STATE OF 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: 06-2015-016  Project Number: 2014-05-035
Installation Number: 510-2752

Parent Company: Shelter Works
Parent Company Address: 2616 South Third Street, St. Louis, MO 63118

Installation Name: Shelter Works
Installation Address: 2616 South Third Street, St. Louis, MO 63118
Location Information: City of St. Louis

Application for Authority to Construct was made for:

Increase in production rate over previously permitted levels. 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.

JUN 29 2015

DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES
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 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 Department’s Air Pollution Control Program of the anticipated date of start up of these air contaminant sources. The information must be made available within 30 days of actual startup. Also, you must notify the Department of Natural Resources’ regional office responsible for the area within which you are located within 15 days after the actual start up of these air contaminant sources.

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources’ 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 sources(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 at (573) 751-4817. If you prefer to write, please address your correspondence to the Missouri Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention: Construction Permit Unit.
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 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.”

Shelter Works
City of St. Louis

1. Superseding Condition
The conditions of this permit supersede all of the special conditions found in the previously issued construction permits 01-01-053 and 01-01-053PM issued by the City of St. Louis, Department of Health.

2. HAPs and VOC Emission Limitations
A. Shelter Works shall emit less than 10.0 tons of methyl methacrylate (MMA) in any consecutive 12-month period from the fiberglass spray system (EP01).

B. Shelter Works shall emit less than 100.0 tons of VOCs in any consecutive 12-month period from the entire installation, which includes the fiberglass spray system (EP01A, EP01B, and EP01C) and the natural-gas fired heaters (EP03 and EP04).

C. Shelter Works shall emit styrene emissions no more than the following:
   1) 117.1 lb/day from the interior gelcoat application (EP01A)
   2) 239.7 lb/day from the exterior gelcoat application (EP01B)
   3) 308.3 lb/day from the resin application (EP01C)

D. Attachment A, B, and C, or equivalent forms, such as electronic forms, approved by the Air Pollution Control Program shall be used to demonstrate compliance with Special Conditions 2.A., 2.B. and 2.C.

3. Operational Requirements
A. The exhaust fans shall be on at all times when the fiberglass spray system (EP01A, EP01B, and EP01C) is in operation.

B. Shelter Works shall keep all chemicals (e.g. solvents, coatings, gelcoats, resins, etc.) in sealed containers whenever the materials are not in use. Shelter Works shall provide and maintain suitable, easily read, permanent
SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special
conditions:

markings on all solvent and coatings containers use at the installation.

C. All doors and windows at the building shall remain closed during normal
operations except for personnel and equipment entry and exit (i.e. there
should no propping open of the door and windows, etc.)

4. Use of Alternative Gelcoats, Resins, and Catalysts
A. When considering the use of alternative gelcoats, resins, and catalysts at
the installation that is different than a material listed in the Application for
Authority to Construct, Shelter Works shall calculate the potential
emissions of all individual HAP in the alternative material, except for
styrene and MMA, on an annual basis. For styrene, the potential
emissions shall be calculated on a 24-hour basis. For MMA, no
calculation is needed.

B. Shelter Works shall seek approval from the Air Pollution Control Program
before the use of the alternative material if the following occurs.
1) The styrene emissions, on a 24-hour basis, exceed the values in
Special Condition 2.C.
2) Individual HAP emissions, except for styrene and MMA, are equal
to or greater than their respective SMAL. A list of current SMAL
can be found in Appendix C.

C. Attachment D and E or equivalent forms, such as electronic forms,
approved by the Air Pollution Control Program shall be used to maintain
compliance with Special Condition 4.A.

D. Once Shelter Works begin using the alternative gelcoats, resins, and
catalysts, it shall include the MMA and VOC emissions from the alternative
material in the emissions limit and tracking in Special Condition 2.

