Results of the August 8-9, 2019 Compliance Tests on the EU-Dryer, EU-Raw Material, and EU-Dried Material Stacks at National Carbon Technologies Located in Gwinn, Michigan

EU-Dryer	SV-Exhaust
EU-Raw Material	SV-BH 666
EU-Dried Material	SV-BH 667

Permit to Install No. 24-12A
Barr Project 22521165.00

Prepared for
National Carbon Technologies
Gwinn, Michigan

October 2019

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October 2019

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Report Certification

Certification of Sampling Procedures:

I certify that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below

1.) A direct reading of HCL at the FTIR was used for spiking for the EU – Dryer location. This approach was verified with Mark Dziadosz onsite.

Thomas Leier
Senior Air Quality Technician
Barr Engineering Co.

Oct. 9, 2019
Date

Certification of Analytical Procedures:

I certify that the analytical procedures were performed in accordance with the requirements of the test methods and that the data presented for use in the test report were, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below

Richard Berg
Senior Air Quality Technician
Barr Engineering Co.

Oct 9, 2019
Date

Certification of Test Report by Testing Company:

I certify that this test report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.

Tom Kuchinski
Stack Testing Services Coordinator
Barr Engineering Co.

Oct. 9, 2019
Date

Certification of Test Report by Owner or Operator of Emission Facility:

I certify that the information submitted in this test report accurately reflects the operating conditions at the emission facility during this performance test and describes the date and nature of all operational and maintenance activities that were performed on the process and control equipment during the month prior to the performance test. Based on my inquiry of the person or persons who performed the operational and maintenance activities, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.

Dan Hendrickson
Plant Manager
National Carbon Technologies

10/8/19
Date

Executive Summary

Barr Engineering Co. performed emissions tests on the EU-Dryer exhaust stack (SV-EXHAUST), EU-Raw Material baghouse (SV-BH 666), and EU-Dried Material baghouse (SV-BH 667) at National Carbon Technologies located in Gwinn, Michigan. Testing was performed August 8-9, 2019 to demonstrate compliance with the permitted emission limits outlined in Permit to Install 24-12A. Testing was performed on August 8, 2019 on the EU-Dryer exhaust stack (SV-EXHAUST) for the determination of particulate matter (PM), particulate matter less than 10 microns (PM_{10}), nitrogen oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOC), hydrogen chloride (HCl) and methanol (MeOH) emissions. On August 9, 2019 testing was performed on the EU-Raw Material (SV-BH 666) and EU-Dried Material (SV-BH 667) baghouses for the determination of particulate matter (PM). Additionally, VOC and MeOH emissions tests were performed on the EU-Dried Material (SV-BH 667) stack. An opacity determination was made at each source by a certified visible observer.

Table ES-1 on the following page summarizes the test results and provides applicable emission limits (Permit to Install 24-12A).

Table ES-1 Executive Summary Table

TEST PARAMETER EPA Methods 1-4, 5/202, 7E, 9, 10, 25A, and 308	EU – Dryer	EU – Raw Material	EU-Dried Material
Stack Vent ID	SV-EXHAUST	SV-BH 666	SV-BH 667
Test Date	8/8/19	8/9/19	8/9/2019
Volumetric Airflow Rate			
ACFM	78,300	39,500	28,700
SCFM	50,000	37,000	25,700
DSCFM	41,500	36,500	25,100
Particulate Matter			
PM Emission Rate (Filterable), lb/hr	2.8	0.44	0.39
PM Emission Rate (Filterable), lb/1000 lb gas	0.013	0.0027	0.0034
PM/PM_{10} Emission Rate (Filterable + Condensables), lb/hr	3.4	0.44[1]	0.45
PM (Filterable) Emission Limit, lb/hr	*11.45*	*4.22*	*4.52*
PM_{10} Emission Limit, lb/hr[2]	*20.5*	*4.22*	*4.52*
PM (Filterable) Emission Limit, lb/1000 lb exhaust gas	*0.09*	*0.017*	*0.016*
Nitrogen Oxides (NO_X)			
Concentration, ppm (dry basis)	16.1	--	--
Emission Rate, lb/hr	4.8	--	--
Nitrogen Oxides (NO_X) Emission Limit, lb/hr	*46.2*	--	--
Carbon Monoxide (CO)			
Concentration, ppm (dry basis)	39.0	--	--
Emission Rate, lb/hr	6.7	--	--
Carbon Monoxide (CO) Emission Limit, lb/hr	*23.1*	--	--
Volatile Organic Compounds (VOC)			
Concentration (as Carbon), ppm (wet basis)	*35.0*	--	2.6
Emission Rate (as Carbon), lb/hr[3]	3.3	--	0.12
Non-Methane Organic Compounds (NMOC) Limit, lb/hr	*23.1*	--	--
Hydrogen Chloride			
Emission Rate, lb/hr	<0.04	--	--
Hydrogen Chloride Emission Limit, lb/hr	*2.1*	--	--
Methanol Emission Rate, lb/hr	0.20	--	0.03
Visible Emissions			
% Opacity	0	0	0
Opacity Limit, % Highest 6 minute average	*20*	*10*	*10*

(1) Stack temperatures were below 85 degrees Fahrenheit, collection of condensables assumed to be with filterable PM.

(2) All filterable PM is assumed to be less than or equal to 10 microns (PM_{10}). Using PM limit to be conservative

(3) Methane concentration was not determined/removed from the total VOC concentration to report as NMOC.

1.0 Introduction

Barr Engineering Co. performed emissions tests on the EU-Dryer exhaust stack (SV-EXHAUST), EU-Raw Material baghouse (SV-BH 666), and EU-Dried Material baghouse (SV-BH 667) at National Carbon Technologies located in Gwinn, Michigan. Testing was performed August 8-9, 2019 to demonstrate compliance with the permitted emission limits outlined in Permit to Install 24-12A. Testing was performed on August 8, 2019 on the EU-Dryer exhaust stack (SV-EXHAUST) for the determination of particulate matter (PM), particulate matter less than 10 microns (PM10), nitrogen oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOC), hydrogen chloride (HCl) and methanol (MeOH) emissions. On August 9, 2019 testing was performed on the EU-Raw Material (SV-BH 666) and EU-Dried Material (SV-BH 667) baghouses for the determination of particulate matter (PM). Additionally, VOC and MeOH emissions tests were performed on the EU-Dried Material (SV-BH 667) stack.

