



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
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: 5523 EAST SLAUSON AVENUE
LOS ANGELES, CALIFORNIA 90040

Equipment Location: 5501 EAST SLAUSON AVENUE
LOS ANGELES, CALIFORNIA 90040

EQUIPMENT DESCRIPTION

Appl. No. 555039

Modification to the Latex Emulsion Polymerization System K-5 (P/O G6690 A/N: 499660), by:

the removal of:

- 2,500-gallon weigh tank, T-501

and the addition of:

- 5,000-gallon weigh tank, T-501

Equipment Description:

LATEX EMULSION POLYMERIZATION SYSTEM K-5 CONSISTING OF:

- 1 CHARGE TANK, T-505, 3'-6" DIA. X 4'-2" H., 300 GALLON CAPACITY, WITH AN AGITATOR.
- 2 ~~WEIGH MONOMER MIX~~ TANK, T-504, 5'-6" DIA. X 6'-0" H., 1,100 GALLON CAPACITY, WITH AN AGITATOR.
- 3 ~~WEIGH MONOMER MIX~~ TANK, T-501, ~~7'-0" DIA. X 9'-0" H., 2,500 GALLON CAPACITY,~~ 7'-8" DIA. X 14'-9" H., 5,000 GALLON CAPACITY, WITH AN AGITATOR.
4. WEIGH TANK, T-502, OXIDIZING CATALYST, 2'-06" DIA. X 34'-0" H., 2150 GALLON CAPACITY, WITH AN AGITATOR.
5. WEIGH TANK, T-503, REDUCING CATALYST, 2'-06" DIA. X 34'-0" H., 2150 GALLON CAPACITY, WITH AN AGITATOR.
6. REACTOR, K-5, 8'-0" DIA. X 10'-6" H., 3,000 GALLON CAPACITY, WITH INTERNAL WATER COOLING/HEATING COILS AND AN AGITATOR, AND A REFLUX CONDENSER, 1'-5" DIA. X 20'-0" L.



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO.	DATE:
555039, -41 & -44	April 25, 2014
PROCESSED BY	CHECKED BY
S. JIANG	D. GORDON

~~7. REFLUX CONDENSER, 1'-5" DIA. X 20'-0" L.,~~

- 7. NEUTRALIZATION TANK, T-514, 9'-0" DIA. X 13'-8"H., 5,500 GALLON CAPACITY, WITH AN AGITATOR.
- 8. COOL TANK, T-506, 8' – 0” DIA. X 8’ – 0” H., 3,000 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 WAS 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 OPERATED UNLESS ~~IT IS~~ **THE REACTOR (K-5) AND THE MONOMER MIX TANKS (T-501 AND T-504) ARE** VENTED TO AIR POLLUTION CONTROL EQUIPMENT WHICH IS IN FULL USE AND WHICH HAS BEEN ISSUED A PERMIT BY THE EXECUTIVE OFFICER.
[RULE 1141, RULE 1303(A)(1) – BACT]
- 4. **THE OPERATOR SHALL LIMIT THE VOC EMISSIONS FROM THIS EQUIPMENT TO NO MORE THAN 181.51 POUNDS PER MONTH.**
[RULE 1303(B)(2) – OFFSET]
- 5. **RECORDS SHALL BE MAINTAINED MONTHLY TO DEMONSTRATE COMPLIANCE WITH CONDITION NO. 4, VOC EMISSIONS SHALL BE CALCULATED FOR THE PRECEDING MONTH PERIOD BY THE 15TH DAY OF THE FOLLOWING MONTH. EMISSIONS SHALL BE CALCULATED USING “PREFERRED AND ALTERNATIVE METHODS FOR ESTIMATING AIR EMISSIONS FROM PAINT AND INK MANUFACTURING FACILITIES, U.S. ENVIRONMENTAL PROTECTION AGENCY, EMISSION INVENTORY IMPROVEMENT PROGRAM, VOLUME II; CHAPTER 8, MARCH 1998” OR A MORE RECENT VERSION AND A PROTOCOL APPROVED BY THE DISTRICT.**
[RULE 1303(B)(2) – OFFSET]
- 6. **MATERIALS USED IN THIS EQUIPMENT SHALL NOT CONTAIN ANY TOXIC AIR CONTAMINANTS IDENTIFIED IN RULE 1401, TABLE I, WITH AN EFFECTIVE DATE OF SEPTEMBER 10, 2010 OR EARLIER, EXCEPT FOR THE FOLLOWING COMPOUNDS SPECIFIED BELOW:**

<u>TOXIC AIR CONTAMINANT</u>	<u>CAS NO.</u>
ACRYLIC ACID	79-10-7



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

<i>DIOXANE, 1,4-</i>	<i>123-91-1</i>
<i>METHANOL</i>	<i>67-56-1</i>
<i>METHYL METHACRYLATE</i>	<i>80-62-6</i>
<i>STYRENE</i>	<i>100-42-5</i>
<i>VINYL ACETATE</i>	<i>108-05-4</i>

[RULE 1401]

Periodic Monitoring

- 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)]
- THE OPERATOR SHALL MAINTAIN ADEQUATE RECORDS TO VERIFY COMPLIANCE WITH CONDITION NO. 4 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)]

Emissions and Requirements:

- THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:

VOC: RULE 1141
VOC: RULE 1173

Appl. No. 555041

Modification to the Thermal Oxidizer (P/O G6695 A/N: 499670), by:

the removal of:

- 7.26 MMBtu/hr burner

and the addition of:

- A Rule 1147 Compliant 9.8 MMBtu/hr burner

Equipment Description:

AIR POLLUTION CONTROL SYSTEM CONSISTING OF:

- AFTERBURNER, *DIRECT FLAME TYPE*, HIRT, MODEL HIH-SM-3000X, SERIAL NO. 9881073, 4'-3" DIA. X 18'-8" L., ~~DIRECT GAS FIRED, 7,260,000 BTU/HR~~ *WITH A LOW*



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO.	DATE:
555039, -41 & -44	April 25, 2014
PROCESSED BY	CHECKED BY
S. JIANG	D. GORDON

NOX BURNER, 9.8 MMBTU/HR, MAXON, MODEL NO. KINEDIZIER LE, NATURAL GAS FIRED.

2. WASTE HEAT BOILER, ABCO, MODEL 100-WHB, SERIAL NO. 9608-1, 4'-10" DIA. X 20'-6" L., 100 HP.
3. SCRUBBER, SPRAY TYPE, VO19, 1'-4" DIA. X 10'-0" H., WITH A SEPARATION TANK, T-16, 8'-1" W. X 9'-7" L. X 5'-0" H., 2,950 GALLON CAPACITY AND AN CIRCULATION PUMP.
4. ONE VAPOR EXPANSION TANK, T-15, 4'-0" DIA. X 5'-0" H., 500 GALLON CAPACITY.
5. ONE VAPOR CONDENSATE TANK, T-17, 8'-0" DIA. X 8'-6" H., 3,760 GALLON CAPACITY.
6. EXHAUST SYSTEM WITH A 20 HP BLOWER VENTING THE FOLLOWING SOURCES:
~~TWO ALKYD RESIN REACTORS, K2 AND K3, EACH WITH ONE CONDENSER, ONE SURGE TANK, AND ONE DECANTER TANK; FOUR RESIN THIN DOWN TANKS, T-401, T-402, T-403 AND T-404, EACH WITH ONE CONDENSER; ONE LATEX REACTOR, K5, WITH ONE CONDENSER; ONE POLYVINYL ACETATE POLYMERIZATION REACTOR, K6, WITH ONE CONDENSER; ONE WASTE WATER TREATMENT SYSTEM; THIRTEEN TANKS: ST-3 (T-803) OR TBD2, ST-8 (T-808) OR TBD4, T-406, T-407, T-501, T-504, T-601, T-802, T-804, T-807, T-810 OR TBD1, T-811 AND T-812.~~
 - A) THREE MIXING TANKS: K-2, T-501 AND T-504
 - B) THREE REACTORS: K-3, K-5 AND K-6
 - C) FOUR RESIN THIN DOWN TANKS: T-401, T-402, T-403 AND T-404
 - D) ELEVEN TANKS: TBD1, TBD2, TBD4, T-406, T-407, T-601, T-802, T-804, T-807, T-811 AND T-812.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT WAS 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 BE MAINTAINED AND OPERATED AT A MINIMUM VOC DESTRUCTION EFFICIENCY OF 95% AND AN OVERALL VOC CONTROL EFFICIENCY (COLLECTION AND DESTRUCTION) OF 95% WHEN THE BASIC EQUIPMENT IT SERVES IS IN OPERATION.
[RULE 1141, RULE 1303(A)(1)-BACT]



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO.	DATE:
555039, -41 & -44	April 25, 2014
PROCESSED BY	CHECKED BY
S. JIANG	D. GORDON

4. THE NOX EMISSIONS DISCHARGED FROM THIS EQUIPMENT SHALL NOT EXCEED 60 PPMV, CALCULATED AS NO₂, BY VOLUME ON A DRY BASIS AT 3% O₂. FOR THE PURPOSE OF THIS CONDITION, THE EMISSION LIMIT SHALL APPLY SOLELY WHEN BURNING 100% FUEL AND NOT WHEN THE BURNER IS INCINERATING AIR TOXIC, VOCS, OR OTHER VAPORS.
[RULE 1147]

5. THE OWNER OR OPERATOR OF THIS EQUIPMENT SHALL CONDUCT SOURCE TESTS UNDER THE FOLLOWING CONDITIONS:

A. THE SOURCE TESTS SHALL BE CONDUCTED NO LATER THAN 180 DAYS AFTER THE BURNER REPLACEMENT IS COMPLETED UNLESS OTHERWISE APPROVED IN WRITING BY THE DISTRICT.

B. THE SOURCE TESTS SHALL BE CONDUCTED TO VERIFY COMPLIANCE WITH THE NOX EMISSION LIMIT SPECIFIED IN CONDITION NO. 4, ABOVE.

C. SOURCE TESTING SHALL BE CONDUCTED USING A DISTRICT APPROVED TEST PROTOCOL. THE TEST PROTOCOL SHALL BE SUBMITTED TO THE DISTRICT AT LEAST 90 DAYS PRIOR TO THE SCHEDULED TEST AND APPROVED BY THE DISTRICT SOURCE TESTING DIVISION.

