SWCAA
Southwest Clean Air Agency

TECHNICAL SUPPORT DOCUMENT

Air Discharge Permit 18-3260
ADP Application CL-3030

MERCURY PLASTICS, LLC
SWCAA ID: 2088

Preliminary Issued: January 16, 2018

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TABLE OF CONTENTS

Abbreviations

ADP	Air Discharge Permit
AP-42	Compilation of Emission Factors, AP-42, Fifth Edition, Volume 1, Stationary Point and Area Sources -- published by the US Environmental Protection Agency
ASIL	Acceptable source impact level identified in WAC 173-460
BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
Btu	British thermal unit
CAS #	Chemical Abstracts Service registry number
cfm	Cubic feet per minute
CFR	Code of Federal Regulations
CO	Carbon monoxide
EPA	U.S. Environmental Protection Agency
HAP	Hazardous air pollutant listed pursuant to Section 112 of the Federal Clean Air Act
LAER	Lowest Achievable Emission Rate
lb/hr	Pounds per hour
lbs	Pounds
lb/MMscf	Pounds per million standard cubic feet
lb/yr	Pounds per year
MMBtu	Million British thermal units
MMBtu/hr	Million British thermal units per hour
NO_X	Nitrogen oxides
PM	Particulate matter with an aerodynamic diameter less than or equal to 100 micrometers (includes both filterable particulate matter measured by EPA Method 5 that is less than 100 micrometers and condensable particulate matter measured by EPA Method 202)
PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (includes both filterable particulate matter measured by EPA Method 201 or 201A and condensable particulate matter measured by EPA Method 202)
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers (includes both filterable particulate matter measured by EPA Method 201 or 201A and condensable particulate matter measured by EPA Method 202)
ppmv	Parts per million by volume
ppmvd	Parts per million, dry volume basis
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RCW	Revised Code of Washington
scfm	Standard (68°F, 1 atmosphere) cubic feet per minute
SQER	Small Quantity Emission Rate listed in WAC 173-460
SO_2	Sulfur dioxide
SWCAA	Southwest Clean Air Agency
TAP	Toxic air pollutant pursuant to Chapter 173-460 WAC
T-BACT	Best Available Control Technology for toxic air pollutants
tpy	Tons per year
VOC	Volatile organic compound
WAC	Washington Administrative Code

1. FACILITY IDENTIFICATION

Applicant Name:	Mercury Plastics
Applicant Address:	3807 SE Hidden Way, Vancouver, WA 98661
Facility Name:	Mercury Plastics
Facility Address:	3807 SE Hidden Way, Vancouver, WA 98661 3601 SE Columbia Way, Suite 105
SWCAA Identification:	2088
Contact Person:	Lee De Stael – Compliance Manager
Primary Process:	Flexographic Printing Process
SIC/NAICS Code:	2673 / 326111
Facility Classification:	Synthetic Minor (SM-80)

2. FACILITY DESCRIPTION

Mercury Plastics uses a flexographic printing process to print primarily onto polyethylene bags. Both solvent-based and water-based inks may be used in the printing process. The facility consists of two flexographic printing presses and eleven bag sealing machines. A regenerative thermal oxidizer controls volatile organic compound and toxic air pollutants volatilized during the printing process.

3. CURRENT PERMITTING ACTION

This permitting action is in response to Air Discharge Permit application number CL-3030 (ADP Application CL-3030) received by SWCAA on October 13, 2017. ADP Application CL-3030 requested approval to increase hours of operation on the previously permitted RTO. There is no proposed increase in ink or solvent usage. No new equipment will be installed.

Notice of Violation (NOV) #6310 was issued June 29, 2017 for exceeding the NO_X and CO emission limits. Exceedance was due to higher hours of operation of the RTO beyond those established in ADP 16-3176. The facility wishes to increase the hours of operation for Destruction Mode to 8,760, while keeping the existing hours for Start-up/Idle Mode. The previous hours of operation limit was based on a facility provided number which was based on no weekend operations consistent with previous practices. The requested limit is based on 8,760 hours per year operation.

This Permit will supersede ADP 16-3176 in its entirety.

4. PROCESS DESCRIPTION

The flexographic printing process at the facility generally consists of printing onto blank rolls of polyethylene which are then shipped offsite. The printing inks are mixed on site from a number of base colors and supplied to the printing presses. The presses were equipped with corona treaters but those have been dismantled. Ink dryers are also installed on each press to dry the ink before the printed substrate is re-rolled. The oxidizer treats solvent laden air that is ducted from various negative-air hoods around the facility. The flexographic printing presses are relatively open and some volatile organic compounds released during the printing process are not captured and vented to the oxidizer.

The polyethylene is then sent through bag machines that convert the polyethylene into bags by folding and heat sealing the overlapping edges.

5. EQUIPMENT/ACTIVITY IDENTIFICATION

Emission units identified at the facility include the following:

Make/Model:	Tellkamp Systems, Inc. / Roxidizer® RTO Model 20.
Design Flow:	24,000 dscfm using variable frequency drive fan / 540 cfm burner.
Design Destruction Eff.:	98% destruction or 20 ppmv as HC at outlet, whichever is greater.
Operation Temp.:	1550 °F minimum during VOC destruction.
Operating Design:	Operates with two ceramic media beds separated by a horizontal combustion chamber, utilizes supplemental fuel injection.
Destruction Capacity:	281 lb VOC/hr (with the ability to handle short term VOC spikes up to 309 lb/hr: a 10% variability factor) or 4.8 MMBtu/hr: Expected feed is 120 lb VOC/hr.
Thermal Efficiency:	95%.
Burner Make / Model:	One Maxon Kinedizer® LE (30 ppm NO_X and 250 ppm CO at 3%O_2).
Burner Capacity:	2.4 MMBtu/hr, 0.34 MMBtu/hr pilot capacity. In Start-up/Idle mode (no VOCs or process air) gas use is 0.9 MMBtu/hr. In Destruct mode (fuel provided by a maximum of ~281 lb VOC/hr (with the ability to handle short term VOC spikes up to 309 lb/hr: a 10% variability factor), or an average of ~120 lb VOC/hr: no burner operation) supplementary gas use is 0.2 MMBtu/hr (fuel is injected directly into the flame zone. The burner is not operating during Destruct Mode).
Stack Description:	35' above grade, 40" diameter, between of 180 °F to 240 °F depending on process.

