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Consultation Document

Proposed Amendments to the Chromium Electroplating, Chromium Anodizing and Reverse Etching Regulations

Chemical Production Division
Environmental Stewardship Branch

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1. Introduction

1.1 Purpose and Scope

The purpose of this discussion document is to inform stakeholders of the proposed amendments to the *Chromium Electroplating, Chromium Anodizing and Reverse Etching Regulations* (the Regulations) under CEPA 1999 and to provide an opportunity to comment on them.

Hexavalent chromium is known to cause cancer in humans and has considerable negative effects on the environment. Accordingly, it has been declared toxic to both human health and the environment and is on the List of Toxic Substances under Schedule 1 of the *Canadian Environmental Protection Act, 1999* (CEPA 1999).

The Regulations were published in Part II of the *Canada Gazette* on June 24, 2009. The Regulations came into force on July 4 of the same year and they address the release of hexavalent chromium into the air from chromium electroplating, chromium anodizing, and reverse etching processes. Since the Regulations come into force, Environment Canada has identified a need to review certain provisions, to clarify the regulatory text and also to incorporate new material.

Stakeholders include representatives of:

- The metal finishing industry;
- Industry trade associations (such as: the Canadian Association for Surface Finishing and the Metal Finishing Suppliers Association);
- Provincial and territorial governments;
- Federal government departments; and
- Non-governmental organizations.

1.2 Objectives

The objectives of this discussion document are:

- To present a summary of the areas of the Regulations proposed for amendment, and
- Solicit input and comments from stakeholders.

The goals of the proposed regulatory amendments are to:

- Provide more flexibility and consistency for facilities to comply with the Regulations; and
- Clarify regulatory requirements in light of currently available technologies.

2. Background

2.1 Process Description

Chromium is used widely in the metal finishing industry for its excellent performance characteristics related to engineering requirements, corrosion resistance and hardness.

Chromic acid is utilized as the electrolyte for both electroplating and anodizing and it is made by dissolving chromium trioxide (a hexavalent chromium compound) in water.

Surface metal finishing with chromium can be categorized into the following processes:

- Chromium electroplating (plating):
 - o Hard (or industrial) chromium plating, which includes the reverse etching process; and
 - o Decorative chromium plating.
- Chromium anodizing

2.1.1 Chromium Electroplating

Hard chromium plating is a process by which metal substrates are coated (or plated) with a layer of chromium to provide a finish that is resistant to wear, abrasion, heat, and corrosion. Such parts include drive shafts, hydraulic cylinders, aircraft landing gear, pins, valves, and other components used in the aerospace, railway, naval and automotive industries.

Decorative chromium plating is a process in which materials (such as: brass, steel, or plastic) are first plated with layers of copper and nickel, which is then followed by a relatively thin layer of chromium. This provides the final product with a bright surface finish that is both tarnish and wear resistant. This process is used for items such as: automotive trim components (including plating on plastics), metal furniture, bicycles, hand tools and plumbing fixtures.

2.1.2 Reverse Etching

Reverse etching is a preparation technique employed to remove the final trace of oxides on a surface that will ultimately be plated, and to provide a microscopic etch on the base metal, which is necessary for proper adhesion prior to plating. Reverse etching is only used with hard chromium plating.

2.1.3 Chromium Anodizing

Chromium anodizing (which is also commonly referred to as chromic acid anodizing) is a process whereby chromic acid is used to produce a protective oxide layer on aluminum

alloys. This process is used on components that will be subjected to high-stress and corrosive conditions, such as those found in architectural and aerospace applications.

2.2 Potential Releases

Electroplating, anodizing, and reverse etching generate a large amount of hydrogen and oxygen gas at the electrodes. These gases are released from the surface of the solution and, in doing so, also release chromic acid mist. The chromic acid mist is the source of hexavalent chromium compounds which, if not correctly addressed, may be released to the workplace and the environment.