D. TWO COMPLETE COPIES OF THE SOURCE TEST REPORTS SHALL BE SUBMITTED TO THE DISTRICT (ADDRESSED TO SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT, ATTN: STEPHEN JIANG, P.O. BOX 4941, DIAMOND BAR, CA 91765) WITHIN 45 DAYS AFTER THE SOURCE TESTING DATE. THE SOURCE TEST REPORT SHALL INCLUDE, BUT MAY NOT BE LIMITED TO, EMISSIONS RATE IN POUNDS PER HOUR AND CONCENTRATION IN PPMV AT THE OUTLET OF THE BOILER.

E. A TESTING LABORATORY CERTIFIED BY THE CALIFORNIA AIR RESOURCES BOARD IN THE REQUIRED TEST METHODS FOR CRITERIA POLLUTANTS TO BE MEASURED, AND IN COMPLIANCE WITH DISTRICT RULE 304 (NO CONFLICT OF INTEREST) SHALL CONDUCT THE TEST.

F. SAMPLING FACILITIES SHALL COMPLY WITH THE DISTRICT GUIDELINES FOR CONSTRUCTION OF SAMPLING AND TESTING FACILITIES, PURSUANT TO RULE 217.

[RULE 1147]

Periodic Monitoring:

6. THE OPERATOR SHALL OPERATE AND MAINTAIN THIS HIRT DIRECT FLAME THERMAL OXIDIZER ACCORDING TO THE FOLLOWING REQUIREMENTS:

THE COMBUSTION CHAMBER TEMPERATURE SHALL BE MAINTAINED AT A



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO.	DATE:
555039, -41 & -44	April 25, 2014
PROCESSED BY	CHECKED BY
S. JIANG	D. GORDON

MINIMUM OF 1,400 DEGREES FAHRENHEIT WHENEVER THE EQUIPMENT IT SERVES IS IN OPERATION.

THE OPERATOR SHALL OPERATE AND MAINTAIN A TEMPERATURE MEASURING AND RECORDING SYSTEM TO CONTINUOUSLY MEASURE AND RECORD THE COMBUSTION CHAMBER TEMPERATURE PURSUANT TO THE OPERATION AND MAINTENANCE REQUIREMENTS SPECIFIED IN 40 CFR PART 64.7. SUCH A SYSTEM SHALL HAVE AN ACCURACY OF WITHIN 1% OF THE TEMPERATURE BEING MONITORED AND SHALL BE INSPECTED, MAINTAINED, AND CALIBRATED ON AN ANNUAL BASIS IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS. THE TEMPERATURE INDICATING AND RECORDING SYSTEM SHALL BE IN OPERATION WHENEVER THE EQUIPMENT IT SERVES IS IN OPERATION.

FOR THE PURPOSE OF THIS CONDITION, A DEVIATION SHALL BE DEFINED AS WHEN A COMBUSTION CHAMBER TEMPERATURE OF LESS THAN 1,400 DEGREES FAHRENHEIT OCCURS DURING NORMAL OPERATION OF THE EQUIPMENT IT SERVES AND THE GAS STREAM INCOMING TO THE COMBUSTION CHAMBER CANNOT BE REROUTED THROUGH THE CARBON ADSORPTION SYSTEM, WHICH IS IN FULL USE AND WHICH HAS BEEN ISSUED AN OPERATING PERMIT BY THE EXECUTIVE OFFICER. THE OPERATOR SHALL REVIEW THE RECORDS OF THE COMBUSTION CHAMBER TEMPERATURE ON A DAILY BASIS TO DETERMINE IF A DEVIATION OCCURS OR SHALL INSTALL AN ALARM SYSTEM TO ALERT THE OPERATOR WHEN A DEVIATION OCCURS.

WHENEVER A DEVIATION OCCURS, THE OPERATOR SHALL INSPECT THIS EQUIPMENT TO IDENTIFY THE CAUSE OF SUCH A DEVIATION, TAKE IMMEDIATE CORRECTIVE ACTION TO MAINTAIN THE COMBUSTION CHAMBER TEMPERATURE AT OR ABOVE 1,400 DEGREES FAHRENHEIT, AND KEEP RECORDS OF THE DURATION AND CAUSE (INCLUDING UNKNOWN CAUSE, IF APPLICABLE) OF THE DEVIATION AND THE CORRECTIVE ACTION TAKEN.

ALL DEVIATIONS SHALL BE REPORTED TO THE AQMD PURSUANT TO THE REQUIREMENTS SPECIFIED IN 40 CFR PART 64.9 AND CONDITION NOS. 22 AND 23 IN SECTION K OF THIS PERMIT. THE REPORT SHALL INCLUDE THE TOTAL OPERATING TIME OF THIS EQUIPMENT AND THE TOTAL ACCUMULATED DURATION OF ALL DEVIATIONS FOR EACH SEMI-ANNUAL REPORTING PERIOD SPECIFIED IN CONDITION NO. 23 IN SECTION K OF THIS PERMIT.

THE OPERATOR SHALL SUBMIT AN APPLICATION WITH A QUALITY IMPROVEMENT PLAN (QIP) IN ACCORDANCE WITH 40 CFR PART 64.8 TO THE AQMD IF AN ACCUMULATION OF DEVIATIONS EXCEEDS 5 PERCENT DURATION OF THIS EQUIPMENT'S TOTAL OPERATING TIME FOR ANY SEMI-ANNUAL REPORTING PERIOD SPECIFIED IN CONDITION NO. 23 IN SECTION K OF THIS PERMIT. THE REQUIRED QIP SHALL BE SUBMITTED TO THE AQMD WITHIN 90 CALENDAR DAYS AFTER THE DUE DATE FOR THE SEMI-ANNUAL MONITORING REPORT.



