

**DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection**

N699647732

FACILITY: POET Biorefining - Caro, LLC		SRN / ID: N6996
LOCATION: 1551 Empire Drive, CARO		DISTRICT: Saginaw Bay
CITY: CARO		COUNTY: TUSCOLA
CONTACT: Charles Hauxwell , EHS Specialist II		ACTIVITY DATE: 01/16/2019
STAFF: Matthew Karl	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: Scheduled inspection to determine compliance with ROP No. MI-ROP-N6996-2018.		
RESOLVED COMPLAINTS:		

On Wednesday (1/16/19) I (Matt Karl) conducted a compliance inspection at POET Biorefining – Caro, LLC located at 1551 Empire Drive, Caro, Michigan. The purpose of the inspection was to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control of Natural Resources and Environmental Protection Act, 1994 Public Act 451; Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) Administrative Rules; Renewable Operating Permit (ROP) No. MI-ROP-N6996-2018. Mr. Charles Hauxwell, EH&S Specialist II and Ms. Emily Boynton, Plant Manager, assisted me during my inspection and provided requested records.

Facility Description:

POET Biorefining – Caro, LLC is an ethanol production facility with a current permitted capacity of 89.25 million gallons per year. The operation consists of grain receiving, handling, fermentation, distillation and ethanol loadout equipment.

POET Biorefining – Caro, LLC uses corn as a feedstock. The facility has an onsite grain elevator and storage bins for receiving corn. Particulate matter (PM, PM2.5, PM10) emissions are controlled with a fabric filter collector (CE001).

POET Biorefining – Caro, LLC uses a dry mill process. The dry mill process consists of running the corn through five hammermills which grind the corn into a fine powder called flour. The hammermills emit particulate matter (PM, PM2.5, PM10) which are controlled using five baghouses (F-110 through F-114). The hammermills and corresponding baghouses make up the flexible group FG-FLOUR.

The next step is the fermentation process. First, the flour is added to water, enzymes and yeast to form a slurry. The enzymes are added to convert starch into glucose, or simple sugars. The yeast converts the simple sugars (glucose) into ethanol and carbon dioxide. The fermented mash (beer) is continuously agitated and cooled until the ethanol concentration has been maximized. Next is the distillation process. The fermented mash (beer) is pumped to the continuous flow, multicolumn distillation system where the ethanol is extracted from the top of the distillation columns and is separated from the solids and water which exit from the bottom of the columns to the co-product process. The ethanol extracted from the distillation columns is further processed by molecular sieves, which further concentrate the ethanol. The fermentation and distillation process emissions of VOCs and acetaldehyde are controlled by a packed wet bed scrubber and is supported by a redundant packed wet bed scrubber (CE004 and CE014). Emissions can also be routed to the regenerative thermal oxidizer (RTO) (CE012) if both scrubbers are unavailable. The fermentation and distillation process equipment make up the flexible group FG-FERM&DIST.

The concentrated ethanol is sent to several floating roof storage tanks before being transported by rail or truck. The ethanol storage tanks make up the flexible group FGETHANOLTANKS.

The bottoms of the distillation columns are sent to the co-product process. The co-product process consists of a centrifuge, which separates the solids from the liquids. The wet grain is sent to two dryers, which drive off the moisture to produce dried distillers' grains with solubles (DDGS) which is sold as livestock feed. The liquids which are separated in the centrifuge are sent to an evaporator. The evaporator separates the liquids into corn oil, syrup and distillate. The corn oil is extracted and sold as a byproduct, the syrup is re-combined with the DDGS, and the distillate is recycled to the slurry. The emissions from the DDGS dryers are controlled by multiclone dust collectors (CE006 and CE007) and is then routed to the thermal oxidizer and heat return boiler (TO&HRB) (CE010) and RTO (CE012). The control devices are for particulate matter (PM, PM2.5, PM10), VOCs and NOx. The centrifuge and dryers make up the flexible group FGDDGSDRYERS.

Site Inspection:

On Wednesday (1/16/19) I arrived on site at approximately 09:00 am. I met with Charles Hauxwell and Emily Boynton. We proceeded to a conference room in the administrative building to review the records relevant to the ROP. The majority of the records I requested to review were contained within Excel Spreadsheets connected to the company's PI database.

First, I reviewed the Excel Spreadsheet for 2018 which contained information on the monthly VOC emission rate from the fluidized bed cooler (EUFBCOOLER), the fermentation and distillation processes (FGFERM&DIST), the DDGS dryers (FGDDGSDRYERS) when the TO&HRB and RTO were being used as pollution control and the DDGS dryers when wet cake was being produced. The summaries of the records I reviewed are included below in the "Records Review" section.

