

**CITY OF PHILADELPHIA**  
**Department of Public Health**  
**Environmental Protection Division**  
**Air Management Services**

**InterOffice Memo**

**To:** File  
**From:** Maryjoy Ulatowski, Environmental Engineering Supervisor  
**Date:** February 17, 2022  
**Subject:** Initial Natural Minor Operating Permit Summary for Evergreen Resources Group, LLC, OP17-000056, PLID 10479

**Company Description:**

Evergreen Resource Group, LLC is responsible for operation of **one (1) closed vent system and one (1) bio filter** at the former Philadelphia Energy Solutions Refining and Marketing LLC (PES) Philadelphia Refining Complex (3144 W. Passyunk Avenue, Philadelphia, PA 19145) and **one (1) biofilter** located Sunoco Partners Marketing and Terminals L.P. (SPMT) Belmont Terminal (2700 W. Passyunk Avenue, Philadelphia, PA 19145). The three remediation systems are operated by Evergreen Resource Group and in proximity to each other; therefore, the remediation systems qualify for under one operating permit. The three remediation systems are listed below:

<b>Source ID</b>	<b>Location</b>	<b>Source Name</b>	<b>Source Description and Capacity</b>	<b>AMS Permit No. / Construction Date</b>
PB-RS	Former PES Terminal Site	Point Breeze Remediation System	Consists of: <ul style="list-style-type: none"> <li>• Biofilter 14,000 CFM, 2 banks of 2 beds for a total of 4 biomass treatment beds. Each bed is approx. 73 x 39 x 4 ft.</li> <li>• Three (3) blower fans</li> </ul>	Originally permitted under 98005 dated 3/23/1998. Modified under 06170 dated 4/30/2007. Modified under 15302 dated 11/29/2016.
BT-RS	Belmont Terminal Site	Belmont Terminal Remediation System And Holding Tank	Consists of: <ul style="list-style-type: none"> <li>• Biofilter - Three (3) cells, biomass treatment beds</li> <li>• Each bed is Approx. 45 ft x 45ft x 4ft</li> <li>• One (1) 5000 Gallon LNAPL Holding Tank</li> </ul>	Originally permitted under 01092 dated 10/5/2001. Modified under 13280 dated 12/23/2013.
PB-ML	Former PES Terminal Site (Northern Border of Point Breeze Refinery)	Maiden Lane Remediation System	Closed-Vent System Components: <ul style="list-style-type: none"> <li>• Two (2) Influent EQ Settling Tank (180 gallons) [Hydro Quip, TC3060AA]</li> <li>• One (1) Oil Water Separator (OWS) [Hydro Quip, AGM-3SS-150V-HP-1H]</li> <li>• One (1) Secondary Settling Tank (150 gallons) [Hydro Quip Surge Tank, R243948AB]</li> <li>• One (1) Secondary Settling Tank (105 gallons, Chem Trailer/ TC2454AA/AB)</li> <li>• One (1) LNAPL Holding Tank (550 gallons)</li> </ul>	IP21-000137 dated 3/23/2021

			[Highland Tank and Manufacturing, Inc] • One (1) AMETEK/ROTRON regenerative blower, EN656M5XL  Control Devices: One (1) Catalytic Oxidizer - Falmouth Products	
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In September 2017, the facility submitted an initial Natural Minor Operation Permit Application (OP17-000056) to operate the remediation systems at the 2 locations. Since 2017, various remediation systems have been installed and removed from the 2 locations. The following are remediation systems that were installed in the past but have been removed from the site or no longer in operation have been removed from the revised draft of the operating permit.