2.3 Existing Regulatory Landscape

In Canada and the United States (US), atmospheric releases of hexavalent chromium are regulated to varying degrees at federal, state/provincial, and municipal levels (See Appendix 1 to 3). Prior to the publication of the Regulations, Ontario and Quebec had provincial regulations in place. The Ontario Ministry of Environment release limit for hexavalent chromium is based on a point of impingement requirement. The Ministère du Développement durable, Environnement, Faune et Parcs du Québec's limit is a concentration-based release limit which is based on the existing federal Regulations.

Municipal by-laws are also currently in place in Montreal and Vancouver. The Montreal Metropolitan Community (Communauté métropolitaine de Montréal) and the Greater Vancouver Regional District both have limits for air releases of hexavalent chromium. As detailed in Appendix 1, these limits vary from one region to another.

One of the goals of the Regulations is to provide a consistent degree of environmental and health protection across Canada. The regulated community comprises of approximately 170 facilities, of which roughly 60% are located in Ontario and Quebec. The remaining facilities are well distributed among the remaining provinces, with the exception of Prince Edward Island and the Territories, where no chromium plating or anodizing facilities are known to exist.

The Regulations allow three methods to control the release of hexavalent chromium compounds to air from the chromium plating, anodizing, and reverse etching processes:

- Using point source control, i.e. installing a control device to maintain point source air emission concentrations within the regulatory limit;
- Limiting the surface tension of the chromic acid solution below a specified value;
or
- Using a tank cover.

3. Proposed Amendments to the Regulations

The proposed amendments to the Regulations aim to:

- a. Modify the requirements with respect to the control method and surface tension measurement notification;
- b. Amend the inspection control and maintenance requirements for point source control
- c. Amend surface tension measurement and reporting requirements;
- d. Amend record keeping and reporting requirements for point source and surface tension control, respectively
- e. Allow for new surface tension measurement equipment ;
- f. Clarify timelines for the submission of documents to Environment Canada and performing release tests for new facilities (using point source control).

The following sections provide an overview of the relevant issues and proposed amendments.

3.a Control Method Notice Requirements

Subsection 3(4) – Changing control method or surface tension measurement method

Currently, the Regulations require any person intending to change either the method of controlling releases from a tank or the surface tension measurement method to notify the Minister of that intention at least 30 days before the change is to be implemented. This notification is known as a Control Method Notice.

In changing from the surface tension measurement method (i.e. using a tensiometer or stalagmometer) to using a point source or a tank cover, the 30-day advance notification period is considered sufficient considering the time required for implementing the change. Accordingly, no change is proposed for this notification requirement. However, a change from the use of a point source or a tank cover to limiting the surface tension (i.e. using a tensiometer or stalagmometer) can be made very rapidly, and as such, a 30-day period before implementing this change may result in unnecessary delays. The same reasoning applies to changing between the use of a tensiometer and stalagmometer.

Proposal: It is proposed that both requirements be addressed as follows:

- i) The 30-day advance notification period for changing from using a point source or tank cover to limiting the surface tension would be removed. Regulated facilities would be able to make the transition from using a point source or a tank cover to limiting the surface tension immediately and would have to provide a notification (a Control Method Notice) within 10 days after implementing the change.
- ii) The 30-day advance notification period for changing surface tension measuring equipment from a stalagmometer to a tensiometer, or vice versa, would be removed. Regulated facilities would only be required to indicate the type of surface tension

measuring equipment used in the reports required under Section 11 of the Regulations and to comply with the surface tension limit associated with the measuring instrument.

Both proposals are expected to reduce administrative burden for regulated facilities, while providing them the flexibility to choose the appropriate control method for their operations.

3.b Inspection and Maintenance Plan for Control Devices and Inclusion of New Control Technologies

Subsection 6(1) – Inspection and maintenance plan requirements

An inspection and maintenance plan for a control device currently requires the inspection of the internal and external surfaces of the control device to verify that they are free from any fracture or deformation. However, some internal surfaces may be difficult to access and inspect.

Proposal: This section would be modified such that only an inspection of accessible and visible surfaces of the control device would be required.

