PERMIT REVIEW
Chapter 127
Significant Permit Modification

TO: Mark J. Wejkszner, P.E., Air Quality Program Manager

THRU: Raymond Kempa, P.E., Chief, New Source Review Section

FROM: Alan Berardi, Air Quality Engineer

DATE: November 23, 2017 (revised 3/13/2020)

Region 2	Schuylkill County
PERMIT NUMBER:	54-00041
COMPANY NAME:	Silberline Manufacturing Co Inc
LOCATION:	Rush Township, Schuylkill County

On May 21, 2019 Silberline Manufacturing Co Inc (Silberline) submitted a Significant Operating Permit Modification Application to request modification to TVOP 54-00041 for their facility located in Rush Township, Schuylkill County. Silberline submitted a complete application along with the appropriate $1,000.00 application fee. Act 14 notifications were received by the Borough on February 22, 2019 and the County on February 22, 2019.

Background

Silberline Manufacturing Company purchased this existing facility at 130 Lincoln Drive, Tamaqua, PA from another owner in 1988. Over the next ten years, Silberline operated its aluminum pigment manufacturing operations, but only had DEP Air Permits for its steam boilers that were fired by No. 2 fuel oil. In 1997, DEP became aware of Silberline's VOC emissions, and requested a Plan Approval be submitted for the aluminum pigment manufacturing processes. Silberline determined they had actual VOC emissions that exceeded the Major Source threshold of 50 TPY. Silberline submitted a Plan Approval application for a 1,500 CFM dual-bed carbon adsorption system for control of the VOC's from Source ID 101 and 102. The carbon adsorber was installed in 2001 to recover between one (1) to two (2) 55gallon drums of solvent per day.

The Facility currently operates under Title V Operating Permit (TVOP) No. 54-00041, which was last revised on March 20, 2019. As defined in 25 Pa. Code § 121.1, the Facility is classified as a major VOC emitting facility with a facility- wide potential to emit (PTE) greater than 50 tpy of VOC emissions. The Facility is not a major source of NOx as facility-wide potential NOx emissions are below 100 tpy.

In accordance with 25 Pa. Code §129.96, this facility is subject to the Department's RACT2 requirements under §§129.97-129.100. In accordance with §129.99(d)(1)(i), Silberline submitted a RACT proposal after the October 24, 2016 deadline. This proposal was included with the application noted above.

PRESUMPTIVE VOC RACT II SOURCES

Presumptive VOC RACT II sources include VOC sources which have the potential to emit greater than or equal to 1 TPY, but less than 2.7 TPY. Silberline's RACT proposal addresses six (6) sources subject to presumptive VOC evaluation pursuant to §129.97(c).

ID 103 - MIXING AND LOADOUT PROCESS
ID 104 - VAC DISTILLATION OF USED SOLVENT
ID 105 - MINERAL SPIRIT STORAGE TANKS
ID 106 - LARGE BOILER
ID 107 - SMALL BOILER
GEN 1 - EMERGENCY GENERATOR 1

Sources subject to Alternative RACT proposal

CASE-BY-CASE VOC RACT SOURCES

A case-by-case RACT analysis must be performed for VOC sources that are not classified as exempt or presumptive VOC RACT sources. Silberline's RACT proposal addresses two (2) sources subject to a case-specific VOC evaluation pursuant to §129.99(c).

ID 101 - MILLING/SCREENING
ID 102 - FILTER PRESSES

Per 25 Pa. Code §129.96, RACT II applies to Silberline Hometown because it is an actual Major VOC Source that was in existence before July 20, 2012; and for which a requirement or emission limit has not been established in the DEP regulations. This RACT Il Proposal is written in compliance with 129.92

(a)(l) List each source subject to the RACT Il requirements.

101 - Milling & Screening
102 - Filter Presses

(2) The size of each source and the types and quantities of materials processed or produced.

These sources produce aluminum pigment from ball milling, screening, and then filter pressing. The raw materials are aluminum paste and D40 mineral spirits (a grade of Naphtha). There are nine (9) systems-in place for product variations,

(3) Provide a physical description of each source and its operating characteristics.

Ball mills are used to reduce the aluminum into a small, uniform particle size in a slurry form, with D40 Solvent for viscosity. The slurry is transferred to vibratory screens that separate all large particles from the slurry, That slurry is then pumped to a filter press which separates the D40 from the filter-cake. The cake is then made into the final product for customers. These mills, screens, and presses are located in large production departments that are the majority of this facility's plant area.