5. Record Keeping and Reporting Requirements
A. Shelter Works 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. Shelter Works shall report to the Air Pollution Control Program’s
Compliance/Enforcement Section, P.O. Box 176, Jefferson City, MO
65102, no later than 10 days after the end of the month during which any
SPECIAL CONDITIONS:
The permittee is authorized to construct and operate subject to the following special conditions:

record required by this permit show an exceedance of a limitation imposed by this permit.
REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (6) REVIEW
Project Number: 2014-05-035
Installation ID Number: 510-2752
Permit Number:

Shelter Works
2616 South Third Street
St. Louis, MO 63118

Parent Company:
Shelter Works
2616 South Third Street
St. Louis, MO 63118

City of St. Louis

REVIEW SUMMARY

- Shelter Works has applied for authority to increase production by eliminating a 10.0 tpy styrene emissions limit.

- HAP emissions are expected from the equipment. HAPs of concern from this process are styrene, MMA, and dimethyl phthalate (DMP).

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

- None of the NESHAPs apply to this installation.

- Subpart WWWW, National Emission Standard for Hazardous Air Pollutants: Reinforced Plastic Composites Production, of the MACT applies to the installation. Subpart MMMM, National Emission Standards for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts and Products, and Subpart PPPP, National Emission Standard for Hazardous Air Pollutants for Surface Coating of Plastic Parts and Products, of the MACT do not apply to the installation because fiberglass spraying is not considered a surface coating operation.

- A dust collector is being used to control particulate emissions from the trimming equipment. However, there is no special condition in this permit requiring its use.

- This review was conducted in accordance with Section (6) of Missouri State Rule 10 CSR 10-6.060, Construction Permits Required. Potential emissions of styrene, which is a HAP, are above major levels. However, a MACT applies to the installation and a Section (9) permit is not required.

- This installation is located in the City of St. Louis, a nonattainment area for ozone, 1997 PM$_{2.5}$, and 2010 SO$_2$ standards.
This installation is not on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. Due to its nonattainment area status, the major source level for PM$_{2.5}$, SO$_X$, NO$_X$, and VOC is 100 tpy and the major source levels for all other criteria pollutants are 250 tpy.

Ambient air quality modeling was performed to determine the ambient impact of Styrene. Ambient air quality modeling was not performed for VOC because no model is currently available which can accurately predict ambient ozone concentrations caused by this installation’s VOC emissions.

Emissions testing is not required for the equipment as a condition of this permit.

A Part 70 Operating Permit application is required for this installation within 1 year of equipment startup.

Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

Shelter Works owns and operates a fiberglass shelter manufacturing plant in St. Louis. Equipment at the installation consists of two natural gas-fired makeup air heaters and a fiberglass gelcoat/resin spraying operation. The two heaters (RAU-1 and RAU-2) have maximum design rates of 2.475 and 2.073 MMBtu/hr, respectively. Various trimming equipment, such as diamond cutting tools, random orbital sanders, and grinders, are also used at the facility. The trimming equipment is done inside an enclosed trim booth with a dust collection system. The exhaust from the trim booth is returned to the production building.

Before this project, the facility is considered a minor source for construction permits and was not required to apply for an operating permit. After the issuance of this permit, the facility will be a major source of HAP for construction permits and a Part 70 operating permit will be required.

The following New Source Review permits have been issued to Shelter Works from the St. Louis Department of Health.

<table>
<thead>
<tr>
<th>Permit Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-01-053</td>
<td>Fiberglass spray operation and paint spray booth.¹</td>
</tr>
<tr>
<td>01-01-053PM</td>
<td>Correcting modeling results.</td>
</tr>
</tbody>
</table>

Note 1: Permit includes a paint spray booth, but company has indicated that no paint booth was built.

PROJECT DESCRIPTION

In Permit No. 01-01-053PM issued to the facility by the St. Louis Department of Health,
the individual HAP emissions were limited to 10 tpy, the total HAPs emissions were limited to 25 tpy, and the total VOC emissions were limited to 40 tpy. The facility proposes to eliminate the 10 tpy limit for styrene and the 25 tpy limit for combined HAP so that it can increase production. No additional equipment are being added. The increase in production is being accomplished through longer operating hours and greater utilization of the present equipment and plant space. As part of this project, the VOC emissions limit was also increased to 100 tpy because there is currently no modeling which can accurately predict ambient ozone concentrations caused by this installation’s VOC emissions so VOC emissions do not need to be limited to 40 tpy.

