Filename: S:\wp11\PERMITS\Website\Title V\MESAFULLY tsd 2011.wpd
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Date: November 7, 2006

Technical Support Document
Proposed Title V Permit
Mesa Fully Formed, Inc.
Permit # V20628.000

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1. BACKGROUND

1.1 Applicant

Mesa Fully Formed, Inc.
1111 S. Sirrine
Mesa, AZ 85210

1.2 Facility/Process Description

This permit authorizes the construction and operation of a facility for the manufacture of cultured marble, plastic laminate products, solid surfaces, and engineered and natural stone. The facility is located at 1340, 1341, 1348 and 1349 East Industrial Drive, Coolidge, Arizona, upon parcels also identified by Pinal County Assessor numbers 209-25-01200, -01309, -01408, -01507. The main SIC Codes for the facility are 3089 (Plastic products), 3083 (Laminated Plastic plate, sheet and profile shapes) and 3281 (Cut stone and stone products). The facility is situated in an area classified as "attainment" for all pollutants.

The principal operations at the facility are:

- manufacture of cultured marble, custom bath tubs, shower panels and pans and manufacturing of vanity tops;
- manufacture and fabrication of plastic laminated counter tops;
- fabrication of solid surfaces, engineered and natural stone.

The operations will be located in 4 separate buildings (corresponding to the addresses indicated above). The building at 1341 W. Industrial Dr. will include the cultured marble finish shop and the plastic laminate cut shop. The building at 1349 W. Industrial Dr. will include the cultured marble pour shop. The buildings at 1348 and 1340 W. Industrial Dr. will, in the future, contain the plastic laminate blank and cut shop, and the granite/solid surface shop, respectively.

1.2.1 Cultured Marble Products

Molds for the different lines of products are sprayed with gelcoat in 4 gelcoat booths in the Marble Pour Process Area. After air-drying in the drying area, polyester resins and additives, what is called “marble”, are poured into the molds from 4 mixer/casting machines. The marble is leveled out and set up in the production area to cure. After curing, the product is removed from the molds using mold releases and sent to the finishing shop.

Gelcoats and polyester resins typically contain styrene and methyl methacrylate (MMA). The additives and promotors used in the marble also may contain styrene and other HAPs. The mold releasing waxes used, and other solvents used during the process contain VOC and HAP compounds, including principally methylene chloride, methanol, toluene and others.

VOC and HAP emissions are uncontrolled.

In the Cultured Marble Finishing Shop, marble products are ground, sanded, polished and buffed as needed. The products are then stored until installation. Particulate matter emissions from grinding will be controlled by a baghouse.

1.2.2 Laminated Products (Counter tops)

In the Core Production/Blank Production/CNC Router shop, wooden boards and plastic laminate are received from a supplier and cut to dimension. They are glued together with an adhesive spray and put through a drying tunnel. After the drying tunnel, a "pinch roller" and a forming machine form the laminate onto the board. The product is then moved to the Laminate Finishing area where it is cut and finished as needed. Particulate emissions from the woodworking and finishing operations are controlled by baghouses.

VOC and HAP emissions are uncontrolled.

1.3 Application History

The following information submitted by the applicant was used in the processing of this permit:

- Industrial Permit Application, received on March 21, 2006. Signed by Stephen M. King, General Manager.
- Letter with Potential To Emit information from Randy Cooper, consultant, received on May 24, 2006.
- Verbal comments on draft during telephone call, suggesting alternative limitations, received on June 28, 2006.

2. EMISSIONS - METHODOLOGY

The principal emissions from the facility will be generated mainly from the gelcoat and resin operations, which will emit styrene and MMA, both considered Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs). Solvents, thinners and glues are used in several operations around the facility and will generate some HAPs and VOCs. Emissions of particulate matter (PM10) will be generated by the finishing operations.

2.1 Polymer Casting VOCs and HAPs

Polymer casting is defined (40 CFR §63.5935) as "a process for fabricating composites in which composite materials are ejected from a casting machine or poured into an open, partially open, or closed mold and cured. After the composite materials are poured into the mold, they are not rolled out or worked while the mold is open...Products produced by the polymer casting process include cultured marble products..."