(4) Estimate the potential and actual VOC emissions from source ID 101 and 102:

Potential Emissions @ 8,760 Hrs/Yr using 9 Operating Systems, each @ 5 lbs VOC/filter hour (includes all mills, screens, and presses) is **197.1 TPY VOC**

Monthly Process Emissions of VOC are calculated using the Model: (Operating Source Hrs)(Co. Factor in # VOC/Hr)

Actual ATM Emissions/Month = Process Emissions - Recorded Gallons of VOC Recovered by the Carbon Adsorber

Example of Recovered Solvent:

	Carbon Adsorber	Reclaimed
2017	Recorded Gallons	Tons of VOC
January	1,974	6.5
February	1,789	5.9
March	1,760	5.8
April	1 ,503	4.9
May	1.518	5.0
June	1 ,639	5.4

33.5 Tons of VOC Recovered in 6 Months

X 2

Annual Expected Recovery: 67 TPY of VOC

The above Model is used to determine the actual monthly VOC emissions from production sources. Those monthly emissions are reported annually in AIMS Reports to the Department, the last nine (9) of which follow:

NOTE: Source ID 101 and 102 are currently served by a 1,500 CFM Carbon Adsorption Unit (C01), with solvent recovery estimated to be 67 TPY of VOC. In-plant fugitive VOC's cannot be thoroughly captured by only 1,500 CFM from strategically located exhaust points. Thus, uncontrolled fugitive VOCs from Source ID 101 and 102 are reported each year via AIMS to exceed 50 TPY (2017/2018 VOC emissions are below 50 TPY due to decreased demand).

	Facility-wide VOC Emissions	Portion from Milling & Screening (101) & Filter Presses (102)
2010	133.7 TPY	106.2 TPY
2011	105.6 TPY	83.4 TPY
2012	164.5 TPY	**131.2 TPY- Baseline Year used for RACT 2 Analysis**
2013	84.3 TPY	66.2 TPY
2014	55.6 TPY	46.8 TPY
2015	64.4	54.5 TPY
2016	59.3 TPY	50.4 TPY
2017	29.4 TPY	22.4 TPY
2018	29.1 TPY	23.7 TPY

(5) Provide RACT Analysis - with Technical and Economic Support: The RACT Analysis shall include:

STEP 1

(b)(l) Rank the available control options in descending order of control effectiveness:

Pollution Control Device	% Control Efficiency
1. Carbon Adsorption	98%
2. Regenerative Thermal Oxidizer (RTO)	98%
3. Recuperative Oxidizer	98%
4. Catalytic Oxidizer	98%
5. Good Operating Practices	NA

*indicates this device currently exists, albeit at only 1 ,500 CFM

STEP 2

(b)(2) Provide an evaluation of the technical feasibility of the available control options:

Overall removal Efficiency = Capture Efficiency x Control Efficiency

Capture Efficiency of in-plant fugitive VOC is best accomplished by applying EPA's 5-point criteria to these building zones where Source ID'S 101 and 102 are contained. That assures 100% capture efficiency from ≥ 200 FPM indrafts through all-Natural Draft Openings (NDO's), All exhausts must be connected to the pollution control device.

Recognizing the five (5) affected zones total 70,000 ft^2 and that the ceiling is 20 feet high, for 1.0 CFM/ft^2, a capture system sized for 70,000 CFM of exhaust to capture the Baseline VOC Emission Rate of 131.2 TPY. The exhaust will contain an average of 30 # VOC/hour or about 28 PPM of VOC as Naphtha.

131.2 TPY x 2000 #/ton / 8760 hr/yr = 30 # VOC/hr

30 #	1 hr	min	389 ft^3 /mol	x	= 28 PPM
hr	60 min	70,000 ft^3	100 #/mol		

(b)(3) Each one of the above listed available control device options has technical difficulties identified below for each of the control options #1-4. However, these difficulties do not exclude those options as technically infeasible.:

For the carbon adsorption control device Option #1: A 70,000 CFM unit is not technically feasible due to its huge theoretical size and that will need to be housed within a heated building. Therefore a carbon adsorber for each of the five (5) departments associated with Source ID 101 and 102 was selected, each being 15,000 CFM as the maximum reasonable size for carbon adsorbers to achieve 70,000 CFM Total.

Technical difficulties include:

1 . There are no natural gas utilities available in this area. CNG, LNG, or propane storage tanks would have to be built for truck deliveries.

2. Carbon Adsorption units are commonly applied to smaller exhaust air volumes, usually less than 5,000 CFM. This project would require five (5) units, each sized for 15,000 CFM. A new boiler would be required to supply steam for carbon regeneration. A new cooling tower would be required to provide cooling water. And a new building with support utilities must be built.

3. Floor scoops to overhead ductwork would connect each department to the control device. Ductwork is a significant capital cost.

For Oxidizers Option #2, 3, and 4: There are no natural gas utilities available in this area. CNG, LNG, or propane storage tanks would have to be built for truck deliveries.

