

A local, family-owned and community-focused business, Glass Alchemy was started over 15 years ago in Portland. We are proud to be a member of this community, and are proud to provide high-quality products for artists all across the world. We energetically comply with all health and safety regulations, and are dedicated to the health and safety of our employees, our neighbors and our customers.

Based on our extensive experience with creating colored art glass while maintaining a safe working environment, we have a number of comments to make regarding the proposed permanent rule. These comments are intended to strengthen the approach being taken by DEQ while ensuring that the rule does not cause more emissions problems than it solves. Glass Alchemy thanks DEQ for taking an active look at our industry, and for allowing us to provide input.

Our comments below are directed toward the three bullet point questions that DEQ placed near the end of the proposed permanent rule.

Bullet #1: Should the rule be modified to apply to sources that make less than 10 tons per year of colored art glass? If so, what threshold would be appropriate? If proposing a new threshold, what is the scientific/risk based rationale for the change?

We believe there are 3 problems with the “10 tons/year” threshold approach used to define scope of applicability for the proposed permanent rule. These problems are discussed in the following bullets, and we then propose an alternative approach:

- The most important problem is that there is no predictable correlation between the amount of finished glass product produced annually by a CAGM and the nature or quantity of airborne emissions generated by those production activities. Different glass types, different colors and different manufacturing processes can result in widely varying emissions from production of exactly the same amount of finished glass product. Taking the approach currently defined in the proposed permanent rule does not provide for a consistent mechanism to identify and regulate those operations that might negatively affect air quality. All stakeholders, including the public, the industrial companies and the government regulators need to use a mechanism for defining scope of applicability that is directly related to air quality impacts affecting public health. The amount of finished glass product is not such a mechanism.
- On top of the fact that the amount of finished glass product produced annually is not a good mechanism to define scope of applicability, the threshold for applying this mechanism appears to be arbitrary. We are aware of no science that would suggest 10 tons/year has any empirical or theoretical foundation. While we understand that DEQ may not have the resources to regulate and apply enforcement leverage against a large number of manufacturers, this reality should not cause the permanent rule to be crippled by definition. Regardless of the mechanism used (as discussed above) or the threshold(s) set against that mechanism, the permanent rule should be written in a manner that allows the best possible outcomes in terms of improved air quality. Artificially limiting the scope of applicability with an arbitrary threshold does not accomplish this.
- There is early evidence that the scope of applicability approach taken in both the temporary rule and the proposed permanent rule is causing a serious unintended consequence that has the potential to worsen air quality instead of improving it. It appears there are numerous small

glass melting operations springing up across Oregon (and many other places in the country). This problem is being exacerbated by the fact that the primary manufacturers of colored art glass are currently unable to supply many of their products to the marketplace and opportunists are seeing the 10 tons/year threshold as a loophole to exploit. Most of these operations are not located in industrially zoned areas, but instead are located in residential neighborhoods with no emissions controls of any type. In the aggregate, this will result in worsening air quality, not improving it. The scope of applicability for the permanent rule should not allow for a loophole to be exploited in such a manner as to worsen air quality rather than improve it.

We believe that the approach to establishing mechanism(s) and threshold(s) defining scope of applicability for the permanent rule should meet several requirements:

- The approach should measure and collect data that are **directly related to emissions that can impact air quality**, as opposed to using a measure that has no consistent correlation to such emissions.
- The approach should be **easy and inexpensive to implement, while not sacrificing accuracy or completeness**. This will reduce the incentive for unscrupulous manufacturers who might try to find ways around the regulation.
- It must **prevent exploitable loopholes from being created**.

