WASHINGTON STATE DEPARTMENT OF ECOLOGY

Chromium Electroplating And Anodizing Tanks

WHAT YOU NEED TO KNOW TO COMPLY

Ecology Fact Sheet *Publication #97-213g*

If you own or operate a Hard or Decorative Chromium Plating or Anodizing Tank you are required to comply with the National Emission Standards for Hazardous Air Pollutants (NESHAP), which has been written for these processes as mandated by the 1990 Clean Air Act. In general, this means you must:

- ***Limit tank emissions***
- ***Perform monitoring***
- ***Establish work practice standards***
- ***Keep records***
- ***Perform initial testing; and***
- ***Submit reports***

***The* CLEAN *Air Act* & SMALL BUSINESS**

The 1990 Clean Air Act (CAA) directs the U.S. Environmental Protection Agency (EPA) to regulate emissions into the air of 189 toxic chemicals. To control emissions of these chemicals, the EPA issues National Emission Standards for Hazardous Air Pollutants (NESHAPs) for particular industries or industrial processes.

On Jan. 25, 1995, the EPA finalized regulations known as the NESHAP for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks. There is strong evidence suggesting that hexavalent chromium causes lung cancer, and that trivalent chromium, though less toxic, can accumulate in the lungs, which could result in decreased lung function after extended exposure. Following are descriptions of the regulation's requirements:

Limit Tank Emissions

Most emissions from chromium electroplating and chromium anodizing baths are found in the fine mists formed by the process. Therefore, reducing mist reduces emissions. This can be achieved through chemical or mechanical control methods. To comply with this NESHAP *(see **Page 3** for emission limits)*, you may choose from the following control methods:

- Composite mesh pad (CMP) system;
- Packed bed scrubber;
- Fiber-bed mist eliminator;
- Wetting agent-type fume suppressant; and
- Foam blanket.

Perform Ongoing Monitoring

Continuous compliance with the regulation is demonstrated through ongoing monitoring of the operating parameters established during initial testing. The monitoring requirements vary depending on the type of emission reduction techniques that you use. *(See **Page 3** for the specific requirements.)*

Establish Work Practice Standards

These standards are better known to industry as Inspection, Operation and Maintenance Plans. Unless a tank is used for decorative plating and contains a trivalent chromium bath with a surfactant, you will need to develop and implement such plans. Here is a brief outline of how to develop them:

- Specify the operation and maintenance criteria for the tank, air pollution control device and monitoring equipment.
- Include a step by step procedure for identifying malfunctions and reporting them to supervisory personnel.
- Specify procedures for preventing malfunctions.

Keep Records and Submit Reports

This regulation requires that sources keep records for five years to document compliance. These include inspection records, equipment maintenance records, records of malfunctions and exceedances, performance test results, and monitoring data. If you operate a decorating chromium plating tank that uses a trivalent chromium bath, you only need to keep records of bath component purchases. *(A Summary of Reporting Requirements and submission dates are outlined on **Page 4**.)*

Achieving Compliance Through Pollution Prevention

Alternative Technologies

Physical Vapor Deposition (PVD)

In this process, a coating material is evaporated, then condensed to a solid onto the work piece. PVD coatings typically have excellent abrasion and corrosion resistance, and satisfactory impact strength, and exhibit higher temperature durability than those applied by electroplating. The process is used in equipment coating applications. Possible drawbacks for small firms include capital costs, quality control issues, and cooling water requirements.

High Velocity Oxy-Fuel Thermal Spray Technology (HVOF

This is a dry process producing dense metallic coatings with physical properties surpassing hard chrome plating. In HVOF, a metal-containing powder is melted and propelled toward the work piece at speeds of up to 4,000 feet per second via carrier gases such as argon. Advantages include a significant volume reduction of: 1) rinse waters, 2) toxic air emissions from chrome-plating bath containers, and 3) hazardous waste streams. Over-spray can be captured and recycled. Drawbacks are similar to PVD system.

Cathodic Arc Chromium Coating

Still under development, this technique is designed to produce a high rate of chromium deposition onto a work piece while avoiding the toxic chrome compounds of plating baths. The technique augments the flux to a rate exceeding plating, yet produces low-stress, thick coatings on parts with complicated shapes.

Pollution Prevention Success Story

Amplate, Inc. in Charlotte, N.C., specializes in cadmium, nickel, zinc and decorative/hard chrome electroplating using black oxidizing, chromate conversion, passivation, and nickel electrolysis. Amplate implemented the following pollution prevention measures.