Good operating practices (#5): There are no technical difficulties with this option.

STEP 3

(b)(3)(i) State the current Baseline VOC Emission Rate (BER) (before implementing any of the above new control options): From the 2015 AIMS Report, Source 101 and 102 lost 131.2 TPY of VOC.

(ii) Provide the estimated emission reduction potential for each control option:

Control Device	Capture Efficiency	Control Efficiency	Overall Efficiency	BAE	Amount of Emission Reduction
Carbon Adsorption	100%	98%	98%	131.2 TPY	128.6 TPY
RTO	100%	98%	98%	131.2 TPY	128.6 TPY
Recuperative TO	100%	98%	98%	131.2 TPY	128.6 TPY
Catalytic TO	100%	98%	98%	131.2 TPY	128.6 TPY
Good Operating Practices	N/A	N/A	N/A	N/A	N/A

(iii) Provide the estimated emissions after the application of each control option:

Control Device	Estimated Emissions After Control
1. Carbon Adsorption	2.1 TPY
2. RTO	2.1 TPY
3. Recuperative TO	2.1 TPY
4. Catalytic TO	2.1 TPY
5. Good operating practices	N/A

STEP 4

(iv) Provide the economic impact of each control option:

Cost effectiveness spreadsheets were calculated for each control option using the EPA Control Cost Manual Excel Spreadsheets found in Chapter 1 - Carbon Adsorbers; and Chapter 2 - Oxidizers, (source: https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution)

A summary of the cost effectiveness using those costs for each of the option above and 98% DRE of 131.2 tons of VOC's results in the following:

Control Device	Cost Effectiveness (TAC / Total VOC removed)**	Incremental Cost ($/incremental Ton removed)
(1) 70,000 CFM Regenerative RTO	$9,736/ton removed	
(5) 15,000 CFM Carbon Adsorbers	$17,248/ton removed*	+7,462
(1) 70,000 CFM Recuperative TO	$41,595/ton removed	+31 ,940
(1) 70,000 CFM Catalytic TO	$24,582/ton removed	+14,883

* NOTE: Carbon adsorber cost calculated is for (1) 15,000 CFM unit. Total Annual Cost is 5 X $443.612 = $2,218,060. In order to calculate the cost/ton removed 1/5 of the total VOC removed was used for a single 15,000 CFM unit (128.6TPY VOC removed /5=25.72TPY VOC), which results in the same cost effectiveness.

** NOTE: All costs are based on 128.6 TPY removal. TAC / Total VOC removed were calculated and reported here.

STEP 5

Incremental Cost Effectiveness:
As shown above, the above Cost Effectiveness shows the Regenerative RTO to have the best economic advantage over all other options due to its high heat recovery and its corresponding low operating costs for fuel (natural gas),

The Incremental Cost Effectiveness of the next most stringent option is even more expensive than the Regenerative RTO to own and operate. That is due to their lower heat recovery efficiencies, which have corresponding higher operating costs for fuel.

CONCLUSION:

Due to the high annual operating costs of each control device evaluated, VOC RACT for Source ID's 101 and 102 at Silberline's Hometown facility will be Work Practice Requirements which are as follows:

1) Each source shall be inspected, operated, and maintained as per manufacturers specification and good air pollution control practices.
2) All mixer covers remain closed, except when production, sampling, maintenance, or inspection procedures require access,
3) The permittee shall follow the visual leak and inspection maintenance plan which shall include, at minimum, the following:

    A) An inspection schedule,
    B) Methods for documenting the date and results of each inspection and any repairs that were made, and
    C) The time frame between identifying a leak and making the repair, which shall adhere to the following:

        a) A first attempt at repairs, including tightening of packing glands, shall be made no later than five (5) working days after the leak is detected.
        b) Final repairs shall be made within fifteen (15) working days, unless the leaking equipment is to be replaced by a new purchase, in which case repairs shall be completed within three (3) months,

RACT2 Recordkeeping and Testing

Silberline is proposing work practice standards as VOC RACT. Silberline is proposing incorporation of the language specified into TVOP No. 54-00041 to demonstrate compliance with the RACT 2 requirements.

In accordance with §129.100(d), all sources subject to any of the RACT2 requirements will have accompanying recordkeeping conditions to demonstrate compliance. These records include but are not limited to records of monthly throughput of mineral spirits and calculations of estimated VOC emissions in tons. Pursuant to § 129.100(i), all records will be maintained for at least five years, and will be made available to PADEP upon receipt of a written request.

Conclusions/Recommendations

Based on my review of Silberline's application and accompanying RACT2 proposal, I recommend modifying the facility's TVOP to include all proposed changes.

The public notice was placed in the PA Bulletin on November 23, 2019. No public comments were received, and no public meeting was held.

cc: EPA Region 3