- Pollock Street Remediation System
- Penrose Remediation System
- PGW Border Remediation System

The facility’s representative to contact concerning their Natural Minor Operating Application is below:

Owner: Philadelphia Refinery Operations - Evergreen Resources Group.  
 Mailing Address: 2 Righter Parkway, Suite 120. Wilmington, DE 19803

Facility and Permit Contact: Tiffani L. Doerr  
 Phone: 302-477-1305  
 Email: tldoerr@evergreenmngt.com

The facility is subject to the operating permit requirements under 25 Pa Code §127, Subchapter F. The facility is not a major stationary source as defined in Title I, Part D of the Clean Air Act Amendments and is therefore not subject to the Title V operating Permit requirements adopted in 25 Pa Code §127, Subchapter G. The Table 1 below the potential emissions from the facility that indicates that the facility not a major source for criterial pollutants.

**. Table 1: Criteria Pollutant Potential Air Emissions**

Source ID, Name	Location	NOx	SOx	CO	VOC	HAPS	Pb	PM
PB-RS	Former PES Site, Point Breeze	Neg or ND	Neg or ND	Neg or ND	Neg or ND	Neg or ND	Neg or ND	Neg. or ND
BT-RS, Belmont Terminal Biofilter	Sunoco Belmont Terminal	Neg or ND	Neg or ND	Neg or ND	Neg or ND	Neg or ND	Neg or ND	Neg or ND
PB-ML, Maiden Lane Remediation System	Former PES Site, Point Breeze	Neg or ND	Neg or ND	Neg or ND	0.5	0.5	Neg or ND	Neg or ND
<b>Total Emissions (tpy)</b>		<b>Neg or ND</b>	<b>Neg or ND</b>	<b>Neg or ND</b>	<b>0.5</b>	<b>0.5</b>	Neg or ND	<b>Neg or ND</b>

<b>Major Source Threshold (tpy)</b>		<b>25</b>	<b>100</b>	<b>100</b>	<b>25</b>	<b>25 (Combined) 10 Individual HAPs</b>	<b>10</b>	<b>100</b>
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Neg or ND = Negligible or Not Detected. NOx, CO, SOx, PM, and Pb are negligible or non-detected because the remediation system and the biofilters are not considered a source of NOx, CO, PM, SOx and Pb or previous air monitoring records indicate emissions or negligible.

**Applicability for Regulations:**

**Point Breeze Remediation System at Former PES Site**

The Point Breeze Remediation system located at the PES Terminal Site consist of the following:

- Biofilter 14,000 CFM, 2 banks of 2 beds for a total of 4 biomass treatment beds. Each bed is approx. 73 x 39 x 4 ft. and
- Three (3) blower fans

The unit was originally permitted under 98005 dated 3/23/1998 to SUN Refinery, modified under 06170 dated 4/30/2007 and modified under 15302 dated 11/29/2016. There are no emission limits for the biofilter when it was originally issued in 1998. The main purpose of the biofilter was to control odors from the sewer coming from SUN Refinery. The original permit was modified to change the frequency of monitoring for various operating parameters under 06170 and 15302. The Permittee shall perform all routine maintenance procedures to the biofilter according to the latest weekly maintenance schedule log which includes annual maintenance/testing of the heating coil and air distribution piping.

For the Point Breeze Remediation System, to ensure that the system is working properly, the Permittee will need to keep monitor and keep records of the following items per IP15302 dated 11/29/2016:

- Weekly monitoring of the steam injection system.
- Weekly temperature of the inlet gas to the Biofilter.
- Weekly Maintenance Schedule Log .
- Monthly checklists for fan current and fan differential pressure.
- Monthly checklists for biofilter cell pressures.
- Quarterly checks of blower fan performance.
- Quarterly checks of pH cell beds.
- Annual inspection and calibration of the humidification and temperature control systems.
- Annual inspection of the stem valve position.

Recent monitoring data (May-Jul 2021) from the remediation system are provided in Attachment A. There are no VOC permit emission limits or no permit requirement to monitor emissions; however, Evergreen periodically monitors emissions. The recent monitoring data indicates effluent readings are consistently at 0 ppm.