Next, I reviewed the Excel Spreadsheet which contained information on the amount of total ethanol and denaturant loaded out (FGETHLOAD) at the facility during 2018. I reviewed both the monthly total gallons and the 12-month rolling total. The summary of the records I reviewed are included below in the "Records Review" section.

Next, I reviewed the Excel Spreadsheet which contained information on the amount of grain processed at the facility in 2018 (EUCORNELEV1, FGCORN-DDGS). From 12/16/18 to 1/16/19 420.53 ton of grain had been processed. There was also a graph present in addition to the data tables and from this I could observe that the greatest grain acceptance rate occurred on 10/30/18 and was 7,460 lbs/day. This is well below the FGCORN-DDGS process/operational restriction SC III.1 of 9,700 tons/day.

I received a "LOG FOR GENERATOR USE 2018" which contained information about the operating hours and mode for the emergency stationary reciprocating internal combustion engine (RICE). The EUGENSET generator was only operated for preventative maintenance (PM) purposes during 2018. The summary is included below in the "Records Review" section.

I received a record for the natural gas consumption in the TO&HRB and package boiler (EUBOILER). The record consisted of the btu/hr total for each day from 1/1/18 to 1/9/19. The facility appears to be tracking the natural gas usage in compliance with the permit material use conditions.

I received copies of the "Operators Shift Log" for 1/1/18, 4/1/18, 10/1/18 and 12/1/18. The purpose of reviewing these records was to observe that visible emissions checks were being conducted. I confirmed that visible emissions checks were being made on the baghouses associated with the grains, surge bins, mill and DDG. No abnormal visible emissions were noted on any of the records reviewed.

Charles Hauxwell pulled up the control system screens for the facility on his laptop. We reviewed pressure drop (differential pressure, dp) graphs for the particulate collectors associated with the following flexible groups: FGCORN-DDGS, FGFLOUR, FGSCALP, and FGFERM&DIST. At that time, I noted no abnormalities.

I collected graphs for the wet scrubber differential pressure, temperature and flow rate from late December 2018 to mid-January 2019. The summary of the findings derived from the graphs is included below in the "Records Review" section.

Next, I reviewed the Leak Detection & Repair Work Order ticket binder and collected a copy of the ticket dated 12/5/18 as an example. I also reviewed the Orr LeakDAS electronic recordkeeping system that the facility recently began using. The electronic recordkeeping system allows the facility to track all of the equipment in the flexible group FGNSPSVVA as well as the inspection schedule and work order tickets.

Finally, we reviewed the inspection history for the tanks on site at the facility. Charles Hauxwell informed me that the tanks in the flexible group FGNSPSTANKS were last inspected on 5/23/17 and the tanks in FGETHANOLTANKS were last inspected in 11/2016. All of the tanks are inspected every 10 years. All of the tanks use a cathodic protection system to prevent corrosion. On Thursday (1/24/19) Charles Hauxwell emailed me with a correction and informed me that the internal floating roofs had been inspected on all of the tanks (T801-T805) by Compass Environmental, Inc on 10/29/18. He provided me with records of the "Annual Internal Floating Roof Inspection" for tanks (T801-T805) at that time.

We then performed a brief facility walkthrough. We left the administrative building and began in the Grains Receiving and Handling area. I noted no visible emissions coming from the hammermills or the associated baghouses. We then proceeded across the parking lot and walked a circuit of the first floor of the facility starting in the Fermentation and Distillation areas. I confirmed that the redundant wet scrubber (CE014) had been installed. Charles and Emily informed me that they would wait until there was warmer weather in the spring to switch over to the redundant wet scrubber so that the primary wet scrubber (CE004) could be cleaned and have any maintenance required performed on it. In order to switch between scrubbers, there are several valves that

need to be manually adjusted. We then proceeded to the section of the facility that houses the DDGS dryers and TO&HRB. At approximately 11:15, I read off of the equipment display panels that the dryers were operating at 576 F and the TO&HRB was operating at 1508 F. We finished the tour outside on the southwest side of the facility so that I could observe the TO&HRB and RTO stacks. I noted no visible emissions.