The RTO has two modes that affect emissions: Destruct mode and Start-up/Idle mode.

- Cold Start-up is considered the prelude to Start-up/Idle. It takes the combustion temperature from ambient to approximately 1100 °F. It takes 24-48 hours to achieve operating combustion temperatures from a cold start. This is generally the only time the burner operates at its maximum of 2.4 MMBtu/hr. This mode happens rarely and is included in the Start-up/Idle mode for emissions determinations.
- In Start-up/Idle mode, the RTO fan is off and only the burner fan is operating (at 540 cfm). The burner is operating at an average of 0.9 MMBtu/hr, per Tellkamp. In a typical heating cycle, the burner initially purges the RTO at the burner airflow for approximately 10 minutes, then for about 20-30 minutes (depending on seasonal temperature, etc.) the burner fires to heat up the media. Then the burner shuts off and sits idle, no airflow or combustion, until it needs to purge again.
- In Destruct mode the burner is off. The fuel is the VOC laden air (expected operation of 120 lb/hr based on the specific criteria of Mercury's process). Supplemental gas of an average of 0.2 MMBtu/hr can be injected to maintain combustion temperature when the amount of VOC fuel is low due to production factors (speed of the print, type of ink, etc.). This supplementary fuel is automatically adjusted as needed.

The burner is encased within the combustion chamber and cannot be tuned or tested directly.

The oxidizer is located outside at ground level on a pad adjacent to the existing building on the west side.

5.b Fischer & Krecke Flexographic Printing Press #305. This is a 10-color flexographic printing press, model 16S-10, serial number 058.328. The press has a width of 56 inches and a maximum line speed of 2,000 ft/min. The press is equipped with two natural gas burners for drying the printed ink. Two Maxon driers have a maximum heat input of 1.45 MMBtu/hr each at 10,272 acfm. Most VOC emissions are captured and vented to the regenerative thermal oxidizer.

The press was initially permitted with corona treaters, but those have been disabled and are not intended to be used.

5.c Fischer & Krecke Flexographic Printing Press #306. This is a 10-color flexographic printing press, model 16S-10, serial number 058.329. The press has a width of 56 inches and a maximum line speed of 2,000 ft/min. The press is equipped with two natural gas burners for drying the printed ink. Two Maxon driers will have a maximum heat input of 1.45 MMBtu/hr each at 10,272 acfm. Most VOC emissions are captured and vented to the regenerative thermal oxidizer.

The press was initially permitted with corona treaters, but those have been disabled and are not intended to be used.

5.d Space Heating. Four natural gas space heaters rated at 0.175 MMBtu/hr each, with a combined heat input rate of 0.70 MMBtu/hr, used exclusively for space heating. The units are Space-Ray infrared heaters, model RSTP17C-N5D.

The following is located at 3601 SE Columbia Way, Suite 105.

5.e Bag Sealing Machines/Converters. Eleven bag machines (Machines #0, #8, #9, and #10 are new. #8, #9, and #10 are to be installed at a later date) are used to fold, perforate, and seal the edges of bags made from the printed polyethylene. The particulate emissions from the machines are partially controlled by an Air Handler Rigid Cell particulate filter. The filter is a MERV 14, 24x20x12 with an efficiency of 95%. Emissions from these machines are collected with hoods and vented through the filter and exhausted to the atmosphere. However, some emissions are assumed to escape from the facility through building openings. The "knives" have heating coils within them that operate between 850 °F and 950 °F, heading the "knife" edge to approximately 300 °F, according to Mercury. The units' exhausts are plumbed into one stack with one fan at 11,000 acfm. The details of the bag machines are given in the following table:

Facility ID	Manufacturer	Model	Serial No.
Machine #0	Ro-An	PS-10001	6041-05
Machine #1	Ro-An	10030-16	5903-04
Machine #2	Ro-An	PS-10001-05	6000-05
Machine #3	Ro-An	10030-16	5881-03
Machine #4	Ro-An	PS-10416-41	6017-05
Machine #5	Ro-An	Mach #69, 30"	None
Machine #6	Ro-An	PS-10001	6041-05
Machine #7	G.T. Schieldahl	S-8601 308-56-T	GS-2346
Machine #8	Ro-An	PS-10001	Unknown
Machine #9	Ro-An	PS-10001	Unknown
Machine #10	Ro-An	PS-10001	Unknown

Machine #7, is a slower model (40-80 bags/minute) and is used for specialty products.

The bag sealing machines are located at 3601 SE Columbia Way Suite 105, across the street from the main Mercury building.

5.f Equipment/Activity Summary.

ID No.	Generating Equipment/Activity	# of Units	Control Equipment	# of Units
1	Fischer & Krecke Flexographic Printing Press #305	1	Regenerative thermal oxidizer	1
2	Fischer & Krecke Flexographic Printing Press #306	1	Regenerative thermal oxidizer	1
3	Regenerative Thermal Oxidizer	1	Low-NO_X burners, supplemental fuel injection, Low sulfur fuel (natural gas)	1
4	Space Heaters	4	Low sulfur fuel (natural gas)	N/A
5	Bag Sealing Machines	11	Air handler filter	1

6. EMISSIONS DETERMINATION

6.a Printing VOC/TAP Emissions. Facilitywide VOC emissions are dominated by the evaporation of VOC content in printing inks and solvents not captured and destroyed in the regenerative thermal oxidizer. In Notice of Construction CL-1434, dated July 15, 1999, the Permittee requested a facilitywide emission limit of 80.0 tons per year to remain exempt from the provisions of WAC 173-401 (Air Operating Permit Program) and has asked that this limit remain the same. In ADP Application CL-1762, dated January 26, 2007, the facility stated they use approximately 90% n-propanol and 10% propyl acetate. The usage now is similar. Based on the ratio of various toxic air pollutants emitted in 2007, the following toxic air pollutant emissions would be anticipated at a facilitywide VOC emission rate of 80.0 tons per year:

Pollutant	CAS Number	Category	Facilitywide Emissions (lb/yr)	WAC 173-460 SQER (lb/yr)
n-Propanol	71-23-8	TAP B	142,429	43,748
n-Propyl Acetate	109-60-4	TAP B	17,579	43,748

Annual emissions shall be calculated using a material balance to determine the quantity of volatile organic compounds (including volatile toxic air pollutants) emitted from the printing operations and the capture and control efficiency of the regenerative thermal oxidation system measured during the most recent source emissions test.

