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Environment Canada Proposed Regulations Volatile Organic Compounds in Architectural and Industrial Maintenance Coatings

- - Considerations for the Development of Regulations - -

**Chemicals Control Branch
Environment Canada**

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1 - Introduction

The purpose of this document is to provide background information and supporting rationale for proposed regulations on *Volatile Organic Compounds (VOCs) in Architectural and Industrial Maintenance (AIM) Coatings* which will be developed under the Canadian Environmental Protection Act, 1999.

2 - Background

Smog is responsible for many serious health effects for Canadians, including thousands of premature deaths, hospital admissions and emergency room visits each year. As gaseous precursors, volatile organic compounds (VOCs) contribute to the formation of particulate matter (PM) and ground-level ozone - the main ingredients of smog. Up to two-thirds of fine particulate matter and almost all ground-level ozone are formed in the atmosphere from gaseous precursors. In order to reduce particulate matter and ground-level ozone, it is therefore necessary to reduce emissions of their precursors, particularly VOCs.

Background information on the links between VOCs, ground-level ozone and particulate matter can be found in several Science Assessment Documents (SAD) published by Environment Canada and Health Canada:

- **The Particulate Matter SAD**
- **The Ozone SAD**
- **The Priority Substances List (PSL) Assessment Report on PM10**
- **The Meteorological Survey of Canada (MSC) Precursor Report**

VOC emissions from the Architectural and Industrial Maintenance (AIM) coatings sector result from the use of solvents (and other organic compounds) in both solvent-based and water-based paint. The solvents in paints and coatings are used as a vehicle to transfer the paint to a substrate and are released to the atmosphere by evaporation following application. Due to the highly fragmented and widely distributed nature of painting applications using AIM coatings in small batches, it is usually not feasible to capture and control VOC emissions resulting at the point of use. The best option to reduce VOC emissions from AIM paints is to reformulate products to contain lower levels of VOCs.

Canada-Wide Standards

In recognition of the significant adverse human health effects of ground-level ozone and of particulate matter, the Canadian Council of Ministers of the Environment (CCME), on behalf of the Governments of Canada, the Provinces and the Territories (except Quebec), adopted new Canada-Wide Standards (CWSs) for both of these air pollutants in June 2000. These standards establish ambient air concentration target levels to be achieved by 2010: 65 ppb for ozone and 30 µg/m³ for particulate matter less than 2.5 µm in diameter (PM_{2.5}). Achieving these targets will require significant reductions of PM, ozone and their precursors, including VOCs.

VOCS as a CEPA Toxic Substance

On July 2, 2003, an Order was published in the *Canada Gazette, Part II* adding VOCs to Schedule 1 (List of Toxic Substances) of the *Canadian Environmental Protection Act 1999* (CEPA, 1999). Along with gaseous ammonia, nitric oxide, nitrogen dioxide and sulphur dioxide, VOCs were added to Schedule 1 due to their role as precursors in the development of ground-level ozone and of particulate matter. This listing of the precursors gives the Government of Canada the legislative authority to control the emissions contributing to PM and ozone.

Federal Agenda for Reduction of Emissions of VOCs from Consumer and Commercial Products

In March 2004, the Minister of the Environment and the Minister of Health published a Notice of Intent (NOI) in the *Canada Gazette, Part I* which outlined Environment Canada's *Federal Agenda for Reduction of Emissions of Volatile Organic Compounds (VOCs) from Consumer and Commercial Products*. The Federal Agenda was developed after a series of technical studies and through consultation with industry, other government departments and environmental non-governmental organizations (ENGOS). The following documents further describe the selection of actions which are included in the Federal Agenda:

- **Notice of Intent**
- **Support Document to the Notice of Intent**

One of the action items outlined in the Federal Agenda is the development of regulations under CEPA 1999 that would set VOC content limits for AIM coatings. Two other similar (VOC content limit) regulatory initiatives under the Federal Agenda are being prepared for Consumer Products and Auto-Refinish Coatings.

The initiatives contained in the Federal Agenda contribute to fulfilling commitments in the Government of Canada's "Interim Plan 2001 on Particulate Matter and Ozone" to develop an action plan to reduce VOC emissions from consumer and commercial products. The measures outlined in the NOI also respond to a commitment included in the Ozone Annex to the 1991 Canada-US Air Quality Agreement. The Ozone Annex, signed in 2000, commits Canada and the US to take measures to reduce VOC emissions and contains specific commitments to take action to reduce VOC emissions from consumer and commercial products.

Previous Action on VOCs in Architectural Coatings

Memorandum of Understanding

As part of the 1990 CCME Phase I NOx/VOC Management Plan, Initiative V101 set a target for a 20% reduction in emissions from the consumer paints sub-sector (a subset of the larger AIM sector) from 1985 emissions. A task force was established to analyse VOC emissions from this sector and the results were published in a document titled "A Plan to Reduce VOC Emissions by 20% from Consumer Surface Coatings", CCME, March 1994.

The task force concluded that the 20% reduction had been achieved and recommended a voluntary approach to encourage further VOC reductions in this sub-sector. As a result, a Memorandum of Understanding (MOU) was signed in 1995 by the Canadian Paint and Coatings Association (CPCA), Environment Canada and the National Air Issue Coordinating Committee (NAICC) of the CCME. The MOU acknowledged that the 20% reduction in VOC emissions from the consumer paints sector outlined in Initiative V101 had already been achieved between 1985 and 1991. The objectives of the MOU were to establish a sound and reliable data base for the consumer paint sub-sector, to provide the NAICC with adequate information for the development of subsequent phases of the NOx/VOC Management Plan and to document the actual trend of VOC emissions from this sub-sector.