No control devices are used to control emissions from the gel coat/resin spraying operation. A dust collector is used to control emissions from the trimming equipment. The installation can laminate a maximum of 3,000 ft² per day.

Even though the HAP emissions are expected to be major for this project, a permit under Missouri State Rules 10 CSR 10-6.060(9) is not required because the facility is subject to MACT Subpart WWWW. Instead, this permit is issued under Missouri State Rules 10 CSR 10-6.060(6).

EMISSIONS/CONTROLS EVALUATION

Styrene and MMA emissions from the gelcoats and resins were calculated using the Unified Emission Factors for Open Molding of Composites jointly developed by the National Marine Manufacturer’s Association (NMMA) and the American Composites Manufacturers Association (ACMA, previously known as Composites Fabricators Association). It was assumed that the gelcoats and resins with the highest styrene and MMA emissions were used 100% of the time so that the emissions calculation would be conservative. MMA emissions were calculated to be greater than the major source level of 10 tons per year and the installation accepted a limit of 10 tpy of MMA emissions to avoid modeling requirements. Styrene emissions were modeled to ensure that the RAL is not exceeded.

DMP emissions from the catalysts were calculated assuming a 0.04% evaporation rate, as indicated in the paper “Emission Factors for Liquid Organic Peroxide Catalysts used in the Open Molding of Composites,” (3/99) PM emissions were calculated using mass balances assuming a 94% transfer efficiency, a number that was accepted for use in the permit 01-01-053PM. PM_{2.5} and PM_{10} emissions were calculated assuming that 30% of the PM is PM_{2.5} and 70% of PM is PM_{10}. These numbers were obtained from the article “Size Distribution of Chromate Paint Aerosol Generated in a Bench-Scale Spray Booth,” December 30, 2003. Although the tests were performed on paint, instead of gelcoats, it was assumed that the numbers are conservative because the spraying of gelcoats should generate larger particles than spraying of paint.

PM emissions from the manual trimming equipment were estimated using emission factor for hardboard sanding in AP-42, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, fifth edition, Chapter 10.6.4, Hardboard and Fiberboard, (10/02), and Chapter 11.16, Gypsum Manufacturing, (7/1993). The
emission factors in AP-42 are controlled emission factors using fabric filters and they were back-calculated into uncontrolled emission factors, assuming 99% control for the filters. The facility is using a dust collector to control emissions from the trimming equipment. However, using the uncontrolled emission factor does not affect the type of permit that should be issued. Therefore, the uncontrolled emission factor was used in the calculations and the facility is not required, by a permit special condition, to operate the dust collector. Emissions from the combustion of natural gas were calculated using AP-42, Chapter 1.4, *Natural Gas Combustion*, (7/1998).

The following table provides an emissions summary for this project. Existing potential emissions were taken from previous permits. Emissions from the natural-gas fired heaters were not included in the previous permits but is included in the emissions of this project. Existing actual emissions were taken from the installation’s 2014 EIQ. VOC emissions are limited to less than 100 tpy to avoid major source review. MMA emissions are limited to less than 10 tpy to avoid modeling requirements. Combined HAPs and Styrene do not have actual emissions limits in this permit. However, by limiting the VOC to less than 100 tpy, the combined HAP and Styrene emissions will be indirectly limited to less than 100 tpy as there are no particulate HAP emissions. Potential emissions of the application represent the potential of the project, assuming continuous operation (8760 hours per year).