According to"Frequently Asked Questions about the Reinforced Plastic Composites Production NESHAP" (www.epa.gov/ttn/atw/rpc/faq_final.pdf), EPA estimates polymer casting emissions as 2 percent of the available styrene. This emission factor is documented in Chapter 5 of the Background Information Document for the NESHAP.

It is assumed that approximately half of the styrene is emitted during the mixing, and half during

the curing[1]. At Mesa Fully Formed, the operators indicate that the open mixing process may take upwards of 30 minutes. The cure time takes approximately 40-60 minutes. While the resin is curing, the styrene is being polymerized and becomes locked in the matrix. Since during the mixing the exposed surface area of the resin is exposed, it is estimated that the majority of emissions occur during the mixing process. The mixing is conducted in fully enclosed machines, in a matter of seconds as opposed to the 30-minute open mixer time. Therefore, the applicant uses an emission factor[2] of 1% for closed mixing, and 2% for hand mixed operations.

2.1.1 Potential Emissions

Each of the 4 autocasters is rated at 80 lb/min. At 8760 hours per year, this facility could pour 84,094 tons of marble per year. 21% of the marble is assumed (Mesa Fully Formed formulation) to be resin.
According to the list of typical resins used included in the permit application, the average styrene content of the resins is 30%. The potential styrene emissions from the polymer casting were estimated as follows:

Styrene (resin) = 84,094 tons x 21% x 30% x 1% = 53 tons of styrene (VOC) per year

2.1.2 Allowable Emissions

By limiting the amount of resin used per year to 4,000 tons, at 32% styrene content, and 1% emission factor, the permit restricts the styrene emissions from the marble pouring to approximately 13 tpy.

2.2 Gel Coating VOCs and HAPs

The amount of gelcoat sprayed on the molds is related to the resin pouring, since resin is not poured without the molds first being sprayed with gelcoat. From current operations in their Mesa, AZ. facility, the applicant has determined a gelcoat to resin styrene emission ratio of 3.68.

2.2.1 Potential Emissions

Therefore the potential styrene emissions from gelcoating were calculated as follows:

Styrene (gelcoat) = 53 tpy x 3.68 = 195 tons of styrene (VOC) per year

2.2.2 Allowable Emissions

By limiting the amount of gelcoat used per year to 260 tons, and using an emission factor of 440 lb styrene/ton gelcoat[3], the permit restricts the styrene emissions from the gel coating to approximately 57 tpy.

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[1]See "Technical Discussion of the Unified Emission Factors for Open Molding of Composites" by Robert A. Haberlien, page 15, partitioning of emissions for manual application based on open, bucket, mixing process.

[2]This emission factor of 1% is supported by the EPA report titled "Locating and Estimating Air Emissions from Sources of Styrene", EPA-454/R-93-011, April 1993, page 119.

[3]The highest emission factor determined in the 3/10/06 application is 596.76 lb/ton, and the lowest 41.3 lb/ton. Understanding that the applicant will use a variety of gelcoats with emission factors in that range, a weighted average of 440 lb/ton was used for the calculations. Records required by the permit will show whether this emission factor was over or underestimated.

2.3 Other VOC/HAP Emitting Activities

Laminate Shop and other Ancillary operations are also related to the resin pouring. Mesa Fully Formed generally conducts Laminate Shop and Ancillary Operations at a rate dependent upon the amount of resin poured. Emissions from these related processes are, on average, directly proportional to emissions from the resin pouring. From their existing facility, Mesa Fully Formed has determined that 72.2% of the facility's total VOC emissions come from the styrene in gelcoat spraying and resin pouring. That would mean that potential total VOC emissions are:

VOC (total) = (53 + 195) x 100/72.2 = 343 tons/yr

2.3.1 Potential Emissions

VOCs (other) = 343-195-53 = 95 tons of VOCs per year

2.3.2 Allowable Emissions

Using the same methodology as that used to calculate PTE "other VOCs" from the facility, PCAQCD calculated that with the limitations described in 2.1.2 and 2.2.2, other VOC emissions would be approximately 27 tons per year. The bulk of these VOC emissions will be generated by the adhesive used in the laminate production and the different waxes for mold releasing.

