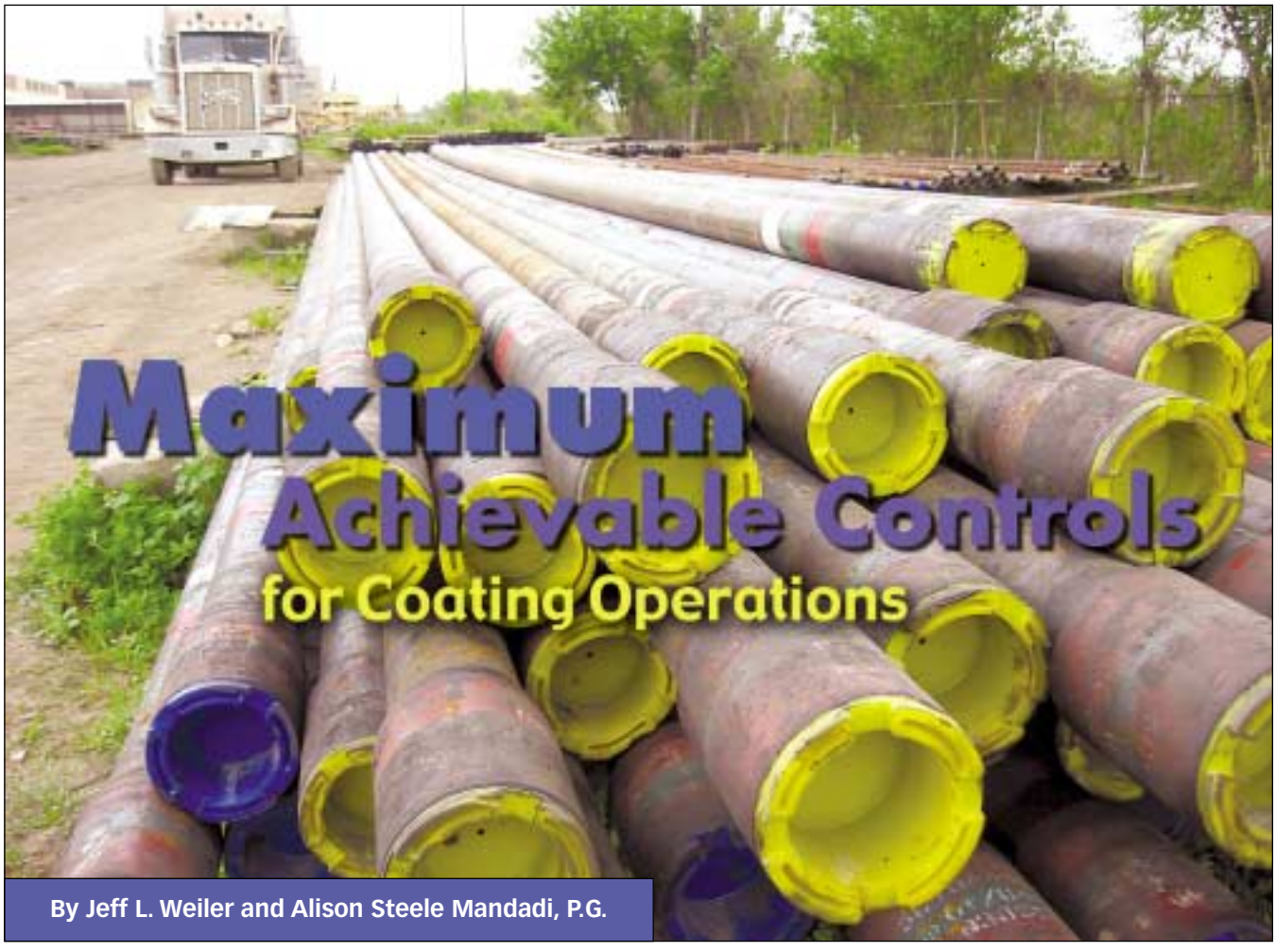

Maximum Achievable Controls for Coating Operations

By Jeff L. Weiler and Alison Steele Mandadi, P.G.