6.b Natural Gas Combustion (not including RTO). Potential annual emissions from the combustion of natural gas in four printing dryers and space heaters were calculated with the assumption that all dryers and heaters will operate up to 8,760 hours per year at full rated load (5.8 MMBtu/hr total of all dryers and 0.7 MMBtu/hr for space heating with a combined total of 6.5 MMBtu/hr). TAPS, VOC and CO emissions from the dryers will be largely destroyed in the regenerative thermal oxidizer; however there is no guarantee of the efficiency of this from the manufacturer, so emissions of these pollutants are calculated as normal.

Emission Summary (Printing dryers and Space heaters)

Heat Input Rating =	6.5 MMBtu/hr
Gas Heat Content =	1020 Btu/scf
Fuel Constumption =	0.00637 MMscf/hr
Hours of Operation =	8760 hrs/yr

Pollutant	Emission Factor lb/MMscf	Emission Factor lb/MMBtu	Emissions lb/hr	Emissions tpy	Emission Factor source
NO_X	100	0.098	0.64	2.79	AP-42 Sec 1.4 (7/98)
CO	84	0.082	0.54	2.34	AP-42 Sec 1.4 (7/98)
HC	5.5	0.005	0.04	0.15	AP-42 Sec 1.4 (7/98)
SO_X as SO_2	0.60	0.00059	0.00	0.02	AP-42 Sec 1.4 (7/98)
$PM/PM_{10}/PM_{2.5}$	7.6	0.0075	0.05	0.21	AP-42 Sec 1.4 (7/98)
Benzene	0.0021	2.059E-06	0.00001	0.00006	AP-42 Sec 1.4 (7/98)
Formaldehyde	0.075	7.353E-05	0.00048	0.00209	AP-42 Sec 1.4 (7/98)

Greenhouse Gases	kg/MMBtu	GWP	CO_2e lb/MMBtu	lb/hr, CO_2e	tpy, CO_2e	Emission Fact Source
CO_2	53.02	1	116.89	759.78	3,328	40 CFR 98
CH_4	0.001	25	0.055	0.36	2	40 CFR 98
N_2O	0.0001	298	0.066	0.43	2	40 CFR 98
Total GHG - CO_2e	53.0211		117.010		3,331	

All particulate matter is assumed to have an aerodynamic diameter of 1 μm or less.

Emissions shall be calculated using the emission factors identified above unless new emission factors are provided by the manufacturer or developed through source testing.

6.c Bag Sealing Machines/Converters. The bag machines at the facility emit VOCs and particulate matter as the sealing 'blades' heat, seal, and cut the rolls of polyethylene into individual bags. The air pollutants rise off the sealing section of the bag machine and are partially collected by an overhead hood/blower system that routes the exhaust through a particulate filter. The filter is an Air Handler MERV 14 filter that is 24 inch wide by 20 inch by 2 inch rigid cell filter with a filter efficiency of 95 percent for particulate matter. The total emissions from these units depend on a series of variables including the film composition, the film thickness, the sealing blade temperature, the desired seal, the radius of the sealing blade edge, the capture efficiency of the control hoods, and the removal efficiency of the particulate filters. It is assumed that the filters provide no VOC control.

Emission factors are not available for polyethylene bag sealing operations. Mercury Plastics indicates that the typical operating temperature of the sealing blades is between 700 and 900°F. It was suggested by an Exxon-Mobile representative that the majority of the emissions from this process could be material stuck to the blade that is burning. However, the combustion of polyethylene occurs at a temperature closer to 1600 °F. The only emission factors available for polyethylene processing are for the extrusion process. These are often empirical equations that are developed over a given temperature range (typically 350-600 °F). For the purpose of approximating emissions from this process, low-density polyethylene (LDPE) equations are used to approximate the VOC and PM emissions from heated product. These equations are from a report entitled "Quantification of Employee Exposure to Volatile Emission Products Generated by Commercial-Scale Processing of Polyethylene" (June 1994). Although the heated

temperatures are not the same, they were the nearest as determined by a thorough search of air pollution factor data for polyethylene processing.

$$PM = 2.11225 \times Temp - 1025.2 = (lb.PM/MMlb.Polyethylene)$$
$$VOC = 1.22075 \times Temp - 575.04 = (lb.VOC/MMlb.Polyethylene)$$

These equations are valid for temperatures from 500°F to 620°F. At 620°F the PM and VOC emission factor equations equate to 284.4 lb/MM lb processed and 181.83 lb/MM lb processed respectively.

The amount of polyethylene that is heated by the sealing machines in one year was approximated by calculating the volume of heated polyethylene during the bag sealing process (half circumference of the blade [0.1472 inches], length of the blade [24 inches], and depth of the material) and multiplying that times the density of the bags. The bags produced at the facility fall into three basic categories; potato, apple, and general produce with no material thicker than 1.25 mm. Each of these bags has a different size, thickness, and density. The density used was 0.92 lbs/ft^3. A maximum year's worth of cuts (or heated slices into the polyethylene) was approximated by the facility (which was 283,243,726 cuts per year for all machines) and multiplied by the above factors. This amounted to 45.30 MM lbs of polyethylene processed.

VOC = 181.83 lb/MM lb processed x 45.30 MM lb processed = 4.12 tpy
$PM_{2.5}$ = 284.4 lb/MM lb processed x 45.30 MM lb processed = 6.44 tpy x 95% control = 0.32 tpy

Since it is difficult to measure exactly how many pounds of film is seared by the bag sealing 'knife', a lb/hr emission factor was calculated. Based on 96,360 hours a year of operation for all combined units, emission factors are 0.0067 lb $PM_{2.5}$/hr and 0.0855 lb VOC/hr. The control efficiency of the particulate filter is applied to the particulate matter emissions.

