By Drek A. Newton

Jobshops performing chromium electroplating and/or anodizing are required to comply with the National Emission Standards for Hazardous Air Pollutants (NESHAP). A compliance flowchart developed for the Department of Defense can make it easier for managers to understand and comply with the regulations.

any Federal regulations are difficult to read and understand. The NESHAP for Chromium Electroplating and Chromium Anodizing Tanks are no exception.^{1,2} The Naval Facilities Engineering Service Center (NFESC) has prepared a flowchart to help managers of Department of Defense plating facilities quickly comprehend the requirements. The chart contains helpful information for others involved with chromium electroplating or anodizing.

First Things First

- Do you have any existing hard chrome plating tanks? A tank is an existing source if construction or reconstruction began on or before December 16, 1993.
- Do you have (or want to pursue classification as) a small hard chrome plating facility? (Answer this question only if you have an existing hard chrome plating tank.)

A small hard chrome plating facility is one where the "maximum cumulative potential rectifier capacity" (MCPRC) is less than 60 million Ahr/yr. If the total installed rectifier capacity (facility-wide, all hard chrome tank rectifiers) is less than 10,200 A, then your facility is small. Large facilities can be reclassified as small. If your exhaust line, however, complies with the large hard chrome facility standard (0.015 mg/m³), there is no reason to pursue reclassification. A large facility may be reclassified as small if the actual A-hr usage (facility-wide, all hard chrome tank

rectifiers) is less than 60 million A-hr/ yr. The actual A-hr usage must be demonstrated by using one of the following procedures:³

- 1. Use nonresettable A-hr meters and keep monthly records of actual A-hr usage for each 12-month rolling period to show that the facility uses less than 60 million A-hr/yr.
- 2. Accept a federally enforceable MCPRC limit in your Title V permit and maintain monthly records to demonstrate that the limit has not been exceeded.

The Flowchart

The flowchart identifies applicable requirements for each exhaust line that ventilates a hexavalent chromium process tank. Trivalent chromium plating is addressed in §63.342(e) of the rule. Each block is discussed either individually or collectively below.

Start

Analyze each exhaust line that ventilates at least one of the following hexavalent chromium process tanks: hard chromium (HC), decorative chromium (DC), chromium anodize (CA).

Blocks 1–3

The applicable limits can be grouped according to three types of affected processes as shown in the accompanying table. HC tanks must comply with an emission concentration limit. DC and CA must comply with either an emission concentration limit, or a surface tension limit. Some exhaust lines ventilate more than one type. An exhaust line, for example, may ventilate both HC and DC tanks. Likewise, a small HC plating facility may have existing and new HC tanks attached to the same ventilation system. The questions asked in blocks 1 and 2 boil down to one question. "Does the exhaust line ventilate more than one of the three types of affected chromium process?" If so, you must

calculate the allowable emission rate by using the procedures in (63.344(e)(4)).

Blocks 4–10

If you are in block 4, your exhaust line ventilates only one type of chromium process as defined in Table 1. If the tank(s) are all HC, determine the applicable emission limit as follows. If your exhaust line ventilates HC tanks and one or more unaffected tanks or processes, calculate the allowable emission rate using the procedures in §63.344(e)(3). If it ventilates only new HC tanks, the allowable emission concentration is 0.015 mg/m^3 . If it ventilates both new and existing HC tanks and the facility is a large HC facility, 0.015 mg/m³ also applies. If it ventilates only existing HC tanks and the facility is a small HC facility, the allowable emission concentration is 0.030 mg/m^3 .

Blocks 11-14

If you are in block 11, your exhaust line ventilates only type 3 tanks-all DC, all CA, or a combination of both DC and CA tanks. You must comply with either an emission concentration limit or a surface tension limit. It is important to note that if you choose to comply with an emission concentration limit, you must also comply with operation and maintenance, emission testing, monitoring, and recordkeeping requirements. If you choose to comply with the surface tension limit, the additional requirements do not apply. You may even want to dismantle your existing control device to save energy and wastewater treatment costs. If you decide to comply with an emission concentration limit, determine the applicable emission limit as follows: If your exhaust line ventilates other unaffected tanks or processes, calculate the allowable emission rate using the procedures in 63.344(e)(3). Otherwise, the applicable emission standard is 0.010 mg/m³.