Records Review:

I received the following records during my on-site inspection on Wednesday (1/16/19):

- Leak Detection & Repair Work Order- 12/5/18
- FERM SCRUB TOTAL DP
- FERM SCRUBBER TEMP
- FERM SCRUB FLOW
- Operators Shift Log- 12/1/18, 10/1/18, 4/1/18, 1/1/18
- LOG FOR GENERATOR USE 2018
- Nat Gas TOHRSG + EUBOILER

I received the following record from Charles Hauxwell via email on Thursday (1/24/19):

- "Annual Internal Floating Roof Inspection" (T801-T805)

Additionally, I also reviewed the following records:

- ROP Semiannual 2 and Annual Certification
- CAM Report/Excursions
- Semi Annual LDAR Report, Component Listing, Letter describing plant shutdown dates, inventory (component) changes and repairs made

Table 1. Summary of VOC Emissions

	EUFB cooler	FGFERM&DIST	FGDDGSDRYERS (TO+RTO)	FGDDGSDRYERS (Wet Cake)
Month-Year	lb/hr	lb/hr	lb/hr	lb/hr
Jan-18	0.73	10.39	0.73	0.24
Feb-18	0.46	10.49	0.45	0.25
Mar-18	0.5	10.13	0.49	0.27
Apr-18	0.7	10.55	0.69	0.29
May-18	0.41	10.17	0.41	0.24
Jun-18	0.16	7.5	0.16	0.22
Jul-18	0.4	9.46	0.4	0.25
Aug-18	0.35	9.94	0.35	0.24
Sep-18	0.38	9.37	0.37	0.27
Oct-18	0.49	9.87	0.49	0.27
Nov-18	0.03	9.61	0.03	0.26

EUFB cooler: Compliant

Based on my review of the data summarized in Table 1 it appeared that the VOC emissions rate from the fluidized bed cooler was well below the permit emission limit in SC I.4 of 6.6 lb/hr VOC over the period of the records reviewed.

FGFERM&DIST: Compliant

FGFERM&DIST has two VOC emission limits in SC I.1 and SC I.2 based upon whether emissions are being vented through the packed wet bed scrubber or the RTO. The monitoring/recordkeeping condition SC VI.5 requires the permittee to record the number and duration of the times the scrubber is bypassed for the RTO. Charles Hauxwell informed me that there were no scrubber bypass episodes for 2018. Therefore, the emission limit in SC I.1 of 19.66 lb/hr applies. Based on my review of the data summarized in Table 1 it appeared that the VOC emissions over the period of the records review was well below this limit.

I reviewed the three charts: FERM SCRUB TOTAL DP, FERM SCRUBBER TEMP, FERM SCRUB FLOW to determine compliance with the monitoring/recordkeeping condition SC VI.3 which requires the permittee to record the scrubber liquid flow rate, exhaust temperature and pressure drop of the operational scrubber. The charts covered from approximately 12/28/18-1/16/19.

Reviewing FERM SCRUB FLOW, I noted the flow rate ranged from approximately 32 to 62 gallons/minute (GPM) and averaged approximately 56 GPM. This follows the malfunction abatement plan (MAP) which specifies the 3-hour water flow rate averages 30-GPM with mash flow online and for at least 36 hours with mash flow off; after 36 hours of mash flow off a 15-GPM average rate is acceptable. There were a few negative spikes on the chart, which occurred on Wednesday (1/2/19) and Tuesday (1/8/19). Charles Hauxwell informed me that these were due to DCS control card RI0301 communication losses. These communication losses do not represent the actual flow rate during those time periods and indicate that control card needs to be repaired or replaced.

Reviewing FERM SCRUBBER TEMP, I noted the exhaust temperature ranged from approximately 53.4 F to 63.4 F and averaged approximately 61 F. This follows the MAP which specifies the 3-hour exhaust temperature averages less than 65 F.

Reviewing FERM SCRUB TOTAL DP, I noted the differential pressure ranged from approximately 2.6" Water Column ("WC) to 9.4" WC and averaged approximately 5" WC. This follows the MAP which specifies the combined 3-hour average differential pressure is less than 15" WC. There were a few negative spikes on the chart, which occurred on Wednesday (1/2/19) and Tuesday (1/8/19). Charles Hauxwell informed me that these were due to DCS control card RI0301 communication losses. These communication losses do not represent the actual differential pressure during those time periods and indicate that control card needs to be repaired or replaced.

Additionally, I also reviewed the following records: ROP Semiannual 2 and Annual Certification and the CAM Report/Excursions. There were two deviations noted and both were regarding the flexible group FGFERM&DIST. The first deviation noted occurred on 6/6-6/9/18, totaling 69 hours. The packed wet bed scrubber was shut down during this time period to allow for tie-in connections to be made to a steam turbine. The fermentation process was at least 72 hours old before the shutdown, and the estimated emissions during this deviation were below the limits of 19.66 lb/hr VOC and 1.50 lb/hr acetaldehyde. The second deviation noted occurred on 9/1/18, totaling 183 minutes. The exhaust temperature from the packed wet bed scrubber exceeded the 3-hour average of 65 F. The scrubber control systems went off line due to a control card failure. The resulting chain of events caused the coupler on the scrubber chiller recirculation pump to fail. Facility staff reprogrammed the control card and repaired the pump coupler as quickly as possible. No violation notice was sent for these reported deviations.