	Emission Factor	Emissions @ 96,360 hours per year
VOC	0.0855 lb/hr	4.12
$PM_{2.5}$	0.0067 lb/hr	0.32

6.d Regenerative Thermal Oxidizer. The Regenerative Thermal Oxidizer (RTO) will utilize natural gas as a supplemental fuel and will itself generate some combustion-related emissions. Mercury estimates the average VOC feed to be controlled by the RTO to be 120 lb/hr, with a spiking maximum of 309 lb/hr. Potential combustion related annual emissions from operation of the RTO were calculated with the assumption that the RTO will operate a maximum of 8,760 hours per year in VOC Destruct mode at 0.2 MMBtu/hr of supplemental fuel, and 2,520 hours per year in Start-up/Idle mode at 2.4 MMBtu/hr. The unit has an airflow of 24,000 dscfm; the burner has an airflow of 540 cfm. The addition of natural gas is to supplement the heating value of the VOCs as needed during Destruction Mode.

Maxon stated that CO emissions from the burner specifically are 250 ppm. However, when the RTO is in Destruct mode, the burner is not operating and a maximum emission concentration of 50 ppm should be expected.

The *Air Pollution Engineering Manual* produced by the Air & Waste Management Association, page 498, states that "thermal oxidization can reduce VOC and CO levels in the vent gases by 99%" at 875 °C (approximately 1600 °F).

Tellkamp stated that NO_X emissions should be negligible during Destruct mode, but Steve Olivier of Tellkamp offered a guess of 15 ppm at 20% O_2 in destruct mode. Nitrogen oxides from the printing dryers will likely slip through the RTO. South Coast Air Quality Management District stated in the Hitco Composites Inc. Permit to Construct (application number 492308-9) that there could be 2 ppm NO_X emission concentration from the oxidation of the contaminated airflow alone.

Annual emissions from the RTO are calculated as follows:

(1) NO_x and CO emissions are calculated from the emission concentrations:
- Start-up/Idle Mode: Maxon guarantee - 30 ppm NO_x @ 3% O_2 from burner, 250 ppm CO @ 3% O_2 from burner.
- Destruct Mode: Tellkamp information - 15 ppm NO_x @ 20% O_2, 50 ppm CO @ 20% O_2 (32 ppm NO_x @ 19% O_2, 106 ppm CO @ 19% O_2)

(2) VOC/TAP/HAP emissions are calculated from:
- Start-up/Idle Mode: EPA AP-42 Section 1.4 (7/98) emission factors and actual natural gas consumption.
- Destruct Mode: expected average VOC stream (120 lb/hr), 8,760 hours per year, and oxidizer destruction efficiency of 98% and capture efficiency of 75%. (Note: the facility has the capability of operating more hours per year in Destruct Mode, however they are limited to 80 tpy VOCs and must modify their ink usage if they wish to operate more hours.)

(3) SO_2, PM, benzene, and formaldehyde emissions are calculated from the applicable EPA AP-42 Section 1.4 (7/98) emission factors and actual natural gas consumption. The emission limit for PM is conservatively based on 5,000 hours per year in Start-up/Idle Mode due to the higher emission factor.

(4) CO_2e emissions are calculated from emission factors from 40 CFR 98 for natural gas and the RTO capacity of 2.4 MMBtu/hr and 8,760 hours of operation.

RTO Emissions

	Destruct Mode[2] (0.2 MMBtu/hr)		**Start-up/Idle Mode (2.4 MMBtu/hr)**			
Pollutant	**Emission Factor (lb/hr)**	**Emissions @ 8,760 hours**	**Emission Factor (lb/hr)**	**Emissions @ 2,520 hours**	**Total Emissions [4] (lb/yr)**	**Total Emissions [4] (tpy)**
Nitrogen oxides	2.578	22,583	0.116	292	22,583	11.29
Carbon monoxide	5.233	45,841	0.589	1,484	45,841	22.92
Volatile organic compounds	NA[3]	NA[3]	0.013	32.8	32.8	0.02
Sulfur oxides as SO_2	0.0001	0.88	0.0014	3.6	4.23	0.002
$PM/PM_{10}/PM_{2.5}$[1]	0.0015	13.14	0.018	45.4	54.76	0.03
Benzene	4.12E-07	0.004	4.94E-06	0.01	0.01	0.00
Formaldehyde	1.47E-05	0.13	1.76E-04	0.44	0.53	0.00
				Emission Fact.		
CO_2e				117 lb/MMBtu	2,459,808	1,229.90

[1] All particulate matter is assumed to have an aerodynamic diameter of 1 μm or less.
[2] In Destruct Mode the burner is off.
[3] VOC emissions with the RTO in destruct mode are calculated using mass balance and percent control and destruction (see section 6.a)
[4] Total emissions are established either using Destruct Mode emissions if the emission factor for that mode is higher, or a ratio based on the hours if the Start-up/Idle Mode emission factor is higher.

6.e Emissions Summary/Potential to Emit

Pollutant	Potential Annual Emissions (tpy)
Nitrogen oxides	14.08
Carbon monoxide	25.26
Volatile organic compounds	84.29
Sulfur oxides as sulfur dioxide	0.02
Particulate matter	0.56
PM_{10}	0.56
$PM_{2.5}$	0.56
Toxic Air Pollutants	80.00
Hazardous Air Pollutants	0.00
CO_2e	4,561

Pollutant	CAS Number	Category	Facilitywide Emissions (lb/yr)	WAC 173-460 SQER (lb/yr)
Benzene	71-43-2	HAP A	0.13	20
Formaldehyde	50-00-0	HAP A	4.47	20
n-Propanol	71-23-8	TAP B	142,429	43,748
n-Propyl Acetate	109-60-4	TAP B	17,579	43,748

7. REGULATIONS AND EMISSION STANDARDS

Regulations that have been used to evaluate the acceptability of the facility and establish emission limits and control requirements include, but are not limited to, the regulations, codes, or requirements listed below.

7.a Title 40 Code of Federal Regulations (CFR) Part 63, Subpart KK "National Emission Standards for the Printing and Publishing Industry" establishes requirements for each new and existing facility that is a major source of HAPs as defined in 40 CFR 63.2, at which publication rotogravure, product and packaging rotogravure, or wide-web flexographic printing presses are operated. The definition of major sources in 40 CFR 63.2 excludes those sources that have federally enforceable limits on their potential to emit. This regulation does not apply to this facility because the facility has requested a federally enforceable limit on their potential to emit HAPs and VOCs in order to remain a minor source for the purposes of Title V (Air Operating Permit Program).