A test plan was submitted to the Michigan Department of Environmental Quality (MDEQ) on June 10, 2019. An approval of the test protocol was given on July 25, 2019. Email communication related to the test rescheduling, copies of the stack testing protocol and the testing protocol approval letter are located in Appendix J.

Thomas Leier of Barr Engineering lead the test team. Dan Hendrickson of Michigan Renewable Carbon provided the coordination of the Barr test team with facility operations. Mark Dziadosz of the MDEQ were on site to witness testing activities. A list of project participants is provided in Appendix K.

Testing consisted of three one-hour runs at each source for each pollutant required. Particulate matter emissions were determined using EPA Method 5 or Modified EPA Method 5, and EPA Method 202 with the assumption that all particulate matter is less than or equal to PM_{10}. A one hour opacity test was performed during the first particulate matter test run at each location. EPA Method 320 was used in-lieu of EPA Method 26 for HCL and EPA Method 308 for MeOH at the request of Mark Dziadosz of the MDEQ.

Test results are presented in the following section. Field data and laboratory data along with supporting documentation are located in the appendices.

Table 1 Emission Source Information

Name of source group				
Source/Emissions Unit (Plant or process descriptor)	**Control Equipment**	**Stack Vent**	**Process Rates**	**Applicable Rule**
EU-Dryer	Multiclones and Thermal Oxidizer	SV-Exhaust	24 dry tons/hr 25 MMBTU/hr (Natural Gas) 44 MMBTU/hr (wood dust	Permit to Install 24-12A
EU-Raw Material	CE-BH 666	SV-BH 666	48 green tons/hr	Permit to Install 24-12A
EU-Dried Material	CE-BH 667	SV-BH 667	24 green tons/hr	Permit to Install 24-12A

2.0 Results

Pollutant emission rate results are reported in pound per hour (lb/hr). PM is also reported in pound per 1000 lb exhaust gas (lb/1000 lb exhaust gas). Emission rates are provided in the Executive Summary and in the results tables. Applicable emission limits are provided in the Executive Summary table.

2.1 EU-Dryer (SV-Exhaust)

Results of the August 8, 2019 testing on the EU-Dryer exhaust stack (SV-EXHAUST) are provided in Tables 1-3. Table 1 summarizes the test results for PM/PM_{10} emission rates and opacity. Visible emissions readings were performed during test run one. All readings were zero percent opacity. Table 2 summarizes NO_X, CO and VOC concentrations and emission rates. All three pollutants are below permitted emission rate limits. The parameter for VOC concentration in Permit to Install 24-12A is listed as Non-Methane Organic Compounds (NMOC). Methane concentration was not determined, thus an NMOC value was not determined by subtraction from the VOC results. The VOC emission rate as carbon in lb/hr was used as a conservative comparison to the NMOC limit. Table 3 summarizes the hydrogen chloride and methanol emissions. No difficulties were noted during the testing.

2.2 EU-Raw Material (SV-BH 666)

Testing for PM/PM_{10} and opacity on the EU-Raw Material baghouse (SV-BH 666) was performed on August 9, 2019. Results are summarized in Table 4. Visible emission readings were performed during test run 1. All readings were zero percent opacity. No difficulties were noted during the testing.

2.3 EU-Dried Material (SV-BH 667)

Testing on the EU-Dried Material baghouse (SV-BH 666) was performed on August 9, 2019 for PM/PM_{10}, visual emissions, and VOC. PM/PM_{10} and visual emission results are summarized in Table 5. Visual emission readings were performed during test run one. All readings were zero percent opacity. VOC as propane, summarized in Table 6, averaged 0.15 lb/hr, below permitted limits. No difficulties were noted during the testing.

3.0 Process Description

The drum dryer system used during normal drying operations may burn softwood or hardwood chips, corn stover, switch grass, sawdust (raw material) and/or natural gas or biogas. The burner is fired with natural gas during start-up, and can also continue with natural gas or biogas during normal operation. Emissions from the dryer are controlled by a multiclone and thermal oxidation system and gases are vented to the atmosphere through the EU-Dryer exhaust stack (SV-EXHAUST). Emissions from the EU-Raw Material process equipment are controlled by baghouse (CE-BH 666). The gas stream is then exhausted through the EU-Raw Material baghouse stack (SV-BH 666).

The dried feedstock material from the dryer is conveyed through a metering bin and then into the process heater where the feedstock is carbonized. Carbonized feedstock is then cooled and densified. Densified pellets are optionally dried and finished product is packaged prior to shipping. Emissions from the process heater are reused as process fuel before ultimately being controlled by the thermal oxidation system and vented to the atmosphere through the EU-Dryer exhaust stack (SV-EXHAUST). The process heater emissions and the collected emissions from EU-Dried Material process equipment are controlled by baghouse (CE-BH 667).

Process operating data can be found in Appendix I.

4.0 Stack Testing Procedures and Methods

Testing was performed from two ports meeting EPA Method 1 (40 CFR Part 60, Appendix A) criteria. Sample port locations and traverse point detail are provided in Figures 1 through Figure 6.

Table 2 Method 1 Criteria

Location	Distance to Upstream Disturbances (Diameters)	Distance to Downstream Disturbances (Diameters)	Number of Ports	Number of Points
EU-Dryer	3	17	2	24
EU-Raw Material	2	14	2	24
EU-Dried Material	4.4	2.2	2	24

Volumetric airflow determinations were performed in accordance with EPA Method 2 (40 CFR Part 60, Appendix A) using an S-type pitot tube and an oil manometer.