CCME Standards and Guidelines for the Reduction of VOC Emissions from Canadian Industrial Maintenance Coatings

The CCME published *Recommended Standards and Guidelines for the Reduction of VOC Emissions from Canadian Industrial Maintenance Coatings* in 2002. These standards and guidelines were developed as a part of the Phase 2 Federal Smog Management Plan (1997) which called for a multi-stakeholder review of the industrial maintenance coating and traffic marking sector to verify VOC emission estimates, assess the potential for reductions and develop measures to ensure VOC emission reductions from this sector. A working group called the *Technical Sub Group for the Reduction of VOCs from Canadian Industrial Maintenance Coatings for the CCME Working Group for Surface Coating Initiatives* was formed and participated in the development of the guidelines and standards.

The standards and guidelines recommend VOC content limits for traffic marking coatings, industrial maintenance coatings and four sub-categories of industrial maintenance coatings - pre-treatment wash primers, extreme high durability coatings, high temperature coatings and metallic pigmented coatings. There is also a "Code of Good Practice" included in the CCME publication which is intended to apply to users of industrial maintenance and traffic marking coatings. The VOC content limits specified in the standards are intended to be implemented by manufacturers and importers of industrial maintenance coatings by January 1, 2003 and by January 1, 2005, the limits apply to users of these coatings. For traffic marking coatings, the effective date for both manufacturers and users is January 1, 2005. There is also a requirement for users of traffic marking coatings to use only water-based coatings from May 15th to September 30th - the main period of the year when smog formation is likely.

The CCME standards and guidelines may be obtained at: www.ccme.ca.

3 - Architectural and Industrial Maintenance Coatings Background

INDUSTRY BACKGROUND

Architectural and Industrial Maintenance (AIM) coatings are comprised of coatings which are purchased and applied by both consumers and contractors. Products include paints, stains, varnishes and many other types of coating and sealing products which are intended for in-situ application to buildings, furniture, pavement, concrete, metal and a wide variety of surfaces present in residential, commercial, institutional and industrial settings. AIM coatings have been addressed by several names in the past including: trade paints and consumer paints - both segments of architectural coatings as defined in the proposed regulation. Other important segments of AIM paints that have been addressed in the past include industrial maintenance and traffic/zone marking paints.

Based on industry information and the results of an Environment Canada survey, it is estimated that approximately 293 million litres of AIM coatings were sold in Canada in 2002. This represents a total sale value of \$1.4 billion. Approximately 80% of these coatings were manufactured in Canada by an estimated 120 Canadian manufacturers. Approximately 20% of the total volume was imported - primarily from the United States.

Canadian manufacturing facilities are concentrated mainly in Ontario (61% of Canadian manufactured market consumption) with Quebec and British Columbia facilities fulfilling 26% of Canadian market consumption. Approximately 7,200 Canadians are employed in companies manufacturing AIM coatings. For most categories of AIM coatings, there is a high degree of supplier concentration, where fewer than 10 firms account for the majority of the total Canadian market share. An exception to this rule is the industrial maintenance coatings segment, where the supply is much more fragmented among many companies compared to other categories of AIM coatings. Overall, the Canadian paints and coatings industry is a mature industry and most of its companies have been in operation for many years.

The demand for architectural coatings tends to be closely correlated with general population levels and the performance of the residential and commercial construction market. For industrial maintenance coatings, demand is more closely tied to growth rates in the manufacturing industry. Based on an estimated 2% growth rate from 2002 levels, demand for architectural paints in 2010 is forecast to be 17% higher than in 2002.

Source: Cheminfo, 2005.

VOC EMISSIONS FROM AIM COATINGS

The solvents contained in AIM coatings constitute a significant source of VOC emissions from consumer and commercial products. Based on results of the Environment Canada survey and Cheminfo estimates, emissions of VOCs from AIM coatings were estimated to be approximately 59 kt in 2002. Based on total estimated VOC emissions from the use of solvents and solvent containing products of 438 kt (Cheminfo, 2004b), this represents 13% of all VOC emissions from this sub-sector, which is the largest of the solvent-use sub-sector emission sources. The 2000 National Criteria Air Contaminant (CAC) inventory identifies a

total of 1,892 kt of VOC emissions for Canada (excluding upstream oil & gas, oil sands development and forest fires, which are primarily regional sources). As shown in Figure 1, VOC emissions from the use of solvents and solvent containing products comprised 24% of the total VOC emissions.