FGDDGSDRYERS: Compliant

FGDDGSDRYERS has two VOC emission limits in SC I.7 of 9.00 lb/hr and SC I.8 of 6.13 lb/hr based upon whether emissions are being vented to the TO&HRB and RTO or when the facility is producing wet cake and TO&HRB and RTO are not operating, respectively. Based on my review of the data summarized in Table 1 it appeared that the VOC emissions over the period of the records review were well below both of these respective emission limits.

Table 2. FGETHLOAD Total Ethanol and Denaturant Throughput

Month-Year	Monthly Total	12-Month Rolling Total
	Gallons	Gallons
Jan-18	32,413	1,287,864
Feb-18	91,966	1,296,835
Mar-18	96,586	1,393,421
Apr-18	38,174	1,086,082
May-18	97,240	1,183,322
Jun-18	517,838	1,582,010
Jul-18	183,052	1,409,562
Aug-18	49,043	1,391,400
Sep-18	298,742	1,651,210
Oct-18	73,947	1,532,670
Nov-18	360,177	1,880,683
Dec-18	-	1,839,176

FGETHLOAD: Compliant

Based on my review of the data summarized in Table 2 it appeared that the ethanol and denaturant throughput from the truck and rail load out was well below the permit material limits in SC II.1 of 5,000,000 gallons per 12 month rolling time period of denaturant and 89,250,000 gallons per 12 month rolling time period of total ethanol and denaturant over the period of the records reviewed.

EUGENSET: Compliant

I reviewed the LOG FOR GENERATOR USE 2018. The facility usually operated the emergency stationary RICE twice a month for ~15 minutes for the purposes of non-emergency preventative maintenance. The total time operated during 2018 was approximately 6.1 hours.

FGNSPSTANKS: Compliant

I reviewed the "Annual Internal Floating Roof Inspection" records for EUNATGASTANK1 (T-802) and EUNATGASTANK2 (T-805). Both tanks were inspected on 10/29/18 by 3rd party contractor Compass Environmental, Inc. It was noted on the inspection forms that the inspector evaluated the tanks through the manholes. It was noted that the inspector looked for holes, tears, gouges or other openings in the seals. The internal floating roof, primary seal and secondary seal were visually inspected, and no defects were noted.

FGETHANOLTANKS: Compliant

I reviewed the "Annual Internal Floating Roof Inspection" records for EU190TANK (T-801), EU200TANK1 (T-803) and EU200TANK2 (T-804). The tanks were inspected on 10/29/18 by 3rd party contractor Compass Environmental, Inc. It was noted on the inspection forms that the inspector evaluated the tanks through the manholes. It was noted that the inspector looked for holes, tears, gouges or other openings in the seals. The internal floating roof, primary seal and secondary seal were visually inspected, and no defects were noted.

FGNSPSVVA: Compliant

I reviewed the "Semi Annual LDAR Report, Component Listing, Letter describing plant shutdown dates, inventory (component) changes and repairs made" documents. The latest component inventory was conducted in July by 3rd party contractor BLOC Environmental. I've included a summary of the component listing in Table 3. below:

Table 3. NSPS VVa Component Inventory

Component	Distillation	Tank Farm
Compressors	0	0
Connections	1235	1013
Pumps	8	6
Valves	333	174
Relief Valves	10	0

Over the reporting period, 7/1 to 12/31/18, in Distillation, there were 10 leaks detected (9 connectors and 1 pump). In Tank Farm, there was 1 leak detected in valves.

I also reviewed the "Leak Detection & Repair Work Order dated 12/5/18." The work order form contained areas for component information, initial leaking information, inspections, repairs, comments, additional repair/retest information, extraordinary efforts, and a delay of repair authorization. For this work order, the component was one of the connections in distillation. The leak was detected by a meter inspection on 12/4/18 which recorded a ppm reading of 2679, in excess of the 499 ppm maximum. The connection was tightened and retested on 12/6/18. On 12/10/18 a more permanent repair was made, which re-taped and sealed the connection.

Summary:

Based on my site inspection and review of records, it appears that POET Biorefining – Caro, LLC was in compliance with the conditions of ROP No. MI-ROP-N6996-2018.

NAME Matthew L. Kord DATE 2/6/19 SUPERVISOR C. Hare