Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

JAN 2 9 2019

Mr. Clint Decker
Executive Business Unit Director
Betterway Products
70891 County Road 23
New Paris, IN 46553

RE: New Source Review Permit – Project Number: 2018-09-005

Dear Mr. Decker:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions, your new source review permit application and with your operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

This permit may include requirements with which you may not be familiar. If you would like the department to meet with you to discuss how to understand and satisfy the requirements contained in this permit, an appointment referred to as a Compliance Assistance Visit (CAV) can be set up with you. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at the following website: http://dnr.mo.gov/regions/. The online CAV request can be found at http://dnr.mo.gov/cav/compliance.htm.

If you were adversely affected by this permit decision, you may be entitled to pursue an appeal before the administrative hearing commission pursuant to Sections 621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission, whose contact information is: Administrative Hearing Commission, United States Post Office Building, 131 West High Street, Third Floor, P.O. Box 1557, Jefferson City, Missouri 65102, phone: 573-751-2422, fax: 573-751-5018, website: www.oa.mo.gov/ahc.

If you have any questions regarding this permit, please do not hesitate to contact Ryan Schott, at the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or at (573) 751-4817. Thank you for your attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Susan Heckenkamp
New Source Review Unit Chief

SH:rsj

Enclosures

c: Southwest Regional Office
PAMS File: 2018-09-005

Permit Number: 012019-008

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 012019-008

Project Number: 2018-09-005
Installation Number: 105-0052

Parent Company: Patrick Industries

Parent Company Address: 1107 West Franklin Street, Elkhart, IN 46515

Installation Name: Betterway Products

Installation Address: 20064 Hemlock Road, Lebanon, MO 65536

Location Information: Laclede County (S26, T35N, R16W)

Application for Authority to Construct was made for:
The installation and operation of an electrical shroud (dashboard) manufacturing facility. This review was conducted in accordance with Section (6), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

☐ Standard Conditions (on reverse) are applicable to this permit.

☑ Standard Conditions (on reverse) and Special Conditions are applicable to this permit.

Director or Designee
Department of Natural Resources

JAN 29 2019
Effective Date

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Enforcement and Compliance Section of the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Enforcement and Compliance Section of the Department's Air Pollution Control Program of the anticipated date of startup of this (these) air contaminant source(s). The information must be made available within 30 days of actual startup. Also, you must notify the Department's regional office responsible for the area within which you are located within 15 days after the actual startup of this (these) air contaminant source(s).

A copy of the permit application and this permit and permit review shall be kept at the installation address and shall be made available to Department's personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit using the contact information below.

Contact Information:
Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102-0176
(573) 751-4817

The regional office information can be found at the following website:
http://dnr.mo.gov/regions/

SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted to the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

Betterway Products
Laclede County (S26, T35N, R16W)

1. HAP Emission Limitation
   A. Betterway Products shall emit less than 10.0 tons of individual HAPs and less than 25.0 tons of combined HAPs in any consecutive 12-month period from the entire installation, which includes the following HAP emission points:
      1) Gelcoat Application EP-01
      2) Resin Application EP-02 & EP-03
      3) Mold Preparation EP-04
      4) Assembly EP-06

   B. Betterway Products shall develop and use forms to demonstrate compliance with Special Condition 1.A. These forms shall contain, at a minimum, the following information:
      1) Installation name & ID number
      2) Permit number
      3) Current month & 12-month date range
      4) All HAP emission points
      5) Monthly throughput of each HAP-containing compound applied at each emission point
      6) Emission factors for each HAP-containing compound
         a) Styrene and methyl methacrylate emission factors (lb/gal) from EP-01, EP-02 & EP-03 shall be calculated using the methods provided in the document: *Unified Emission Factors for Open Molding of Composites* (July 2001), provided in Appendix B.
         b) All other individual HAP emission factors (lb/gal) from EP-01, EP-02 & EP-03, as well as all individual HAP emission factors from EP-04 & EP-06 shall be calculated by multiplying the density of the compound by its respective HAP percentage. These values shall be taken from the SDS. If a range is given, the largest value shall be used.
      7) Monthly individual and combined HAP emissions for each emission point
      8) Monthly startup, shutdown, and malfunction emissions, as reported to the Air Pollution Control Program's Compliance/Enforcement section according to the requirements of 10 CSR 10-6.050

SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special conditions:

9) Total monthly individual and combined HAP emissions (tons)
10) 12-month rolling total for individual and combined HAP emissions (tons)
11) Indication of compliance with Special Condition 1.A.