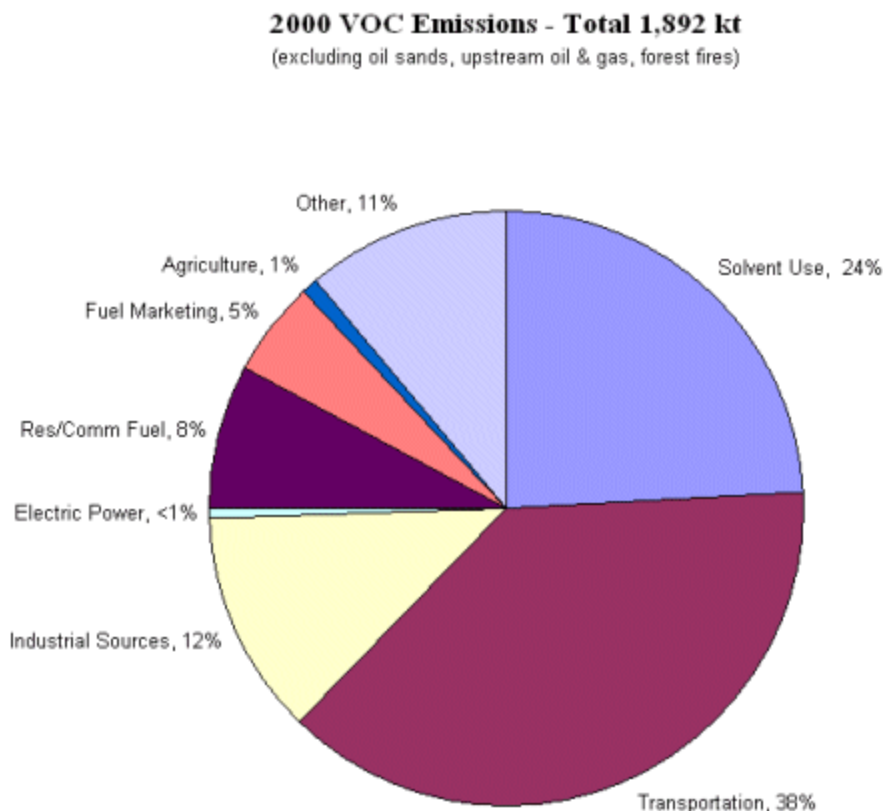


Figure 1 - 2000 VOC Emissions

Implementation of measures under the "*Federal Agenda on Cleaner Vehicles, Engines and Fuels*" will achieve substantial reductions of VOCs from the transportation sector by 2010. Estimates of VOC emissions for 2010 indicate that the solvent use sector will have replaced the transportation sector as the largest emitter of VOCs. Forecasts for the AIM coatings subsector indicate that sales may grow by 17% by 2010 (from 2002 volume estimates). Assuming no change in the VOC content of coatings, this translates to a 17% increase in emissions to 69.1 kt.

Source: 2000 CAC Inventory, Cheminfo 2004b, Cheminfo 2005

4 - Action in other jurisdictions

In North America, the first regulatory efforts to reduce VOC emissions from the AIM coatings sub-sector originated almost twenty years ago in Southern California. The severity of smog problems in the Los Angeles County Air basin prompted the California South Coast Air Quality Management District (SCAQMD) to develop VOC content limits for a variety of AIM coating categories. Over the years, these limits have been gradually lowered, such that they are now the most stringent of any jurisdiction in the United States. The development of VOC content limits for use state-wide by California's Air Resources Board (CARB) started in the mid-1980's, a few years after the efforts of the SCAQMD. The most recent set of limits recommended for use in California were released in 2000, when CARB published its *Suggested Control Measure* (SCM) for reducing VOC emissions from the AIM coatings sub-sector. For the most part, the categories used by CARB are similar to those of SCAQMD, but in many cases, the actual VOC content limits are less stringent.

In the early 1990's, the United States Environmental Protection Agency (EPA) began efforts to develop a national set of VOC content limits for the AIM coatings sector. In September 1998, it promulgated (brought into force) the *National Emission Standards for Architectural Coatings* (also referred to as the "National Rule"). The regulation sets VOC content limits for 61 categories of AIM coatings. The National Rule contains additional categories that were not created in either the SCAQMD or CARB measures and, in general, VOC content limits are less stringent than these measures. The National Rule is probably best characterized as a regulatory backstop, since State regulatory authorities still have the ability to implement more stringent limits, as in California.

In 2000, the Ozone Transport Commission (OTC), which represents 12 north-eastern States and the District of Columbia, developed a *Model Rule* for state regulations based on the CARB SCM. Currently the model rule has been adopted (with some variations) by six states and is under development in another three states. This model rule is particularly relevant to Canada since many of the application conditions found in the northeastern states (e.g. temperature, humidity) are similar to Canada.

It should be noted that in various U.S. regulations, Architectural and Industrial Maintenance coatings are usually referred to as the more generic "Architectural" coatings. Despite the name, these regulations include categories that are clearly industrial maintenance in nature. A summary of the VOC content limits contained in the EPA National Rule and the OTC Model Rule are included in Annex 1.

Source: Cheminfo, 2004b.

In April 2004 the European Union finalized a directive that intends to reduce VOC emissions from architectural coatings. The directive sets VOC content limits for 12 categories of coatings. Content limits exist for water-based and solvent-based coatings within each category and are calculated with "water in" - that is, the VOC content limits are the actual VOC content in the coatings. The first set of limits will be in effect January 1, 2007, with a more stringent set of limits set for January 1, 2010.

5 - Why a Regulation?

LEVEL PLAYING FIELD

Above all, the proposed regulations will act to provide a "level playing field" for manufacturers and importers of AIM coatings. Voluntary actions which have been used in the past to encourage VOC reductions from AIM coatings give an unfair advantage to those companies who choose not to participate in the initiatives and continue to market their products without having to put resources towards the research and development necessary to create lower VOC coatings. The regulatory approach provides assurance for purposes of business decision-making that all manufacturers and importers must meet the same requirement for the VOC content of their coatings.

NATIONAL APPROACH

Although smog is a regional issue, with areas of concern including the Windsor-Quebec corridor in Ontario and Quebec, the lower mainland of British Columbia and the Atlantic Provinces, it would be extremely difficult to implement and enforce regulations on product content developed on a regional or provincial basis. Such an approach could result in different VOC content requirements for paint used in different regions. Since paint is generally formulated and marketed on a national (or international) basis, a patchwork of regulations would considerably complicate the manufacture of coatings.

