

OVERVIEW OF THE

Airborne Toxic Control Measure for Chromium Plating

Control of Emissions from Plating and Anodizing Facilities

What is chromium plating and chromic acid anodizing?

Hexavalent chromium plating, or simply chromium plating, is the electrical application of a coating of chromium onto a surface for decoration, corrosion protection, or for durability. An electrical charge is applied to a tank containing a chromium solution. The electrical charge causes the chromium metal particles in the tank to fall out of solution and deposit onto objects placed in the plating solution. The most familiar type of chromium plating is the decorative chromium plating process which provides a bright, shiny finish onto objects such as wheels and plumbing fixtures. During chromic acid anodizing, an oxidation layer is generated on the surface of the part. These electrolytic processes cause mists containing hexavalent chromium to be ejected from the plating tank which are eventually emitted into outdoor air.

What are ARB's efforts to control hexavalent chromium emissions from Chromium Plating and Chromic Acid Anodizing?

In 1988, the ARB adopted the Hexavalent Chromium Airborne Toxic Control Measure for Chrome Plating and Chromic Acid Anodizing Operations (Chromium Plating ATCM or ATCM) in California. This effort reduced emissions from facilities by 95 percent, and for the largest facilities by 99 percent. Despite these significant reductions, due to the carcinogenicity of hexavalent chromium, staff determined that people could still be exposed to unacceptable hexavalent chromium concentrations. An investigation found that 43 percent of facilities are located within 330 feet (about one block) of a sensitive receptor, such as a residence or school. ARB staff also found that reliable add-on air pollution control devices such as high efficiency particulate arrestor (HEPA) filters are available to significantly reduce hexavalent chromium emissions. Thus, to further reduce exposure and cancer risk, ARB amended the ATCM in December 2006.

What are the health effects of exposure to chromium?

Hexavalent chromium is a known human carcinogen. The Board identified hexavalent chromium as a Toxic Air Contaminant in 1986 and determined that there was no known level of exposure considered safe. A cancer unit risk factor of 0.15 ($\mu\text{g}/\text{m}^3$)-1 was developed by the Office of Environmental Health Hazard Assessment and approved by the Scientific Review Panel. Hexavalent chromium is the second most potent carcinogen identified by the Board to date. Inhalation of hexavalent chromium in the workplace causes lung and nasal cancers, respiratory irritation, nasal and skin ulcerations and lesions, perforation of the nasal septum, and allergic reactions including dermatitis and asthma. Exposure to trivalent chromium emissions also causes some adverse health effects, but it is not considered to be a carcinogen.

Who is affected?

Any business conducting chromium plating, chromic acid anodizing, or any business selling chromium plating kits to non-permitted facilities is subject to the ATCM.

What are the requirements for existing facilities?

Use of best available control technology, or BACT, is required for all facilities. BACT for most hexavalent chromium facilities is meeting an emission rate equivalent to HEPA level of control. As shown in the table on the next page, the emission rate for all but small facilities is 0.0015 milligrams per ampere-hour. Most facilities must meet this emission rate as measured after add-on control equipment. Small facilities located 330 feet or less from a sensitive receptor and operating 20,000 ampere-hours or less per year, or greater than 330 feet from a sensitive receptor and operating 50,000 ampere-hours or less per year are required to use specific chemical fume suppressants.

The very largest facilities must also conduct a site specific risk analysis if their annual emissions exceed 15 grams per year. Although not shown, trivalent chromium plating facilities are required to limit emissions of total chromium. Generally, this is accomplished by using chemical fume suppressants.

Requirements for facilities based on distance to sensitive receptors

Distance	Ampere-Hours ¹	Emissions Limitation	Start Date
≤ 330 feet	≤ 20,000	Use of specific chemical fume suppressants ²	4/24/2008
≤ 330 feet	> 20,000 - ≤ 200,000	0.0015 mg/amp-hr ³ with add-on control	10/24/2010
≤ 330 feet	> 200,000	0.0015 mg/amp-hr with add-on control	10/24/2009
> 330 feet	≤ 50,000	Use of specific chemical fume suppressants ²	4/24/2008
> 330 feet	> 50,000 - ≤ 500,000	0.0015 mg/amp-hr	10/24/2011
> 330 feet	> 500,000	0.0015 mg/amp-hr with add-on control	10/24/2009

1. Permitted annual / ampere-hours

2. Specific chemical fume suppressants (see § 93102.8) are listed at the following web address: <http://www.arb.ca.gov/toxics/chrome/fumesuppresslist.pdf>

3. mg/amp-hr = milligrams per ampere-hour

What are the requirements for new facilities?

New hexavalent chromium facilities, in addition to installing BACT and meeting a very stringent emission limit of 0.0011 milligrams per ampere-hour, are prevented from operating inside, or within 1,000 feet of an area zoned residential or mixed use, or within 1,000 feet of a school or school under construction. They are also required to conduct a site specific risk analysis to ensure their emissions do not cause adverse impacts.

What are the additional requirements?

To reduce dust emissions, facilities are required to rapidly clean up spills and practice safe chemical storage. Training conducted by the ARB explaining the requirements of the Chromium Plating ATCM, is required every 2 years for employees responsible for compliance. The ATCM also prohibits the sale or use of electroplating materials unless sold or used by individuals or businesses under air district permit to conduct such operations.

What is the compliance schedule?

The timelines for compliance are listed in the table above. Each compliance period is determined based on the effective date of the ATCM which was October 24, 2007. Housekeeping measures and use of specific chemical fume suppressants for facilities without add-on control devices are required beginning April 24, 2008.

What are the health benefits and other environmental impacts?

After full implementation, about 75 percent of facilities would have cancer risk of less than one per million people exposed, and over 90 percent of facilities would have cancer risk of less than ten per million people exposed.

For more information

Contact Ms. Michelle Komlenic at (916) 322-3926 (email: mkomleni@arb.ca.gov) or visit our website at: <http://www.arb.ca.gov/toxics/chrome/chrome.htm>. To obtain this information in other languages please contact ARB's Helpline at (800) 242-4450.