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO.

555039, -41 & -44

DATE:

April 25, 2014

PROCESSED BY

S. JIANG

CHECKED BY

D. GORDON

THE OPERATOR SHALL INSPECT AND MAINTAIN ALL COMPONENTS OF THIS EQUIPMENT ON AN ANNUAL BASIS IN ACCORDANCE WITH THE MANUFACTURER’S SPECIFICATIONS.

THE OPERATOR SHALL KEEP ADEQUATE RECORDS IN A FORMAT THAT IS ACCEPTABLE TO THE AQMD TO DEMONSTRATE COMPLIANCE WITH ALL APPLICABLE REQUIREMENTS SPECIFIED IN THIS CONDITION AND 40 CFR PART 64.9 FOR A MINIMUM OF FIVE YEARS.

[RULE 1303(A)(1)-BACT, 1303(B)(2)-OFFSET, 3004(A)(4), 40CFR PART 64]

Emissions and Requirements:

7. THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:

NOX: RULE 1147

VOC: RULE 1141

VOC: ~~RULE 1171, SEE APPENDIX B FOR EMISSION LIMITS~~

CO: 2000 PPM, RULE 407

PM: 0.1 GR/SCF, RULE 409

PM: RULE 404, SEE APPENDIX B FOR EMISSION LIMITS

Appl. No. 555044 – 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

EPS is a Title V facility. The existing Title V Permit for the facility will expire on January 29, 2014. EPS submitted a Title V renewal application no. 549164 on March 29, 2013.

On August 06, 2013, EPS submitted the following permit applications:

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT****ENGINEERING AND COMPLIANCE****APPLICATION PROCESSING AND CALCULATIONS**

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

<u>Appl. No.</u>	<u>Type</u>	<u>Previous P/O</u>	<u>Equipment</u>	<u>Fee Sch.</u>	<u>Expedited?</u>
555039	Modification	G6690	Latex Emulsion Polymerization System K-5	Sch. D	Yes
555041	Modification*	G6695	Afterburner	Sch. D	Yes
555044	Plan	N/A	N/A	Title V Rev.	N/A

Note

* The fee for process this application is charged as administrative change fee based on the Board Resolution package for Rule 1147. See Attached email dated on July 29, 2010 from Fred Del Rosario.

Appl. No. 555039 is submitted as a modification application to the latex emulsion polymerization system, K-5. The modification is to replace the 2,300-gal monomer pre-mix tank, T-501, with a 5,000 gallon tank. The process formulations will be the same. In addition, the throughput is bottle-neck at the reactor, K-5; thus, the throughput will not change and the emissions will be the same.

Appl. No. 555041 is submitted to replace the afterburner with a R1147 Complaint burner. The existing burner is rated at 7.26 MMBtu/hr. The new burner is a low NOx burner rated at 9.8 MMBtu/hr.

Appl. No. 555044 is submitted as a plan application for the minor revision of the Title V permit as specified in Rule 301.

PROCESS DESCRIPTION

K-5 system processes two coating categories, which include Acrylic Latex and Acetate Latex.

Monomers and solvents are loaded from the storage tanks to the two monomer pre-mix tanks, T-501 and T-504. Catalysts are loaded to the two weigh tanks, T-502 and T-503. Soap water is loaded from a drum to the charge tank, T-505.