## **Belmont Remediation System at Sunoco Belmont Terminal Site**

The Belmont Remediation System at the Sunoco Belmont Terminal Site consists of the following:

- Biofilter - Three (3) cells, biomass treatment beds
- Each bed is approximately 45 ft x 45ft x 4ft
- One (1) 5000 Gallon LNAPL Holding Tank

The unit was originally permitted under 01092 dated 10/5/2001 to Sunoco, Inc. The main purpose of the biofilter was to control sewer odors and remove organic vapors. The original permit did not have emission limits. The permit was modified under 13280 dated 12/23/2013 to change monitoring frequencies of various biofilter operating parameters. Below is a summary of the changes to Permit 01092 and incorporated under Permit 13280.

### **REQUEST TO MODIFY PLAN APPROVAL NO.: 01092 REVISED BIOFILTER SYSTEM OPERATION AND MONITORING PLAN**

Conclusions  
October 23, 2013

## **5.0 Conclusions**

Based on the historical organic vapor concentration recovery data, it appears that the source of petroleum hydrocarbon vapors within the Shunk Street sewer has been remediated. As such, Sunoco is requesting that the revised operation and monitoring plan, as indicated below, be approved by AMS.

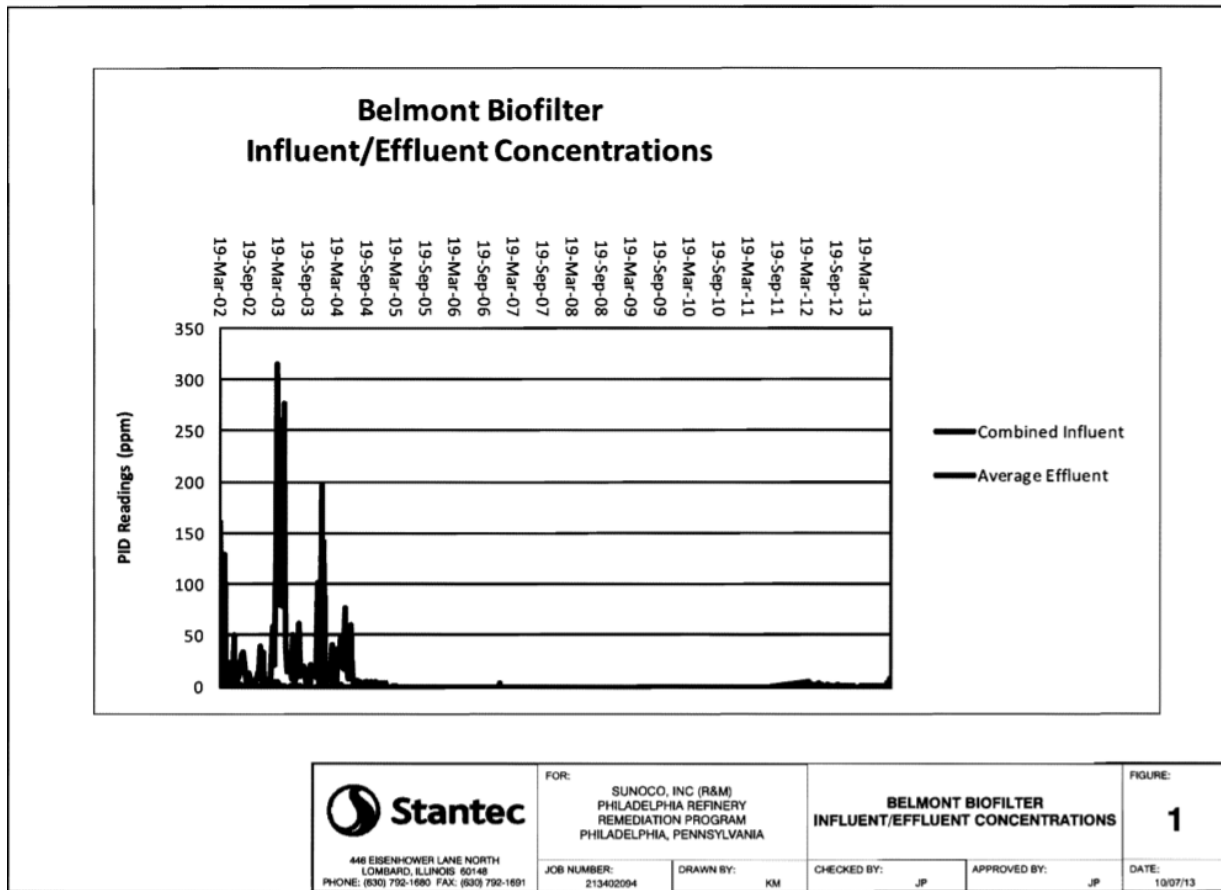
To ensure proper operation of the biofilter system and to maintain compliance with the design criteria as discussed in Section 2.1, the following parameters will be collected:

- Weekly blower flow rate, influent vacuum, effluent pressure, and influent and effluent vapor concentrations;
- Weekly treatment bed temperatures, influent pressure and influent and effluent vapor concentrations;
- Weekly relative humidity readings;
- Weekly system temperature readings;
- Quarterly leachate pH testing; and,
- Annual smoke testing.

The biofilter system influent and effluent mass loading concentrations have been below the approved concentrations since the system was started in March 2002. The influent mass loading rate has remained below 0.5 lbs/hr since July 29, 2004, and the effluent mass loading rate has been zero since April 12, 2004. Approximately 18,800 pounds of petroleum hydrocarbon vapors have been removed from the Shunk Street sewer since the system was started in 2002. Mass loading and mass removal rates will continue to be calculated using the data collected in accordance with the proposed monitoring plan above.

Currently, the biofilter system is operating at a treatment efficiency of 97%. If influent concentrations increase and the biofilter removal efficiencies decrease (less than 85%), the biofilter will be inspected for proper operation and necessary maintenance and repairs will be conducted. If influent concentrations increase (in excess of 50 ppm), the biofilter system monitoring plan will be re-evaluated and revised as necessary.

Effluent monitoring data from 2002-2013 for the Belmont Remediation System are provided in the graph below. For details on actual readings, see Attachment A. Effluent data from 2004-2013 shows that PID readings were less than 50 ppm or zero. Vapor readings were taken with a photoionization meter (PID).



FILEPATH:W:\2013 LOMBARD\SUNOCO 267H\213402094-G13.dwg(KMichele)\Oct 08, 2013 at 21:58\Layout: FIGURE 1

Per 13280, the Biofilter shall be installed, operated and maintained according to Best Management Practices to maximize odor reduction for the air stream it controls. Odors from the process shall not cause odor nuisance outside the boundary of the property. The Permittee shall smoke test the piping of the biofilter to ensure proper distribution of the influent vapors. The smoke testing shall be repeated annually.

For the Belmont Terminal Remediation System, the Permittee will need to monitor and keep the following records:

- Weekly blower flow rate, influent vacuum, and effluent pressure
- Weekly treatment bed temperatures, and influent pressure
- Weekly influent concentration at the Shunk St. Sewer blower and the effluent concentration from the top of each bed.
- Humidity and temperature of the influent stream weekly.
- pH of the filter media quarterly.

Recent monitoring data (May-Jul 2021) from the remediation system are provided in Attachment A. There are no VOC permit emission limits or no permit requirement to monitor emissions;

however, Evergreen periodically monitors emissions. The recent monitoring data indicates effluent readings are consistently at 0 ppm.

**Maiden Lane Remediation System at Former PES Site**

The Maiden Lane Remediation System located at the Former PES Site consist of the following to treat groundwater:

- Two (2) Influent EQ Settling Tank (180 gallons) [Hydro Quip, TC3060AA] ·
- One (1) Oil Water Separator (OWS) [Hydro Quip, AGM-3SS-150V-HP-1H] ·
- One (1) Secondary Settling Tank (150 gallons) [Hydro Quip Surge Tank, R243948AB] ·
- One (1) Secondary Settling Tank (105 gallons, Chem Trailer/ TC2454AA/AB)
- One (1) LNAPL Holding Tank (550 gallons) [Highland Tank and Manufacturing, Inc]
- One (1) AMETEK/ROTRON regenerative blower, EN656M5XL
- One Catalytic Oxidizer