### Table 2: Emissions Summary (tons per year)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>25.0</td>
<td>N/D</td>
<td>N/D</td>
<td>17.75</td>
<td>N/A</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>15.0</td>
<td>N/D</td>
<td>0.10</td>
<td>13.43</td>
<td>N/A</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>10.0</td>
<td>N/D</td>
<td>0.03</td>
<td>7.81</td>
<td>N/A</td>
</tr>
<tr>
<td>SO$_x$</td>
<td>40.0</td>
<td>N/D</td>
<td>N/D</td>
<td>0.0005</td>
<td>N/A</td>
</tr>
<tr>
<td>NO$_x$</td>
<td>40.0</td>
<td>N/D</td>
<td>N/D</td>
<td>0.09</td>
<td>N/A</td>
</tr>
<tr>
<td>VOC</td>
<td>40.0</td>
<td>&lt;40.0</td>
<td>7.09</td>
<td>151.8</td>
<td>&lt;100.0</td>
</tr>
<tr>
<td>CO</td>
<td>100.0</td>
<td>N/D</td>
<td>N/D</td>
<td>0.07</td>
<td>N/A</td>
</tr>
<tr>
<td>GHG (CO$_{2}$e)</td>
<td>75,000</td>
<td>N/D</td>
<td>N/D</td>
<td>103.7</td>
<td>N/A</td>
</tr>
<tr>
<td>GHG (mass)</td>
<td>250.0</td>
<td>N/D</td>
<td>N/D</td>
<td>103.1</td>
<td>N/A</td>
</tr>
<tr>
<td>HAPs</td>
<td>10.0/25.0</td>
<td>&lt;10.0/25.0</td>
<td>N/D</td>
<td>140.13</td>
<td>&lt;100.0</td>
</tr>
<tr>
<td>Styrene</td>
<td>2.0</td>
<td>&lt;10.0</td>
<td>N/D</td>
<td>121.41</td>
<td>&lt;100.0</td>
</tr>
<tr>
<td>MMA</td>
<td>10.0</td>
<td>&lt;10.0</td>
<td>N/D</td>
<td>18.72</td>
<td>&lt;10.0</td>
</tr>
<tr>
<td>DMP</td>
<td>10.0</td>
<td>&lt;10.0</td>
<td>N/D</td>
<td>0.004</td>
<td>N/A</td>
</tr>
</tbody>
</table>

N/A = Not Applicable; N/D = Not Determined

**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 emissions of HAPs are
above de minimis/major levels.

APPLICABLE REQUIREMENTS

Shelter Works 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. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- **Submission of Emission Data, Emission Fees and Process Information**, 10 CSR 10-6.110
- **Operating Permits**, 10 CSR 10-6.065
- **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
- **Restriction of Emission of Odors**, 10 CSR 10-6.165
- **Restriction of Emission of Particulate Matter from Industrial Processes**, 10 CSR 10-6.400
- **Control of Emissions from Industrial Surface Coating Operations**, 10 CSR 10-5.330
  - This rule does not apply to the installation because the spraying of gelcoat and resins for fiberglass manufacturing is not considered a surface coating operation.

SPECIFIC REQUIREMENT

- **MACT Regulations**, 10 CSR 10-6.075

AMBIENT AIR QUALITY IMPACT ANALYSIS

Ambient air quality impact analysis (AAQIA) was performed for styrene because emissions from the project are greater than the SMAL of 1.0 tpy. Modeling was conducted using AERMOD program. Emissions will be vented from five stacks on top of the building. While the facility believes that it can maintain 100% capture efficiency
from the building, it cannot currently prove 100% capture. Therefore, it was assumed that 10% of the styrene will be emitted as fugitive emissions through the doors. The 10% emission rate is based on the company’s estimation that the doors would be open for no more than 45 minutes during a typical 8 hour shift. The facility will be required as a condition in this permit to keep the doors closed except during material and personnel entry and exit. Results of the AAQIA show that the facility will be in compliance with the RAL for styrene. More information on the AAQIA can be found in the memo “Ambient Air Quality Impact Analysis (AAQIA) for Shelter Works” issued on April 23, 2015.