The stack gas compositions and molecular weights were determined by EPA Method 3A (40 CFR Part 60, Appendix A) with a Servomex 1440 O_2/CO_2 analyzer at the EU-Dryer (SV-Exhaust) and EU-Dried Material (SV-BH 667). Stack gas conditions at the EU-Raw Material baghouse (SV-BH 666) were assumed to be ambient and verified using a portable oxygen analyzer.

Stack gas moisture contents were determined by the performance of EPA Method 4 in conjunction with the EPA Method 5 tests (40 CFR Part 60, Appendix A).

Filterable particulate matter concentrations and emission rates were determined in accordance with EPA Method 5 (40CFR Part 60, Appendix A). Particulate matter concentrations at the EU-Dryer (SV-EXHAUST) and EU-Dried Material (SV-BH 667) include condensable particulate matter collected in the back half of the sample train using EPA Method 202 (40 CFR Part 51, Appendix M). Stack gas temperatures on the EU-Raw Material (SV-BH 666) were below 85 degrees Fahrenheit, therefore, Modified EPA Method 5 was utilized for the determination of particulate matter using an unheated probe and filter system.

Determination of opacity of visual emissions was performed in accordance with EPA Method 9 (40 CFR Part 60, Appendix A). One 60-minute observation was performed at each source concurrent with test run one. The visible emissions observer's certification is provided in Appendix H.

Hydrogen chloride (HCl) and methanol emissions were determined by EPA Method 320 (40 CFR Part 60, Appendix A). An MKS Model 2030 Fourier-Transform Infrared (FTIR) analyzer was used for the testing. Sample gas was transported through a heated stainless steel probe and heated glass fiber filter and heat traced Teflon sample line to the instrument. The FTIR reads stack gas "wet" and concentration results are reported as wet ppm. The detection limit was determined utilizing the analytical algorithm error noise limited detectable concentration approach (MDCU 2). The software utilized with the FTIR instrument

records files approximately every minute and the required minimum samples per test run were collected. Spiking gas was challenged to the system and within the 70%-130% requirement. The FTIR output data, calculated results, and quality assurance information is located in Appendix E along with supporting data.

Total hydrocarbon concentrations were determined by EPA Method 25A (40CFR Part 60, Appendix A) with Thermo model 52i-HT flame ionization detector analyzer calibrated with propane. The parameter for VOC concentration in Permit to Install 24-12A is listed as Non-Methane Organic Compounds (NMOC). Methane concentration was not determined, thus an NMOC value was not determined by subtraction from the VOC emission rate results because VOCs were present in very low concentrations.

Nitrogen oxide concentrations were determined by EPA Method 7E (40CFR Part 60, Appendix A) using an API 200EH analyzer. Filtered stack gas was delivered through a heated sample line to a sample chiller and directed to the analyzers. The analyzers were calibrated with EPA Protocol 1 gases.

Carbon monoxide concentrations were determined by EPA Method 10 (40 CFR Part 60, Appendix A) with a Thermo Environmental Model 48i gas filter correlation analyzer. The analyzers were calibrated with EPA Protocol 1 gases.

Data was recorded on an electronic data acquisition system. Instrument output data and calibration gas certifications are located in Appendix F and G, respectively.

Tables

National Carbon Technologies
Gwinn, Michigan

Barr Engineering Co.
October 8, 2019

TABLE 1

PARTICULATE MATTER TEST RESULTS

EU-Dryer (SV-Exhaust)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	8/8/2019	8/8/2019	8/8/2019	---
Test Period	1521 - 1639	1802 - 1921	2032 - 2140	---
Test Duration, min	60	60	60	60
Average Stack Temperature, °F	325	335	324	328
Average Moisture Content, %V/V	16.5	16.1	17.7	16.7
Particulate Loading, g				
PM - Filterable	0.0178	0.0190	0.0140	0.0170
Organic CPM	0.0025	0.0016	0.0011	0.0017
Inorganic CPM	0.0031	0.0022	0.0015	0.0023
Air Flow Rate				
acfm	75,300	89,800	69,900	78,300
scfm	48,300	56,900	44,900	50,000
dscfm	40,400	47,700	37,000	41,700
Sample Volume				
acf	35.22	41.10	32.80	36.37
dscf	32.46	38.06	30.45	33.66
Isokinetic Variation, %	100.2	99.3	102.6	100.7
Particulate Matter Concentration, gr/dscf				
PM - Filterable	0.0085	0.0077	0.0071	0.0078
Organic CPM	0.0012	0.00066	0.00055	0.00079
Inorganic CPM	0.0015	0.00088	0.00077	0.0010
Primary PM - All Fractions	0.011	0.0093	0.0084	0.010
Particulate Matter Emission Rate, lb/hr				
PM - Filterable	2.9	3.2	2.3	2.8
Organic CPM	0.41	0.27	0.17	0.28
Inorganic CPM	0.51	0.36	0.24	0.37
Primary PM - All Fractions	3.8	3.8	2.7	3.4
PM - lb/1000 lb gas	0.014	0.013	0.012	0.013
Visible Emissions, % Opacity	0	--	--	0

PM_{10} - Assume PM_{10} emissions are equal to Primary PM (filterable plus CPMs)