The adhesive is used in large quantities, but it is an aqueous product. While the application uses a 0.17 lb/gal VOC content for emissions calculations, the applicant has indicated that the formulation of the glue may vary in different seasons. The VOC content would never exceed 0.30 lb/gal. Therefore, the permit limits the glue VOC emissions to 0.30 lb/gal to ensure the use of an aqueous glue. Even with the maximum predicted use of 20,000 gallons pe year, emissions from the glue will not exceed 3 tons per year.

The throughput of the waxes has been limited to 22,000 pounds per year. With an average VOC content of 98% by weight for all the waxes and mold release sealer, emissions should not exceed 11 tons per year.

2.4 Finishing Operations and Woodworking

Controlled potential PM10 emissions from the stone/engineered stone and solid surface finishing, marble process, and laminate blank/finish and CNC router are not expected to exceed 1 ton per year. Emissions from those 3 areas will be controlled by baghouses rated at 99% control efficiency.

3. TOTAL EMISSIONS - POTENTIAL/ALLOWABLE

	VOC Emissions (typ)		HAP[4] Emissions (tpy)	
Operation	Potential	Allowable	Potential	Allowable
Marble Mix/Pour	53	13	53	13

[4]Styrene, MMA, methylene chloride, dimethyl phthalate, toluene.

Gelcoat Spraying	195	57	195	57
Other Operations	95	27	25[5]	7
TOTAL[6]	**343**	**~97**	**273**	**~77**

4. REGULATORY REQUIREMENTS AND CONSTRAINTS

4.1 TITLE V/PSD Applicability

This facility constitutes a "major source" of Hazardous Air Pollutants (HAPs) and requires a permit pursuant to Title V of the CAA Amendments of 1990.

Without the limitations of the permit, the source would constitute a "major emitting source" for VOCs within the meaning of 40 CFR §51.166, and would require the facility to go through a Prevention of Significant Deterioration (PSD) review. This source is considered a "synthetic minor" with respect to PSD. In order to maintain synthetic minor status with emissions of VOCs and HAPs below 99 tons per year, the permit restricts the amount of polyester resins, gelcoats and mold releasing products used per year. It also limits the styrene content of both resins and gelcoats, as well as the VOC content of the laminate blank shop adhesive, to ensure that a low-VOC glue is used at all times.

4.2 Maximum Achievable Control Technology (MACT) Applicability and Implementation

The facility has to comply with 40 CFR 63 Subpart WWWW, National Emission Standards for Hazardous Air Pollutants (NESHAP): Reinforced Plastic Composites Production. Operations at Mesa Fully Formed include open molding operations in tooling and production area, the mixing of HAP containing materials, equipment cleaning, and storage of HAP containing material and repair activity. All of these activities are regulated by the standard. In their most recent revision to the NESHAP, EPA exempted polymer casting from any of the limitations and work practice standards in the subpart. While it this type of operation is exempted from those standards, it is still subject to the MACT standard and no case-by-case MACT (per §112j) needs to be developed. Emissions from polymer casting are counted towards MACT applicability, and the permittee is still required to keep records and show compliance with the overall VOC and HAP limitations of the permit.

The applicant has requested a limitation to keep VOC and HAP emissions below 100 tons per year, to avoid more stringent reductions required by the NESHAP for sources with 100 + tpy of emissions.

Subpart WWWW requires sources to meet annual organic HAP limitations for each type of operation, as well as work practice standards.

There are 4 compliance options to meet the HAP limitations, and sources can switch from one to the other without much restriction. Emission calculations are done every month, and the applicant is required to demonstrate initial compliance with the HAP limitations within a year of permit issuance. Due to the compliance options that allow averaging, the applicant is not restricted to any single resin or gelcoat due to their HAP content, and is not restricted to using only one type of

[5]Using the same ratio from application tpy other HAP/tpy styrene.

[6]While the applicant requested limits of 99 tpy for HAPs, due to the application-estimated ratios of resin to gelcoat, and VOC emissions to HAP emissions, the throughput limitations will maintain the facility at levels well below 99 tpy of HAPs.

operation (atomized vs. non-atomized stream). Instead, the compliance with the limitations of each type of operation is assessed at the end of one year of operations.