Chromium NESHAP Compliance Flowchart

Blocks 15-17

You must determine if the exhaust line will comply with the applicable emission concentration limit.

Caution! Your state or local regulatory agency may Тур implement or already have stricter requirements. New sources should already be in Тур compliance. Baseline chromium emission test Тур data, however, are needed to evaluate existing sources. Past test data may be adequate to evaluate exhaust line compliance. The data should be adequate if tests were performed during normal or maximum operating conditions and there have not been major changes to the process tanks or ventilation system. If you do not have representative emission test data, contract or perform an emission test immediately using EPA Method 306 or Method 306A.4 If you expect to comply, consider coordinating the test with the permitting authority. If results show compliance, the permitting authority may allow the baseline test to count as the final performance test.

If your exhaust line ventilates only type 3 tanks (DC, CA) and does not comply with the emission limit, reconsider complying with the surface tension standard. Otherwise, pursue compliance with the emission concentration limit.

Blocks 18 and 19

If your exhaust line ventilates only type 3 processes (DC, CA) and you decide to comply with the 45 dyne/cm surface tension standard, compliance deadlines are shown in block 18. You must purchase chemical tank additives for surface tension control and a surface tension measurement device.

Block 20

Your emission test data show that your exhaust line does not comply with the allowable emission concentration. Install maximum achievable control technology or achieve equivalent emission control before the applicable compliance deadline shown in block 20. If necessary, apply for a one-year compliance extension. ⁵ To comply with emission concentration limits, options include:

Chromium NESHAP Limits Grouped by Type of Process

Process Type	Affected Chromium Process Tanks	Emission Concentration Limit (mg/m ³)	Alternative Surface Tension Limit (dynes/cm)
Туре 1	Existing hard chrome tanks at small hard chrome plating facilities.	0.030 mg/m ³	N/A
Type 2	All other hard chrome tanks.	0.015 mg/m ³	N/A
Type 3	All decorative chrome and chromium anodize tanks.	0.010 mg/m ³	45

- Use a pollution prevention solution and switch to a trivalent or nonchromium process.
- Install new air pollution control equipment.
- Refurbish or retrofit existing control devices to achieve equivalent emission control.
- Use process modifications to reduce emissions at the tank.

Option 1 is the environmentally correct solution and should be implemented if cost-effective alternatives are available.

Option 2 is your best choice if your control device is working properly, but substantially exceeds the emission limit. Consider options 3 and 4 if you are on the borderline of complying with the limit.

Option 1: There are viable pollution prevention alternatives to chromium process tanks.⁷ Emerging technologies also appear promising.

Option 2: The 0.015 mg/m3 emission limit is based on the performance of composite mesh-pad mist eliminators. The 0.030 mg/m³ emission limit is based on packed-bed scrubber performance. If you must install a new control device, select a device that will comply with both EPA and California standards. In eight years, EPA must determine if these emission limits are adequate to protect the public. If inadequate, EPA will issue stricter limits.

Option 3: Your existing control device may just need fixing or retrofitting. Gaps in the packing media or faulty spray headers can reduce control efficiency. In some cases, you may be able to retrofit existing non-composite mesh-pad devices with new composite mesh-pads.

Option 4: Process modifications include chemical additives (foam blankets and surfactants), floating plastic balls, and elimination of air agitation. In order to guarantee a reduced emission concentration using process modifications, the control efficiency of the modifications must exceed the efficiency of the air pollution control device. EPA's data shows that packed-bed scrubbers and mesh-pad mist eliminators are constant emission concentration control devices. This means that the chromium emission concentration at the outlet of these devices is independent of the inlet chromium concentration. For example, if an existing control device is already achieving 95 percent control efficiency, reducing tank emissions by 85 percent will not substantially reduce the stack emission concentration. How can this be? The size of the chromium mist that escapes the additive-controlled tank is much smaller than the mist from an additive-free tank. The efficiency of a chromium control device decreases with decreasing particle size.