CPM - Condensable particulate matter

National Carbon Technologies
Gwinn, Michigan

Barr Engineering Co.
October 07, 2019

TABLE 2

GASEOUS POLLUTANT TEST RESULTS SUMMARY

EU-Dryer (SV-Exhaust)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	8/8/2019	8/8/2019	8/8/2019	--
Test Period	1521-1639	1802-1921	2032-2140	--
Air Flow Rate				
ACFM	75,300	89,800	69,900	78,300
SCFM	48,300	56,900	44,900	50,000
DSCFM	40,400	47,700	37,000	41,700
EPA Method 3A Results				
O_2 Concentration, % dry	17.4	17.5	17.4	17.4
CO_2 Concentration, % dry	3.3	3.3	3.4	3.3
EPA Method 7E Results				
NO_X Concentration, ppm dry	14.4	16.5	17.6	16.1
NO_X Emission Rate, lb/hr	4.2	5.6	4.7	4.8
EPA Method 10 Results				
CO Concentration, ppm dry	37.6	19.3	60.1	39.0
CO Emission Rate, lb/hr	6.6	4.0	9.7	6.8
EPA Method 25A Results				
THC Concentration, ppm wet as Propane	12.5	11.8	10.0	11.5
THC Emission Rate, lb/hr as propane	4.2	4.6	3.1	4.0
THC Concentration, ppm wet as Carbon	37.6	35.5	30.1	34.4
THC Emission Rate, lb/hr as Carbon	3.4	3.8	2.5	3.2

National Carbon Technologies
Gwinn, Michigan

Barr Engineering Co.
October 09, 2019

TABLE 3

Method 320 MeOH & HCL Test Results

EU-Dryer (SV-Exhaust)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	8/8/2019	8/8/2019	8/8/2019	---
Test Period	1521-1639	1814-1921	2032-2140	---
Volumetric Flow Rates				
SCFM	48,322	56,896	44,917	50,045
Moisture, %	16.5	16.1	17.7	16.7
Speciated Concentration by Method 320, ppmv				
Methanol	0.93	0.68	0.79	0.80
Hydrochloric Acid (HCL)	< 0.09	< 0.23	< 0.06	< 0.12
Speciated Emissions by Method 320, lb/hr				
Methanol	0.22	0.19	0.18	0.20
Hydrochloric Acid (HCL)	< 0.02	< 0.07	< 0.01	< 0.04

*Run results listed as "<" indicate that the compound was not detected or detected below the method detection limit

TABLE 4

PARTICULATE MATTER TEST RESULTS

EU-RAW MATERIAL (SV-BH 666)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	8/9/2019	8/9/2019	8/9/2019	---
Test Period	1155 - 1259	1355 - 1458	1550 - 1653	---
Test Duration, min	60	60	60	60
Average Stack Temperature, °F	76	80	81	79
Average Moisture Content, %V/V	1.5	1.5	1.5	1.5
Particulate Loading, g				
PM - Filterable	0.0049	0.0039	0.0031	0.0040
Air Flow Rate				
acfm	39,900	39,400	39,100	39,500
scfm	37,800	37,100	36,700	37,200
dscfm	37,200	36,500	36,200	36,600
Sample Volume				
acf	46.82	47.00	46.65	46.82
dscf	44.68	44.33	43.66	44.22
Isokinetic Variation, %	99.2	100.4	99.8	99.8
Particulate Matter Concentration, gr/dscf				
PM - Filterable	0.0017	0.0014	0.0011	0.0014
Particulate Matter Emission Rate, lb/hr				
PM - Filterable	0.54	0.43	0.34	0.44
PM Filterable - lb/1000 lb gas	0.0032	0.0026	0.0021	0.0027
Visible Emissions, % Opacity	0	--	--	0

PM_{10} - Assume PM_{10} emissions are equal to Filterable PM

TABLE 5

PARTICULATE MATTER TEST RESULTS

EU-Dried Material (SV-BH 667)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	8/9/2019	8/9/2019	8/9/2019	---
Test Period	1525 - 1639	1733 - 1836	1915 - 2020	---
Test Duration, min	60	60	60	60
Average Stack Temperature, °F	110	106	102	106
Average Moisture Content, %V/V	2.5	2.6	2.1	2.4
Particulate Loading, g				
PM - Filterable	0.0042	0.0056	0.0012	0.0037
Organic CPM	0.0005	0.0002	0.0004	0.0004
Inorganic CPM	0.0000	0.0003	0.0002	0.0002
Air Flow Rate				
acfm	30,300	27,900	27,800	28,700
scfm	27,000	25,000	25,100	25,700
dscfm	26,300	24,400	24,600	25,100
Sample Volume				
acf	31.62	34.99	34.73	33.78
dscf	29.79	32.90	32.60	31.77
Isokinetic Variation, %	100.8	100.9	99.2	100.3
Particulate Matter Concentration, gr/dscf				
PM - Filterable	0.0022	0.0026	0.0006	0.0018
Organic CPM	0.00027	0.00010	0.00020	0.00019
Inorganic CPM	0.00000	0.00014	0.00007	0.00007
Primary PM - All Fractions	0.0025	0.0029	0.0008	0.0021
Particulate Matter Emission Rate, lb/hr				
PM - Filterable	0.50	0.55	0.12	0.39
Organic CPM	0.061	0.021	0.042	0.041
Inorganic CPM	0.000	0.030	0.015	0.015
Primary PM - All Fractions	0.56	0.60	0.17	0.44
PM - lb/1000 lb gas	0.0041	0.0050	0.0010	0.0034
Visible Emissions, % Opacity	0	--	--	0

PM_{10} - Assume PM_{10} emissions are equal to Primary PM (filterable plus CPMs)

CPM - Condensable particulate matter

TABLE 6

GASEOUS POLLUTANT TEST RESULTS SUMMARY

EU-Dried Material (SV-BH 667)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	8/9/2019	8/9/2019	8/9/2019	--
Test Period	1525-1639	1733-1836	1915-2020	--
Air Flow Rate				
ACFM	30,300	27,900	27,800	28,700
SCFM	27,000	25,000	25,100	25,700
DSCFM	26,300	24,400	24,600	25,100
EPA Method 3A Results				
O_2 Concentration, % dry	20.8	20.7	20.8	20.8
CO_2 Concentration, % dry	0.2	0.2	0.2	0.2
EPA Method 25A Results				
THC Concentration, ppm wet as Propane	0.89	1.20	0.92	1.00
THC Emission Rate, lb/hr as propane	0.16	0.21	0.16	0.18
THC Concentration, ppm wet as Carbon	2.7	3.6	2.8	3.0
THC Emission Rate, lb/hr as Carbon	0.13	0.17	0.13	0.14