Table 3: Stack Parameters

<table>
<thead>
<tr>
<th>Stack No.</th>
<th>Stack Diameter (in)</th>
<th>Stack Height (ft)</th>
<th>Stack Velocity (fph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>40</td>
<td>4456</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>40</td>
<td>4584</td>
</tr>
</tbody>
</table>

Table 4: AERMOD Modeling Results

<table>
<thead>
<tr>
<th>Max 24-Hour Impact (µg/m³)</th>
<th>24-Hour RAL (µg/m³)</th>
<th>Max Annual Impact (µg/m³)</th>
<th>Annual RAL (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1471.71</td>
<td>2240.0</td>
<td>276.04</td>
<td>333.0</td>
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</table>

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, I recommend this permit be granted with special conditions.

Chia-Wei Young  
New Source Review Unit

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated June 30, 2014, received July 2, 2014, designating Shelter Works as the owner and operator of the installation.

Attachment A – MMA Emissions Compliance Worksheet

Shelter Works
City of St. Louis
Project Number: 2014-05-035
Installation ID Number: 510-2752
Permit Number: ________

This sheet covers the period from ______ to ______.
(month, year)                  (month, year)

<table>
<thead>
<tr>
<th>Material</th>
<th>Monthly Usage (lb)</th>
<th>(a) MMA Content (%)</th>
<th>(b) MMA EF (lb/ton)</th>
<th>(c) MMA Emissions (lb/month)</th>
<th>(d) MMA Emissions (tons/month)</th>
</tr>
</thead>
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<tr>
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</table>

(e) Total MMA Emissions This Month (tons) = 

(f) Last Month’s Total 12-Month MMA Emissions (tons) = 

(g) Previous Year’s Monthly Individual MMA Emissions (tons) = 

(h) Current 12-month Total MMA Emissions (tons) = 

(a) MMA Content taken from the safety data sheet (SDS) of the material. If a range is given, the highest value of the range shall be used.

(b) MMA Emission Factor shall be taken from the table of “Unified Emission Factor for Open Molding of Composites” based on the MMA content. If a range is given in the SDS, the highest value shall be used to determine the EF. The most recent and approved version of the table shall be used. The table given in Appendix B is current as of the date of permit issuance. If the table is modified in the future, the new version shall be used.

(c) MMA Emissions (lb/month) calculated using [Monthly Usage (lb) ÷ 2,000 lb/ton] x [MMA EF (lb/ton)]

(d) MMA Emissions (tons/month) calculated using [MMA Emissions (lb/month) ÷ 2,000 lb/ton]

(e) Total MMA Emissions This Month (tons) calculated by summing the MMA Emissions (tons/month) of each material.

(f) 12-month Total MMA Emissions (tons) from last month’s Attachment A.

(g) Monthly MMA Emissions (tons) from the previous year’s Attachment A.

(h) Current 12-Month Total MMA Emissions (tons) calculated using [(e) + (f) – (g)]. A 12-Month MMA Emission of less than **10.0 tons** for the entire installation indicates compliance.
Attachment B – VOC Emissions Compliance Worksheet

Shelter Works  
City of St. Louis  
Project Number: 2014-05-035  
Installation ID Number: 510-2752  
Permit Number: ________

This sheet covers the period from __________ to __________.

(month, year)                  (month, year)

<table>
<thead>
<tr>
<th>Material</th>
<th>Monthly Usage (lb)</th>
<th>(a) MMA Emissions (tons/month)</th>
<th>(b) Styrene Emissions (tons/month)</th>
<th>(c) DMP Emissions (tons/month)</th>
<th>(d) Other VOC Emissions (tons/month)</th>
<th>(e) Total VOC Emissions from Material</th>
</tr>
</thead>
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</tbody>
</table>

From Natural Gas (NG) Combustion

<table>
<thead>
<tr>
<th>NG Usage (mmscf)</th>
<th>EF (lb/mmscf)</th>
<th>(f) Total VOC Emissions from Combustion</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5</td>
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<td></td>
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</tbody>
</table>