7.b Title 40 CFR Part 70 "State Operating Permit Programs" requires affected facilities to have a permit to operate that assures compliance by the source with all applicable requirements. This regulation is not currently applicable to this facility because the applicant has voluntarily accepted federally enforceable limits on the facility's potential to emit such that potential emissions to the ambient air are below the relevant Title V emission thresholds (less than 100 tpy of VOCs, 10 tpy single HAP, and 25 tpy combined HAPs).

7.c Revised Code of Washington (RCW) 70.94.141 empowers any activated air pollution control authority to prepare and develop a comprehensive plan or plans for the prevention, abatement and control of air pollution within its jurisdiction. An air pollution control authority may issue such orders as may be necessary to effectuate the purposes of the Washington Clean Air Act [RCW 70.94] and enforce the same by all appropriate administrative and judicial proceedings subject to the rights of appeal as provided in Chapter 62, Laws of 1970 ex. sess.

7.d RCW 70.94.152 provides for the inclusion of conditions of operation as are reasonably necessary to assure the maintenance of compliance with the applicable ordinances, resolutions, rules and regulations when issuing an Air Discharge Permit for installation and establishment of an air contaminant source.

7.e WAC 173-401 "Operating Permit Regulation" requires all major sources and other sources as defined in WAC 173-401-300 to obtain an operating permit. This regulation is not currently applicable to this facility because the applicant has voluntarily accepted federally enforceable limits on the facility's potential to emit such that potential emissions to the ambient air are below the relevant Title V emission thresholds (less than 100 tpy of VOCs, 10 tpy single HAP, and 25 tpy combined HAPs).

7.f Washington Administrative Code (WAC) 173-401-300(7) "Federally Enforceable Limits" provides that any source with the potential to emit exceeding the tonnage thresholds defined in WAC 173-401-200(18) can be exempted from the requirement to obtain an Operating Permit when federally enforceable conditions are established which limit that source's potential to emit to levels below the relevant tonnage thresholds. This facility has utilized this provision to remain exempt from the permit requirements of WAC 173-401.

7.g WAC 173-460 "Controls for New Sources of Toxic Air Pollutants" (effective 2/14/94) requires Best Available Control Technology for toxic air pollutants (T-BACT), identification and quantification of emissions of toxic air pollutants and demonstration of protection of human health and safety.

7.h WAC 173-470 "Ambient Air Quality Standards for Particulate Matter" establishes ambient air quality standards for total suspended particulate matter and for particulate matter smaller than 10 microns (PM_{10}), which may not be exceeded more than one day per year.

7.i WAC 173-475 "Ambient Air Quality Standards for Carbon Monoxide, Ozone, and Nitrogen Dioxide" establishes ambient air quality standards for carbon monoxide, ozone, and nitrogen dioxide in the ambient air, which shall not be exceeded.

7.j WAC 173-490-204 "Graphic arts systems" requires printing operations that use more than 100 tpy of VOC in the printing process and located in designated ozone nonattainment areas to meet specified control provisions. Although this facility consumes more than 100 tons of VOCs per year of VOC, it is not currently subject to this regulation because the area in which it is located is no longer designated "nonattainment."

SWCAA has determined that the facility meets the intended requirements of this regulation. SWCAA is interpreting this rule such that it is consistent with the guidance in EPA document EPA-450/2-79-004 "Guidance to State and Local Agencies in Preparing Regulations to Control Volatile Organic Compounds from Ten Stationary Source Categories." In this document a flexographic printing facility consuming more than 100 tons of VOCs per year would be in compliance if they have installed an incineration system that oxidizes at least 90.0 percent of the non-methane volatile organic compounds and operates a capture system consistent with good engineering practice that provides an overall 60.0 percent reduction of VOC emissions. WAC 173-490-204 2(a)(iii) includes a statement with an additional requirement of 90 percent for the capture efficiency of the control system. This requirement coupled with the 90 percent destruction efficiency requirement, would make the 60 percent overall destruction requirement in WAC 173-490-204 2(b)(iii) irrelevant. SWCAA has determined that the intent of WAC 173-490-204 was to match that of the guidance in EPA-450/2-79-004. The facility's operations can comply with that intended requirement because the regenerative thermal oxidizer system has been guaranteed to capture more than 70 percent of the VOC emissions and has a destruction efficiency greater than 90 percent.

In addition, this regulation requires that the volatile fraction of ink as applied to the substrate contain 25% or less organic solvent by volume.

7.k SWCAA 400-040 "General Standards for Maximum Emissions" requires all new and existing sources and emission units to meet certain performance standards with respect to Reasonably Available Control Technology (RACT), visible emissions, fallout, fugitive emissions, odors, emissions detrimental to persons or property, sulfur dioxide, concealment and masking, and fugitive dust.

7.l SWCAA 400-040(1) "Visible Emissions" requires that no emission of an air contaminant from any emissions unit shall exceed twenty percent opacity for more than three minutes in any one hour at the emission point, or within a reasonable distance of the emission point.

7.m SWCAA 400-040(3) "Fugitive Emissions" requires that reasonable precautions be taken to prevent the fugitive release of air contaminants to the atmosphere.

7.n SWCAA 400-040(4) "Odors" requires any source which generates odors that may unreasonably interfere with any other property owner's use and enjoyment of their property to use recognized good practice and procedures to reduce these odors to a reasonable minimum. This source must be managed properly to maintain compliance with this regulation.

7.o SWCAA 400-050 "Emission Standards for Combustion and Incineration Units" requires that all provisions of SWCAA 400-040 be met and that no person shall cause or permit the emission of particulate material from any combustion or incineration unit in excess of 0.23 grams per dry cubic meter (0.1 grains per dry standard cubic foot) of exhaust gas at standard conditions.

7.p SWCAA 400-060 "Emission Standards for General Process Units" requires that all new and existing sources not emit particulate matter in excess of 0.1 grains per dry standard cubic foot of exhaust gas.

7.q SWCAA 400-091 "Voluntary Limits on Emissions" allows sources to request voluntary limits on emissions and potential to emit by submittal of an Air Discharge Permit application as provided in SWCAA 400-109. Upon completion of review of the application, SWCAA shall issue a regulatory order that reduces the source's potential to emit to an amount agreed upon between SWCAA and the Permittee. This facility has requested voluntary limits on emissions to remain exempt from the Title V Air Operating Permit Program (WAC 173-401).