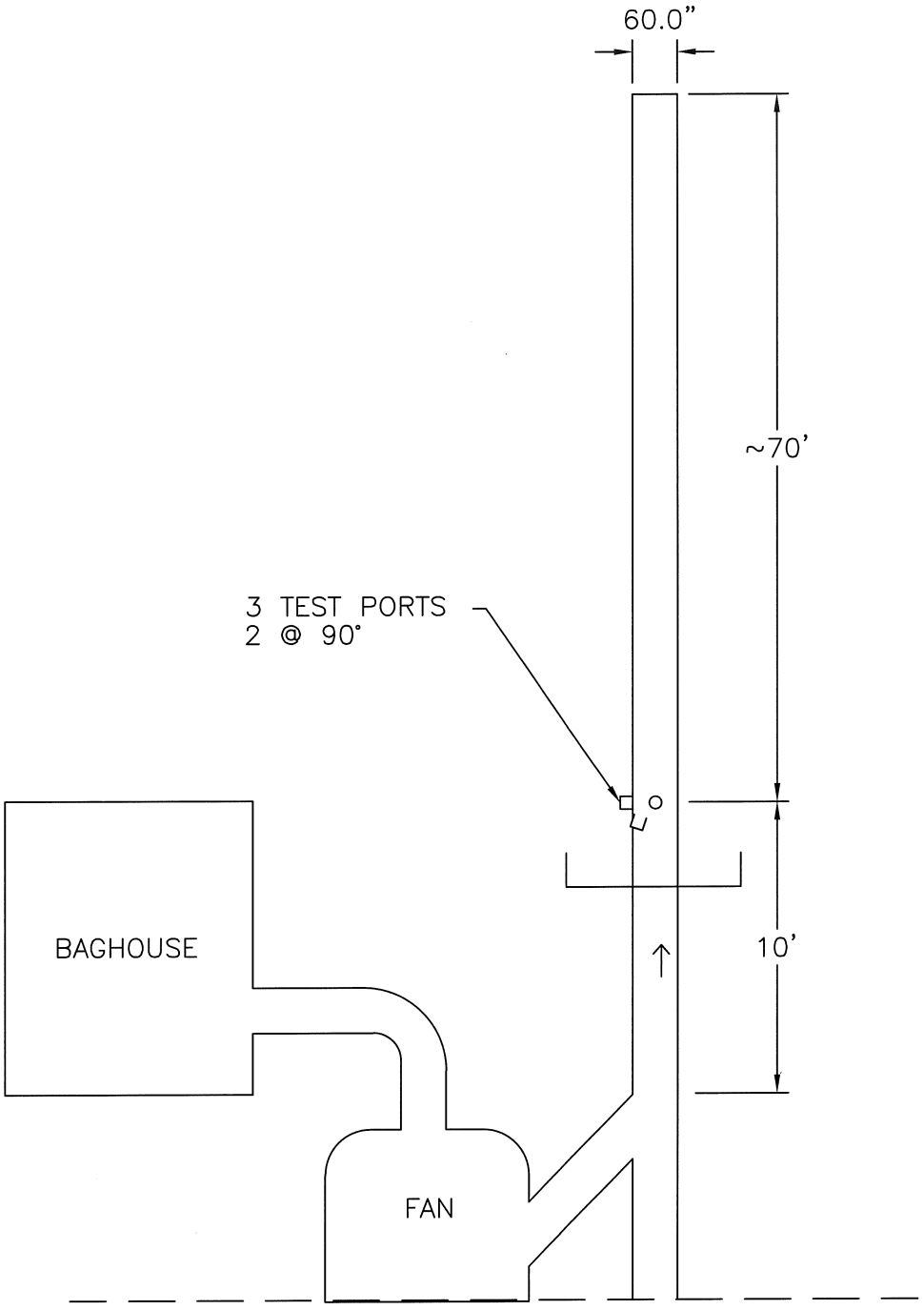
TABLE 7

Method 320 MeOH Test Results

EU-Dried Material (SV-BH 667)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	8/9/2019	8/9/2019	8/9/2019	---
Test Period	1525-1639	1733-1836	1915-2020	---
Volumetric Flow Rates				
SCFM	26,992	25,032	25,082	25,702
Moisture, %	2.5	2.6	2.1	2.4
Speciated Concentration by Method 320, ppmv				
Methanol	0.19	0.34	0.23	0.25
Speciated Emissions by Method 320, lb/hr				
Methanol	0.03	0.04	0.03	0.03

