



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 542666 & 542667	DATE: October 23, 2012
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

EVALUATION REPORT FOR PERMIT TO CONSTRUCT/OPERATE

Applicant's Name: ENGINEERED POLYMER SOLUTIONS INC. Facility ID: 074060

Mailing Address: 5501 EAST SLAUSON AVENUE
LOS ANGELES, CALIFORNIA 90040

Equipment Location: SAME

EQUIPMENT DESCRIPTION

Appl. No. 542666

Modification to the existing storage tank, T-804 (P/O F98686 A/N: 486723), by:

the removal of:

- Toluene content

and the addition of:

- Methyl MethAcrylate (MMA) content

Equipment Description:

STORAGE TANK T-804, FIXED ROOF, 8'-0" DIA. X 21'-0" H., 8,000 GALLON CAPACITY.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
[RULE 204]
2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
[RULE 204]
3. THIS EQUIPMENT SHALL NOT BE LOADED WITH PRODUCT UNLESS DISPLACED VAPORS ARE RETURNED TO THE SUPPLY VESSEL.
[RULE 1303(A)(1) – BACT]
4. THIS EQUIPMENT SHALL NOT BE OPERATED UNLESS IT IS VENTED TO AIR POLLUTION CONTROL EQUIPMENT WHICH IS IN FULL USE AND WHICH HAS BEEN ISSUED AN OPERATING PERMIT BY THE EXECUTIVE OFFICER.
[RULE 1303(A)(1) – BACT]



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- 5. THIS EQUIPMENT SHALL BE USED TO STORE METHYL METHACRYLATE ONLY.
[RULE 1303(B)(2) – OFFSET]
- 6. THIS EQUIPMENT SHALL NOT BE FILLED UNLESS A SUBMERGED FILL TUBE IS USED.
[RULE 1303(A)(1) – BACT]
- 7. THIS EQUIPMENT SHALL PROCESS NO MORE THAN 45,000 GALLONS METHYL METHACRYLATE PER CALENDAR MONTH.
[RULE 1303(B)(2) – OFFSET]
- 8. MATERIALS USED IN THIS EQUIPMENT SHALL NOT CONTAIN ANY TOXIC AIR CONTAMINANTS IDENTIFIED IN RULE 1401, TABLE I, WITH EFFECTIVE DATE OF SEPTEMBER 10, 2010 OR EARLIER, EXCEPT FOR METHYL METHACRYLATE (CAS NO. 80-62-6).
[RULE 1401]

Periodic Monitoring

- 9. MATERIAL SAFETY DATA SHEETS FOR ALL MATERIALS USED IN THIS EQUIPMENT SHALL BE KEPT CURRENT AND BE MADE AVAILABLE TO THE EXECUTIVE OFFICER OR HIS REPRESENTATIVE UPON REQUEST.
[RULE 3004 (A)(4)]
- 10. THE OPERATOR SHALL MAINTAIN ADEQUATE RECORDS TO VERIFY COMPLIANCE WITH CONDITION NO. 7 ABOVE. SUCH RECORDS SHALL BE KEPT ON THE PREMISES FOR AT LEAST FIVE YEARS AND BE MADE AVAILABLE TO THE EXECUTIVE OFFICER OR HIS REPRESENTATIVE UPON REQUEST.
[RULE 3004 (A)(4)]

Appl. No. 542667 – Minor Title V Facility Permit Revision

Revision of Title V Facility Permit per Rule 301(m)(7).

BACKGROUND/HISTORY

Engineered Polymer Solutions Inc. (EPS) manufactures a variety of resins including latex, alkyd and urethane resins for paints and coatings. EPS currently operates reactors, mix tanks, raw materials and finished products storage tanks, a boiler and a wastewater treatment system. Some of the reactors are equipped with a water-cooled condenser to allow for solvent reflux in the reactions. Emissions from the facility include VOC emissions from the reactors and raw material and finished product storage tanks, and products of combustion from the boiler and several process heaters. The VOC emissions from the facility are being controlled by an afterburner followed by a waste heat boiler.