We propose that the scope of applicability for the permanent rule be defined using the following approach, fully replacing the 10 tons/year approach currently proposed:

- Any operation (not just a CAGM) that melts any type of glass in one or more furnaces and/or heated crucibles, either for internal use or to be sold to other parties, must provide a standardized annual report to DEQ showing the quantities of the following materials melted during the previous year, with the first report being submitted within 90 days of the permanent rule taking effect. This includes both quantities of these materials used in raw form as well as quantities of these materials present in glass from other manufacturers used in creating the finished product (i.e., clear cullet or recycled glass).
 - (A) Arsenic
 - (B) Cadmium
 - (C) Chromium III
 - (D) Chromium VI
 - (E) Cobalt
 - (F) Lead
 - (G) Manganese
 - (H) Nickel
- An operation that uses more than the following Maximum Allowable Metals Usage (MAMU) amounts of one or more of the listed materials must perform an emissions test, conducted by a contractor approved by DEQ, within 90 days of providing their first annual report. This test will determine grain-loading levels at the point where emissions from the melting operations are vented to the outside atmosphere (see the discussion of grain-loading levels under bullet #3, below). Additional background on how these MAMU levels are established is available in Appendix A of this document.

Maximum Allowed Metals Usage (MAMU)

<u>Compound</u>	<u>lb/year</u>
(A) Arsenic	1.1
(B) Cadmium	3.3
(C) Chromium III	0.4
(D) Chromium VI	0.4
(E) Cobalt	551.8
(F) Lead	82.8
(G) Manganese	496.6
(H) Nickel	22.1

- If the grain-loading levels are acceptable based on the threshold discussed in bullet #3 below then the operation in question will not have to implement any further controls nor do any further testing unless the quantities of the listed materials as shown on their annual reports ever changes by more than 20% from those shown on their initial annual report. If usage does ever change by more than 20% then the operation will be required to perform another emissions test as described above within 90 days to determine if the remainder of the rule now applies.
- If the operation in question is producing emissions at levels greater than the grain-loading thresholds defined by the rule, then the remainder of the permanent rule takes effect. This will result in the operation being required to implement appropriate additional control mechanisms and then demonstrate to DEQ that those control mechanisms are effective in reducing emissions of the listed materials to levels below the grain-loading thresholds defined in the rule.

Bullet #2: Should the rule be modified to apply statewide, rather than only in the Portland AQMA?

Although many people do not realize it, Oregon is home to the vast majority of domestic art glass manufacturers who create glass intended for use by artists in the hot glass, warm glass and lampworking (torchwork) fields. Bullseye and Uroboros serve primarily the hot glass and warm glass markets, while Glass Alchemy, Northstar Glass and Trautman Art Glass serve primarily the lampworking market. Currently all 5 of these manufacturers are located in the greater Portland area. However, we are already seeing numerous small, but growing, operations popping up across the state as well as across the rest of the U.S. These operations are being opportunistic in that the hot glass, warm glass and lampworking markets are unable to purchase many of the colors they want from any of the established companies due to the universal voluntary halt in melting materials that are currently of the most concern to the DEQ. These new operations appear to be run by amateurs with little or no experience in glass chemistry or toxic emissions, they are located in residential areas and they are operating with no emissions controls at all. The opportunity for these operations to continue unabated is obvious, as they each can produce up to 10 tons of art glass annually and are exempt under the currently proposed threshold of applicability for the permanent rule.

There are two unintended side effects of geographically restricting the current temporary rule and, if left as-proposed, the permanent rule to the Portland AQMA:

- These small operations, which are appearing in ever-increasing numbers, will cause much more damage to air quality in the aggregate than the larger companies in the greater Portland area would have ever caused. The small operations appear to be directly venting their furnaces in the air of the residential neighborhoods where they are located.
- The lack of regulation beyond the AQMA will cause the established companies to be at a significant competitive disadvantage in relationship to the new smaller operations, possibly forcing the established companies in the greater Portland area to eventually move outside the AQMA or go out of business altogether.

As a result of these unintended side effects, we propose to DEQ that the geographic scope of the proposed permanent rule must be extended to provide uniform regulation across the entire state. Actually, we propose to DEQ that they begin working in earnest with the U.S. EPA to coordinate similar regulation across the country, as we are seeing indications of the types of small operations described above being launched in many locations outside Oregon. If an effort is not launched at the national level, it may well be that a significant industry born in Oregon, dominated by Oregon companies and providing world-class products to customers around the globe will become extinct due to competitive disadvantage.

