.3
7	14.8
8	16.0



	Distance From Ports to Nearest Upstream Bend/ Disturbance	Distance From Ports to Nearest Downstream Bend/ Disturbance
Liquid Bay	9 feet (6.5 diameter)	21 feet (15.3 diameter)

Figure 4
Liquid Bay Sampling Ports and Traverse Point Locations

APEX

Condat Corporation
250 South Industrial Drive
Saline, Michigan

Project No. 11019-000120.00

Last Revision: December 30, 2019