(g) Total VOC Emissions This Month (tons) = 
(h) Last Month’s Total 12-Month VOC Emissions (tons) = 
(i) Previous Year’s Monthly Individual VOC Emissions (tons) = 
(j) Current 12-month Total VOC Emissions (tons) =

(a) MMA Emissions (tons/month) for the month shall be taken from Attachment A of this month
(b) Styrene emissions (tons/month) shall be calculated using [Monthly Usage (lb) ÷ 2,000 lb/ton] x [ EF (lb/ton] ÷ 2,000 lb/ton. The EF (lb/ton) shall be taken from the table of “Unified Emission Factor for Open Molding of Composites” based on the styrene content. If a range is given in the SDS, the highest value shall be used to determine the EF. The most recent and approved version of the table shall be used. The table given in Appendix B is current as of the date of permit issuance. If the table is modified in the future, the new version shall be used.
(c) DMP emissions (tons/month) shall be calculated using [Monthly Usage (lb) x (% DMP) x 0.0004] ÷ 2,000 lb/ton. % DMP shall be taken from the material’s SDS. If a range is given, the highest value shall be used.
(d) Other VOC emissions (tons/month) shall be calculated using [Monthly Usage (lb) x (% VOC)] ÷ 2,000 lb/ton. % VOC shall be taken from the material’s SDS. If a range is given, the highest value shall be used.
(e) Total VOC Emissions from Material (tons/month) calculated using (a)+(b)+(c)+(d)
(f) Total VOC Emissions from Combustion (tons/month) calculated using [NG Usage (mmscf) x EF (lb/mmscf)] ÷ 2,000 lb/ton.
(g) Total VOC Emissions This Month (tons) calculated using (e) + (f)
(h) 12-month Total VOC Emissions (tons) from last month’s Attachment B.
(i) Monthly VOC Emissions (tons) from the previous year’s Attachment B.
(j) Current 12-Month Total MMA Emissions (tons) calculated using [(g)+(h)–(i)]. A 12-Month VOC Emission of less than 100.0 tons for the entire installation indicates compliance.
Attachment C – Daily Styrene Emissions Compliance Worksheet

Shelter Works
City of St. Louis
Project Number: 2014-05-035
Installation ID Number: 510-2752
Permit Number: ______

This sheet covers the period from _______ to _______.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Process</th>
<th>Daily Material Usage (lb)</th>
<th>EF (lb/lb coating)</th>
<th>Emissions (lb/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interior Gelcoat</td>
<td></td>
<td>0.1323</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exterior Gelcoat</td>
<td></td>
<td>0.2195</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resin Application</td>
<td></td>
<td>0.05975</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** Input the amount of gelcoat or resins used for this day.
**Note 2:** EF is for use with gelcoats and coatings with the following styrene emissions: Interior Gelcoat – 29.73%, Exterior Gelcoat – 40%, and Resin – 48.50%. If using coatings with different styrene contents, the facility should calculate a new EF using the table for “Unified Emission Factors for Open Molding of Composites” in Appendix B. The most recent and approved version of the table shall be used. The table given in Appendix B is current as of the date of permit issuance. If the table is modified in the future, the new version shall be used.

**Note 3:** Emissions (lb/day) calculated by multiplying daily material usage (lb) with EF (lb/lb coating). A total equal to or less than the following indicates compliance: 117.1 lb/day from interior gelcoat, 239.7 lb/day from exterior gelcoat, and 308.31 lb/day from resin application.
Shelter Works
City of St. Louis
Project Number: 2014-05-035
Installation ID Number: 510-2752
Permit Number: _______

**Individual HAP**

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>MHDR (gal/hr)</td>
<td>Density (lb/gal)</td>
<td>HAP Name, CAS #</td>
<td>Individual HAP Content (Wt. %)</td>
<td>(a) Individual HAP PTE (tpy)</td>
<td>(b) SMAL (tpy)</td>
</tr>
<tr>
<td>Example</td>
<td>1.67</td>
<td>8.75</td>
<td>Toluene</td>
<td>3.0%</td>
<td>1.92</td>
<td>10.0</td>
</tr>
</tbody>
</table>

(a) Individual HAP PTE (tpy) calculated using (Column 2) x (Column 3) x [(Column 5)/100] x 8760 hours/yr + 2,000 lb/ton. A 0.04% evaporation rate can be used for dimethyl phthalate emissions from catalysts.