7.r SWCAA 400-110 "New Source Review" requires that an Air Discharge Permit Application be filed with SWCAA, and an Air Discharge Permit be issued by SWCAA, prior to establishment of the new source, emission unit, or modification. The new flare is a new source of air pollution subject to New Source Review.

7.s SWCAA 400-111 "Requirements for Sources in a Maintenance Plan Area" requires that no approval to construct or alter an air contaminant source shall be granted unless it is evidenced that:

(1) The equipment or technology is designed and will be installed to operate without causing a violation of the applicable emission standards;
(2) Emissions will be minimized to the extent that the new source will not exceed emission levels or other requirements provided in the maintenance plan;
(3) Best Available Control Technology will be employed for all air contaminants to be emitted by the proposed equipment;
(4) The proposed equipment will not cause any ambient air quality standard to be exceeded; and
(5) If the proposed equipment or facility will emit any toxic air pollutant regulated under WAC 173-460, the proposed equipment and control measures will meet all the requirements of that Chapter.

This facility is located within the Portland/Vancouver Maintenance Plan area and therefore is subject to this regulation.

7.t SWCAA 490-040(6) "Surface Coaters" requires specified surface coating sources of VOCs located within designated ozone nonattainment areas comply with emission standards of that Chapter if potential VOC emissions are greater than 10 tons per year. The applicant's potential uncontrolled VOC emissions from each printing press are greater than 40 pounds per day so this regulation applies to this facility. The VOC content of the printing inks used at the facility complies with the coating VOC limits of that section.

7.u SWCAA 490-204 "Graphic Arts Systems" requires specified printing operations that use more than 100 tpy of VOC in the printing process and located in designated nonattainment or maintenance plan areas to meet specified control provisions. This facility is subject to this standard because they use more than 100 tons of VOCs per year and are located in the Portland/Vancouver Maintenance Plan Area. SWCAA has interpreted the intended requirements of this regulation to match that of the state regulation WAC 173-490-204. This interpretation is described in 7.j above. The facility's operations can comply with this regulation because the proposed capture and regenerative thermal oxidizer control system will capture more than 70 percent of the VOC emissions and will have a destruction efficiency greater than 90 percent.

8. RACT/BACT/BART/LAER/PSD/CAM DETERMINATIONS

The proposed equipment and control systems incorporate Best Available Control Technology (BACT) for the types and amounts of air contaminants emitted by the processes as described below:

8.a Bag Sealing Machines. The use of partial enclosure (hoods), particulate filters, and vertical atmospheric dispersion of exhaust streams has been determined to meet the requirements of BACT for the bag sealing operations at this facility.

8.b Regenerative Thermal Oxidizer. The applicant uses a regenerative thermal oxidizer capable of a volatile organic compound destruction efficiency of 98% or an outlet VOC concentration of 20 ppmv as hydrocarbons. Based on a review of recent BACT determinations and manufacturer literature, this level of control represents BACT for destruction of VOC emissions.

A review of the EPA RACT/BACT/LAER Clearinghouse revealed the following limits established for RTOs controlling emissions from printing operations:

Facility/ Date	VOC Limits	CO Limits	RTO Control
American Packaging / 2010	119 tpy	N/A	98%
Fort James Operating CO. / 2006	48.5 tpy	N/A	N/A
American Packaging / 2004	373 tpy 0.041 lb VOC/lb materials	N/A	95%

NO_X emissions were guaranteed by Maxon to meet 30 ppm at 3% O_2.

CO emissions were guaranteed by Maxon to meet 250 ppm at 3% O_2. Further discussion with the RTO manufacturer (Tellkamp Systems, Inc.) suggested the unit could meet a CO emission rate of 50 pppmvd or less at the RTO outlet in destruction mode. SWCAA has permitted RTOs at CO emission limits than range from approximately 16.5 ppmvd to 30 ppmvd. The following RTO or Regenerative Catalytic Oxidizer (RCO) emission limits have been imposed by SWCAA for VOC destruction (note that Emerald Kalama Chemical has been excluded because one of the primary feeds to those RTOs is CO):

Facility	CO Emission Limits	Notes
Steelscape	2.5 lb/hr (~ 16.5 ppmvd)	35,000 dscfm RTO, 96-1907R6 (3/8/06)
Hardel Mutual Plywood – Oxidizer #1	2.66 lb/hr (~29 ppmvd)	21,323 dscfm RCO, 98-2093R8 (4/18/06)
Hardel Mutual Plywood – Oxidizer #2	1.19 lb/hr (~30 ppmvd)	912 dscfm RCO, 98-2093R8 (4/18/06)

Based on the above data, SWCAA believes that a CO emission limit of 50 ppmvd meets the requirements of BACT for operation of the new RTO at this facility in Destruct mode.

8.c Fischer & Krecke Flexographic Printing Press #305 and #306 (for ADP 04-2537R1). For VOCs and TAPs from printing operations, the use of water-based inks containing less than 1.0 pound per gallon VOCs; or the use of low-VOC solvent-based inks containing less than 25% VOCs in the volatile fraction of the ink, less water or a minimum of 60% solids content in the ink, less water meets the requirements of BACT and Best Available Control Technology for Toxics (T-BACT).

In the case that acceptable print quality cannot be obtained using inks meeting the requirements of the preceding paragraph, the use of a VOC capture and regenerative thermal oxidation system providing a minimum of 75% capture and 95% reduction of captured VOCs and TAPs meets the requirements of BACT for VOCs and Best Available Control Technology for Toxics (T-BACT) for TAPs at this source.

The use of natural gas in the solvent dryers in conjunction with a regenerative thermal oxidizer meets the requirements of BACT for the combustion emissions from the press dryers.

8.d Prevention of Significant Deterioration (PSD) Applicability Determination. This permitting action will not result in a potential emissions increase equal to or greater than applicable PSD thresholds. Therefore, requirements of the PSD program are not applicable to this action.

8.e Compliance Assurance Monitoring (CAM) Applicability Determination. CAM is not applicable to any emission unit at this facility because this facility is not a major source required to obtain a Part 70 or 71 permit.