On Jan. 2, 2004, the EPA promulgated a new rule to regulate surface coating operations for an industrial facility category referred to as miscellaneous metal parts and products[1] (MMPP). This new rule requires the use of maximum achievable control technology (MACT) in coatings operations. The rule is used in conjunction with National Emission Standards for Hazardous Air Pollutants, or NESHAP regulations, which are found within the *Code of Federal Regulations*.[2] The intent of these regulations was to reduce the release of hazardous air pollutants (HAPs) by imposing MACT standards on specific equipment (e.g., turbines, engines and boilers), processes (e.g., surface coating) and named operations (e.g., petroleum refining, chemical manufacturing and shipbuilding).

Regulatory applicability

Surface coatings, including those applied for protective, decorative and adhesive purposes, are integral to the manufacturing of automobile parts, heavy equipment, trucks and buses, prefabricated metal buildings, recreational vehicles, metal containers, rail transportation equipment, metal pipe and other consumer and industrial products. Facilities that coat these products are referred to as MMPP within these regulations. Any facility that uses paints, clear coats, high temperature coatings, high performance architectural coatings, magnet wire coatings, rubber-to-metal coatings or extreme performance fluoropolymer coatings on MMPP is subject to this new MACT standard if the site is a "major HAP source." A site is considered "major" if it emits more than 10 tons per year of any single HAP or 25 tons or more per year of all HAPs combined. These limits are referred to as the 10/25 threshold.

These tonnages seem large, but many smaller operators may underestimate their emissions when doing a mental inventory of their processes. Manufacturing can consume coatings rapidly, and many coatings contain in excess of 4 pounds of VOCs per gallon, most or all of which can be HAPs. For these reasons, it does not take long to approach or exceed the limits. Furthermore, emissions calculations must incorporate all operations at the plant, not just those for coating. Additional complexities involving permitting and regulatory applicability can often arise in applications in which co-located processes also release HAPs. Numerous related industrial processes are subject to specific emission standards that were developed prior to the January 2004 MMPP rule (e.g., the coating of large metal appliances or metal components of wood furniture). Each industrial operator needs to evaluate these other rules in light of the facility's processes to ultimately determine how the MMPP rule applies.

Coating processes and emissions

Coatings are applied using a number of generally accepted processes, including spray, roll on, dip and other specialized techniques unique to specific manufacturing activities (e.g., a flood-and-wipe approach for certain linear metal parts). VOCs are emitted during the mixing, application, drying and curing stages of surface coating processes, and smaller amounts are emitted during cleanup, storage and waste handling operations. The VOCs emitted during these processes usually contain organic HAPs, including xylenes, toluene, methyl ethyl ketone, phenol, methyl isobutyl ketone, glycol ethers, styrene, ethyl benzene or cresols/cresylic acid.

In a spray booth, VOCs evaporate from the portion of the coating that adheres to metal parts and from the overspray. The coated parts may then pass through an open (flash-off) area where additional volatiles evaporate from the coating. Finally, the coated parts may require drying or curing time in an oven, or be allowed to air dry, thereby evaporating the remaining VOCs. Roll-on, dip and specialized applications release VOCs in a similar fashion, although the process line may not be as elaborate.

VOCs and HAPs cannot be destroyed during surface coating except through the use of specific control technology, which is not always present in a majority of permitted surface coating operations. For instance, filter media used at the end of a spray booth only remove particulates generated from the overspray; they do not impede the release of VOCs and HAPs into the atmosphere. Similarly, cleaning spray guns, transfer lines, tanks and spray booth interiors often results in the evaporation, but not destruction, of VOCs, which often include HAPs.

HAP emission limits

The new MMPP rule defines limits for HAP emissions generated from these processes based on five subcategories of coatings: General Use Coatings, High Performance Coatings (including both high temperature coatings and high performance architectural coatings), Magnet Wire Coatings, Rubber-to-Metal Coatings and Extreme Performance Fluoropolymer Coatings. Emission limits for all five subcategories are set on a rolling 12-month compliance period, with monthly recordkeeping required in order for the source to demonstrate annual compliance on a monthly basis.

Spray booth operations resulted in evaporation of VOCs from metal parts, but destruction is not achieved without the addition of specific technology (photo by J. Weiler).