HARMONIZE WITH UNITED STATES

One of the intentions of the proposed regulations is to harmonize the requirements for VOC content in AIM paints with those existing in the US. Clean air is a transboundary issue, and as such, efforts must be made on both sides of the border to ensure a reduction in smog precursors such as VOCs. The US has a history of regulatory limits on the VOC content of AIM coatings, and Canadian regulations are needed to harmonize our efforts. The AIM coatings market is highly integrated on a North American basis. Aligning the proposed

Canadian regulation with existing measures in the US will facilitate consistency in product requirements in the North American market and allow Canada to benefit from the US experience in implementing VOC emissions reduction strategies.

CERTAINTY IN REDUCTIONS

Given the large reduction in VOC emissions that are required to meet the CWS for ozone and PM, it is necessary to guarantee significant reductions in important sectors with large emissions of VOCs. Due to their nature, voluntary actions cannot provide this level of assurance. As opposed to a voluntary measure, where the level of compliance can be uncertain, the proposed regulation will result in a certain reduction in VOC emissions when implemented.

6 - Considerations for the Proposed Regulations

INTENT

The proposed regulations will mandate VOC content limits for 50 categories of AIM coatings. The regulations would apply to manufacturers and importers of AIM coatings sold in Canada.

COATING CATEGORIZATION

The regulations would apply to any coating that meets the definition of an AIM coating. Each AIM coating may be categorized into one or more of the 50 categories. Except for coatings classified in seventeen specific categories (as discussed below), coatings that may fall into more than one category must meet the most restrictive VOC content limit of any applicable categories. For example, if a floor coating (VOC content limit of 250 g/L) is also marketed as a flat coating used on surfaces other than floors (VOC content limit of 100 g/L), it must meet the VOC content limit for the flat coating category.

Consistent with the *OTC Model Rule*, for seventeen specific categories indicated in the proposed regulation, the VOC content limits for those categories would apply to products even if they are marketed for a use described by another category with a lower VOC content limit. This exemption was included to recognize that even though certain products may be used for one purpose, they may not be able to be formulated to meet the VOC content limits for all intended purposes.

The categories which are exempt from the most restrictive limit requirement are: antenna coatings, bituminous roof primers, calcimine recoaters, fire-retardant coatings, flow coatings, high-temperature coatings, impacted immersion coatings, industrial maintenance coatings, lacquer (including lacquer sanding sealers) ; low-solids coatings, metallic pigmented coatings, nuclear coatings, pre-treatment wash primers, shellacs, specialty primers, sealers and undercoaters, temperature indicator safety coatings and thermoplastic rubber coatings and mastics.

The categories chosen for inclusion in the proposed regulations are based mainly on the *OTC Model Rule*, with several modifications to consider the Canadian market. Further information on the category definitions, choice of categories and content limits is provided in the category tables appearing in Annex 2.

The US EPA and OTC AIM regulations include categories for anti-fouling coatings and wood preservatives. In Canada, these products are regulated as pesticides by Health Canada's Pest Management Regulatory Agency (PMRA) under the authority of the *Pest Control Products Act* (PCPA). The VOC standards for anti-fouling paints and wood preservatives (including low solids) listed in the US EPA Rule will be managed by PMRA under the PCPA. The requirements of other jurisdictions will be considered and the timeframe to develop a strategy will be consistent with the proposed CEPA regulations.

VOC CONTENT LIMITS

The proposed VOC content limits were chosen based on the results of the Environment Canada survey on AIM coatings, a report completed for Environment Canada by Cheminfo Services Inc. titled *Technical Assessment of Categorization and VOC Content Limits for Architectural and Industrial Maintenance Coatings in Canada* and on available background information which has been developed by jurisdictions in the US including the US Environmental Protection Agency, Ozone Transport Commission, California Air Resources Board and various US states. Of the fifty categories, 48 of the proposed limits are consistent with OTC limits and two are consistent with EPA limits (used where a higher content limit was required).

The *OTC Model Rule* VOC content limits, upon which the proposed Environment Canada regulation is based, were originally based on the CARB Suggested Control Measure, which was published in 2000. These limits have subsequently been adopted in regulations developed in several OTC states including Delaware, the District of Columbia, Maine, New Jersey, New York and Pennsylvania. The VOC content limits in many of these regulations were effective on January 1, 2005. Since these limits have been extensively reviewed by both CARB during their SCM development process, and by each of the OTC states during their regulatory development, these limits could be considered to be the Best Available Control Technology (BACT) for reducing VOC emissions from AIM coatings in Canada. A significant portion of the US AIM coatings market must now comply with the CARB and OTC Model Rule VOC content limits, indicating that in order to harmonize requirements between the US and Canada these limits are the most appropriate to consider for the proposed regulation.

Lower VOC content limits have been developed for use in the South Coast Air Quality Management District (SCAQMD) which includes Los Angeles, California. However, these limits were not considered for use in Canada. These limits have been set in a region where the smog issue is extreme and where regulations limiting the VOC content of AIM coatings have been in place for over 20 years. Several of these limits are currently considered to be technology forcing.

A survey of the AIM coatings industry was initiated by Environment Canada in October 2003 to collect information on the 2002 sales volumes and VOC contents of AIM coatings sold in Canada. The results of the survey were used to estimate the impact of the proposed regulations on manufacturers of AIM coatings. The survey indicated that for most categories and VOC contents in the proposed regulation, there is a significant existing complying marketshare. For all categories where sales were reported, there are existing products that comply with the proposed limit. Details on complying marketshare and results of the survey are presented for each category in Annex 2.

EFFECTIVE DATE

The effective date for the regulation will be determined through the consultation process. The proposed regulation may also contain a sell-through provision where products manufactured prior to the effective date of the regulation may be sold for up to three years following the effective date.