EPS facility type:

<u>RECLAIM</u>		<u>Title V</u>
SOx	NOx	
No	No	Yes



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EPS is a Title V facility. The existing Title V Permit for the facility will expire on January 29, 2014.

On September 11, 2012, EPS submitted the following permit applications:

<u>Appl. No.</u>	<u>Type</u>	<u>Previous P/O</u>	<u>Equipment</u>	<u>Fee Sch.</u>	<u>Expedited?</u>
542666	Modification	F98686	Storage Tank	Sch. B	Yes
542667	Plan	N/A	N/A	Title V Rev.	N/A

Appl. No. 552666 is submitted to change the tank content from Toluene to Methyl Methacrylate (MMA).

Appl. No. 542667 is submitted as a plan application for the minor revision of the Title V permit as specified in Rule 301.

PROCESS DESCRIPTION

Storage tank T-804 will be used for the storage of MMA. The storage tank currently is used for the storage of Toluene. It is a vertical fixed roof tank with a capacity of 8,000 gallons. The loading loss is being controlled by the vapor return line and the breathing loss is being controlled by the direct flame afterburner.

Emissions

VOC - Loading loss and breathing loss are expected from this storage tank.

EMISSION CALCULATIONS

Appl. Nos. 542666 – Storage Tank

The VOC emissions from the storage tank will be estimated using the following equations:

Working Loss:

$L_W = 0.0010 M_V P_{VA} Q K_N K_P$ Equation (1)

Where:

- L_W = working loss, lb/yr
- M_V = vapor molecular weight, lb/lb-mole
- P_{VA} = vapor pressure at daily average liquid surface temperature, psia
- Q = annual net throughput (tank capacity [bbl] times annual turnover rate), bbl/yr
- K_N = working loss turnover (saturation) factor, dimensionless
 - For turnovers > 36, K_N = (180 + N)/6N
 - For turnovers ≤ 36, K_N = 1
- K_P = working loss product factor, dimensionless



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For crude oils $K_p = 0.75$
For all other organic liquids, $K_p = 1$

Standing Storage Loss

$L_S = V_V W_V K_E K_S$ Equation (2)

Where:

- L_S = standing storage loss, lb/day
- V_V = vapor space volume, ft^3
- W_V = stock vapor density, lb/ft^3
- K_E = vapor space expansion factor, dimensionless
- K_S = vented vapor saturation factor, dimensionless

The density of the vapor is calculated using the following equation:

$W_V = \frac{M_V P_{VA}}{RT_{LA}}$ Equation (2a)

Where:

- W_V = stock vapor density, lb/ft^3
- M_V = vapor molecular weight, $lb/lb\text{-mole}$
- P_{VA} = vapor pressure at daily average liquid surface temperature, psia
- T_{LA} = Average daily temperature ($^{\circ}R$)

Since the liquid stock has a true vapor pressure greater than 0.1 psia, K_E is obtained by Equation 2b.

$K_E = \frac{\Delta T_V}{T_{LA}} + \frac{\Delta P_V - \Delta P_B}{P_A - P_{VA}}$ Equation (2b)

Where:

ΔT_V = daily vapor temperature range, $^{\circ}R$ or $^{\circ}F$
 $= 0.72\Delta T_A + 0.028\alpha I$ Equation (2c)

Where:

- ΔT_A = daily ambient temperature range, $^{\circ}R$ or $^{\circ}F$
- α = tank paint solar absorptance, dimensionless
- I = daily total solar insolation factor, Btu/ft^2
- ΔP_V = daily vapor pressure range, psi
- ΔP_B = breather vent pressure setting range
- P_A = atmospheric pressure, psia
- P_{VA} = vapor pressure at daily average liquid surface temperature, psia
- T_{LA} = Average daily temperature ($^{\circ}R$)

The vented vapor saturation factor, K_S , is calculated using the following equation:

$K_S = \frac{1}{1 + 0.53P_{VA}H_{VO}}$ Equation (2d)

Where:



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K_S = vented vapor saturation factor, dimensionless

M_V = vapor molecular weight, lb/lb-mole

P_{VA} = vapor pressure at daily average liquid surface temperature, psia

H_{VO} = vapor space outage, ft

$$= H_S - H_L + H_{RO}$$

Where:

H_S = tank shell height, ft

H_L = liquid height, ft

H_{RO} = roof outage, ft

Pre-Modification Emissions

Data:

Operating Schedule: 24 hr/day, 7 days/wk, 52 wks/yr

Throughput (Max.): 15,479 gallons/month (506.75 bbl/month), 24 turnovers/yr

Tank Capacity: 8,000 gallon

Working Loss

M_v = 92.13 lb/lb-mole for Toluene

$P = 0.4216$ psia @ 68 °F (527.67 °R)

Assumptions:

- 95% control efficiency for the vapor return line

$K_N = 1$

The working loss is calculated using Equation No. 1, and the results are indicated as follows:

Pollutant	M_V lb/lb-mole	P_{VA} psia	Q bbl/mo	K_N	K_P	Z_{vi}	L_w		Controlled L_w lbs/day
							lbs/mo	lbs/day	
Toluene	92.13	0.4216	507	1	1	1.00	19.68	0.656	0.033
VOC	92.13	0.4216	507	1	1	1.00	19.68	0.656	0.033

Standing Storage Loss

Data:

$\Delta T_A = 70.375$ °F - 55.525 °F = 14.85 °F = 14.85 °R

$T_{LA} = 62.95$ °F = 522.62 °R

$\alpha = 0.35$ (Beige/Cream with good paint condition)

$I = 1,534$ Btu/ft²

Control valve pressure setting = 11.2 Oz/in² = 0.7 psig

Control valve vacuum setting = 0.5 Oz/in² = 0.03 psig

Tank Diameter = 8 ft

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Assumptions:

- Direct Flame Afterburner Control Efficiency = 95%

The Stock Vapor Density, W_v is calculated using Equation No. 2a, and the result is indicated as follows:

M_v lb/lb-mole	T_{LA} °R	P_{VA} @ 62.95 °F psi	R psia ft ³ /lb-mole °R	W_v lb/ft ³
92.13	522.62	0.362	10.73	0.0059

The daily vapor temperature range, ΔT_A , is calculated using Equation No. 2c, and the result are indicated as follows:

ΔT_A °R	α	I Btu/ft ²	ΔT_v °R
14.85	0.35	1534	25.7

The Vapor Space Expansion Factor, K_E is calculated using Equation No. 2b, and the results is indicated as follows:

ΔT_v °R	T_{LA} °R	P_A psi	P_v @ 55.525 °F psi	P_v @ 70.375 °F psi	ΔP_v psi	P_{VA} @ 62.95 °F psi	Pressure Setting psig	Vacuum Setting psig	ΔP_b psi	K_E
25.7	522.62	14.67	0.287	0.453	0.166	0.362	0.70	-0.03	0.73	0.010

The standing storage loss is calculated using Equation No. 2, and the results are indicated as follows:

Pollutant	V_v ft ³	W_v psia	P_{VA} @ 62.95 °F psi	H_s ft	H_L ft	H_{RO} ft	H_{VO} ft	K_E	K_S	Uncontrolled L_S lbs/day	Controlled L_S lbs/day
Toluene	195.03	0.0059	0.362	21.0	18.6	1.5	3.9	0.010	0.57	6.60E-03	3.30E-04
VOC	195.03	0.0059	0.362	21.0	18.6	1.5	3.9	0.010	0.57	6.60E-03	3.30E-04

VOC/Toluene emission summary

$R_1 = L_W + L_S = 0.656 \text{ lb/day} + 0.0066 \text{ lb/day} = 0.663 \text{ lb/day}, 0.028 \text{ lb/hr}$