2. Operational Requirement – Gelcoat/Resin Containers

Betterway Products shall keep all gelcoat/resin compounds in sealed containers when not in use. Betterway Products shall provide and maintain suitable, easily read, permanent markings on these containers.

3. Record Keeping and Reporting Requirements

A. Betterway Products shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request. These records shall include SDS for all materials used.

B. Betterway Products shall report to the Air Pollution Control Program's Compliance/Enforcement Section, by mail at P.O. Box 176, Jefferson City, MO 65102 or by email at AirComplianceReporting@dnr.mo.gov, no later than 10 days after the end of the month during which any record required by this permit shows an exceedance of a limitation imposed by this permit.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (6) REVIEW
Project Number: 2018-09-005
Installation ID Number: 105-0052
Permit Number: 012019-008

Installation Address:
Betterway Products
20064 Hemlock Road
Lebanon, MO 65536
Laclede County (S26, T35N, R16W)

Parent Company:
Patrick Industries
1107 West Franklin Street
Elkhart, IN 46515

REVIEW SUMMARY

- Betterway Products has applied for authority to install and operate an electrical shroud (dashboard) manufacturing facility.

- The application was deemed complete on September 27, 2018.

- HAP emissions are expected from the proposed equipment. HAPs of concern from this process include cobalt compounds, ethyl benzene, methyl methacrylate, naphthalene, styrene, toluene, and xylene.

- None of the New Source Performance Standards (NSPS) apply to the installation.

- None of the currently promulgated MACT regulations apply to the proposed equipment:
    - 40 CFR 63, Subpart VVVV – *National Emission Standard for Hazardous Air Pollutants for Boat Manufacturing* does not apply because the installation is not a major source for HAPs.
    - 40 CFR 63, Subpart WWWW – *National Emission Standard for Hazardous Air Pollutants: Reinforced Plastic Composites Production* does not apply because the installation is not a major source for HAPs.
    - 40 CFR 63, Subpart HHHHHH – *National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources* does not apply because the coatings used at the installation do not contain any of the target HAPs.

- Panel filters are being used to control particulate emissions from the equipment in this permit, though they are not specifically required.

- This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required.* Potential VOC emissions are above the de minimis level but below the major source level. Potential HAP emissions are conditioned below de minimis levels, and potential emissions of all other pollutants are below de minimis levels.

- This installation is located in Laclede County, an attainment area for all criteria pollutants.

- This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation's major source level is 250 tons per year and fugitive emissions are not counted toward major source applicability.

- Ambient air quality modeling was performed to determine the impact of styrene. Although potential VOC emissions are above the de minimis level, no model is currently available which can accurately predict ambient ozone concentrations caused by VOC emissions.

- Emissions testing is not required for the equipment as a part of this permit. Testing may be required as part of other state, federal, or applicable rules.

- No Operating Permit is required for this installation.

- Approval of this permit is recommended with special conditions.

INSTALLATION/PROJECT DESCRIPTION

Marine Electrical Products operates a facility in Lebanon, Missouri that manufactures electrical shrouds (dashboards) for the marine industry. Operations include molding, gel coating, resin application, and assembly of the fiberglass and plastic shrouds. Marine Electrical Products originally began operating at a facility located at 22468 Pleasant Drive (Facility ID: 105-0037); however, that facility was destroyed by a fire on March 5, 2005. The facility was rebuilt at 1401 Tower Road (Facility ID: 105-0050) and resumed operation. In early 2013, Marine Electrical Products outgrew their facility. To expand operations, a second property was leased, located at 20064 Hemlock Road (originally permitted as 27490 Highway 5), and the two sites were considered to be the same installation, according to 10 CSR 10-6.020(2)(I)17. A gelcoat spray booth and resin spray booth were installed at the new 20064 Hemlock Road site, under Construction Permit No. 042013-007, but the booths were collectively permitted with the equipment at the 1401 Tower Road site.

In mid-2018, Betterway Products purchased the 20064 Hemlock Road site from Marine Electrical Products. This location is now independently owned and operated under Facility ID: 105-0052. This construction permit serves to establish Betterway Products' independent operating status and permit all equipment at the installation separately from Marine Electrical Products.

EMISSIONS/CONTROLS EVALUATION

Styrene emission factors from gelcoat application (EP-01) and resin application (EP-02 & EP-03) were calculated using the methods provided in the document: *Unified Emission Factors for Open Molding of Composites* (July 2001). Methyl methacrylate emission factors from EP-01 were also calculated using methods from the same document. Both the gelcoat and resin are applied using mechanical non-atomized high efficiency spray equipment.