Subsection 6(2) – Inspection and maintenance plans for composite mesh pad (CMP) systems

The regulations specify that an inspection and maintenance plan for a control device with a CMP system must include, in part, washing the mesh pads for at least 20 minutes at least twice during every 8 hours of operation, if the manufacturer's recommendations provide for less frequent washing, or in any other case, at least 20 minutes at least twice during every 8 hours of operation, with a minimum interval of 3 hours. However, this requirement could result in excessive water use (and subsequent generation of wastewater) as the appropriate washing requirements often vary from one control device to another. Correct washing rates also depend on the technology and the manufacturer. In addition, new control devices presently in use do not have CMP technology, but are effective in controlling the releases from chromium plating, chromium anodizing and reverse etching processes.

Proposal: It is proposed that within the inspection and maintenance plan for facilities employing point source control, it would simply be necessary to follow the manufacturer's instructions for maintenance of the control devices. It would be the responsibility of each facility to obtain and keep these instructions. This would provide greater flexibility to facilities using point source control and would also serve as a preventative measure to ensure the facilities keep a reference for proper maintenance of their respective control devices.

3.c Measurement Requirements for Surface Tension Control

Subsection 7(3) – Surface tension measurement requirements

The Regulations currently require that the surface tension of the solution be measured and recorded each day that the tank is used. These measurements must be taken with a minimum interval of 16 hours between measurements.

The intent of the Regulations is for regulated facilities to measure the surface tension of the solution in the tank(s) as frequently as required to maintain it at a value of less than 35 dynes/cm (if the surface tension is measured with a tensiometer) or less than 45 dynes/cm (if the surface tension is measured with a stalagmometer), and to take corrective action if necessary to ensure that the surface tension is maintained below the applicable regulatory limit. However, some companies have indicated that this requires clarification.

Proposal: Environment Canada proposes that the Regulations be clarified to reflect the fact that facilities which obtain a daily measured surface tension value exceeding the regulatory limit must take corrective action, and then measure the surface tension value again to ensure compliance. This requirement would also be included under Reporting, at subsection 11(2), (see section 3.d of this document), thereby promoting the maintenance of surface tension values of the solution below the regulatory limit during plating, anodizing or reverse etching activities.

Furthermore, the phase-out of perfluorooctane sulfonate (PFOS), effective May 2013 under the *Perfluorooctane Sulfonate and Its Salts and Certain Other Compounds Regulations*, means that facilities must discontinue the use of conventional PFOS-containing fume suppressants and switch to PFOS-free alternatives. These PFOS-free fume suppressants have different chemical compositions and may have an effect on surface tension maintenance and measurement. Accordingly, a study is currently being conducted by Environment Canada to investigate the impact of the use of PFOS-free fume suppressants on maintaining and measuring surface tension. The results of this study will be taken into account during the drafting of the proposed regulatory amendments and in developing the Regulatory Impact Analysis Statement.

Subsection 7(4) – Surface tension measurement requirements

The Regulations require that surface tension measurements made with a tensiometer be performed in accordance with ASTM D 1331-89 (Reapproved 2001), *Standard Test Methods for Surface and Interfacial Tension of Solutions of Surface-Active Agents*. New and different types of tensiometers are now available which are not based on the principles of the duNuoy tensiometer and therefore do not require a reference to ASTM D 1331-89.

Surface tension measurements made with a stalagmometer must currently be performed in accordance with manufacturer's instructions. However, some stakeholders have informed Environment Canada that the manufacturer's instructions for stalagmometers may be difficult to follow. This may lead to incorrect calculations of surface tension values.

Proposal:

1) In the case of tensiometers, this provision would be amended to provide more flexibility in choosing a tensiometer by removing the reference to the ASTM method and allowing the manufacturer's instructions to be followed.

2) In the case of stalagmometers, Environment Canada has developed a draft Reference Method for using the stalagmometer, which is now available as part of this consultation. The Reference Method will also include a table that regulatees can use to determine surface tension values without the need to perform manual calculations, thereby reducing time and effort. This constitutes a reduction in administrative burden for facilities that use stalagmometers to measure the surface tension. The draft Reference Method is now available for comments.