SMALL CONTAINER EXEMPTION

Consideration will be given to a small container exemption, such that the regulation would apply only to AIM coatings sold in containers larger than 1 US quart (0.946 L). This exemption for small containers has been included in all existing US AIM rules and regulations. The purpose for the exemption is to allow the continued use of potentially high VOC content niche market coatings which would fall under the AIM definition, but whose volume of sales is too small to address with a specific category description and VOC content limit. The exemption affects several categories included in the AIM regulation such as faux-finishing coatings, lacquers, clear/semitransparent stains and clear varnishes. Coatings sold in these categories have a significant portion of sales in small containers.

VOC CONTENT LIMIT CALCULATION

The VOC content limits apply at the time of application of the coating (e.g. after any thinning of the coating has been accomplished). The VOC content limits in the regulation are calculated on a "less water and exempt compounds" basis. This VOC content is typically referred to as the VOC_{Regulatory} for a coating and has been used in all US jurisdictions in their AIM coating regulations. VOC contents in the regulation are calculated as follows:

$$\text{VOC Content} = (Ws - Ww - Wec) / (Vm - Vw - Vec) \dots\dots\dots \text{equation 1}$$

where

VOC Content, in grams of VOC per litre of coating
Vec = volume of exempt compounds, in litres
Vm = volume of coating, in litres
Vw = volume of water, in litres
Wec = weight of exempt compounds, in grams
Ws = weight of volatiles, in grams
Ww = weight of water, in grams

For a solvent-based coating containing no water or exempt solvents, this equation calculates the actual VOC content of a coating, i.e., the weight of VOC solvents divided by the volume of the entire product. For either a water-based or solvent-based coating containing either water or exempt solvents, this equation removes the weight and volume of the water and exempt solvents from both the numerator and denominator, effectively removing them from consideration. The equation thus links the weight of VOC solvents in the coating to the combined volume of VOC solvents and solids. In theory, the volume of solids contained in a coating is related to the coverage, therefore, the equation generally describes the mass of VOCs released per area of surface coated.

Two important points about compliance with the VOC content limits should be noted. First, since the VOC limits in the proposed regulation are intended for AIM coatings at the point of application, any VOCs contained in thinners added to the coating at the point of application up to the manufacturer's maximum recommendation for thinning must be included in the calculation. In other words, the VOC content limits apply to the VOC content that would result after thinning a coating according to the manufacturer's maximum thinning recommendations. Second, the VOCs contained in colourants added to a tint base (an un-tinted coating) at a store are not included in this regulation. In other words, the VOC content of a tint base is to be calculated without the colourant that is added after the tint base is manufactured or imported.

One exception to the use of VOC_{Regulatory} is when calculating the VOC content of a low-solids coating. For this type of coating, the volume of solids is not related to coating coverage, so the VOC content is on the basis of the entire volume of the coating. The equation used to determine the VOC content of a low-solids coating is:

$$\text{VOC Content}_{\text{ls}} = (Ws - Ww - Wec) / (Vm) \dots\dots\dots \text{equation 2}$$

where

VOC Content_{ls} is the VOC content of a low-solids coating, in grams of VOC per litre of coating
Vm = volume of coating, in litres
Wec = weight of exempt compounds, in grams
Ws = weight of volatiles, in grams
Ww = weight of water, in grams

TEST METHODS

The reference method included in the proposed regulations to determine the composition of a coating is US EPA Method 24, US 40 Code of Federal Register, Part 60. This method may be used for all coatings except for methacrylate multicomponent coatings used as traffic marking coatings and on a case-by-case basis where an alternative method may be approved by Environment Canada. The proposed method which would be used to determine the VOC content of methacrylate multicomponent coatings used as traffic markings is described in the US Code of Federal Register, Part 59, Subpart D, Appendix A. Manufacturers or importers

may use Method 24, formulation data or any reasonable means for predicting that the coating has been formulated as intended; however, if there are any inconsistencies between the results of a Method 24 test and any other means for determining VOC content, the Method 24 test results would be considered correct.

LABELLING REQUIREMENTS

Consideration will be given to a requirement in the proposed regulation that manufacturers and importers of architectural coatings would have to provide specified information on the labels of their coatings. The labels would have to contain information on the date of manufacture, any specific thinning recommendations and the VOC content of the coating. For manufacturers and importers of industrial maintenance coatings, the proposed regulation would require that coatings meeting the definition of "industrial maintenance coating" carry specific descriptions on the label indicating that the coating is to be used as an industrial maintenance coating only.

Other specific labelling requirements may be considered for clear brushing lacquers, rust preventative coatings, specialty primers, sealers and undercoaters, quick dry enamels and non-flat high gloss coatings where clarification of intended use or of coating characteristics may be necessary to identify the coating with the intended category.

REPORTING REQUIREMENTS

Consideration will be given to reporting requirements for manufacturers and importers. These considerations include reporting of VOC product content to Environment Canada and record keeping provisions.