$R_2 = \text{Controlled } L_W + \text{Controlled } L_S = 0.033 \text{ lb/day} + 0.0003 \text{ lb/day} = 0.033 \text{ lb/day}, \text{ or } 0.0014 \text{ lb/hr}$

Post-Modification Emissions

Data:

Operating Schedule: 24 hr/day, 7 days/wk, 52 wks/yr
 Throughput (Max.): 45,000 gallons/month (1,473.2 bbl/month), 56 turnovers/yr
 Tank Capacity: 8,000 gallon

Working Loss

$M_v = 100.12 \text{ lb/lb-mole}$ for MMA ($\text{CH}_2=\text{C}(\text{CH}_3)\text{COOCH}_3$)

$P = 0.5375 \text{ psia @ } 68 \text{ °F } (527.67 \text{ °R})$

Assumptions:

- 95% control efficiency for the vapor return line

$K_N = (180 + N)/6N = (180 + 56) \div (6 \times 56) = 0.702$

The working loss is calculated using Equation No. 1, and the results are indicated as follows:



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Pollutant	M _v lb/lb-mole	P _{vA} psia	Q bbl/mo	K _N	K _P	Z _{vi}	L _w		Controlled L _w lbs/day
							lbs/mo	lbs/day	
MMA	100.12	0.5375	1,473	0.702	1	1.00	55.68	1.856	0.093
VOC	100.12	0.5375	1,473	0.702	1	1.00	55.68	1.856	0.093

Standing Storage Loss

Data:

$$\Delta T_A = 70.375 \text{ }^\circ\text{F} - 55.525 \text{ }^\circ\text{F} = 14.85 \text{ }^\circ\text{F} = 14.85 \text{ }^\circ\text{R}$$

$$T_{LA} = 62.95 \text{ }^\circ\text{F} = 522.62 \text{ }^\circ\text{R}$$

$$\alpha = 0.35 \text{ (Beige/Cream with good paint condition)}$$

$$I = 1,534 \text{ Btu/ft}^2$$

$$\text{Control valve pressure setting} = 11.2 \text{ Oz/in}^2 = 0.7 \text{ psig}$$

$$\text{Control valve vacuum setting} = 0.5 \text{ Oz/in}^2 = 0.03 \text{ psig}$$

$$\text{Tank Diameter} = 8 \text{ ft}$$

Assumptions:

- Direct Flame Afterburner Control Efficiency = 95%

The Stock Vapor Density, W_v is calculated using Equation No. 2a, and the result is indicated as follows:

M _v lb/lb-mole	T _{LA} °R	P _{vA} @ 62.95 °F psi	R psia ft ³ /lb-mole °R	W _v lb/ft ³
100.12	522.62	0.461	10.73	0.008

The daily vapor temperature range, ΔT_A, is calculated using Equation No. 2c, and the result are indicated as follows:

ΔT _A °R	α	I Btu/ft ²	ΔT _v °R
14.85	0.35	1534	25.7

The Vapor Space Expansion Factor, K_E is calculated using Equation No. 2b, and the results is indicated as follows:

ΔT _v °R	T _{LA} °R	P _A psi	P _v @ 55.525 °F psi	P _v @ 70.375 °F psi	ΔP _v psi	P _{vA} @ 62.95 °F psi	Pressure Setting psig	Vacuum Setting psig	ΔP _b psi	K _E
25.7	522.62	14.67	0.365	0.577	0.212	0.461	0.70	-0.03	0.73	0.013

The standing storage loss is calculated using Equation No. 2, and the results are indicated as follows:

Pollutant	V _v ft ³	W _v psia	P _{vA} @ 62.95 °F psi	H _S ft	H _L ft	H _{RO} ft	H _{VO} ft	K _E	K _S	Uncontrolled L _S lbs/day	Controlled L _S lbs/day
MMA	195.03	0.0082	0.461	21.0	18.6	1.5	3.9	0.013	0.51	0.011	0.001
VOC	195.03	0.0082	0.461	21.0	18.6	1.5	3.9	0.013	0.51	0.011	0.001