- **REUSE –** Installed countercurrent rinsing and ion exchange technology for rinse water reuse
- **BATH LIFE EXTENSION –** Extended alkaline cleaning bath life from 3 to 30 months through in-tank filtration and acid pickle bath life to 4 years through metals coagulation
- **CLOSED-LOOP RECYCLING –** Used electro-coagulation rinse water recycling for alkaline cleaners and acid pickle rinses.

RESULTS: Elimination of wastewater discharges, 100 percent reuse of acid baths, and 88 percent reduction of hazardous waste disposal costs. Call Amplate at 704-597-0688 for information.

Alternative Coatings

Sol-Gel-Derived Composite Coating

By incorporating thermally active organic materials into porous alumina coating, this pre-treatment process for adhesive bonding to aluminum alloys has the potential to eliminate the priming step in conventional anodizing.

Polymer Resist/Masking

The use of a conducting polymer as a replacement for the resist and mask processes can eliminate many chrome-plate preparation steps and wastes. The exposed regions polymerize, permanently adhering to the plate and replacing the chrome. Unexposed monomer can be removed with water.

Alodine 2000

Marketed by Parker Amchem, this non-chromate conversion coating has successfully passed performance requirements of MIL-C-5541E/MIL-C-81706 specifications for Class 3 coatings, including corrosion resistance, contact electrical resistance, and paint adhesion. ■

Who to Call for Help

Through the Washington Department of Ecology's Compliance Assistance Office, non-enforcement assistance is available for small businesses with air quality questions. The purpose of the program is to:

- Explain air quality regulations and recommend ways to comply.
- Provide free, on-site technical assistance visits.
- Help businesses estimate air pollution emissions;
- Refer businesses to needed resources; and
- Provide information on potential sources of financing.

For more information, contact:
Compliance Assistance Office
Bernard Brady, 360-407-6803
bbra461@ecy.wa.gov
http://www.wa.gov/ecology

Produced by the Pacific Northwest Pollution Prevention Resource Center, Seattle, Wash.
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This fact sheet is intended for general reference only; it is not a complete statement of the technical or legal requirements associated with the CAA.
October 1997

Chrome Emission Limits

Affected Tanks	Emission Limits	Emissions Reduction Technique
Hard Chrome Electroplating Tank (small existing)*	0.03 mg/dscm	Packed-Bed Scrubber
Hard Chrome Electroplating Tank (all others)	0.015 mg/dscm	Composite Mesh-Pad System
Decorative Plating Using Chromic Acid Bath	0.01 mg/dscm or 45 dynes/cm	Fume Suppressant with Wetting Agent
Decorative Plating Using Trivalent Chromium Bath	Only subject to record-keeping and reporting	
Chromium Anodizing Tank	0.01 mg/dscm or 45 dynes/cm	Fume Suppressant with Wetting Agent

* Small tanks have a facility maximum potential rectifier capacity of less than 60 million ampere-hours per year. Existing tanks were installed before Dec. 31, 1993.

dynes/cm = dynes per centimeter

mg/dscm = milligrams total chromium per dry standard cubic meter of ventilation air

Summary of Monitoring Requirements

Emissions Reduction Technique	What to Monitor	How Often
Composite Mesh-Pad (CMP) System	Pressure drop across CMP system	Once daily
Packed-Bed Scrubber (PBS)	Inlet velocity pressure and pressure drop across scrubber	Once daily
PBS/CMP System	Pressure drop across CMP system	Once daily
Fiber-Bed Mist Eliminator (FBME)	Pressure drop across FBME and across upstream control used to prevent unplugging	Once daily
Wetting Agent-Type Fume Suppressant	Bath surface tension	Once every 4 hours
Foam Blankets	Foam thickness	Once hourly

Summary of Reporting Requirements

All Tanks

Requirement	Report Due By:
Initial notification	July 24, 1995

Decorative Plating with Chromic Acid Bath

Requirement	Report Due By:
Compliance Deadline	Jan. 25, 1996
Testing Deadline	July 23, 1996
Performance Test Notification	At least 60 days before test
Compliance Status Notification	Within 90 after test, or by Feb. 24, 1996 if test not required
Test Results Notification	Within 90 days after test

Decorative Plating with Trivalent Chromium Bath

Requirement	Report Due By:
Compliance Status	Feb. 24, 1996
Process Change Notification	Within 30 days after change

Hard Chrome Plating, Chrome Anodizing Tanks

Requirement	Report Due By:
Compliance Deadline	Jan. 25, 1997
Testing Deadline	July 24, 1997
Performance Test Notification	At least 60 days before test
Compliance Status Notification	Within 90 days after test or by Feb. 24, 1997 if test not required
Test Results Notification	Within days after test