If the emission reduction efficiency achieved by the process modifications exceeds the efficiency of the control device, the stack emission concentration will be reduced. For example, if your control device efficiency is 85 percent and you use a chemical additive that reduces tank emissions by 98 percent, you will reduce the stack emission concentration.

In 1989, the Metal Finishing Association of Southern California studied the emission reduction potential of process modifications on the uncontrolled emissions from HC tanks.⁶ Results show that emissions were reduced 98–99 percent by using a foam blanket, plastic balls and eliminating air agitation, simultaneously. Emissions were also reduced by 86–87 percent by using plastic balls and eliminating air agitation. Chemical manufacturers claim that new and improved chemical additives (foam blanks and surfactants) provide substantially greater emission control.

Block 21

If you are using air pollution controls to comply with an emission concentration limit, certain parameters must be monitored daily, beginning on the compliance deadline or immediately after the performance test, which ever is later. Monitor the pressure drop across all control devices and packedbed scrubber inlet velocity.

Block 22

(Note: Submit all of the following notifications and reports to both the delegated permitting authority, if applicable, and to the EPA regional office, unless directed otherwise by the EPA regional office.)

All source owners complying with an emission standard must contract or perform a performance emission test using EPA Method 306 or 306A by 180 days after the applicable compliance deadline.⁸ Be sure to establish velocity and pressure drop parameters during the emission test as required by §63.344(d). You must send the permitting authority a "notification of performance test" at least 60 days before the test date. You must also prepare a site-specific test plan in accordance with §63.344(a). The permitting authority may require you to submit the test plan for approval.

Block 23

Prepare and submit an "initial notification report" for existing and new tanks containing the information listed in §63.347(c). The initial notification report for existing tanks was due July 24, 1995.

Block 24

Prepare and implement the O&M plan, described in §63.342(f)(3), by the applicable compliance deadline. Retain this document on-site. Also begin complying with the recordkeeping requirements outlined in §63.346.

Block 25

Prepare and submit a "notification of compliance status" per §63.347(e). If you are complying with an emission concentration limit, submit this notification and the performance test results 90 days after the performance test is performed. If a compliance test is not required (*e.g.*, for those complying with a surface tension standard), submit this notification within 30 days after the compliance deadline.

Block 26: The Endless Loop

Submit "compliance status reports" semiannually or quarterly, according to the §63.347(g) and (h).

Other Information Resources

- EPA, A Guidebook on How to Comply with the Chromium Electroplating and Anodizing National Emission Standards for Hazardous Air Pollutants, EPA-453/B-95-001, April 1995. This guide contains reporting and recordkeeping forms, compliance cost, and other useful information.
- D. A. Newton, "How to Obtain Quality Chromium Emission Test Results from Chrome Plating and Chromic Acid Anodizing Operations," A&WMA 87th Annual Meeting, 94-TA27.05. This paper describes emission test procedures that will improve data quality and reduce costs.
- EPA, "Technology Transfer Network (TTN) Bulletin Board System (BBS)." Wordperfect 5.1 files of the final NESHAP and EPA's compliance guide are available for downloading from this BBS. The TTN can be accessed by modem at 919/541-5742, or by telnet at *ttnbbs.rtpnc.epa.gov*. For more information on how to access the TTN, call 919/541-5384.

References

- 1. *Federal Register*, Vol. 60, p. 4948, January 25, 1995.
- 2. Code of Federal Regulations, Vol. 40, Part 63, Subpart N (40 CFR 63 Subpart N).
- 3. 40 CFR 63 Subpart N §63.342(c)(2)(i).
- 4. 40 CFR 63 Appendix A.
- 5. 40 CFR 63 Subpart A §63.6(i)(3).
- 6. "Test Report: Evaluation of the Impact of Selected Process Conditions on Hexavalent Chromium Emissions from Hard Chrome

Plating Tanks," Metal Finishing Association, February 10, 1989.

- 7. Dr. J. H. Lindsay, *Plating and Surface Finishing*, **82**, No. 2, p.19 (1995).
- 8. 40 CFR 63 Appendix A.

About the Author



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