(b) The current SMAL can be found in Appendix C. The table in Appendix C is current as of the date of permit issuance. If a SMAL is modified in the future, the new number shall be used. The facility shall contact the Air Pollution Control Program for the new SMAL.
Attachment E – Alternative Material Styrene Calculations

Shelter Works
City of St. Louis
Project Number: 2014-05-035
Installation ID Number: 510-2752
Permit Number: _______

Copy this sheet as needed.

<table>
<thead>
<tr>
<th>Column 1</th>
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<th>Column 3</th>
<th>Column 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Process</strong></td>
<td><strong>Maximum Usage (lb/hr)</strong></td>
<td><strong>1 Emission Factors (lb/ton)</strong></td>
<td><strong>2 Emissions (lb/day)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Exterior Gelcoat (EP01B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resin (EP01C)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Emission factors, in lb/ton, for the gel coat gun and resin application should be taken from the Table “Unified Emission Factors for Open Molding of Composites.” The most recent and approved version of the table shall be used. The table given in Appendix B is current as of the date of permit issuance. If the table is modified in the future, the new version shall be used.

Note 2: Emissions (lb/day) for the gel coat gun and resin application calculated from [Column 2 + 2,000 lb/ton] x Column 3 x 24 hours/day.

For styrene, Shelter Works may use the alternative material if emissions are less than the limits in Special Condition 2.C. – 117.1 lb/day from the interior gelcoat application (EP01A), 239.7 lb/day from the exterior gelcoat application (EP01B), and 308.3 lb/day from the resin application (EP01C).
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
CO₂ .......... carbon dioxide
CO₂e....... 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
μg/m³ ....... 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
NOₓ ........ nitrogen oxides
NSPS ...... New Source Performance Standards
NSR ........ New Source Review
PM .......... particulate matter
PM₂.₅ ...... particulate matter less than 2.5 microns in aerodynamic diameter
PM₁₀ ...... 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
SOₓ .......... sulfur oxides
SO₂ .......... sulfur dioxide
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 Emittet per Ton of Resin or Gelcoat Processed