All other HAP emission factors from EP-01, EP-02 & EP-03, as well as all HAP emission factors from mold preparation (EP-04) and assembly (EP-06) were calculated using mass balances. The density of each applied compound was multiplied by the constituent HAP percentage. VOC emissions from all emission points were similarly calculated; the density of each applied compound was multiplied by its volatile content. Constituent values were taken from the compound SDS. It was assumed that 100% of applied VOCs and HAPs are emitted. The maximum design rates associated with the emission factors calculated above are provided in Table 1.

Table 1: Process Emission Factors

Emission Point	Compound Applied	Maximum Design Rate (gal/hr)
EP-01	Gelcoat	3.50
	Curing Agent	0.23
	Additive	0.13
EP-02 & EP-03	Resin	15.50
	Resin Cleaner	0.25
EP-04	Mold Release	0.10
EP-06	Adhesive	0.25

No particulate emissions are generated during the application of gelcoat and resin because the mechanical, non-atomized spray equipment uses fluid impinged technology to transfer large droplets of coating onto the part surfaces. According to the Composite Fabricators Association document: *Draft Guide to the Estimation and Permitting of Particulate Emissions from the Manufacture of Reinforced Plastic Composites* (August 2001), any droplets small enough to become suspended or entrained by ventilation airflows virtually never form in non-atomized gelcoat/resin application processes. Therefore, potential PM, PM_{10}, and $PM_{2.5}$ emissions from EP-01, EP-02 & EP-03 were considered negligible.

Particulate emissions from grinding (EP-05) were calculated using emission factors taken from WebFIRE, under SCC 3-07-016-60. Because only controlled emission factors were listed, the uncontrolled emission factors were back-calculated. It was conservatively assumed that the fabric filters had a control efficiency of 99%, yielding uncontrolled emission factors of 110 lb/1,000 ft^3 for PM and 5.2 lb/1,000 ft^3 for PM_{10}. It was assumed that all emitted PM_{10} is $PM_{2.5}$. The maximum design rate for EP-05 was estimated to be 6.7 ft^3/hr.

Particulate emissions from the haul roads (EP-07 & EP-08) were calculated using the methods found in AP-42 Section 13.2.2 *Unpaved Roads* (November 2006).

Table 2 provides an emissions summary for this project. Existing potential emissions for Betterway Products (Facility ID: 105-0052) are unknown because the installation has not been permitted separately from Marine Electrical Products (Facility ID: 105-0050). Existing actual emissions are unknown because Betterway Products has not previously submitted a separate EIQ from Marine Electrical Products. Potential emissions of the project represent the potential of all equipment at Betterway Products, assuming continuous operation (8,760 hours per year). New installation conditioned potential emissions account for voluntary HAP de minims limits.

Table 2: Emissions Summary (tons per year)

Pollutant	Regulatory *De Minimis* Levels/SMAL	Existing Potential Emissions	Existing Actual Emissions (2017 EIQ)	Potential Emissions of the Project	New Installation Conditioned Potential
PM	25.0	N/D	N/D	3.32	3.32
PM_{10}	15.0	N/D	N/D	0.18	0.18
$PM_{2.5}$	10.0	N/D	N/D	0.15	0.15
SO_x	40.0	N/D	N/D	N/A	N/A
NO_x	40.0	N/D	N/D	N/A	N/A
VOC	40.0	N/D	N/D	40.60	40.60
CO	100.0	N/D	N/D	N/A	N/A
Cobalt Compounds	10.0/0.1	N/D	N/D	0.02*	0.02
Ethyl Benzene	10.0/10	N/D	N/D	0.08	0.08
Methyl Methacrylate	10.0/10	N/D	N/D	10.38	<10.0
Naphthalene	10.0/10	N/D	N/D	0.03	0.03
Styrene	10.0/1	N/D	N/D	26.34	<10.0
Toluene	10.0/10	N/D	N/D	1.53	1.53
Xylene	10.0/10	N/D	N/D	1.53	1.53
Total HAPs	25.0	N/D	N/D	39.90	<25.0

N/A = Not Applicable; N/D = Not Determined; SMAL = Screening Model Action Level

*The total mass of cobalt compounds comparable to the major source threshold is 0.02 tons per year, but the mass of the metal portion comparable to the SMAL is 0.003 tons per year

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential VOC emissions are above the de minimis level but below the major source level. Potential HAP emissions are conditioned below de minimis levels, and potential emissions of all other pollutants are below de minimis levels.