Table 1 - Proposed VOC Content Limits	
Coating Category	Proposed VOC Content Limit (grams/litre)
Antenna coatings	530
Bituminous roof coatings	300
Bituminous roof primers	350
Bond breakers	350
Calcimine recoater	475
Clear brushing lacquers	680
Concrete curing compounds	350
Concrete surface retarder	780
Conversion varnish	725
Dry fog coatings	400
Extreme high durability coatings	800
Faux finishing/glazing	350
Fire resistive coatings	350
Fire retardant coatings - clear	650
Fire retardant coatings - opaque	350
Flat coatings	100
Floor coatings	250
Flow coatings	650
Form release compounds	250

Graphic arts coatings	500
High temperature coatings	420
Impacted immersion coatings	780
Industrial maintenance coatings	340
Lacquers (including lacquer sanding sealers)	550
Low solids coatings	120
Mastic texture coatings	300
Metallic pigment coatings	500
Multi-colored coatings	250
Nonflat coatings	150
Nonflat coatings - high gloss	250
Nuclear coatings	450
Pretreatment wash primers	420
Primers, sealers and undercoaters	200
Quick dry enamels	250
Quick dry primers, sealers and undercoaters	200
Recycled coatings	250
Roof coatings (non-bituminous)	250
Rust preventative coatings	400
Sanding sealers (other than lacquer sanding sealers)	350
Shellacs - clear	730
Shellacs - opaque	550
Specialty primers, sealers and undercoaters	350
Stains	250
Swimming pool coatings	340
Temperature indicator safety coatings	550
Thermoplastic rubber coatings and mastics	550
Traffic and zone marking coatings	150
Varnishes	350
Waterproofing sealers	250
Waterproofing sealers (concrete/masonry)	400

7 - Benefits and Costs

VOC REDUCTIONS

The reduction in VOC emissions is estimated at 41% of total VOC emissions from AIM coatings once the proposed limits are fully implemented. (Cheminfo, 2005; Environment Canada Survey Results)

Considering the small container exemption, the reduction in VOC emissions would be approximately 30% of the total VOC emissions from AIM coatings once the proposed limits are fully implemented. (Environment Canada Survey Results)

With an estimated 17% growth in AIM coatings sales predicted by 2010 (from 2002 amounts), and the 30% reduction in emissions expected from the proposed regulations, it is expected that the overall impact of the regulations in 2010 will be to reduce VOC emissions by 48.3 kt (an 18% reduction from 2002 emission levels).

COSTS

Cheminfo Services Inc. completed an estimate of the cost of compliance with the proposed regulation in the report titled *Background Economic Study of the AIM Coatings Sector*. The methodology for the cost estimate followed the analysis conducted by CARB to support the June 2000 *Suggested Control Measure*. The inputs for the analysis were derived from CARB and EPA economic analyses, industry estimates and Environment Canada survey information. Overall the proposed regulation is estimated to cost manufacturers of coatings sold in Canada \$74 million dollars per year over the next ten years assuming the lump sum cost of reformulation (R&D, equipment, etc.) is spread over ten years. When compared to the gross margin for the sector (total revenues less operating expenses), a \$74 million dollar increase in operating expenses results in an overall decrease in gross margin of approximately 15%. On a volume basis, this equates to an estimated cost increase of approximately \$0.43 per litre of coating (assuming costs are passed through entirely to end users). (Cheminfo, 2005)

BENEFITS

The proposed regulations generate environmental and health benefits that could be translated into economic terms. For example health benefits could be translated into avoided costs to the health care system as well as improved individual well-being. However, the links between emission reductions, atmospheric concentration of pollutants, and health and environmental improvements are difficult to establish in quantitative terms, given the currently available information.

The VOC emission reductions to be achieved through this regulation are one of many required across a wide variety of sectors to meet the Canada-Wide Standards for ozone and particulate matter.

8 - Path Forward

Since the focus of this proposed regulation is on AIM paints, stakeholders in the consultation process may include Canadian manufacturers of architectural coatings, associations representing manufacturers, importers and applicators of coatings including: Canadian Paints and Coatings Associations (CPCA), The Society for Protective Coatings (SSPC), Roof Coatings Manufacturers Association (RCMA). Other stakeholders may include government departments and environmental non-governmental organizations (ENGOS).

A multi-stakeholder consultation on this proposed regulation was held on April 5, 2005 in Toronto. Environment Canada provided background information on the development of the proposed regulation, described the elements of the proposed regulation and solicited feedback. The need for more focused working groups to address specific segments of the architectural coatings market will be evaluated following the consultation.

Stakeholders will be encouraged to provide written comments on the proposed regulation following the consultation. After the comments are reviewed a draft regulation and the *Regulatory Impact Analysis Statement* (RIAS) will be published in the *Canada Gazette, Part I*. The RIAS provides a clear explanation of the regulation, its purpose, the analysis substantiating it and its expected impacts. This publication is followed by a sixty-day public comment period during which stakeholders will have an opportunity to provide comment on the proposed regulation. Publication of the final regulation in the *Canada Gazette, Part II* will follow the receipt of stakeholder comments.

Contact Information

For further information on this discussion document or to find out how to get involved in the public consultation activities for the proposed regulation please contact:

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References

Cheminfo, 2004a. Technical Assessment of Categorization and VOC Content Limits for Architectural and Industrial Maintenance Coatings in Canada. Report by Cheminfo for Chemical Controls Branch, Environment Canada, March 2004.

Cheminfo, 2004b. Volatile Organic Compounds (VOC) Emissions from the Use of Solvents in Canada for the Year 2002. Report by Cheminfo for Pollution Data Branch, Environment Canada, March 2004.

Cheminfo, 2005. Background Economic Study of the Architectural and Industrial Maintenance (AIM) Coatings Sector. Report by Cheminfo Services Inc. for Chemical Controls Branch, Environment Canada. December 2004.

Environment Canada, 2004a. A Federal Agenda for Reduction of Emissions of Volatile Organic Compounds from Consumer and Commercial Products - Support Document to the Notice of Intent. Transboundary Air Issues Branch, Environment Canada. March 2004.

Environment Canada, 2004b. 2000 National Criteria Air Contaminants Inventory, Pollution Data Branch, Environment Canada. November 2004.