3.d Reporting and Record Keeping Requirements and Definitions

Subsection 11(2) – Reporting requirements for surface tension control

In accordance with the proposals outlined in sections 3.a and 3.c of this document, facilities would have the opportunity to provide further information on their surface tension reports in the case of a necessary corrective action being taken or a change in surface tension measuring equipment. Furthermore, certain facilities have indicated that the reporting requirements for surface tension control are unclear.

Proposal: To ensure consistency in surface tension reports, it is proposed that the following modifications to surface tension reporting be incorporated:

- A requirement for surface tension users to indicate whether corrective action (i.e. addition of fume suppressant) was required, and if so, the subsequently measured surface tension value; and
- An option allowing surface tension users to indicate whether there was a change in the surface tension measuring equipment.

The format of the surface tension report currently in use would be amended accordingly to clarify reporting requirements.

Section 1 and subsection 14(1) – Definitions and record keeping

The Regulations define “representative operating conditions” for a release test as the conditions for obtaining the average of a rectifier’s electrical output for 30 days of use before the test is performed. Under the Regulations, facilities are not required to keep records of rectifier settings for 30 days of use before performing a release test. However, Environment Canada has found the information on representative operating conditions to be of use for the release test, as it should be performed at a rectifier output commensurate with, and representative of, the work performed by the facility. In addition, during the release testing period, facilities may have a higher than average production period. Therefore, they may require carrying out their operations during this time with a rectifier output that is higher than the average obtained from 30 previous days of use. Facilities

should have the flexibility to operate at such higher settings if they wish to carry out their release test without artificially lowering their production during this time.

Proposal: To modify the record keeping requirements to include the output setting for the rectifier associated with each tank for the 30 days of use before a release test is performed. In this way, facilities will consistently have a record of data in order to establish representative operating conditions. Additionally, it is proposed to modify the definition of “representative operating conditions” for a release test to the conditions for obtaining a value that is equal or greater to the average of a rectifier’s output for 30 days of use before a release test is performed.

3.e Timelines for New Facilities Using Point Source Control

New facilities that choose the point source control method are required to be in compliance with the release limit specified in the Regulations from their first day of operation. However, such facilities will not have had an opportunity to establish representative operating conditions by obtaining the average of rectifier output data for 30 days of use before the release test is performed.

Proposal: To clarify timelines for submitting required documentation and performing release tests for new facilities (i.e. those that started operations after July 4, 2009). The approach and timelines to meet the release test requirements would be consistent with those in the Advisory note published on EC’s website. This would provide new facilities with the opportunity to establish representative operating conditions before performing the release test.

The Advisory Note may be found at:

<http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=8D17C71B-1>

3.f Timelines for Facilities Changing Control Methods from Surface Tension Control to Point Source Control

The Regulations require that all facilities using the point source control method perform a release test. However, if a facility changes to this control method, the Regulations currently do not provide a timeline by which this test must be performed. As with new facilities using point source control, the intent of the Regulations for facilities changing to point source control is to demonstrate compliance by performing a release test as soon as possible after installing and commencing operations with a control device. As only one control method may be officially declared per tank, facilities using point source control must demonstrate regulatory compliance solely through the operation of the control device (at the time of the release test, any tank under point source control must not contain an amount of fume suppressant which could affect the results of the test).

Proposal: To include a provision in the Regulations establishing a time period of 30 days of use, after which facilities changing from surface tension control to point source control must perform their required release test. This time period would be consistent with that for new facilities and would be sufficient to allow both the necessary degradation of residual

fume suppressant in the tank that would be under point source control, and the establishment of representative operating conditions. Accordingly, no fume suppressant may be added to these tanks during this time period.

4. Administrative Burden

On October 1, 2012, the Government of Canada released the *Red Tape Reduction Action Plan report*. This action plan details regulatory reforms the government is putting in place to reduce the administrative burden on businesses and consider the regulatory impact on small businesses.

It is estimated that approximately 170 businesses are subject to the Regulations, of which approximately 100 are small businesses that use the surface tension control method. A small business is defined by the Treasury Board of Canada as any business, including its affiliates, that has fewer than 100 employees or between \$30,000 and \$5 million in annual gross revenues. Environment Canada encourages self-identification of facilities that are small businesses.

