



Department of Environmental Quality  
Air Quality Program

**GENERAL**  
**AIR CONTAMINANT DISCHARGE PERMIT**  
**ASSESSMENT REPORT**

**HARD CHROMIUM ELECTROPLATING**

SOURCE DESCRIPTION AND QUALIFICATION

1. This General Permit is designed to regulate air contaminant emissions from hard chromium electroplating tanks.
2. If there are other emissions activities occurring at the facility besides those regulated by this permit, the facility may be required to obtain a Simple or Standard ACDP or General ACDP Attachment(s), if applicable.
3. Facilities eligible for assignment to this permit have not experienced recurring or serious compliance problems.

ASSESSMENT OF EMISSIONS

4. Facilities assigned to this General Permit are sources of hexavalent chromium emissions.
5. DEQ 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 OAR 340-200-0020.

SPECIFIC AIR PROGRAM APPLICABILITY

6. 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 hard chromium electroplating. EPA promulgated the NESHAP on January 25, 1995, and several amendments and/or corrections since initial promulgation. EPA finalized a residual risk and technology review on September 19, 2012. That review resulted in revisions to the emission limits for total chromium, addition of housekeeping requirements to minimize fugitive emissions, and a requirement to phase-out the use of perfluorooctane sulfonic acid based fume suppressants. The NESHAP, including amendments and corrections through July 1, 2013, were adopted as a state rule in OAR 340-244-0510.

### NESHAP APPLICABILITY

7. The NESHAP applies to each chromium electroplating or chromium anodizing tank at facilities performing hard chromium electroplating, decorative chromium electroplating, or chromium anodizing.
8. 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:

9. 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.
10. The NESHAP classifies facilities that perform hard chromium electroplating as follows:
  - a. Large, hard chromium electroplating facility: A facility that has a maximum cumulative potential rectifier capacity greater than or equal to 60 million ampere-hours per year.
  - b. Small, hard chromium electroplating facility: A facility that has a maximum cumulative potential rectifier capacity less than 60 million ampere-hours per year.

11. The NESHAP defines maximum cumulative potential rectifier capacity as the summation of the total installed rectifier capacity associated with the hard chromium electroplating tanks at a facility, expressed in amperes, multiplied by the maximum potential operating schedule of 8,400 hours per year and 0.7, which assumes that electrodes are energized 70% of the total operating time.
12. The emission standards in the NESHAPs are more stringent for hard chromium electroplating facilities classified as large. The NESHAP allows a hard chromium electroplating facility to change its classification from large to small by demonstrating that actual rectifier utilization for the facility is less than 60 million ampere-hours per year. Initial demonstration must be made prior to January 25, 1997 and the actual rectifier utilization must be maintained below 60 million ampere-hours per year after January 25, 1997. If the actual rectifier utilization exceeds 60 million ampere-hours per year after January 25, 1997, the facility will be classified as large.

EMISSIONS

13. Particulate Matter (PM):
  - a. Emission factors from AP42:

Process	Total PM (lb/A-hr)	EF Rating
Hard Chromium Electroplating	3.568E-5	C
-- With moisture extractor	3.996E-6	E
-- With polypropylene (poly) balls	1.256E-5	E
-- With fume suppressant	4.853E-6	E
-- With fume suppressant and poly balls	8.992E-7	E
-- With packed-bed scrubber	6.280E-7	E
-- With packed-bed scrubber, fume suppressant, and poly balls	7.850E-8	E
-- With chevron-blade mist eliminator	2.569E-6	E
-- With mesh-pad mist eliminator	3.711E-7	E
-- With packed-bed scrubber and mesh-pad eliminator	9.563E-10	E
-- With composite mesh-pad mist eliminator	1.142E-7	E

b. Annual PTE 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 is 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

14. Hazardous Air Pollutants (HAPs):

a. Emission factors from AP42:

Process	Chromium Compounds (lb/A-hr)	EF Rating
Hard Chromium Electroplating	1.713E-5	B
-- With moisture extractor	1.998E-6	D
-- With polypropylene (poly) balls	5.995E-6	D
-- With fume suppressant	2.284E-6	D
-- With fume suppressant and poly balls	4.282E-7	D
-- With packed-bed scrubber	2.997E-7	D
-- With packed-bed scrubber, fume suppressant, and poly balls	3.711E-8	D
-- With chevron-blade mist eliminator	1.256E-6	D
-- With mesh-pad mist eliminator	1.713E-7	D
-- With packed-bed scrubber and mesh-pad eliminator	4.567E-10	E
-- With composite mesh-pad mist eliminator	5.424E-8	D

- b. Annual PTE 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 emissions in lbs/yr is 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:

##### 15. Emission Limits:

- a. New hard chromium electroplating tanks: Limit the concentration of total chromium emitted to the atmosphere to 0.006 mg/dscm.
- b. Existing hard chromium electroplating tanks located at a large, hard chromium electroplating facility: Limit the concentration of total chromium emitted to the atmosphere to 0.011 mg/dscm.
- c. Existing hard chromium electroplating tanks located at a small, hard chromium electroplating facility: Limit the concentration of total chromium emitted to the atmosphere to 0.015 mg/dscm.
- d. If a chemical fume suppressant containing a wetting agent is used: Limit the surface tension of the electroplating or anodizing bath contained within the affected tank to exceed 40 dynes/cm as measured by a stalagmometer or 33 dynes/cm as measured by a tensiometer, at any time during tank operation.
- e. Enclosed tanks (in lieu of complying with the above emission limits): Limit the total chromium emissions to rate determined by using the calculation procedure in the permit.

- f. After September 21, 2015: Do not add PFOS-based fume suppressants to any affected open surface hard chromium electroplating tank.
16. Work Practices Standards:
- a. Follow specific work practices to ensure that control system and monitoring equipment are maintained and operated properly.
  - b. Follow additional work practices that include quarterly inspections of control devices, ductwork, and monitoring equipment.
  - c. Develop an operation and maintenance (O&M) plan.
17. Housekeeping Standards: Follow specific housekeeping standards to minimize fugitive emissions.

#### NESHAP COMPLIANCE DEMONSTRATION

18. Initial Compliance:
- a. Perform an initial performance test.
  - b. Establish operating parameters to be monitored in order to ensure continuous compliance.
19. Continuous Compliance:
- a. Monitor operating parameters to demonstrate continuous compliance.
  - b. Maintain the following records for 5 years:
    - i. Records of actual rectifier utilization (if required);
    - ii. Inspection records;
    - iii. Equipment maintenance records;
    - iv. Malfunction records;
    - v. Records to demonstrate compliance with operation and maintenance plan;
    - vi. Records of fume suppressant usage, manufacturer, and product name;
    - vii. Records of occurrence, duration, and cause of excess emissions;
    - viii. Performance test results;
    - ix. Monitoring data.

#### NESHAP REPORTING:

20. 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 to the following schedule.

- i. 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. New sources using add-on controls: Is due 270 days after startup.
- c. Performance test report: This report is required within 60 days of completing a performance test. EPA requires this report to be submitted via EPA's WebFIRE database by using the Compliance and Emissions Data Reporting Interface (CEDRI) that is accessed through the EPA's Central Data Exchange (CDX) ([www.epa.gov/cdx](http://www.epa.gov/cdx)).
- d. Ongoing Compliance Status Report: This report is required to be prepared annually and retained onsite.
- e. Exceedance Report: This report should be prepared semiannually and submitted to DEQ 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

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

#### REVOCAATION OF ASSIGNMENT

23. 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

24. General Air Contaminant Discharge Permits are part of the State Implementation Plan. As part of the permitting 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.

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