Environment Canada, 2005. Summary of Results - 2002 AIM Coatings Survey. Chemical Controls Branch, Environment Canada. February 2005.

Annex 1 - Comparison of US EPA, OTC, and proposed VOC Content Limits

Category	US EPA limit	OTC limit	Proposed limit
Antenna coatings	530	530	530
Bituminous roof coatings	500	300	300
Bituminous roof primers	500	350	350
Bond breakers	600	350	350
Calcimine recoater	475	475	475
Clear brushing lacquers	680	680	680
Concrete curing compounds	350	350	350
Concrete surface retarders	780	780	780
Conversion varnish	725	725	725
Dry fog coatings	400	400	400

Extreme high durability coatings	800	[340]	800
Faux finishing/glazing	700	350	350
Fire resistive coatings	[850/450]	350	350
Fire retardant coatings - clear	[850]	650	650
Fire retardant coatings - opaque	[450]	350	350
Flat coatings	250	100	100
Floor coatings	400	250	250
Flow coatings	650	420	650
Form release compounds	450	250	250
Graphic arts coatings	500	500	500
High temperature coatings	650	420	420
Impacted immersion coatings	780	780	780
Industrial maintenance coatings	450	340	340
Lacquers (including lacquer sanding sealers)	680	550	550
Low solids coatings	[120]	120	120
Mastic texture coatings	300	300	300
Metallic pigment coatings	500	500	500
Multi-colored coatings	580	250	250
Nonflat coatings	380	150	150
Nonflat coatings - high gloss	[380]	250	250
Nuclear coatings	450	450	450
Pretreatment wash primers	780	420	420
Primers, sealers and undercoaters	[350/400]	200	200
Quick-dry enamels	450	250	250
Quick-dry primers, sealers, undercoaters	450	200	200
Recycled coatings	na	250	250
Roof coatings (non-bituminous)	250	250	250
Rust preventative coatings	400	400	400
Sanding sealers (other than lacquer sanding sealers)	550	350	350
Shellacs - clear	730	730	730
Shellacs - opaque	550	550	550
Specialty primers, sealers and undercoaters	[350/400]	350	350
Stains	550/350	250	250
Swimming pool coatings	600	340	340
Temperature indicator safety coatings	[650]	550	550
Thermoplastic rubber coatings and mastics	550	550	550
Traffic and zone marking coatings	450/150	150	150
Varnishes	450	350	350
Waterproofing sealers	600	250	250

Waterproofing sealers (concrete/masonry)	[400]	400	400
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Note:

Where a category is not included in the EPA National Rule or OTC Model Rule, the most applicable VOC content limit is provided in square brackets.

Annex 2 - Background Information

The following section includes background information compiled from various sources. The purpose of providing this information is to describe the proposed coatings categories, to provide results of the Environment Canada survey and to describe a rationale for the selection of the proposed VOC content limits.

Sources of Information

VOC Content Limits

The background information includes a comparison of VOC content limits from the US EPA AIM Rule, the CARB Suggested Control Measure (SCM), the OTC Model Rule and the proposed regulation. Where a category was not included in a rule or regulation the most applicable VOC content limit(s) is provided in square brackets.

Definition

The definition provided is generally consistent with either the OTC Model Rule or the EPA AIM Rule. The definitions are the same as those that will be included in the proposed regulation. This section also identifies if a category is exempt from the most restrictive limit provision in the proposed regulation.

Technical Assessment Results

Information from this section is taken from the 2004 report titled *Technical Assessment of Categorization and VOC Content Limits for Architectural and Industrial Maintenance Coatings in Canada*. The report was completed by Cheminfo Services Inc. for Environment Canada in March 2004.

Survey Results

The survey results provided in the summary sheets are from the 2002 Environment Canada survey of manufacturers and importers of AIM coatings in Canada. The number of products and volume of sales includes information from survey responses where a VOC_{regulatory} value was provided. The water-based/solvent-based (WB/SB) breakdown and VOC content range values are from all available survey responses.

MPI Information

Master Painters Institute (MPI) is a Canadian organization that oversees a specification system for various types of architectural coatings. They publish a list of approved products twice per year which meet their criteria for aspects such as durability and performance. Information on the VOC content of their approved products can be found on their website. Available information from MPI is included as an indication of the range of VOC contents for a given category for acceptable products. Not all manufacturers of AIM coatings have their products approved by MPI, so the results should not be considered representative of the entire market.

Technical Data/Manufacturer Info

Where relevant, information obtained from manufacturer interviews, websites or published technical product data sheets is included.

Information from Other Jurisdictions

Where relevant, published information from jurisdictions in the US related to AIM regulation/model rule development was included. This information is intended to present the rationale used by jurisdictions in selecting their limits.

- **Antenna Coatings**
- **Bituminous Roof Coatings**
- **Bituminous Roof Primers**
- **Bond Breakers**
- **Calcimine Recoater**
- **Clear Brushing Lacquers**
- **Concrete Curing Compounds**
- **Concrete Surface Retarders**
- **Conversion Varnish**
- **Dry Fog Coatings**
- **Extreme High Durability Coatings**
- **Faux Finishing Coatings**
- **Fire-Resistive Coatings**
- **Fire Retardant Coatings - clear**
- **Fire Retardant Coatings - opaque**
- **Flat Coatings**
- **Floor Coatings**
- **Flow Coatings**
- **Form Release Compounds**
- **Graphic Arts Coatings**
- **High temperature Coatings**
- **Impacted Immersion Coatings**
- **Industrial Maintenance Coatings**
- **Lacquers (including lacquer sanding sealers)**
- **Low Solids Coatings**
- **Mastic Texture Coatings**
- **Metallic Pigmented Coatings**
- **Multi-coloured Coatings**
- **Non-Flat Coatings**
- **Non-Flat High Gloss Coatings**
- **Nuclear Coatings**
- **Pre-Treatment Wash Primers**
- **Primers, Sealers and Undercoaters**
- **Quick-dry Enamels**
- **Quick-dry Primers, Sealers, and undercoaters**
- **Recycled Coatings**
- **Roof Coatings**
- **Rust Preventative Coatings**
- **Sanding Sealers (other than lacquer sanding sealers)**
- **Shellacs - clear**
- **Shellacs - opaque**