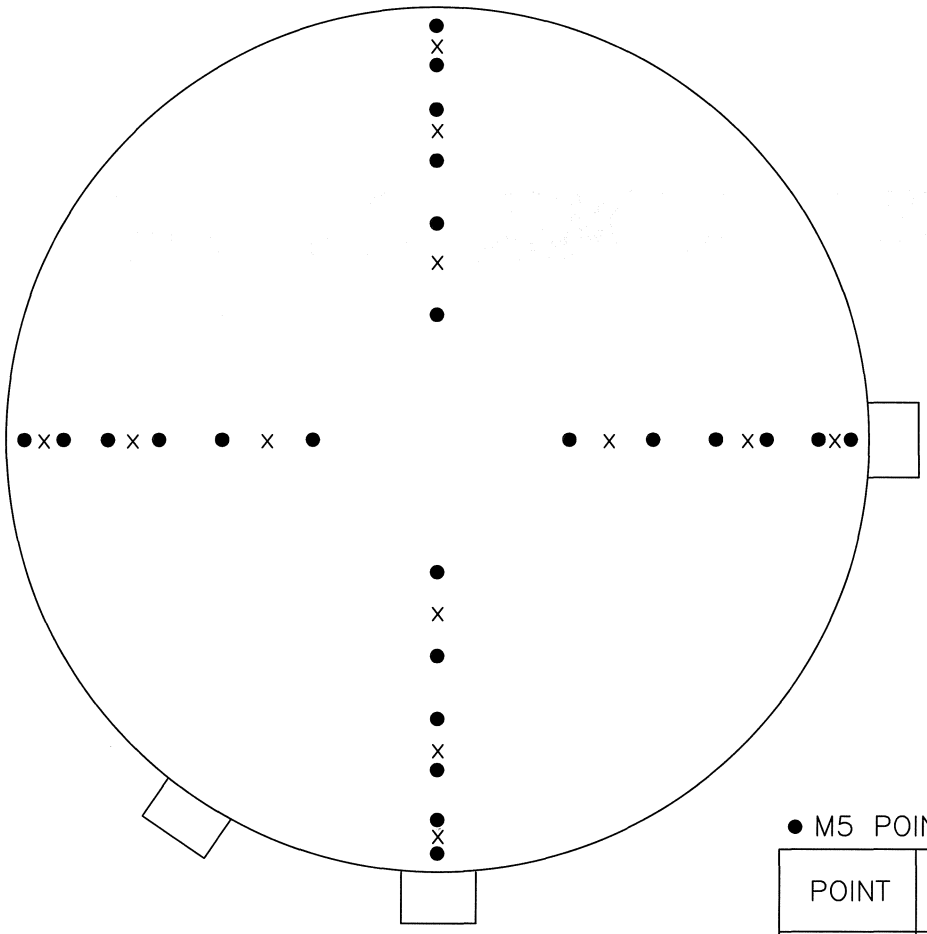
Figures



TEST PORT LOCATIONS
NATIONAL CARBON TECHNOLOGIES
GWINN, MICHIGAN
EU DRYER STACK (SV–EXHAUST)

NOT TO SCALE

FIGURE 1



● M5 POINTS

POINT	INSERTION DEPTH IN "
1	1.28
2	4.02
3	7.09
4	10.64
5	15.00
6	21.34
7	38.66
8	45.00
9	49.36
10	52.91
11	55.98
12	58.72

x ANALYZER POINTS

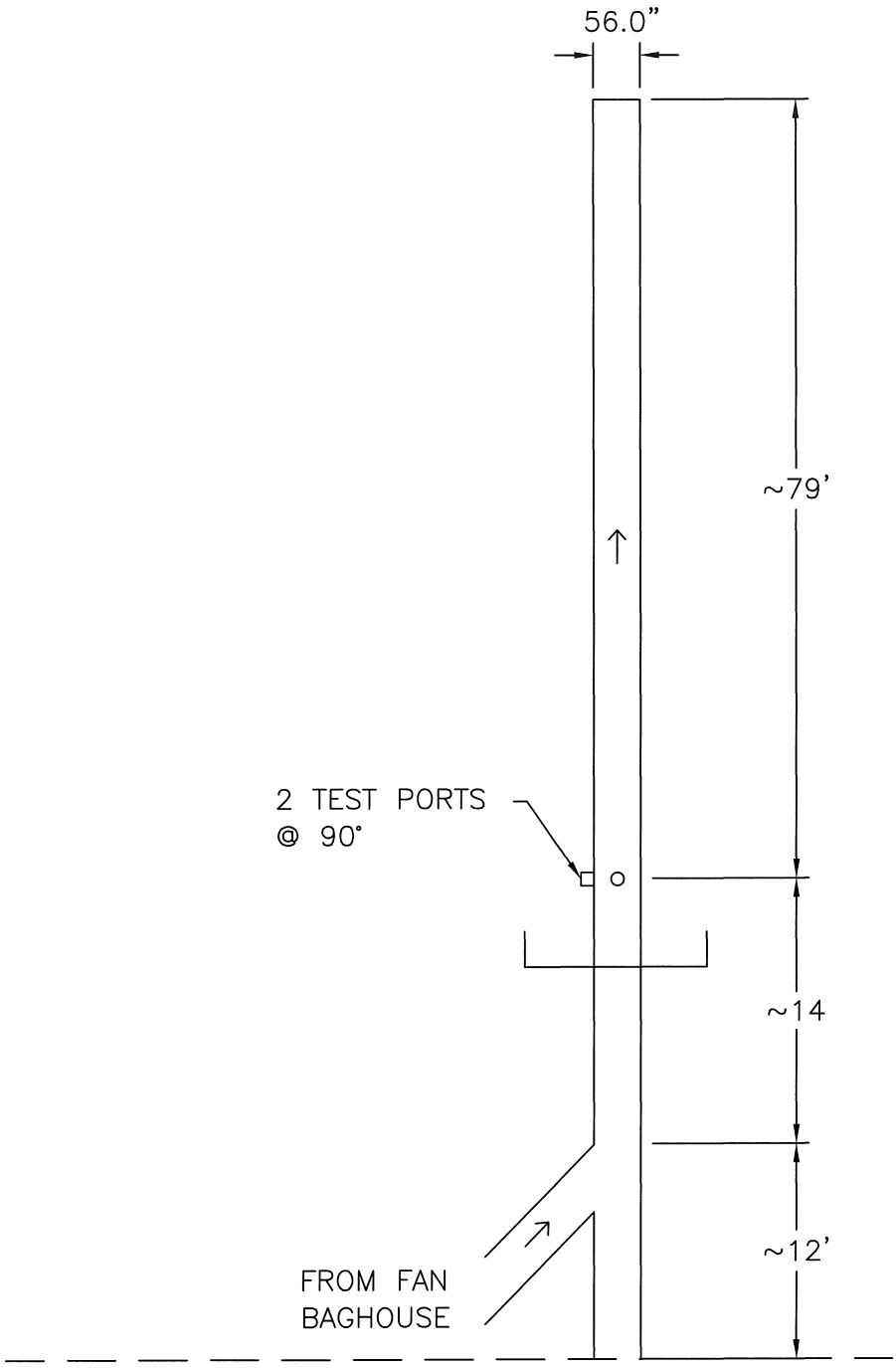
POINT	INSERTION DEPTH IN "
1	2.61
2	8.79
3	17.75
4	42.25
5	51.21
6	57.39

