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- [Treaties, laws and regulations \(https://www.canada.ca/en/government/system/laws.html\)](https://www.canada.ca/en/government/system/laws.html)
- [Canada Gazette \(/accueil-home-eng.html\)](#) → [Publications \(/rp-pr/publications-eng.html\)](#)
- [Part I: Vol. 153 \(2019\) \(/rp-pr/p1/2019/index-eng.html\)](#)
- [July 6, 2019 \(/rp-pr/p1/2019/2019-07-06/html/index-eng.html\)](#)

Canada Gazette, Part I, Volume 153, Number 27: Volatile Organic Compound Concentration Limits for Certain Products Regulations

July 6, 2019

Statutory authority

Canadian Environmental Protection Act, 1999

Sponsoring departments

Department of the Environment
Department of Health

REGULATORY IMPACT ANALYSIS STATEMENT

(This statement is not part of the Regulations.)

Executive summary

Issues: Volatile organic compounds (VOCs) are precursors in the formation of ground-level ozone and particulate matter, two main components of smog. Currently, Canada does not have regulations in place to limit VOC emissions from certain product categories and meet its commitments under the Ozone Annex to the Canada-United States Air Quality Agreement. The existing voluntary guidelines recommending VOC concentration limits for consumer product categories have not been sufficient in meeting these objectives. A technical study commissioned by the Department of the Environment in 2014 found that VOC concentrations for some product categories are still above the voluntary limits. Currently, an estimated 50 kilotonnes (kt) of VOCs continue to be emitted annually from products used by consumers and in institutional, industrial and commercial applications.

Description: The proposed *Volatile Organic Compound Concentration Limits for Certain Products Regulations* (the proposed Regulations) would apply to Canadian manufacturers and importers and would establish VOC concentration limits for approximately 130 product categories and subcategories. This would include personal care products; automotive and household maintenance products; adhesives, adhesive removers, sealants and caulks; and other miscellaneous products.

Rationale: The proposed Regulations would achieve VOC emission reductions and help Canada meet its national and international commitments. The reductions of VOC emissions are expected to lead to improvements in air quality. Between 2023 and 2030, the proposed Regulations are expected to result in 200 kt of VOC emission reductions. The benefits of the proposed Regulations are expected to be approximately \$697 million over the time frame of analysis, with compliance costs assumed by regulated parties expected to be around \$191 million. The net benefits of the proposed Regulations are estimated to be approximately \$496 million.

Issues

Volatile organic compounds (VOCs) are precursors in the formation of ground-level ozone and

particulate matter (PM_{2.5}), two main components of smog. Currently, Canada does not have regulations in place to limit VOC emissions from certain product categories and meet its commitments under the Ozone Annex to the Canada-United States Air Quality Agreement. The existing voluntary guidelines recommending VOC concentration limits for consumer product categories have not been sufficient in meeting these objectives. A technical study commissioned by the Department of the Environment (the Department) in 2014 found that VOC concentrations for many product categories are still above the voluntary limits. The study indicated that an estimated 50 kt of VOCs continue to be emitted annually from certain products used by consumers and in institutional, industrial and commercial applications.

Background

VOCs are a large group of organic chemicals that can be emitted from different natural and anthropogenic sources. VOCs are released from a diverse range of products, including paints, varnishes, wax, cosmetics, as well as cleaning, disinfecting and degreasing products. In 2003, VOCs were added to the list of toxic substances under the *Canadian Environmental Protection Act, 1999* (CEPA) due to their role as precursors in the formation of ground-level ozone and particulate matter, two main components of smog.

Adverse health and environmental effects are experienced across Canada due to smog. Such health impacts include thousands of premature deaths each year, as well as increased hospital visits, doctor visits, and lost days at work and school. Scientific evidence also suggests that smog can have harmful environmental impacts such as reductions in agricultural crop and commercial forest yields. ¹

National and international commitments to address VOC emissions

In 1991, the United States-Canada Air Quality Agreement was established by both countries to address transboundary air pollution leading to acid rain. In 2000, the Ozone Annex was added to the Agreement with the long-term goal of establishing ozone air quality standards in both countries by reducing emissions of nitrogen oxides and VOCs from products. ²

On March 27, 2004, the Department and the Department of Health published Canada's *Federal Agenda on the Reduction of Emissions of Volatile Organic Compounds from Consumer and Commercial Products*. The agenda outlined a series of measures that were developed between 2004 and 2010 to protect the health of Canadians and the environment by reducing VOC emissions from products. ³

One of these measures included the release of the *Regulatory Framework for Air Emissions* in April 2007, which outlined further commitments and actions to reduce VOC emissions in Canada. Key components of this framework included developing regulations to limit VOC concentrations in automotive refinishing products, architectural coatings and certain products. It also aimed to align VOC concentration limits, where applicable, with similar requirements in the United States.