Latex Reactions

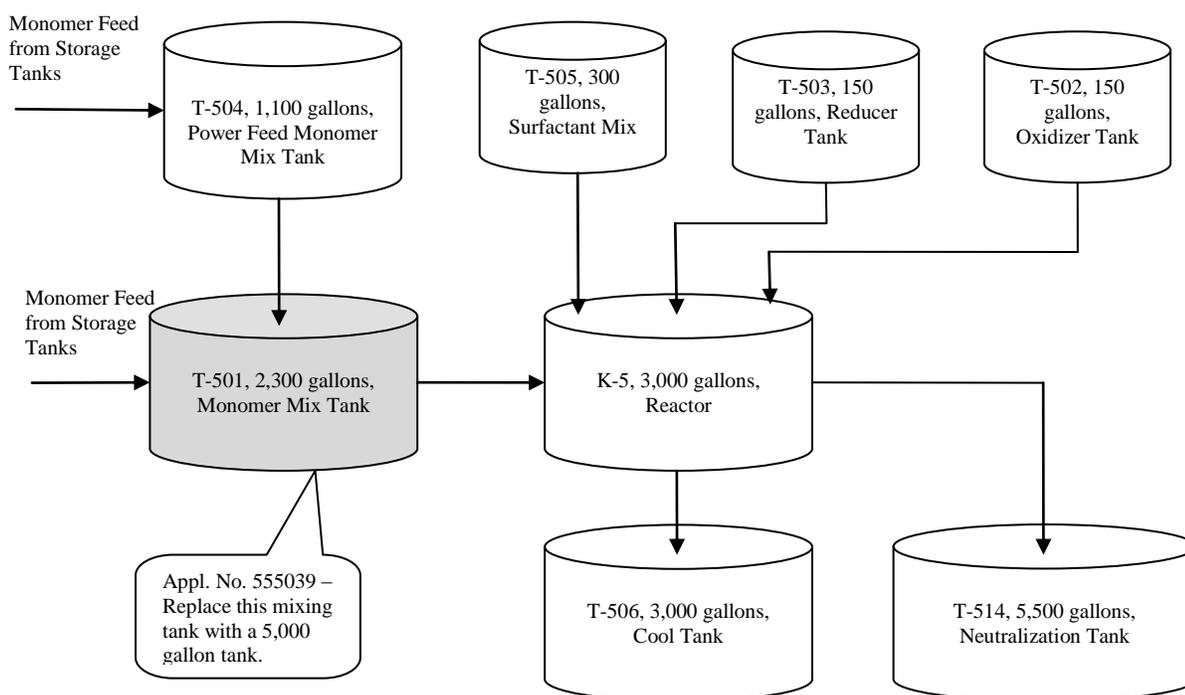
A solution of monomer is prepared in a feed tank. The solution will typically contain 20 percent water, 80 percent monomer, and a small amount of surfactant. The feed tank solution is pumped slowly into the reactor along with water and reaction initiators, maintaining the monomer concentration at 5-10 percent. At the completion of the reaction, extra initiator is added to consume the remaining monomer. At the end of the batch, a small amount of either ammonia or triethylamine is added to neutralize the polymer. The temperature is maintained between 150 – 180 °F. Cycle time for the reaction will vary between 8 to 12 hours, depending on the specific formulation. Both the reactor and the monomer feed tanks are purged with inert gas to render the atmosphere in the vessel inert. The reactors are vented to water-cooled condensers, and the reactors and feed tanks vent to the thermal oxidizer. One or more reactors at the facility will manufacture latex polymers. The HAPs currently used in latex reactions include acrylonitrile and styrene.



APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

The latex emulsion polymerization K-5 system includes the weigh tank, a chemical reactor, mix tanks and storage tanks for raw material and finished products. The facility proposed to modify K-5 system by the replacement of the 2,500-gallon T-501 weigh tank with a 5,000-gallon weigh tank, agitator and load cells. In addition, the facility proposed administrative revisions to weigh tanks T-502 and T-503.

Latex Emulsion Polymerization K-5 System



The VOC solvent used to produce Acrylic Latex is mainly consist of n-Butyl Acrylate, Butyl Methacrylate, Ethylhexyl Acrylate, Methyl Methacrylate, Styrene and other minor VOC ingredients.

The VOC solvent used to produce Acetate Latex mainly consists of n-Butyl Acrylate and Vinyl Acetate.

Emissions:

VOC/TOC Emissions

VOC/TOC emission points:

- a) Loading Loss (T501, T-504 and K-5)
- b) Mixing Loss (T501, T-504 and K-5)
- c) N₂ blanket (K-5)
- d) Product Loading Loss (T-506 and T-514)



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO.	DATE:
555039, -41 & -44	April 25, 2014
PROCESSED BY	CHECKED BY
S. JIANG	D. GORDON

PM10 Emissions

PM10 emission points:

- a) Powder Loading Process (T-512C)

All process emission points are vented to afterburner.

Urethane Reactions

Toluene diisocyanate (TDI) is reacted in a low temperature reactor at 230 °F. The TDI is pumped from drums into the reactor. At the completion of the reaction, methanol is added to react with any residual monomer. Cycle time for the reaction is approximately 10 hours. The reactor is purged with inert gas to render the atmosphere in the vessel inert. The reactor is vented to a water-cooled condenser and the thermal oxidizer. One or more reactors at the facility will manufacture urethane polymers.

Alkyd Reactions

Vegetable oil, such as refined soy oil, is reacted with phthalic anhydride to produce alkyd polymers. Xylene is used as reflux solvent in these reactions and a variety of solvents are used to thin the reaction mixture. The temperature is maintained between 215 – 250 °F during the reaction. Cycle time for the reaction is approximately 8 hours. The reactor is purged with inert gas to increase the reflux rate and to render the atmosphere in the vessel inert. The reactor is vented to a water-cooled condenser and thermal oxidizer. The HAPs currently used in alkyd reactions include xylenes, toluene, and butyl cellosolve.

Emissions

VOC Emissions

Loading loss – Loading monomers into monomer mixing tanks T-501 and the reactor (K-5)

EMISSION CALCULATIONS

The VOC emissions from the storage tank will be estimated using the equations listed in EIIP Document Series, Vol. II, Chapter 8, "Methods for Estimating Air Emissions from Paint, Ink, and Other Coating Manufacturing Facilities." STAPPA/ALAPCO/EPA. February 2005:

Filling Loss:

$$E_{Loading} \text{ lb/day} = (12.46) \frac{(S)(P_x)(M_x)(Q)}{T} \dots\dots\dots \text{Equation (1)}$$

where:

- S = saturation factor (dimensionless; obtained from Table 5.2-1 in AP-42)
 - = 1.45 (Splash loading: dedicated normal service)
- P_x = partial vapor pressure of the VOC species x loaded at temperature T (psia)
 - = x_x × VP_x, where: x_x = liquid mole fraction of VOC species x (mole/mole)



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO.