NO. OF TEST PORTS	2
PORT LENGTH	6.0"
PORT DIAMETER	6"
NO. OF TRAVERSE POINTS	12/24
DUCT DIAMETER	60.0"

TRAVERSE POINT LOCATIONS
NATIONAL CARBON TECHNOLOGIES
GWINN, MICHIGAN
EU DRYER STACK (SV–EXHAUST)

NOT TO SCALE

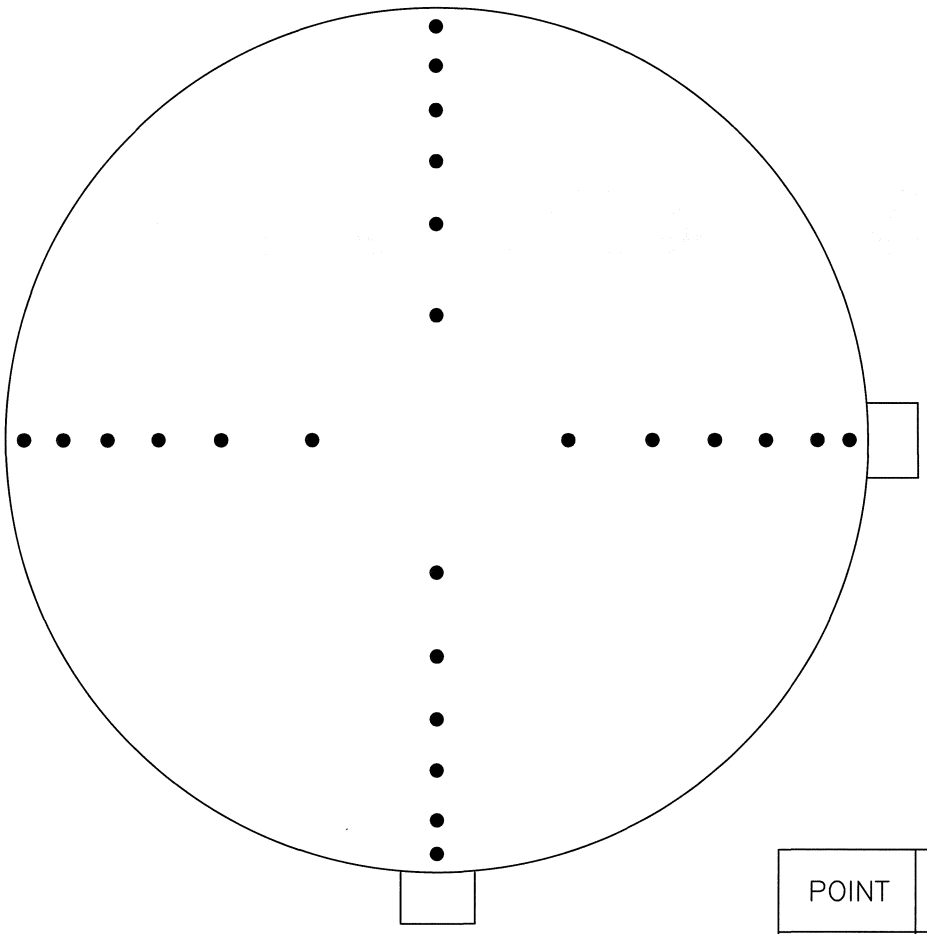
FIGURE 2



TEST PORT LOCATIONS
NATIONAL CARBON TECHNOLOGIES
GWINN, MICHIGAN
EU RAW MATERIAL STACK (SV–BH666)

NOT TO SCALE

FIGURE 3



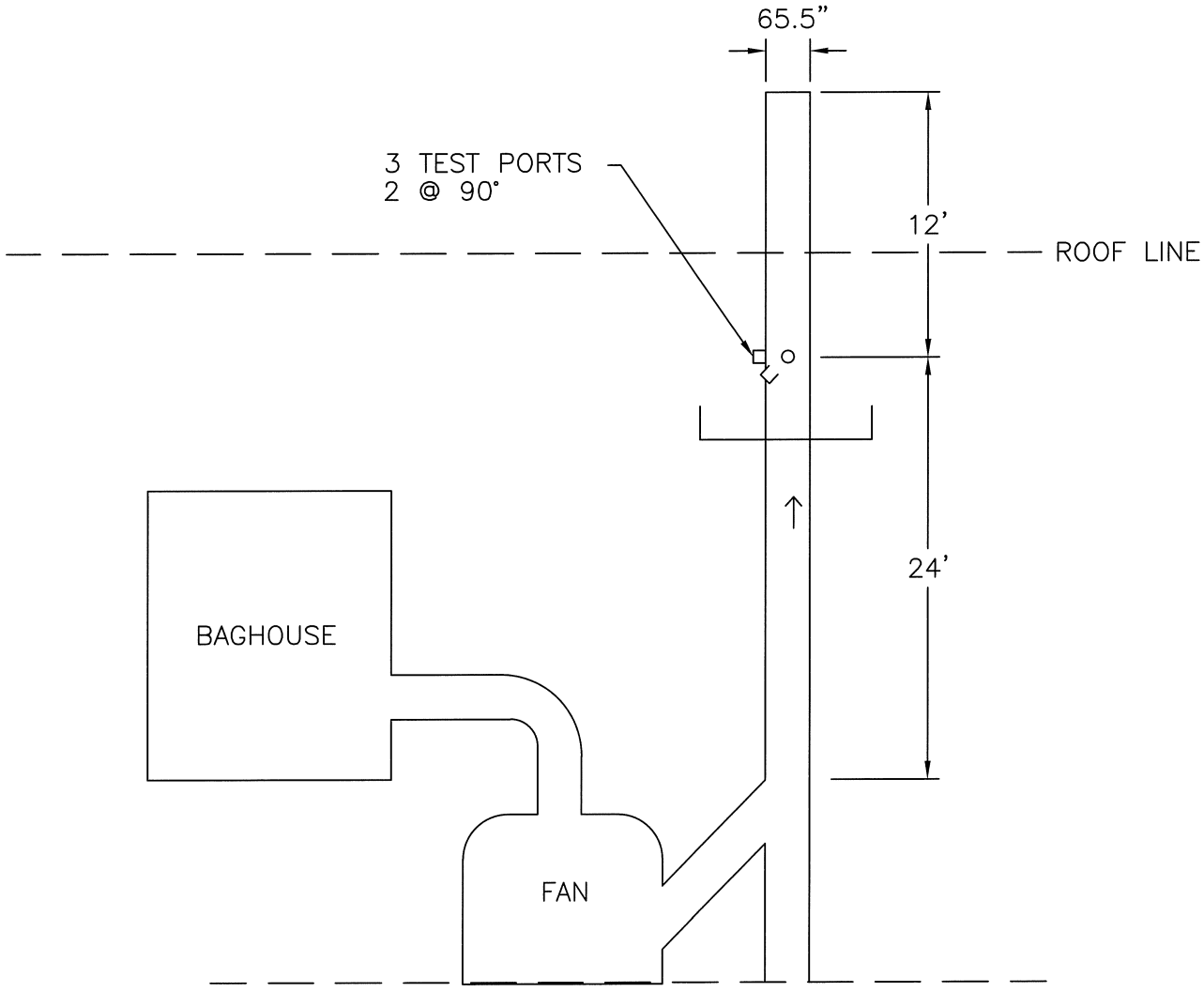
POINT	INSERTION DEPTH IN "
1	1.19
2	3.75
3	6.61
4	9.93
5	14.00
6	19.92
7	36.08
8	42.00
9	46.07
10	49.39
11	52.25
12	54.81

