



Department of Environmental Quality
Air Quality Program

GENERAL
AIR CONTAMINANT DISCHARGE PERMIT
ASSESSMENT REPORT

DECORATIVE CHROMIUM ELECTROPLATING

SOURCE DESCRIPTION AND QUALIFICATION

1. This General Permit is designed to regulate air contaminant emissions from decorative chromium electroplating tanks.
2. The facilities assigned to this General Permit have no other air pollution sources which require regulation beyond that specified in this permit, or have other pollution sources that also qualify for General Permits. Facilities eligible for assignment to this permit have not experienced recurring or serious compliance problems.

ASSESSMENT OF EMISSIONS

3. Facilities assigned to this General Permit are sources of hexavalent chromium emissions.
4. The Department has assessed the level of emissions of all air pollutants from these facilities and determined that facilities complying with the operational limits and monitoring requirements of this permit have emission levels below the established levels of concern stated in Tables 2 and 3 of OAR 340-200-0020.

SPECIFIC AIR PROGRAM APPLICABILITY

5. This permit incorporates the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations in 40 CFR Part 63, Subpart N (Hard and Decorative Chromium Electroplating and Chromium Anodizing) for decorative chromium electroplating. EPA promulgated the NESHAP on January 25, 1995, and several amendments and/or corrections since initial promulgation. The NESHAP, including amendments and corrections through July 1, 2005, were adopted as state rules in OAR 340-244-0510.

NESHAP APPLICABILITY

6. The NESHAP applies to each chromium electroplating or chromium anodizing tank at facilities performing hard chromium electroplating, decorative chromium electroplating, or chromium anodizing.
7. Process tanks associated with a chromium electroplating or chromium anodizing process, but in which neither chromium electroplating nor chromium anodizing is taking place, are not subject to the provisions of the NESHAP. Examples of such tanks include, but are not limited to rinse tanks, etching tanks, and cleaning tanks. Likewise, tanks that contain a chromium solution, but in which no electrolytic process occurs, are not subject to this subpart. An example of such a tank is a chrome conversion coating tank where no electrical current is applied.

NESHAP MACHINE DEFINITIONS AND CLASSIFICATION:

8. The NESHAP splits chromium electroplating into two categories:
 - a. Decorative chromium electroplating: The process by which a thin layer of chromium (typically 0.003 to 2.5 microns) is electrodeposited on a base metal, plastic, or undercoating to provide a bright surface with wear and tarnish resistance. In this process, the part(s) serves as the cathode in the electrolytic cell and the solution serves as the electrolyte. Typical current density applied during this process ranges from 540 to 2,400 Amperes per square meter (A/m^2) for total plating times ranging between 0.5 to 5 minutes. Decorative chromium electroplating can be performed using either a chromic acid (or hexavalent chromium) bath or a trivalent chromium bath.
 - b. Hard chromium electroplating: A process by which a thick layer of chromium (typically 1.3 to 760 microns) is electrodeposited on a base material to provide a surface with functional properties such as wear resistance, a low coefficient of friction, hardness, and corrosion resistance. In this process, the part serves as the cathode in the electrolytic cell and the solution serves as the electrolyte. Hard chromium electroplating process is performed at current densities typically ranging from 1,600 to 6,500 A/m^2 for total plating times ranging from 20 minutes to 36 hours depending upon the desired plate thickness.
9. The NESHAP defines chromium anodizing as: The electrolytic process by which an oxide layer is produced on the surface of a base metal for functional purposes (e.g., corrosion resistance or electrical insulation) using a chromic acid solution. In chromium anodizing, the part to be anodized acts as the anode in the electrical circuit, and the chromic acid solution, with a concentration typically ranging from 50 to 100 grams per liter (g/L), serves as the electrolyte.

EMISSIONS

10. Particulate matter (PM):
 a. Default emission factors from AP42:

Process	Total PM (lb/A-hr)	EF Rating
Decorative Chromium Electroplating	9.848E-6	E
-- With fume suppressant	3.568E-8	E

- b. Annual potential to emit in lbs/yr for PM is calculated as follows:

$$E_{PM} = \sum_{i=1}^n (EF_i \times RC_i \times 8760 \text{hrs/yr})$$

where:

- E_{PM} = PM emissions, in lbs/yr
 EF_i = Emission factor for electroplating tank i, from table above or from a performance test on electroplating tank i, in lbs/Amperes-hr
 RC_i = Rectifier capacity for electroplating tank i, in Amperes

- c. Actual PM emissions in lbs/yr are calculated as follows:

$$E_{PM} = \sum_{i=1}^n (EF_i \times RU_i)$$

where:

- E_{PM} = PM emissions, in lbs/yr
 EF_i = Emission factor for electroplating tank i, from table above or from a performance test on electroplating tank i, in lbs/Amperes-hr
 RU_i = Actual rectifier usage for electroplating tank i over a 12-month period, in Amperes-hr

11. Hazardous Air Pollutants (HAPs):

- a. Default emission factors from AP42:

Process	Chromium Compounds (lb/A-hr)	EF Rating
Decorative Chromium Electroplating	4.710E-6	D
-- With fume suppressant	1.713E-8	D

- b. Annual potential to emit in lbs/yr for chromium compounds is calculated as follows:

$$E_{cr} = \sum_{i=1}^n (EF_i \times RC_i \times 8760 \text{hrs/yr})$$

where:

- E_{cr} = Chromium emissions, in lbs/yr
 EF_i = Emission factor for electroplating tank i, from table above or from a performance test on electroplating tank i, in lbs/Amperes-hr
 RC_i = Rectifier capacity for electroplating tank i, in Amperes

- c. Actual chromium compound emissions in lbs/yr are calculated as follows:

$$E_{cr} = \sum_{i=1}^n (EF_i \times RU_i)$$

where:

- E_{cr} = Chromium emissions, in lbs/yr
 EF_i = Emission factor for electroplating tank i, from table above or from a performance test on electroplating tank i, in lbs/Amperes-hr
 RU_i = Actual rectifier usage for electroplating tank i over a 12-month period, in Amperes-hr

NESHAP EMISSION STANDARDS:

12. The NESHAP contains three compliance approaches for decorative electroplating tanks:
- a. Add-on controls: The following is required for this compliance option:
 - i. Limit the concentration of total chromium, emitted to the atmosphere, to 0.01 mg/dscm.
 - ii. Follow specific work practices to ensure that control system and monitoring equipment are maintained and operated properly.
 - iii. Follow additional work practices that include quarterly inspections of control devices, ductwork, and monitoring equipment.
 - iv. Develop an operation and maintenance (O&M) plan.
 - b. Use of wetting agents: The following is required for this compliance option:
 - i. Limit the surface tension of the electroplating bath to 45 dynes per centimeter using wetting agents.
 - ii. Follow specific work practices to ensure that monitoring equipment are maintained and operated properly.
 - iii. Develop an operation and maintenance (O&M) plan.
 - c. Use trivalent chromium bath containing a wetting agent as a bath component:
 - i. Maintain records of batch component purchases.

NESHAP COMPLIANCE DEMONSTRATION

13. Add-on Controls:
- a. Initial Compliance:

- i. Perform an initial performance test.
 - ii. Establish operating parameters to be monitored in order to ensure continuous compliance.
 - b. Continuous Compliance:
 - i. Monitor operating parameters to demonstrate continuous compliance.
 - ii. Maintain the following records for 5 years:
 - A. Inspection records;
 - B. Equipment maintenance records;
 - C. Records of occurrence, duration, and cause of excess emissions;
 - D. Performance test results;
 - E. Monitoring data.
14. Use of wetting agents:
- a. Initial Compliance: Measure surface tension.
 - b. Continuous Compliance:
 - i. Measure surface tension to demonstrate continuous compliance.
 - ii. Maintain the following records for 5 years:
 - A. Equipment maintenance records;
 - B. Records of occurrence, duration, and cause of excess emissions;
 - C. Surface tension measurement data.
15. Use of trivalent chromium bath containing a wetting agent as a bath component:
- a. Initial Compliance: Maintain records of batch component purchases.
 - b. Continuous Compliance: Maintain records of batch component purchases.

NESHAP REPORTING:

16. The NESHAP specifies the information required for each report. Report forms are also available through DEQ.
- a. Initial Notification Report: This report is used to notify EPA and DEQ that a source is subject to the NESHAP. It also provides some preliminary facility and tank information. It is due according the following schedule.
 - i. Existing sources: Was due July 24, 1995.
 - ii. New sources: Is due as soon as possible before construction is scheduled to commence.
 - b. Notification of Compliance Status Report: This report is due shortly after the compliance date and is used to demonstrate to EPA and DEQ that the tank is in compliance with the NESHAP. It includes information on the how compliance was achieved, how it was initially demonstrated and the necessary ongoing demonstration measurements. It is due according to the following schedule.
 - i. Existing sources using add-on controls: Was due October 22, 1996.
 - ii. Existing sources using wetting agents: Was due February 24, 1996.
 - iii. New sources using add-on controls: Is due 270 days after startup.
 - iv. New sources using wetting agents: Is due 30 days after startup.

- c. Ongoing Compliance Status Report: This report is required to be prepared annually and submitted to DEQ. This report is not required for tanks using trivalent chromium baths that contain a wetting agent as a bath component.
- d. Exceedance Report: The Ongoing Compliance Status Report should be prepared semiannually and submitted if:
 - i. The total duration of excess emissions exceeds 1% of the total operating time for the reporting period; and
 - ii. The total duration of malfunction of the add-on air pollution control device and monitoring equipment exceeds 5% of the total operating time.

COMPLIANCE ASSURANCE

- 17. Permittees are required to maintain records of fuel use, upset conditions, and complaints received at the facility. These items are reported to DEQ annually.
- 18. DEQ staff members perform site inspections of the permitted facilities on a routine basis, and more frequently if complaints are received.

REVOCAION OF ASSIGNMENT

- 19. Any facility that fails to demonstrate compliance, generates complaints, or fails to conform to the requirements and limitations contained in the permit may have its assignment to the General Permit revoked. The facility would then be subject to a higher, more stringent level of permitting.

PUBLIC NOTICE

- 20. General Air Contaminant Discharge Permits are incorporated into the Oregon Administrative Rules by reference and are part of the State Implementation Plan. As part of the rulemaking process, the public will be provided at least 30 days to submit written comments. DEQ will review any comments and may modify the permits in response to the comments. The final permits will be issued as orders signed by the DEQ air quality administrator.