9. AMBIENT IMPACT ANALYSIS

With the exception of n-propanol, emissions of all toxic air pollutants will be below the applicable small quantity emission rate (SQER) identified in WAC 173-460 [effective February 14, 1994]. Emissions of n-propanol were modeled by SWCAA using the following assumptions in EPA's TSCREEN (95260) dispersion model:

1. N-propanol emissions are controlled by the new Regenerative Thermal Oxidizer
2. The stack is vented at an average temperature is 180°F, 35' above grade, through a 40" diameter stack.
3. The stack emissions are not affected by building downwash.
4. Stack flow is 24,000 dscfm.
5. n-Propanol emissions do not exceed 3 grams per second (~ 23.8 lb/hr, 24-hour average). Maximum potential emissions identified in Section 6 are approximately 16.3 lb/hr (annual average).

The model results indicate that stack emissions of n-propanol would have a maximum ambient impact of 91.14 $\mu g/m^3$ which is below the acceptable source impact level (ASIL) for n-propanol of 1,600 $\mu g/m^3$ identified in WAC 173-460-160 (effective 2/14/94).

Conclusions

9.a Operation of the bag sealing machines, as proposed in ADP Application CL-3030, will not cause the ambient air quality requirements of Title 40 Code of Federal Regulations (CFR) Part 50 "National Primary and Secondary Ambient Air Quality Standards" to be violated.

9.b Operation of the bag sealing machines, as proposed in ADP Application CL-3030, will not cause the requirements of WAC 173-460 "Controls for New Sources of Toxic Air Pollutants," WAC 173-470 "Ambient Air Quality Standards for Particulate Matter," WAC 173-474 "Ambient Air Quality Standards for Sulfur Oxides," and WAC 173-475 "Ambient Air Quality Standards for Carbon Monoxide, Ozone, and Nitrogen Dioxide" to be violated.

9.c The bag sealing machines proposed in ADP Application CL-3030 can be operated without causing a violation of emission standards for sources as established under SWCAA General Regulations Sections 400-040 "General

Standards for Maximum Emissions," 400-050 "Emission Standards for Combustion and Incineration Units," and 400-060 "Emission Standards for General Process Units."

10. DISCUSSION OF APPROVAL CONDITIONS

SWCAA has made a determination to issue Air Discharge Permit 18-3260 in response to ADP Application CL-3030. Air Discharge Permit 18-3260 contains approval requirements deemed necessary to assure compliance with applicable regulations and emission standards as discussed below.

10.a General Basis. Approval conditions for equipment affected by this permitting action incorporate the operating schemes proposed by the permittee in the Air Discharge Permit application.

10.b Emission Limits. The facilitywide volatile organic compound and toxic air pollutant emission limits were not modified with this permit action. The facilitywide volatile organic compound emission limit was established at 80.0 tons per year was voluntarily established to remain exempt from the Air Operation Permit program. In addition, emissions of toxic air pollutants are limited at or below the SQER listed in WAC 173-460 (2/14/94) to assure compliance with the provisions of WAC 173-460, except for n-propanol. If emissions of a toxic air pollutant are to exceed the applicable SQER emissions modeling must be performed to assure that the incremental increase in ambient concentrations does not exceed the applicable ASIL.

Nitrogen oxides and carbon monoxide are the primary pollutants from the combustion of natural gas. Emissions of these pollutants from the press dryers, oxidizer and space heating were limited to the amounts corresponding to the maximum rated fuel consumption.

Emissions from bag sealing machines are based on maximum intended operating hours.

When properly operated, none of the equipment at this facility will generate visible emissions, therefore visual emissions from all equipment at this facility was limited to 0% opacity (not to exceed for more than 3 minutes in any 1-hour period).

10.c Operating Limits and Requirements. Maximum and minimum operating temperature limits were provided for the Regenerative Thermal Oxidizer to assure that adequate destruction of the volatile organic compounds and toxic air pollutants is achieved (low temperature limit) while assuring that the unit is not heated to the point where NO_X emissions become excessive (high temperature limit).

The Permit requires that each pollution control device be operated whenever the equipment served by that device is in operation. To operate otherwise would be a general violation of the permit (the equipment was not proposed for operation without the control device), and would presumably result in an exceedance of the applicable emission limits, so these requirements mostly serve as a reminder to the Permittee. An exception is made so that when only low-VOC water-based inks are being used and VOC and TAP emissions will be relatively low, the Regenerative Thermal Oxidizer need not be operated. Operation of the Regenerative Thermal Oxidizer when using these inks exclusively is not justified because of the relatively high cost of control (a large amount of supplemental fuel will be necessary), and the fact that the Regenerative Thermal Oxidizer will itself be an additional source of emissions.

The Permittee is required to maintain system settings effecting capture rate (e.g. fan speed, inlet pressure) at the minimum levels during which compliance was demonstrated during the most recent source emissions test. For example, if compliance was demonstrated when treating 8,000 scfm per printing press, the Permittee is not allowed to reduce flow to 5,000 scfm per printing press to save on fuel or electricity costs. To reduce flow would likely result in a lower capture efficiency and higher VOC emissions from the facility.

Because this type of operation has the potential to produce nuisance odors, the requirement to minimize odor impacts on neighboring property owners from SWCAA 400-040 was incorporated directly into the permit. The requirement to store materials containing volatile organic compounds in enclosed containers to minimize evaporation was included as implementation of good air pollution control practice (presumptive BACT).

10.d Monitoring and Recordkeeping. Sufficient monitoring and recordkeeping was established to document compliance with the annual emission limits and provide for general requirements (e.g. upset reporting, annual emission inventory submission). Because volatile organic compound and toxic air pollutant emissions must be tracked at least monthly to provide a reasonable assurance of continuing compliance with the synthetic minor permit limits, monthly recordkeeping is required for those parameters used to calculated volatile organic compound and toxic air pollutant emissions.

The permittee is required to log maintenance activities that may affect emissions. Maintenance activities that may affect emissions include, but are not limited to activities such as: flow balancing of ductwork leading the Regenerative Thermal Oxidizer that could affect VOC capture rates, maintenance to Regenerative Thermal Oxidizer flop valves, changes to Regenerative Thermal Oxidizer cycle times, and etc.

10.e Testing Requirements. See Section 12.