555039, -41 & -44

DATE:

April 25, 2014

PROCESSED BY

S. JIANG

CHECKED BY

D. GORDON

VP_x = true vapor pressure of VOC species x (psia)

M_x = molecular weight of VOC species x (lb/lb-mole)

Q = volume of material loaded (1,000 gal/day)

T = temperature of liquid loaded (°R).

Surface Evaporation - Mixing/Reaction Operations

$$E_{\text{Surface-Evaporation}}, \text{ lb/hr} = \frac{(M_x)(K_x)(A)(P_x)(3,600 \text{ sec/hr})}{(R)(T)} \dots\dots\dots \text{Equation (2)}$$

where:

M_x = molecular weight of VOC species x (lb/lb-mole)

K_x = gas-phase mass transfer coefficient of VOC species x (ft/sec)

A = surface area of exposure or opening of tank (ft²)

P_x = partial vapor pressure of VOC species x at temperature T (psia)

R = universal gas constant at 1 atmosphere of pressure, 10.73 psia-ft³/°R-lb mole

T = temperature of liquid loaded (°R)

K_x is calculated using the following equation:

$$K_x, \text{ ft/sec} = (0.00438)(U)^{0.78} \left(\frac{18}{M_x} \right)^{1/3} \dots\dots\dots \text{Equation (2a)}$$

where:

U = wind speed above the tank

M = molecular weight of VOC species x (lb/lb-mole)

Nitrogen Purge - Mixing/Reaction Operations

$$E_x, \text{ lb/hr} = \frac{(P_x)(F_{nc})(M_x)(60 \text{ min/hr})}{(R)(T)} \times \frac{P_T}{P_T - \sum P_x} \dots\dots\dots \text{Equation (3)}$$

where:

E_x = Emissions of VOC species x (lb/hr)

M_x = molecular weight of VOC species x (lb/lb-mole)

F_{nc} = Flow Rate of Exhaust (ft³/min)

P_x = partial vapor pressure of VOC species x at temperature T (psia)

P_T = total system pressure (psia)

R = universal gas constant at 1 atmosphere of pressure, 10.73 psia-ft³/°R-lb mole

T = temperature of the exhaust gas (°R)



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

Appl. Nos. 555039 – Latex Emulsion Polymerization System K-5

The modification project is to replace the 2,300-gal monomer pre-mix tank, T-501, with a 5,000 gallon tank. The process formulations will be the same. In addition, the process throughput is limited at the reactor, K-5; thus, the throughput will not change and the emissions will be the same. However, the previous NSR database has shown no emissions; thus, the NSR database will be updated with the estimated emissions as follows:

K-5 system processes two coating categories, which include Acrylic Latex and Acetate Latex. The facility did the emission estimates for each category using a hypothetical "worst case" formulation and using the methods provided in AP-42 Chapter 8 - "Methods for Estimating Air Emissions from Paint, Ink, and Other Coating Manufacturing Facilities".

The results of VOC emission calculation are shown as follows:

For production of acetate latex: R1 = 0.0456 lb/gallon acetate latex product
For production of acrylic latex: R1 = 0.00709 lb/gallon acrylic latex product

Throughput Data (2011-2012):

K-5 System Actual Annual Throughput (2011-2012)				
K-5 System (Coating Categories)	Operating Year		Average	Units
	2011	2012		
Acetate Latex	902,620	277,893	590,257	gal/yr
Acrylic Latex	2,268,120	2,427,860	2,347,990	gal/yr
Throughput Summary =	3,170,740	2,705,753	2,938,247	gal/yr

Assumption:

- The afterburner provides 95% destruction efficiency¹

Note

1. Although the facility had a source test shown a destruction efficiency of 98.7%, because of the fact of the afterburner is only required to be operated at 1,400 °F or above, for the purpose of NSR database and the offset requirement, 95% destruction efficiency will be used. It is communicated to the consultant that higher destruction efficiency will allowed only if the afterburner operation temperature is raised.

VOC emissions:

$$R1 = (590,257 \text{ gallons Acetate Latex / yr}) (0.0456 \text{ lb/gallon acetate latex product}) + (2,347,990 \text{ gallons Acrylic Latex / yr}) (0.00709 \text{ lb/gallon acrylic latex product})$$

$$= 43,563 \text{ lb/yr, or } 3,630 \text{ lb/month, or } 121 \text{ lb/day}$$

$$R2 = (43,563 \text{ lb/yr}) (1 - 95\%) = 2,178 \text{ lb/yr, or } 181.51 \text{ lb/month, or } 6.05 \text{ lb/day for 30-day ave.}$$

PM10 emissions:



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

Data:
0.025 lb powder/gallon

$$R1=R2 = (590,257 \text{ gallons Acetate Latex / yr} + 2,347,990 \text{ gallons Acrylic Latex / yr}) (0.025 \text{ lb powder/gallon}) (1 \text{ lb PM}/1000 \text{ lb, default}) (0.50 \text{ lb PM}_{10} / \text{lb PM, default})$$

$$= 36.73 \text{ lb/yr, or } 3.06 \text{ lb/month, or } 0.10 \text{ lb/day}$$

TAC emissions:

For production of acetate latex:

Vinyl Acetate: R1 = 0.0450 lb/gallon acetate latex product

For production of acrylic latex:

Acrylic Acid: R1 = 0.0000221 lb/gallon acrylic latex product

Glycol Ether: R1 = 0.0000000198 lb/gallon acrylic latex product

Methanol: R1 = 0.00000383 lb/gallon acrylic latex product

Methyl Methacrylate: R1 = 0.00506 lb/gallon acrylic latex product

Styrene: R1 = 0.000862 lb/gallon acrylic latex product

1,4 Dioxane: R1=R2 = 1.50×10^{-10} lb/gallon acrylic latex product (product filling, no control)

EMISSION SUMMARY:

A/N 555039		Hourly (lbs/hr)	Daily (lbs/day)	Annually (lbs/yr)	30 day ave. (lbs/day)	30day NSR (lbs/day)
VOC	R1	5.045	121.08	43,589.9	121.08	121
	R2	0.252	6.05	2,179.5	6.05	6
PM10	R1=R2	0.004	0.10	36.7	0.10	0
Acrylic Acid	R1	6.01E-03	1.44E-01	51.9	0.14	0
	R2	3.01E-04	7.21E-03	2.6	0.01	0
Methanol	R1	1.04E-03	2.50E-02	9.0	0.02	0
	R2	5.20E-05	1.25E-03	0.4	0.00	0
MMA	R1	1.38E+00	3.30E+01	11,884.7	33.01	33
	R2	6.88E-02	1.65E+00	594.2	1.65	2
1,4 - Dioxane	R1=R2	4.07E-08	9.76E-07	0.0	0.00	0
Styrene	R1	2.34E-01	5.62E+00	2,022.8	5.62	6
	R2	1.17E-02	2.81E-01	101.1	0.28	0
Vinyl Acetate	R1	3.08E+00	7.38E+01	26,571.2	73.81	74
	R2	1.54E-01	3.69E+00	1,328.6	3.69	4

HEALTH RISK ASSESSMENT- TIER I ANALYSIS:



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

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

Appl. Nos. 555041 – Thermal Oxidizer / Waste Heat Boiler

Data

Operation (Maximum): 24 hrs/day, 7 days/wk, 52 wks/yr
 Process Air Blower: 10 H.P. and 3,000 scfm, Forced Draft
 Burner Rating: 9.8 MMBtu/hr
 Fuel Type: Natural gas only
 Combustion Air Blower: 10 H.P. and 2,080 scfm
 Retention time at normal operating temperature: 1 sec at 1,450 °F

VOC Control Efficiency

Since the proposed modification is to replace the existing burner with a Rule 1147 compliant burner, no change will be made to physical design of the afterburner such as retention time, operating temperature, flame contact, and velocity, etc.; thus, the afterburner control efficiency will not be changed due to the burner replacement.

Combustion Emissions from the Thermal Oxidizer Burner

Pre-Modification

Burner Rating: 7.26 MMBtu/hr

Emission Factors

$$\text{Emission}_{\text{ROG,SOX,PM10}} \text{ (lb/MMBtu)} = EF_{\text{ROG,SOX,PM10}} \left(\frac{\text{lb}}{\text{MMscf}} \right) \times \frac{1\text{MMscf}}{1050\text{MMBtu}}$$

$$\text{Emission}_{\text{NOX, CO}} \text{ (lb/MMBtu)} = \frac{(MW)(N_{@3\%O_2})(ppm)}{H}$$

Where: H= Heating value of fuel (Btu/lb) (for natural gas= 23,440 btu/lb)
 N_{@3%O₂}= 0.618 mole of dry gas per lb of natural gas.
 MW= Molecular weight (lb/lb-mole)



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

Emission Factor Summary - Natural Gas

Pollutant	Emission Factor (from manufacturer) ppmV @ 3% O ₂	Emission Factor (AQMD Default) lb/mmscf	Emission Factor (for this report) lb/MMBtu
VOC	-	7	0.00667
SO _x	-	0.6	0.000571
PM10	-	7.5	0.00714
NO _x	-	130	0.12381
CO	-	35	0.03333

AQMD Default emission factors for a natural gas fired boiler were taken from “General Instruction Book for the AQMD 2006-2007 Annual Emission Reporting Program”, Appendix A- Table 1):

Combustion Emissions

The calculated afterburner combustion emission results are indicated below:

A/N 555041		Hourly (lb/hr)	Daily (lb/day)	Annually (lb/yr)	30 day ave. (lb/day)
R1=R2	VOC	0.0484	1.16	422.82	1.16
R1=R2	SO _x	0.0041	0.10	36.24	0.10
R1=R2	PM10	0.0519	1.24	453.02	1.24
R1=R2	NO _x	0.8989	21.57	7852.42	21.57
R1=R2	CO	0.2420	5.81	2114.11	5.81

Hourly (lbs/hr) = (Emission Factor, lb/MMBtu) (7.26 MMBtu/hr)

Daily (lbs/day) = (Hourly, lb/hr) (24 hr/day)

Annually (lbs/yr) = (daily lb/day) (7 day/wk) (52 wk/yr)

Post-Modification

Data

Operation (Maximum): 24 hrs/day, 7 days/wk, 52 wks/yr
 Process Air Blower: 75.00 H.P. and 10,000 scfm, Forced Draft
 Burner Rating: 2.4 MMBtu/hr
 Fuel Type: Natural gas only
 Retention time at normal operating temperature: 0.5 sec at 1,400 °F