VOC/MMA emission summary

$$R1 = L_w + L_s = 1.856 \text{ lb/day} + 0.011 \text{ lb/day} = 1.867 \text{ lb/day}, 0.078 \text{ lb/hr}$$

$$R2 = \text{Controlled } L_w + \text{Controlled } L_s = 0.093 \text{ lb/day} + 0.001 \text{ lb/day} = 0.094 \text{ lb/day}, \text{ or } 0.004 \text{ lb/hr}$$



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EMISSION SUMMARY:

A/N 542666		Hourly (lbs/hr)	Daily (lbs/day)	Annually (lbs/yr)	30 day ave. (lbs/day)	30day NSR (lbs/day)
VOC	R1	0.078	1.87	679.6	1.87	2
	R2	0.0039	0.09	34.0	0.09	0
MMA	R1	0.078	1.87	679.6	1.87	2
	R2	0.0039	0.09	34.0	0.09	0

EMISSION CHANGE

VOC: 0.039 lb/day, Post-Mod. – 0.033 lb/day, Pre-Mod. = 0.006 lb/day **Increase!**

HEALTH RISK ASSESSMENT- TIER I ANALYSIS:

Excel program results (attached to this report) show Cancer/Chronic ASI and Acute ASI are less than 1, Tier II analysis is not required.

RULES AND REGULATIONS EVALUATION

Rule 212: **Standards for Approving Permits** – The facility is not located within 1,000 feet of a K-12 school (a map is attached). In addition, there are no TAC’s emissions for this project which will cause an individual cancer risk greater than, or equal to, one (1) in a million. A Public Notice is not required.

Section (g)

Item	Lb/dy daily maximum	Allow limit-lb/dy	Trigger Public notice
NOx	+0	40	No
ROG	+0.006	30	No
CO	+0	220	No
PM10	+0	30	No
SOx	+0	60	No

Rule 401: **Visible Emissions** – Compliance is expected from well maintained and properly operated equipment.

Rule 402: **Public Nuisance** – The potential for public nuisance from the operation of this equipment is minimal. The facility is located in a commercial/industrial area.

Rule 1141: **Control of Volatile Organic Compound Emissions from Resin Manufacturing**

This equipment is a storage tank, which is not subject to this rule.

Rule 1303: **BACT**

The loading loss for the storage tank is being controlled by the vapor return line and the breathing loss is being controlled by the direct flame afterburner. BACT is achieved.



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Rule 1303(b)(1): Modeling

Only VOC emissions are identified; thus, no further screening analysis is required.

Rule 1303(b)(2): **Offsets:** Offsets are not required for this facility since the criteria contaminant emissions will not exceed the limits in table A (rule 1304(d))

	VOC (lb/day)	PM10 (lb/day)	NOX (lb/day)	CO (lb/day)	SOX (lb/day)
Current NSR (PTE)	17.56	14	103	13	0
A/N 542666	+0.006	0	0	0	0
Total PTE	17.566	3.72	15.6	15.24	7
Threshold limit	22	22	22	159	22
Offset required	0	0	0	0	0

Reg XXX: Title V Permit

Engineered Polymer Solutions Inc. (Facility ID: 74060) is a Title V facility. The existing Title V Permit for the facility will expire on January 29, 2014.

Application no. 542666 is to change the tank content from Toluene to Methyl Methacrylate (MMA). The project will increase VOC emissions for 0.006 lb/day. Therefore, application no. 542666 is considered “De Minimis Significant Permit Revision” of Title V Facility Permit and it is subject to a 45-day EPA review prior to final revision of the Title V Facility Permit (Application No. 542667).

CONCLUSION AND RECOMMENDATIONS

Based on this evaluation, it is expected that the subject equipment will be operated in compliance with all applicable District Rules and Regulations. The Permit to Construct/Operate is recommended to be issued.