The work practice standards are required to minimize fugitive emissions of VOC and HAPs during operations and storage of products.

4.3 Regulatory Emission Limitations

4.3.1 Opacity

While the federally enforceable opacity limitation is 40%, there is a locally enforceable 20% opacity limitation that applies to point sources not already regulated by a new source performance standard.

At this facility, the 20% limitation would apply to the baghouses since they are not regulated by any other standard. To monitor for compliance with this standard, the permit requires quarterly opacity "screenings", and required Method 9 opacity tests only when visible emissions are observed. Also, the permit requires weekly baghouse inspections and booth filter inspections.

4.3.2 Particulate Matter from Process Industries

The facility is subject to regulation PGAQCD §7-3-1.8 (§5-24-1032), which is federally enforceable. This regulation limits the particulate matter from the facility to:

E (lb/hr) = $40.10P^{0.67}$, where P is the process weight (tons/hr)

Using process weights indicated in the permit application of 5,000 lbs/hr from stone/engineered stone and solid surface finishing, 300,000 lb/yr from the marble process and 500,000 lb/yr from the laminate blank/finish/CNC router:

$$E = 4.1x\left(\frac{850{,}000(lb/yr)}{2000(lb/ton)x8760(hr/yr)}\right)^{0.67} = 0.54(lb/hr) = 2.36tpy$$

The applicant will be using a filter system in the finish shop, and cyclone/baghouses with control efficiencies of 99% for the marble shop, laminate finish and CNC Router/Thermoformer shop operations. The permit requires that woodworking and finishing operations in these areas are vented to the appropriate control device. Estimated controlled emissions from the facility are 0.6 tons per year (from permit application), which is only 25% of the allowable emissions, approximately. The permit requires weekly inspections of the baghouses and filters to ensure they are working properly.

4.4 Non-Applicable Requirements

- The requirements of 40 CFR 64, Compliance Assurance Monitoring (CAM), are not applicable since Mesa Fully Formed does not use a control device to achieve compliance with any emission limitation or standard for a pollutant for which the source has potential pre-control device emissions greater than or equal to major source levels for that pollutant.

- The Arizona HAPs rule was promulgated in 2006 and it will become effective as of January 2007. It includes standards for new and modified sources of HAPs, as of 1/07. It does not apply to major sources already subject to a NESHAP.

5. HAPS MODELING

Screen3 modeling was conducted for styrene and methylene chloride. Styrene is the largest HAP emitted, and methylene chloride has very low ambient guidelines/standards. The results have been compared with the Arizona Ambient Air Quality Guideline (AAAQG) and they do not show any exceedance.

Since the buildings are not completed yet, dimensions of the stacks and buildings have been estimated. Also, the styrene emitting stacks from the casting machines and the gelcoat booths are simplified for modeling purposes into a single stack. The same stack parameters were used to model methylene chloride.

Styrene emission rate = 71.29 tpy = 16.28 lb/hr (approximately 71 tpy)
Methylene chloride emission rate = 1.04 tpy = 0.237 lb/hr (approximately 1.04 tpy)

Building dimensions = 140'L x 75'W x 15'H
Stack dimensions = 29' Height, 34" diameter
Exit Gas Velocity = 36 fps
Exit Gas Temperature = 80° F

Results

Concentration ($\mu g/m^3$)	STYRENE		METHYLENE CHLORIDE	
	Predicted	AAAQG	Predicted	AAAQG
1-hr (max.)	490.73	3,500	7.16	3,000
24-hr	196.29	1,700	2.86	800
Annual	39.26	n/a	0.57	2.2

6. REGULAR COMPLIANCE REPORTING

The semi-annual report required by the permit and the NESHAP will identify the following:

- Any deviations from the permit limitations, standards and work practices, and any corrective action taken,

- whether the permittee has exceeded the 100 ton threshold that will incur additional requirements from the NESHAP,

- wether the compliance option has changed since the last reporting period, and

- any deviations from the work practice standards of the NESHAP (Table 4).