<table>
<thead>
<tr>
<th>Styrene content in resin/gelcoat, %</th>
<th>&lt;33 (2)</th>
<th>33</th>
<th>34</th>
<th>35</th>
<th>36</th>
<th>37</th>
<th>38</th>
<th>39</th>
<th>40</th>
<th>42</th>
<th>44</th>
<th>46</th>
<th>48</th>
<th>50</th>
<th>&gt;50 (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>0.120 x %styrene x 2000</td>
<td>83</td>
<td>89</td>
<td>94</td>
<td>100</td>
<td>106</td>
<td>112</td>
<td>117</td>
<td>123</td>
<td>129</td>
<td>134</td>
<td>140</td>
<td>145</td>
<td>152</td>
<td>157</td>
</tr>
<tr>
<td>Manual w/ Vapor Suppressed Resin VSR (5)</td>
<td>Manual emission factor [listed above] x (1 - (0.50 x specific VSR reduction factor for each resin/suppressant formulation))</td>
<td>111</td>
<td>126</td>
<td>140</td>
<td>154</td>
<td>168</td>
<td>183</td>
<td>197</td>
<td>211</td>
<td>225</td>
<td>240</td>
<td>254</td>
<td>268</td>
<td>283</td>
<td>297</td>
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<tr>
<td>Mechanical Atomized</td>
<td>0.109 x %styrene x 2000</td>
<td>88</td>
<td>97</td>
<td>108</td>
<td>119</td>
<td>130</td>
<td>141</td>
<td>152</td>
<td>163</td>
<td>174</td>
<td>185</td>
<td>196</td>
<td>207</td>
<td>218</td>
<td>229</td>
</tr>
<tr>
<td>Mechanical Atomized Controlled Spray (5)</td>
<td>Mechanical Atomized emission factor [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))</td>
<td>86</td>
<td>97</td>
<td>108</td>
<td>119</td>
<td>130</td>
<td>141</td>
<td>152</td>
<td>163</td>
<td>174</td>
<td>185</td>
<td>196</td>
<td>207</td>
<td>218</td>
<td>229</td>
</tr>
<tr>
<td>Mechanical Controlled Spray with VSR</td>
<td>Mechanical Atomized Controlled Spray emission factor [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))</td>
<td>86</td>
<td>97</td>
<td>108</td>
<td>119</td>
<td>130</td>
<td>141</td>
<td>152</td>
<td>163</td>
<td>174</td>
<td>185</td>
<td>196</td>
<td>207</td>
<td>218</td>
<td>229</td>
</tr>
<tr>
<td>Mechanical Non-Atomized</td>
<td>0.108 x %styrene x 2000</td>
<td>71</td>
<td>74</td>
<td>77</td>
<td>80</td>
<td>83</td>
<td>86</td>
<td>89</td>
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<td>102</td>
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<td>108</td>
<td>111</td>
<td>115</td>
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<tr>
<td>Mechanical Non-Atomized with VSR (5)</td>
<td>Mechanical Non-Atomized emission factor [listed above] x (1 - (0.45 x specific VSR reduction factor for each resin/suppressant formulation))</td>
<td>71</td>
<td>74</td>
<td>77</td>
<td>80</td>
<td>83</td>
<td>86</td>
<td>89</td>
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<td>102</td>
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<td>108</td>
<td>111</td>
<td>115</td>
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<td>Filament application</td>
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<td>Gelcoat Application</td>
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<td>336</td>
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<td>481</td>
<td>501</td>
<td>522</td>
<td>543</td>
<td>564</td>
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<td>Gelcoat Controlled Spray Application (5)</td>
<td>0.327 x %styrene x 2000</td>
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<td>230</td>
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<td>260</td>
<td>275</td>
<td>290</td>
<td>305</td>
<td>321</td>
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<td>351</td>
<td>366</td>
<td>381</td>
<td>396</td>
<td>411</td>
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<tr>
<td>Gelcoat Non-Atomized Application</td>
<td>SEE Note 9 below</td>
<td>194</td>
<td>205</td>
<td>214</td>
<td>223</td>
<td>232</td>
<td>241</td>
<td>250</td>
<td>259</td>
<td>268</td>
<td>278</td>
<td>287</td>
<td>296</td>
<td>305</td>
<td>314</td>
</tr>
</tbody>
</table>

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

| MMA content in gelcoat, % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | ≥20 |
| Non-Atomized             | 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 OPA Vapor Suppression Effectiveness Test.
4. SEE the OPA 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 MMA 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 ([0.4050 x %styrene] - 0.0500) x 2000 for gelcoats with styrene contents between 10% and 32% by wt., use the equation 0.185 x %styrene x 2000 for gelcoats with less than 10% styrene content by wt.
<table>
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<th>Chemical</th>
<th>CAS #</th>
<th>SMAL (tons/yr)</th>
<th>Group ID</th>
<th>VOC PM</th>
<th>Group ID</th>
<th>VOC PM</th>
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<th>CAS #</th>
<th>SMAL (tons/yr)</th>
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</table>
Mr. John Miller  
Director of Sales and Operations  
Shelter Works  
2616 South Third Street  
St. Louis, MO 63118  


Dear Mr. Miller:  

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, if any, 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.  

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, Truman State Office Building, Room 640, 301 W. High Street, 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 Chia-Wei Young, 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:cyl
Enclosures

c: St. Louis Regional Office
   PAMS File: 2014-05-035

Permit Number:

Celebrating 40 years of taking care of Missouri’s natural resources.
To learn more about the Missouri Department of Natural Resources visit dnr.mo.gov.