Emission Factors



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

Emission Factor Summary - Natural Gas

Pollutant	Emission Factor (from manufacturer) ppmV @ 3% O ₂	Emission Factor (AQMD Default) lb/mmscf	Emission Factor (for this report) lb/MMBtu
VOC	-	7.00	0.00667
SO _x	-	0.60	0.000571
PM10	-	7.50	0.00714
NO _x	60	-	0.0728
CO	-	35.00	0.03333

AQMD Default emission factors for a natural gas fired boiler were taken from “General Instruction Book for the AQMD 2006-2007 Annual Emission Reporting Program”, Appendix A- Table 1):

Combustion Emissions

The calculated afterburner combustion emission results are indicated below:

A/N 555041		Hourly (lb/hr)	Daily (lb/day)	Annually (lb/yr)	30 day ave. (lb/day)	30 day NSR (lb/day)
R1=R2	VOC	0.0653	1.57	570.75	1.57	2
R1=R2	SO _x	0.0056	0.13	48.92	0.13	0
R1=R2	PM10	0.0700	1.68	611.52	1.68	2
R1=R2	NOX	0.7131	17.12	6229.87	17.12	17
R1=R2	CO	0.3267	7.84	2853.76	7.84	8

Hourly (lbs/hr) = (Emission Factor, lb/MMBtu) (9.8 MMBtu/hr)

Daily (lbs/day) = (Hourly, lb/hr) (24 hr/day)

Annually (lbs/yr) = (daily lb/day) (7 day/wk) (52 wk/yr)

The calculated emission change is calculated and the results are indicated below:

A/N 555041		Daily (lb/day)	30 day ave. (lb/day)	Emission Change
R1=R2	VOC	0.41	0.41	Increase
R1=R2	SO _x	0.03	0.03	Increase
R1=R2	PM10	0.44	0.44	Increase
R1=R2	NOX	-4.46	-4.46	Decrease
R1=R2	CO	2.03	2.03	Increase



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

GHG Emissions

Parameter	Value	Unit	Source
Operation Schedule	24	hrs/day	Default
	7	day/wk	Default
Rating	9.8	MMBtu/hr	Manufacturer
CO ₂ EF	116.888	lb/MMBtu	District
CH ₄ EF	0.001984	lb/MMBtu	District
N ₂ O EF	0.000220	lb/MMBtu	District

		Hourly (lb/hr)	Daily (lb/day)	Annually (lb/yr)	30 day ave. (lb/day)	30 day NSR (lb/day)
R1=R2	CO2	1,145.50	27,492.03	10,007,099.7	27,797.499	27,797
R1=R2	CH4	0.019	0.14	49.5	0.138	0
R1=R2	N2O	0.002	0.02	7.7	0.021	0

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	-4.46	40	No
ROG	+0.41	30	No
CO	+2.03	220	No
PM10	+0.44	30	No
SOx	+0.03	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

(b)(1) requires the total VOC emissions from the organic resin reactor, thinning tank and blending tank vents, to be reduced (A) to 0.5 pound per 1000 pounds of completed resin produced, or (B) by 95 percent or more.

The reactor and mixing tanks are controlled by the direct flame afterburner, which has 95% control efficiency or better. Compliance with this rule is expected.



ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

APPL. NO. 555039, -41 & -44	DATE: April 25, 2014
PROCESSED BY S. JIANG	CHECKED BY D. GORDON

Rule 1147: NOx Reductions from Miscellaneous Sources

(c)(1) – The afterburner is subject to NOx emission limit of 60 ppm or 0.073 lb/mmBtu. The facility shall submit a modification application before December 1st, 2013 and shall be in compliance by July 1st, 2014. Application No. 555041 is to replace the burner with a low NOx burner and it was submitted on August 06, 2013; compliance with this rule is expected. In addition, a source test will be performed to show the new burner is able to meet with the NOx emission limit 60 ppm or less.

(c)(7) – On or after January 1, 2010, the operator shall perform combustion system maintenance in accordance with the manufacturer’s schedule and specifications as identified in the manual and other written materials supplied by the manufacturer or distributor. Condition No. 7 is added to ensure the compliance with this rule.

Rule 1303: BACT

The VOC emissions from the mixing tanks and the reactor are being controlled by the direct flame afterburner. BACT is achieved.

Rule 1303(b)(1): Modeling

Only VOC emissions are identified from the mixing tanks and the reactor; thus, no further screening analysis is required.

The afterburner is exempt from this requirement per Rule 1304(a)(5).

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 555039	+0	0	0	0	0
A/N 555041	+0.41	+0.44	-4.46	2.03	+0.03
Total PTE	17.97	14.44	98.54	15.03	0
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. 555039 is to replace the 2,300-gal monomer pre-mix tank with a 5,000 gallon tank. The throughput will not change and the emissions will be the same. Application no. 555041 is to replace the afterburner with a Rule 1147 Complaint burner. Therefore, application no. 555044 is considered “Minor 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. 555044).



SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING AND COMPLIANCE

APPLICATION PROCESSING AND CALCULATIONS

PAGE 19 of 19

APPL. NO.	DATE:
555039, -41 & -44	April 25, 2014
PROCESSED BY	CHECKED BY
S. JIANG	D. GORDON

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 for A/N: 555039, and the Permit to Construct is recommended to be issued for A/N: 555041.