The proposed regulatory amendments would have a net reduction in administrative burden on businesses. Specifically, the following two main changes in the proposed Regulations would reduce administrative burden on facilities using the surface tension control method. Collectively, these two measures would reduce the time required by facilities to meet regulatory requirements:

1. The removal of the 30-day advance notification requirement for changing surface tension measuring equipment would save facilities time spent on compiling and submitting notification on an on-going basis. It is assumed that it takes less than an hour for facilities to compile and submit notification of surface tension measurement equipment change.
2. The addition of a Stalagmometer Reference Method, which includes a table of surface tension values, would eliminate the need for manual calculations. As a result, stalagmometer users would save the time spent on manual calculations (assumed to be less than an hour) on an on-going basis, by simply looking up the values in the table.

In addition and as mentioned in previous sections, the proposed amendments to the Regulations also provide greater flexibility for businesses to meet the regulatory requirements, without adding any incremental change in administrative burden on businesses.

5. Next Steps

Environment Canada is soliciting input from any interested and affected parties on this consultation document and the draft Stalagmometer Reference Method. This consultation document and draft Guidance Document will be available on the CEPA Environmental Registry

(<http://ec.gc.ca/lcpe-cepa/eng/participation/default.cfm?n=FBC634F3-1>).

Please submit your comments either in writing no later than (August 11, 2014). Comments received during this period will be given consideration while drafting the proposed regulatory amendments. Pursuant to section 313 of CEPA 1999, any person who provides information to the Minister of the Environment under CEPA 1999, may submit with the information a written request that it be treated as confidential.

Comments on these proposed regulatory amendments should be submitted to one of the addresses provided below.

By Mail:

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By Email:

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Please type “Consultation on Proposed Amendments to the Chromium Regulations” in the subject line of your message.

By Fax:

(819) 938-4218

APPENDIX 1

Provincial and Municipal Air Release Regulations in Canada for Hexavalent Chromium

Jurisdiction	Limit Value	Type of Limit
Ontario Ministry of the Environment	0.00014 $\mu\text{g}/\text{m}^3$ in the total suspended particulate fraction (Effective July 2016)	Point of impingement (POI) based on an annual average standard
Ministère du Développement durable, Environnement, Faune et Parcs du Québec	0.03 mg/m^3	Concentration-based
Montreal Metropolitan Community (only in Montreal)	0.75 $\mu\text{g}/\text{m}^3$ and a 0.25 hour standard	Point of impingement based on a quarter hour modelled value from a release test.
Greater Vancouver Regional District	0.5 mg/m^3	Concentration-based

APPENDIX 2

US EPA Air Release Regulations for Hexavalent Chromium

Regulation	Limit Value	Type of Limit
U.S. EPA National Emission Standards For Chromium Emissions From Hard And Decorative Chromium Electroplating And Chromium Anodizing Tanks (69 FR 42885)	<i>Current Rule (September 2012):</i> Existing large hard chromium electroplating facilities: 0.011 mg/dscm Existing small hard chromium electroplating facilities: 0.015 mg/dscm (equal to the MACT¹ limit) Existing decorative electroplating tanks: 0.007 mg/dscm, which would be a 30 percent reduction from the current limit of 0.01 Existing chromium anodizing facilities: 0.007 mg/dscm All new facilities, hard (small and large), decorative, and anodizing: 0.006 mg/dscm	Air concentration-based
	<i>Current Rule (September 2012):</i> 40 dyn/cm measured with a stalagmometer 33 dyn/cm measured with a tensiometer	Surface tension limit, based on measuring equipment

¹ Maximum Achievable Control Technology

APPENDIX 3

California Air Resources Board (CARB)

California Air Resources Board (CARB) Hexavalent Chromium Airborne Toxic Control Measure (ATCM) for Chrome Plating and Chromic Acid Anodizing Operations (Chromium Plating ATCM or ATCM)	0.0015 mg/ampere-hour for facilities operating at more than 20,000 annual ampere- hours	Facilities operating under the 20,000 annual ampere-hour threshold must apply surface tension control via chemical fume suppressants
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