The ground water remediation system was permitted under AMS Permit IP21-000137 dated 3/23/2021. Per AMS Permit IP21-000137 dated 3/23/2021, the unit is subject to the following emission limits:

- Actual VOC emissions from the closed-vent system shall be less than 0.5 tons per rolling 12-month period.
- Actual HAP emissions from the closed-vent system shall be less than 0.5 tons per rolling 12-month period.
- During operation of the closed-vent system and catalytic oxidizer, the Permittee shall comply with one of the following:
- Volatile Organic Compound (VOC) content in the air effluent stream shall not exceed 200 ppm at any time; or
- The minimum VOC destruction efficiency for the Catalytic Oxidizer shall be reduced by at least 99%.

All vapors from the closed-vent groundwater remediation system shall pass through the catalytic oxidizer prior to discharge to the atmosphere. The temperatures in the influent air stream, the catalyst bed, and the effluent air stream shall be continuously monitored by the equipment and the system shall shut down upon detection of any operating temperatures which are out of the range of the following catalytic oxidizer specifications:

Temperature Position	Low Operating Range	High Operating Range
Catalyst Bed Influent (T1)	270° C	505° C
Catalyst Bed Effluent (T2)	N/A	620° C
Catalyst Bed (T3)	N/A	600° C

Per AMS Permit IP21-000137 dated 3/23/2021 and manufacturer’s specifications, the catalytic oxidizer shall operate at a minimum pre-catalyst (T1) set point temperature of 626 °F (330° C) and a minimum operating temperature of 270 °C. The system shall be operated without causing any odor nuisances or noise violations beyond the property boundary.

The Permittee shall monitor HAP and VOC emission monthly to demonstrate compliance with

emission limit. The Permittee shall monitor the influent and effluent streams at least biweekly (twice each month) with a photoionization detector (PID) to demonstrate compliance long term VOC/HAP emissions. Monitoring results from 2020 indicate that VOC concentrations at the effluent are negligible or zero. To calculate a mass flow rate (lb/hr) from ppm, the concentration in mg/m<sup>3</sup> is first calculated using the ideal gas law.

$$\text{Concentration in mg/m}^3 = \frac{[\text{Concentration, ppm (v)}] \times [\text{MW of the gas stream}]}{[\text{Molar Gas Volume}]}$$

$$\begin{aligned} \text{Concentration in mg/m}^3 &= (P/RT) \times [\text{Concentration, ppm (v)}] \times [\text{MW of the gas stream}] \\ &= [\text{Pressure}/(\text{Ideal Gas Constant} \times \text{Temperature})] \times [\text{Concentration, ppm (v)}] \times [\text{MW of the gas stream}] \end{aligned}$$

From the ideal gas law  $R = pV/nRT$

For  $n=1\text{ mol}$  at STP,  $P=1\text{ atm}$ ,  $T=273\text{ K}$ , and  $V=22.4\text{ L}$

Value of R	Units of R in various systems
8.31	J mol <sup>-1</sup> K <sup>-1</sup>
1.98	Cal mol <sup>-1</sup> K <sup>-1</sup>
8.31	m <sup>3</sup> (Pa)mol <sup>-1</sup> K <sup>-1</sup>
0.0821	L(atm) mol <sup>-1</sup> K <sup>-1</sup>
62.36	L(torr) mol <sup>-1</sup> K <sup>-1</sup>
1.98 x 10 <sup>-3</sup>	k Cal mol <sup>-1</sup> K <sup>-1</sup>

$$\text{ppmv} = \text{mg/m}^3 \cdot \frac{(0.08205 \cdot T)}{M}$$

and for the reverse conversion:

$$\text{mg/m}^3 = \text{ppmv} \cdot \frac{M}{(0.08205 \cdot T)}$$

where:

**mg/m<sup>3</sup>** = milligrams of pollutant per cubic meter of air at sea level atmospheric pressure and *T*

**ppmv** = air pollutant concentration, in parts per million by volume

*T* = ambient temperature in K = 273.15 + °C

**0.08205** = Universal gas constant in atm·m<sup>3</sup>/(kmol·K)

**M** = molecular weight of the air pollutant

**Notes:**

- One atm = absolute pressure of 101.325 kPa
- mol = gram mole and kmol = 1000 gram moles
- Air pollution regulations in the United States typically reference their pollutant limits to an ambient temperature of 20 to 25 °C as noted above. In most other nations, the reference ambient temperature for pollutant limits may be 0 °C or other values.
- Although ppmv and mg/m<sup>3</sup> have been used for the examples in all of the following sections, concentrations such as ppbv (i.e., parts per billion by volume), volume percent, mole percent and many others may also be used for gaseous pollutants.

After the concentration of the effluent is calculated, the mass flow rate in lb/hr is determined. Emission in lb/hr is calculated by using the equation below:

$$\text{Mass flow rate, lb/hr} = (\text{volume of exhaust, cubic feet/min}) \times (\text{concentration effluent, mg/m}^3) \times (60 \text{ mins/1hour}) \times (28.317 \text{ liter} / 1 \text{ cubic feet}) \times (1 \text{ m}^3 / 1000 \text{ liters}) \times (1 \text{ pound} / 454 \text{ grams}) \times (1 \text{ gram} / 1000 \text{ mg})$$

Once the mass flow rate is determined, the monthly emissions is calculated by multiplying the lbs/hr and operating hours per month. Annual emissions are determined by adding up all the monthly emissions for the past 12 months.

$$\text{Emissions (tpy)} = \text{mass flow rate (lb/hr)} \times \text{operating hours per year (hrs)} \times (1 \text{ ton} / 2000\text{lbs})$$



**Table 1 - System Operational Data**  
**Maiden Lane (Verizon) Remediation System**  
**Philadelphia Refinery Operations, a series of Evergreen Resources Group, LLC**

Date	T1 PreCatalyst Set Point (degrees °C)	T2 (degrees °C)	T3 (degrees °C)	Air Flow rate (cfm)	PID Influent (ppmv)	PID Effluent (ppmv)	VOC Reduction
2/3/2021	330	347	346	64.22	61	0.0	100%
2/4/2021	330	341	342	70.38	32	0.0	100%
2/5/2021	330	347	347	64.21	117	0.0	100%
2/8/2021	330	338	339	65.97	1	0.0	100%
2/9/2021	330	338	340	63.13	5	0.0	100%
2/10/2021	330	370	365	62.38	252	0.0	100%
2/11/2021	330	339	340	60.94	10	0.0	100%
2/12/2021	330	344	344	62.18	47	0.0	100%
2/15/2021	330	359	356	61.09	200	0.0	100%
2/16/2021	330	346	346	56.18	69	0.0	100%
2/17/2021	330	343	343	60.12	47	0.0	100%
2/18/2021	Significant Snow Event - System Inaccessible						
2/19/2021	330	338	339	69.15	0	0.0	100%
2/22/2021	330	338	339	75.17	2	0.0	100%
2/23/2021	330	344	345	56.74	56	0.0	100%
2/24/2021	330	356	353	58.74	118	0.0	100%
2/25/2021	330	347	347	58.64	75	0.3	99.6%
2/26/2021	330	345	348	60.85	19	0.0	100%
3/1/2021	330	345	345	57.05	90	0.0	100%

ppmv - Parts per million by volume

cfm - Cubic feet per minute

Recent monitoring data (May-Jul 2021) from the remediation system are provided in Attachment A. The effluent PID readings indicate 0 for the time period.

**Compliance Review:**

AMS last inspected the facility on 11/2020 (virtual) and on 1/14/2019. There were no violations or significant compliance issues that resulted from the inspections.