10.f Reporting. Specific reporting deadlines were established for each reporting requirement. The submittal date refers to the earlier of the date the report is delivered to SWCAA or the postmarked date if sent through the US Post Office.

Because this facility is a synthetic minor source for volatile organic compounds and hazardous air pollutants with a permit limit of 80.0 tons per year of volatile organic compounds (SM80 - 80% of the major source threshold), emissions of volatile organic compounds and toxic air pollutants (and the data needed to calculate these emissions) were required to be reported to SWCAA quarterly.

The permittee is required to report the annual air emission inventory and the data necessary to develop the emission inventory. Upset conditions with the potential to cause excess emissions must be reported immediately in order to qualify for relief from penalty in accordance with SWCAA 400-107 for unavoidable exceedances. In addition, prompt reporting allows for prompt and accurate investigation into the cause of the event and the prevention of similar future incidents.

11. START-UP AND SHUTDOWN/ALTERNATIVE OPERATING SCENARIOS/POLLUTION PREVENTION

11.a Start-up and Shutdown Provisions. Pursuant to SWCAA 400-081 "Start-up and Shutdown," technology based emission standards and control technology determinations shall take into consideration the physical and operational ability of a source to comply with the applicable standards during start-up or shutdown. Where it is determined that a source is not capable of achieving continuous compliance with an emission standard during start-up or shutdown, SWCAA shall include appropriate emission limitations, operating parameters, or other criteria to regulate performance of the source during start-up or shutdown.

To SWCAA's knowledge, all of the equipment at this facility can comply with all applicable requirements during start-up and shutdown.

11.b Alternate Operating Scenarios. SWCAA conducted a review of alternate operating scenarios applicable to equipment affected by this permitting action. The permittee may change the types of inks and solvents used at the facility from time to time. Because emissions from the use of some of the water-based inks will be relatively low, the Permit contains provisions specifying when use of the Regenerative Thermal Oxidizer is not required.

The nature of the pollutants emitted from the facility may change when new inks or solvents are used. To accommodate this, the Permit contains a requirement that requires the permittee to notify SWCAA before using any new material or implementing a change in the method of operation. If the change will result in an increase in emissions of VOCs or TAPs in excess of an SQER or a permit limit, then New Source Review is required prior to making the change. SWCAA believes this provides the greatest flexibility while assuring compliance with all relevant requirements.

11.c Pollution Prevention Measures. SWCAA conducted a review of possible pollution prevention measures for the facility. No pollution prevention measures were identified by either the permittee or SWCAA separate or in addition to those measures required under BACT considerations. Therefore, none were included in the approval conditions.

12. EMISSION MONITORING AND TESTING

Source emissions testing of the Regenerative Thermal Oxidizer control system is required initially and at least once every 60 calendar months. The frequency of subsequent testing was chosen because the destruction efficiency and nitrogen oxides emissions from this unit may degrade time. Catastrophic failures of the Regenerative Thermal Oxidizer will likely be apparent from operational data including fuel consumption, operational temperatures and cycle times. The source emissions testing is designed to measure the total capture efficiency of the system (this is the most important aspect of measuring total emissions from this facility), the destruction efficiency of the Regenerative Thermal Oxidizer, and combustion emissions from operation of the Regenerative Thermal Oxidizer.

The Regenerative Thermal Oxidizer's burner is not required to be tuned because the burner cannot be reached inside the combustion chamber.

13. FACILITY HISTORY

13.a General History. October 6, 2010, Mercury Plastics – Vancouver purchased Excelsior Packaging West.

13.b Permitting History. The following permits have been issued for this facility:

Permit Number	Application #	Date Issued	Description
93-1515	CL-861 & CL-973	10-15-93	Installation of two 6-color flexographic printing presses with corona treaters and a catalytic oxidizer. This permit was issued to Portco Corporation.
97-2071	CL-1322 & CL-1323	1-28-98	Installation of new off-line press and removal of four Kiwi Presses and one in-line press.
00-2312	CL-1434	1-22-00	Modification of flexographic printing operations and an increase in emission limits including an increase in the VOC emission limit from 28.0 tpy to 80.0 tpy. This permit established the facility as a synthetic minor source of air emissions.
04-2537	CL-1528	6-2-04	Installation of replacement line 304 (PCMC model Encore) flexographic printing press and modification of emission limits.
04-2537R1	CL-1683	10-12-05	Installation of Fischer & Krecke Flexographic Printing Press #305 and Fischer & Krecke Flexographic Printing Press #306. This permit was superseded by 09-2855, but when that permit expired, 04-2537R1 became active.
06-2705	N/A	12-18-06	Consent Order to address delay of source testing pending

			replacement of existing catalytic oxidizer following a failed source emissions test. Required submittal of an Air Discharge Permit application for a new regenerative thermal oxidizer no later than January 31, 2007.
09-2855	CL-1762	4-21-09	Approval for the replacement of the Anguil catalytic oxidizer with a new Anguil regenerative thermal oxidizer. The permit expired.
12-3020	CL-1962	7-17-12	Approval for four bag sealing machines and existing natural gas space heaters.
14-3084	CL-1988	3-19-14	Approval to replace the existing catalytic oxidizer with a regenerative thermal oxidizer. This permit superseded ADP 04-2537R1.
15-3132	CL-2048	6-9-15	Approval to install two additional bag sealing machines and relocate all machines to a new location. This permit superseded ADP 14-3084.
16-3176	CL-2067	4-12-16	Approval to install four additional bag sealing machines and relocate all machines to a new location. This permit superseded ADP 15-3132.

Bold font indicates that the Air Discharge Permit was superceded or will no longer be in effect upon issuance of Air Discharge Permit 18-3260.

14. PUBLIC INVOLVEMENT

14.a Public Notice for Air Discharge Permit Application CL-3030. Public notice for Air Discharge Permit Application CL-3030 was published on the SWCAA internet website on October 26, 2017.

14.b Public/Applicant Comment for Air Discharge Permit Application CL-3030. A thirty (30) day public comment period will be provided for this permitting action pursuant to SWCAA 400-171(3). SWCAA will respond to all comments received during the comment period as part of the final permitting action.

14.c State Environmental Policy Act. A Determination of Nonsignificance (DNS) (SWCAA 18-002) was issued concurrent with this permitting action by SWCAA.