- **Specialty Primers, Sealers and Undercoaters**
- **Stains**
- **Swimming Pool Coatings**
- **Temperature Indicator Safety Coatings**
- **Thermoplastic Rubber Coatings and Mastics**
- **Traffic Marking Coatings**
- **Varnishes**
- **Waterproofing Sealers**
- **Waterproofing Sealers - concrete/masonry**

Categories not included in Proposed Regulation

Anti-fouling coatings

- The Pest Management Regulatory Agency (PMRA) will be managing any VOC emission reduction initiatives dealing with this category.

Anti-graffiti coatings

- This EPA category is considered to be included in the industrial maintenance category in CARB and OTC rules. There were six anti-graffiti coatings reported in the Environment Canada survey and none met the proposed industrial maintenance coating limit of 250 g/L. The Technical Assessment indicated that there are several water-based anti-graffiti products available on the market which are VOC-free. Solvent-based anti-graffiti coatings may be reformulated using exempt compounds.

Chalkboard resurfacers

- This EPA category is considered to be included in the industrial maintenance category in CARB and OTC rules. Six solvent-based products were reported in the Environment Canada survey, but did not provide any VOC regulatory information. Information in the Technical Assessment indicated that water-based chalkboard resurfacers would have no technical issues with meeting the 250 g/L industrial maintenance limit.

Concrete curing and sealing compounds

- This EPA category is considered either a concrete curing compound or waterproofing sealer - concrete/masonry in the CARB, OTC and proposed regulation. These coatings are discussed in the waterproofing sealer - concrete/masonry section.

Concrete protective coatings

- This EPA category is considered to be included in the waterproofing sealer - concrete/masonry category. The EPA VOC content limit for concrete protective coatings is the same as the proposed VOC content limit for waterproofing sealer for concrete and masonry.

Heat reactive coatings

- This EPA category not considered an AIM coating since it has to cure at high temperatures.

Magnesite cement coatings

- This category is used in rules in all US jurisdictions however there is no evidence that magnesite cement flooring is used in Canada. There were no products reported in the Environment Canada survey.

Nonferrous ornamental metal lacquers and surface protectants

- This EPA category is considered to be part of the industrial maintenance category in the CARB, OTC rules and proposed regulation.

Repair and maintenance thermoplastic coatings

- This EPA category is considered to be part of the industrial maintenance category in the CARB, OTC rules and proposed regulation. The technical assessment indicates that water-based repair and maintenance thermoplastic coatings may be formulated to meet the industrial maintenance VOC content limit of 340 g/L. Reformulated solvent-based products may have an increase viscosity resulting in application issues.

Stain controllers

- This EPA category is considered to be part of the low solids category in the CARB, OTC and proposed regulation. There were seven stain controllers reported in the Environment Canada survey. One was water-based and would meet the proposed limit for low solids coatings. The solvent-based products would not meet the proposed limit. Approximately 70% of stain controllers in the survey were sold in small containers and would be considered exempt from the VOC content requirement. According to the Technical Assessment, stain controllers would have to be formulated as water-based products to meet the low solids VOC content limit.

Wood preservatives

- The Pest Management Regulatory Agency (PMRA) will be managing any VOC emission reduction initiatives dealing with this category.

Zone markings

- This EPA category is included in the traffic markings category in CARB and OTC rules. The EPA VOC content limit for zone markings is 450 g/L. These coatings would be considered Traffic Markings in the proposed Environment Canada regulation and have a VOC content limit of 150 g/L.

References for Background Information

/ref1/...Cheminfo Services Inc. Technical Assessment of Categorization and VOC Content Limits for Architectural and Industrial Maintenance Coatings in Canada. Report by Cheminfo for Chemical Controls Branch, Environment Canada, March 2004.

/ref2/...Environment Canada, 2005. Results of Environment Canada survey of Architectural and Industrial Maintenance Coatings - 2002 Sales and VOC content.

/ref3/... MPI List of Approved Products - January 2, 2005 version. www.paintinfo.com

/ref4/... California Air Resources Board, 2003. 2001 Architectural Coatings Survey, Final Report.

/ref5/... California Air Resources Board, 2000. Staff Report for the Proposed Suggested Control Measure for Architectural Coatings, Chapter VI - Description and Technical Assessment of Coating Categories. June 2000

/ref6/... State of Delaware Department of Natural Resources and Environmental Control, Regulation 41, Section 1, "Architectural and Industrial Maintenance Coatings" Response Document, March 2002.

/ref7/... State of New York Department of Environmental Conservation, Assessment of Public Comments on Proposed Revisions to 6 NYCRR Part 205, Architectural and Industrial Maintenance (AIM) Coatings, 2003.

/ref8/... State of New York Department of Environmental Conservation, Consolidated Impact Statement, 6 NYCRR Part 205, Architectural and Industrial Maintenance Coatings, 2003

/ref9/... US EPA, 1998. National Volatile Organic Compound Emission Standards for Architectural Coatings - Background for Promulgated Standards. EPA-453/R-98-006b, August 1998