APPLICABLE REQUIREMENTS

Betterway Products shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved.

GENERAL REQUIREMENTS

- *Start-Up, Shutdown, and Malfunction Conditions,* 10 CSR 10-6.050
- *Submission of Emission Data, Emission Fees and Process Information,* 10 CSR 10-6.110
  - Per 10 CSR 10-6.110(4)(B)2.B(II) and (4)(B)2.C(II) a full EIQ is required for the first full calendar year the equipment (or modifications) approved by this permit are in operation.
- *Restriction of Emission of Odors*, 10 CSR 10-6.165
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220

AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality modeling was performed to determine the impact of styrene because the potential to emit styrene from the equipment in the project is greater than the Screening Model Action Level (SMAL) of 1 ton per year. Modeling was conducted for EP-01, EP-02 & EP-06 using the AERSCREEN screen modeling software. Results from modeling show that the Risk Assessment Levels (RALs) for styrene will not be exceeded. A summary of the modeling results is provided in Table 3.

Table 3: Modeling Summary

Pollutant	Modeled Impact ($\mu g/m^3$)	RALs ($\mu g/m^3$)	Time Period
Styrene	862	2,240	24-hour
	144	333	Annual

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (6), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, it is recommended that this permit be granted with special conditions.

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated August 29, 2018, received September 5, 2018, designating Patrick Industries as the owner and operator of the installation.

APPENDIX A

Abbreviations and Acronyms

% ..... percent
°F ..... degrees Fahrenheit
acfm ..... actual cubic feet per minute
BACT ..... Best Available Control Technology
BMPs ..... Best Management Practices
Btu ..... British thermal unit
CAM ..... Compliance Assurance Monitoring
CAS ..... Chemical Abstracts Service
CEMS ..... Continuous Emission Monitor System
CFR ..... Code of Federal Regulations
CO ..... carbon monoxide
CO_2 ..... carbon dioxide
CO_2e ..... carbon dioxide equivalent
COMS ..... Continuous Opacity Monitoring System
CSR ..... Code of State Regulations
dscf ..... dry standard cubic feet
EIQ ..... Emission Inventory Questionnaire
EP ..... Emission Point
EPA ..... Environmental Protection Agency
EU ..... Emission Unit
fps ..... feet per second
ft ..... feet
GACT ..... Generally Available Control Technology
GHG ..... Greenhouse Gas
gpm ..... gallons per minute
gr ..... grains
GWP ..... Global Warming Potential
HAP ..... Hazardous Air Pollutant
hr ..... hour
hp ..... horsepower
lb ..... pound
lbs/hr ..... pounds per hour
MACT ..... Maximum Achievable Control Technology
$\mu g/m^3$ ..... micrograms per cubic meter
m/s ..... meters per second
Mgal ..... 1,000 gallons
MW ..... megawatt
MHDR ..... maximum hourly design rate
MMBtu ..... Million British thermal units
MMCF ..... million cubic feet
MSDS ..... Material Safety Data Sheet
NAAQS ..... National Ambient Air Quality Standards
NESHAPs National Emissions Standards for Hazardous Air Pollutants
NO_x ..... nitrogen oxides
NSPS ..... New Source Performance Standards
NSR ..... New Source Review
PM ..... particulate matter
$PM_{2.5}$ ..... particulate matter less than 2.5 microns in aerodynamic diameter
PM_{10} ..... particulate matter less than 10 microns in aerodynamic diameter
ppm ..... parts per million
PSD ..... Prevention of Significant Deterioration
PTE ..... potential to emit
RACT ..... Reasonable Available Control Technology
RAL ..... Risk Assessment Level
SCC ..... Source Classification Code
scfm ..... standard cubic feet per minute
SDS ..... Safety Data Sheet
SIC ..... Standard Industrial Classification
SIP ..... State Implementation Plan
SMAL ..... Screening Model Action Levels
SO_x ..... sulfur oxides
SO_2 ..... sulfur dioxide
SSM ..... Startup, Shutdown & Malfunction
tph ..... tons per hour
tpy ..... tons per year
VMT ..... vehicle miles traveled
VOC ..... Volatile Organic Compound