Bullet #3: *The temporary rule requires control devices be shown to capture at least 99.0% of incoming particulate matter. DEQ has received indications that, for some facilities, capturing enough particulate matter to show compliance with the 99.0% requirement may require an unmanageably long source test. DEQ seeks comment on whether replacing the 99.0% capture efficiency standard with an emissions standard at the control device outlet would be appropriate for Tier 1 or all facilities and if so, what emissions standard should be chosen. DEQ is considering a control device outlet particulate matter emission standard between 0.001 and 0.01 gr/dscf (grains per dry standard cubic foot of air) based on a range of emissions standards in federal air toxics rules.*

We are in strong support of altering the compliance monitoring metrics to rely solely on emissions as measured at the outlet of the control system. There are multiple reasons for this position:

- The primary goal for the new rules is to improve air quality through controlling emissions of hazardous materials that can impact human health. Spending time and money measuring aspects of the control system that are not directly related to emissions, such as filter efficiency ratios, serves no purpose in monitoring emissions to the environment.
- It is a basic scientific principle that directly measuring phenomenon of concern is far more accurate than measuring different phenomenon and attempting to extrapolate or correlate those measurements in ways as to infer information regarding the phenomenon of concern. In other words, **if you can measure what you actually care about, that is better than measuring something else that is supposedly related to what you care about.**

What we all care about are the actual emissions being released to the environment. Things like filter efficiency, air flow volumes, etc., are irrelevant from the standpoint of monitoring compliance. We propose that the draft permanent rule be changed to require only outlet testing, and that thresholds be established for the particulate grain-loading acceptable at the outlet.

We, in conjunction with our air quality engineering firm, have conducted a survey of existing science and applied practices with respect to setting outlet grain-loading limits for similar types of emission control situations. This research included a survey of the EPA website “Clean Air Technology Center – RACT/BACT/LAER Clearinghouse” (https://www3.epa.gov/ttn/catc1/rblc/htm/welcome_eg.html). Upon request, we can provide DEQ with further documentation regarding the specific knowledge gained from this clearinghouse.

Based on the many similar situations reviewed in the clearinghouse we propose that DEQ establish an emission standard of **0.005** gr/dscf, and remove any form of filter efficiency measurement from the permanent rule.

Appendix A – Analysis to establish Maximum Annual Metal Usage (MAMU) thresholds.

Using the Oregon Ambient Benchmark Concentrations (ABC) and conservative estimates for emission factors and dispersion impact, an estimate of the maximum annual metal usage (MAMU) can be made. The MAMU represents the maximum level of metal usage in an uncontrolled furnace(s) that would not be expected to exceed the ABCs and would not cause a health impact to the surrounding public. For the estimate here, we assumed the uncontrolled furnace(s) were operating within a neighborhood shed or garage, with emissions leaving through a side opening (e.g. garage door). This source was characterized as a non-buoyant volume source being released from the top of the garage door. Using a simple dispersion model, the impact at 10 meters (~30 feet) downwind of the source was determined and scaled to an annual concentration using a standard persistence factor of 0.08. It was also assumed that the fraction of metals are released had the same proportion as total particulate matter released to the total glass mass melted. For this estimate, a worst case of 12.6 g/kg fraction was used based on worst case uncontrolled pressed and blown glass emission factor reported by Ross (1995)¹. Using these assumptions, the MAMU's listed in the emergency rule are shown in Table 1.

Table 1. Maximum Annual Metal Usage (MAMU) estimates for uncontrolled furnaces

Compound	Annual ABC ($\mu\text{g}/\text{m}^3$)	Max. Allowed Metal Usage (lb/yr)
(A) Arsenic	0.0002	1.1
(B) Cadmium	0.0006	3.3
(C) Chromium III	0.00008	0.4
(D) Chromium VI	0.00008	0.4
(E) Cobalt	0.1	551.8
(F) Lead	0.015	82.8
(G) Manganese	0.09	496.6
(H) Nickel	0.004	22.1

¹ Glass Science Tutorial: Lecture #4, Commercial Glass Melting and Associated Air Emission Issues, C. Philip Ross, Prepared for the U.S. Department of Energy Office of Environmental Restoration and Waste Management, January 1995. Table 8.13-1. http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/26/059/26059421.pdf