NO. OF TEST PORTS	2
PORT LENGTH	6.0"
PORT DIAMETER	6"
NO. OF TRAVERSE POINTS	24
DUCT DIAMETER	56.0"

TRAVERSE POINT LOCATIONS
NATIONAL CARBON TECHNOLOGIES
GWINN, MICHIGAN
EU RAW MATERIAL STACK (SV–BH666)

NOT TO SCALE

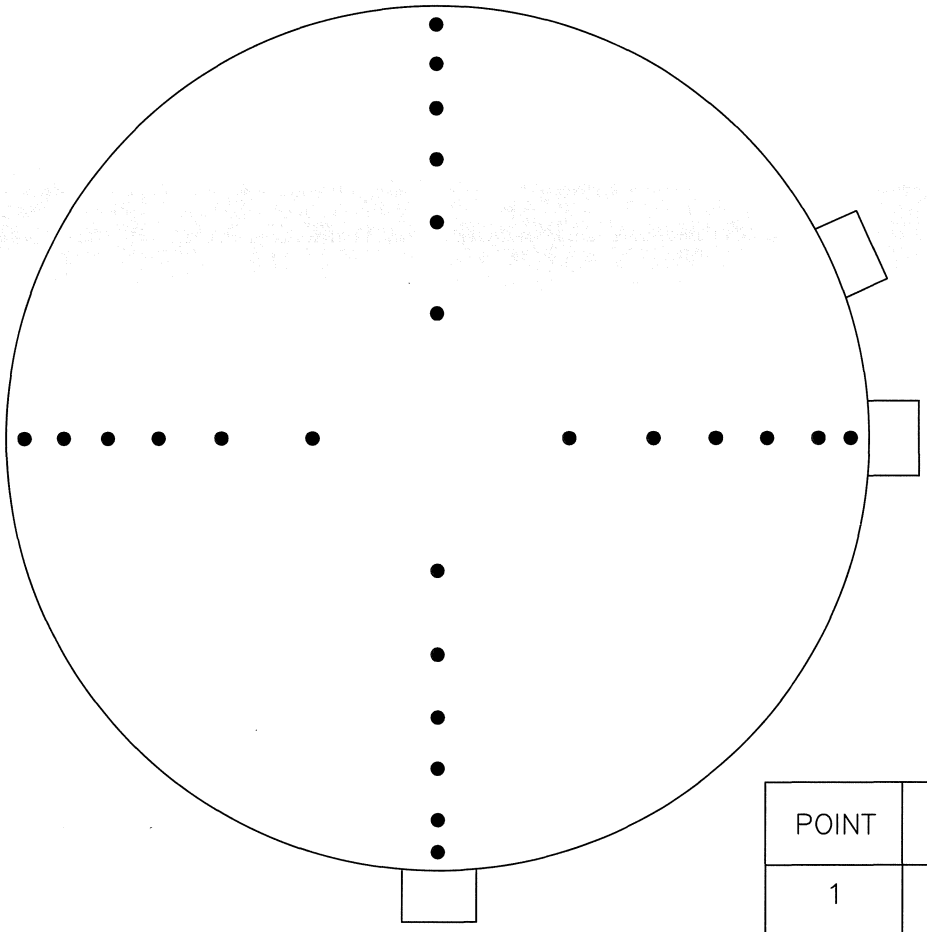
FIGURE 4



TEST PORT LOCATIONS
NATIONAL CARBON TECHNOLOGIES
GWINN, MICHIGAN
EU DRIED MATERIAL STACK (SV–BH667)

NOT TO SCALE

FIGURE 5



NO. OF TEST PORTS	2
PORT LENGTH	6.25"
PORT DIAMETER	6"
NO. OF TRAVERSE POINTS	24
DUCT DIAMETER	65.5"

POINT	INSERTION DEPTH IN "
1	1.39
2	4.39
3	7.74
4	11.61
5	16.38
6	23.30
7	42.20
8	49.13
9	53.89
10	57.76
11	61.11
12	64.11

TRAVERSE POINT LOCATIONS
NATIONAL CARBON TECHNOLOGIES
GWINN, MICHIGAN
EU DRIED MATERIAL STACK (SV–BH667)

NOT TO SCALE

FIGURE 6