Appendix B

Unified Emission Factors for Open Molding of Composites

July 23, 2001

Emission Rate in Pounds of Styrene Emitted per Ton of Resin or Gelcoat Processed

Styrene content in resin/gelcoat, % [1]	<33 [2]	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	>50 [2]
Manual	0.126 x %styrene x 2000	83	89	94	100	106	112	117	123	129	134	140	146	152	157	163	169	174	180	((0.286 x %styrene) - 0.0529) x 2000
Manual w/ Vapor Suppressed Resin VSR [3]	Manual emission factor [listed above] x (1 - (0.50 x specific VSR reduction factor for each resin/suppressant formulation))																			
Mechanical Atomized	0.169 x %styrene x 2000	111	126	140	154	168	183	197	211	225	240	254	268	283	297	311	325	340	354	((0.714 x %styrene) - 0.18) x 2000
Mechanical Atomized with VSR [3]	Mechanical Atomized emission factor [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))																			
Mechanical Atomized Controlled Spray [4]	0.130 x %styrene x 2000	86	97	108	119	130	141	152	163	174	185	196	207	218	229	240	251	262	273	0.77 x ((0.714 x %styrene) - 0.18) x 2000
Mechanical Controlled Spray with VSR	Mechanical Atomized Controlled Spray emission factor [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))																			
Mechanical Non-Atomized	0.107 x %styrene x 2000	71	74	77	80	83	86	89	93	96	99	102	105	108	111	115	118	121	124	((0.157 x %styrene) - 0.0165) x 2000
Mechanical Non-Atomized with VSR [3]	Mechanical Non-Atomized emission factor [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))																			
Filament application	0.184 x %styrene x 2000	122	127	133	138	144	149	155	160	166	171	177	182	188	193	199	204	210	215	((0.2746 x %styrene) - 0.0298) x 2000
Filament application with VSR [3]	0.120 x %styrene x 2000	79	83	86	90	93	97	100	104	108	111	115	118	122	125	129	133	136	140	0.65 x ((0.2746 x %styrene) - 0.0298) x 2000
Gelcoat Application	0.445 x %styrene x 2000	294	315	336	356	377	398	418	439	460	481	501	522	543	564	584	605	626	646	((1.03646 x %styrene) - 0.195) x 2000
Gelcoat Controlled Spray Application [4]	0.325 x %styrene x 2000	215	230	245	260	275	290	305	321	336	351	366	381	396	411	427	442	457	472	0.73 x ((1.03646 x %styrene) - 0.195) x 2000
Gelcoat Non-Atomized Application [9]	SEE Note 9 below	196	205	214	223	232	241	250	259	268	278	287	296	305	314	323	332	341	350	((0.4506 x %styrene) - 0.0505) x 2000
Covered-Cure after Roll-Out	Non-VSR process emission factor [listed above] x (0.80 for Manual <or> 0.85 for Mechanical)																			
Covered-Cure without Roll-Out	Non-VSR process emission factor [listed above] x (0.50 for Manual <or> 0.55 for Mechanical)																			

Emission Rate in Pounds of Methyl Methacrylate Emitted per Ton of Gelcoat Processed

MMA content in gelcoat, % [6]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	≥20
Gel coat application [7]	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	0.75 x %MMA x 2000

Notes

1 Including styrene monomer content as supplied, plus any extra styrene monomer added by the molder, but before addition of other additives such as powders, fillers, glass,...etc.

2 Formulas for materials with styrene content < 33% are based on the emission rate at 33% (constant emission factor expressed as percent of available styrene), and for styrene content > 50% on the emission rate based on the extrapolated factor equations; these are not based on test data but are believed to be conservative estimates. The value for "% styrene" in the formulas should be input as a fraction. For example, use the input value 0.30 for a resin with 30% styrene content by wt.

3 The VSR reduction factor is determined by testing each resin/suppressant formulation according to the procedures detailed in the ***CFA Vapor Suppressant Effectiveness Test.***

4 SEE the ***CFA Controlled Spray Handbook*** for a detailed description of the controlled spray procedures.

5 The effect of vapor suppressants on emissions from filament winding operations is based on the ***Dow Filament Winding Emissions Study.***

6 Including MMA monomer content as supplied, plus any extra MMA monomer added by the molder, but before addition of other additives such as powders, fillers, glass,...etc.

7 Based on gelcoat data from ***NMMA Emission Study.***

8 SEE the July 17, 2001 EECS report ***Emission Factors for Non-Atomized Application of Gel Coats used in the Open Molding of Composites*** for a detailed description of the non-atomized gelcoat testing.

9 Use the equation **((0.4506 x % styrene) - 0.0505) x 2000** for gelcoats with styrene contents between 19% and 32% by wt.; use the equation **0.185 x % styrene x 2000** for gelcoats with less than 19% styrene content by wt.