The limits in these subcategories are stated in "lb/gal," which stands for pounds of HAP emissions per gallon of coating solids (see **Table 1**). Operators should note that this is not the standard pounds of solvent per gallon of product that is typically listed in material safety data sheets. The quantity of solids within a gallon of coating can change depending on solvent dilution rates. Thus, the MMPP MACT standard will place constraints on mixing operations at many facilities, and solvent-coating mix ratios will need to be monitored closely in order to demonstrate compliance.

Compliance options

The new MMPP rule allows operators to choose among three compliance strategies – two that achieve emission reduction goals via the preferred method of air pollution prevention and one that incorporates emission control technology.

The first compliance option involves substitution of environmentally friendly surface coatings – those formulated with lower VOC content – and non-HAP thinners, additives and cleaners. If each coating meets its regulatory limit and the thinners and cleaners do not contain HAPs, then compliance can easily be demonstrated using formulation data and purchase records.

However, lower VOC formulations have not yet proven to be effective in some industrial applications. If a facility must use thinners or cleaners that contain HAPs, or if some operationally required coatings do not meet the regulatory limits, then compliant and non-compliant coatings can be combined such that a facility's overall emissions will still meet the limits over a 12-month period. Use of this second pollution prevention option increases recordkeeping because each facility must track its consumption in order to demonstrate compliance. However, it does allow for greater

Coating Subcategory	Existing Source Emission Limit (HAP lbs/gal coating solids)	New or Modified Source Emission Limit (HAP lbs/gal coating solids)
General Use	2.6	1.9
High Performance	27.5	27.5
Magnetic Wire	1.0	0.44
Rubber-to-Metal	37.7	6.8
Extreme Performance Fluoropolymer	12.4	12.4

Table 1. Emissions Limits, MMPP MACT Rule

flexibility in operations.

The third and final option entails the installation of a capture system and add-on emissions control device, which may be a combustion or recovery apparatus. A chart published within the MMPP regulation depicts the operating limits that must be followed for each control device and the data that must be collected to demonstrate compliance. Many operators will not elect this option because of up-front capital expenditures and the operation and maintenance costs that it will demand. However, the MMPP MACT standard provides this option for facilities that cannot meet emission reduction goals via air pollution prevention strategies.

Compliance dates

All major HAP sources that incorporate coating operations for miscellaneous metal parts must comply with this new MMPP rule, although compliance deadlines depend on the time at which the particular coatings operation commenced. New coating operations and sources installed after Jan. 2, 2004, must be in compliance with this rule upon startup. However, existing sources have until Jan. 2, 2007 to comply.

Compliance strategies

MMPP-applicable facility state and federal air permits may not address any of the operational restrictions contained in this new rule. Compliance with the new

MMPP MACT standard could have a fundamental impact on the way facilities do business, and there are several factors that operators should examine in order to manage this new regulatory challenge.

First, if a facility that conducts MMPP surface coating operations is not yet a major source of air pollution, careful consideration should be given to operational changes that may influence rule applicability and compliance status. Relatively small increases in production can push a smaller manufacturing facility over the 10/25 threshold, requiring its re-classification as a major HAP source as well as triggering extra permitting requirements and implementation of MACT standards that go with that classification. If a facility does not actually exceed the 10/25 threshold but could theoretically do so (e.g., by increasing the pace or duration of operations), then an operator should weigh the financial costs and benefits of any production increases under consideration.

Second, operators should remember that surface coatings are constantly evolving. MMPP-applicable facilities should explore the possibility of product substitutions and encourage their coatings vendors to continue researching and developing lower VOC products. Competition among coatings vendors is considerable and, in an effort to retain clientele, certain vendors will tailor a coating to a client's specific application (e.g., a lower VOC content that still achieves a specified drying time). Conversely, lower VOC reformulations that cannot meet the needs of a specific application may still be serviceable if the coating process itself is updated (e.g., installation of additional fans, blowers or heaters to shorten drying times, although installation of certain fuel-fired equipment may require construction permitting).

Third, operators who find that they have no choice but to incur the expense of control technology should remember that the additional capital investment may allow increased production or the incorporation of new value-added services. For example, perhaps a new control device could be used to destroy emissions from several industrial processes simultaneously. Facility operations and engineering should be reviewed thoroughly so that additional capacity can be leveraged toward optimizing an MMPP-applicable facility's position in its market. **PE**

References:

1. Volume 69 of the Federal Register, pp. 130-192
2. 40 CFR 63

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