In November 2017, Canada ratified the Gothenburg Protocol and its 2012 amendments, which require ratifying parties to control and reduce VOC emissions. As part of the Protocol and its amendments, Canada committed to establishing a VOC emission ceiling of 2 100 kt and a 20% reduction in VOC emissions to be attained by 2020 based on the 2005 VOC emissions level.

Regulatory and voluntary measures addressing VOC emissions

The Government of Canada has taken a number of actions to encourage voluntary reductions in VOC emissions from consumer and commercial products. The *Guidelines for Volatile Organic Compounds in Consumer Products* were published in November 2002. These voluntary guidelines recommended VOC concentration limits for 41 product categories and subcategories and were reflective of VOC concentration limits established by the United States Environmental Protection Agency (U.S. EPA) at the time. Most recently, the *Code of Practice for the Reduction of Volatile Organic Compound (VOC) Emissions from Cutback and Emulsified Asphalt* was published in the *Canada Gazette, Part I*, on February 25, 2017. ⁴

The Department has also taken regulatory measures to address VOC emissions. It published the *Volatile Organic Compound (VOC) Concentration Limits for Automotive Refinishing Products Regulations* and the *Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations* on July 8, 2009, and September 30, 2009, respectively. ^{5, 6}

On April 26, 2008, the proposed *Volatile Organic Compound (VOC) Concentration Limits for Certain Products Regulations* (proposed Regulations) were published in the *Canada Gazette, Part I*. At the time of publication, the proposed Regulations aimed to align with the California Air Resource Board's

(CARB) *Regulations for Reducing Emissions from Consumer Products and Regulations for Reducing VOC Emissions from Antiperspirants and Deodorants* (Consumer Product Regulations). The proposed Regulations would have established VOC concentration limits for certain product categories, including personal care products; automotive and household maintenance products; adhesives, adhesive removers, sealants and caulks; and other miscellaneous products. These products are not covered by regulations previously published by the Department.

Since publication of the proposed Regulations in the *Canada Gazette*, Part I, the Department has expanded the scope to cover a wider range of products to align with the 2010 Consumer Product Regulations under CARB. The Department has consulted stakeholders throughout this process. Given the significance of the changes to the regulatory proposal, republication in the *Canada Gazette*, Part I, is warranted.

Objective

The objective of the proposed Regulations is to reduce VOC emissions by setting VOC concentration limits on products being imported or manufactured in Canada in order to protect the environment and health of Canadians from adverse impacts associated with these emissions.

Description

The proposed Regulations would establish VOC concentration limits for products in approximately 130 product categories and subcategories. These categories and subcategories cover a wide range of products used by consumers, or in institutional, industrial or commercial applications and would include personal care products; automotive and household maintenance products; adhesives, adhesive removers, sealants and caulks; and other miscellaneous products (hereinafter referred to as certain products). The proposed Regulations would align with CARB's amendments to the Consumer Product Regulations implemented in 2010.

Accompanying the proposed Regulations are proposed consequential amendments to the *Regulations Designating Regulatory Provisions for Purposes of Enforcement (Canadian Environmental Protection Act, 1999)* [Designation Regulations]. The Designation Regulations designate various provisions of regulations made under CEPA that are linked to a fine regime following a successful prosecution of an offence involving harm or risk of harm to the environment, or obstruction of authority. The amendments are needed to include the proposed Regulations in the Schedule to the Designation Regulations.

VOC concentration limits for manufacturers and/or importers

The proposed Regulations would prohibit the manufacture and import of products with VOC concentrations in excess of their respective category-specific limits, unless a permit is obtained. The concentration limits and product categories and subcategories are identified in the Schedule to the proposed Regulations. While the proposed Regulations that were prepublished in 2008 included a prohibition on sale, the current proposed Regulations would only apply to the manufacture and import of products in order to reduce administrative burden and impacts on small businesses.

Labelling, reporting and record-keeping requirements

Manufacturers and/or importers of a regulated product would be required to indicate, on the product container, the date on which the product was manufactured or a code representing that date. The proposed Regulations would not include mandatory testing requirements to be conducted by regulated parties to ensure regulated products meet the proposed VOC concentration limits. However, they would be required to keep information regarding regulated products in Canada to ensure that the Department is able to access records and reports, if required.

Alternative compliance options

A number of alternative compliance options are proposed to provide flexibility in complying with the proposed Regulations. To promote transparency, information regarding products and associated permits would be made publicly available.

Permit — Compliance not technically or economically feasible

The proposed Regulations would include a provision for temporary permit applications for products that would be otherwise unable to meet the regulatory requirements for technical or economic reasons. Temporary permits would allow regulated parties to continue manufacturing or importing products if the conditions outlined in the proposed Regulations are met, including a plan to show how

the products would be brought into compliance. A permit would be valid for a period of up to two years from the date it is issued and could be extended for an additional two years, provided the application is submitted 90 days prior to the expiry of the first period.

Permit — Product resulting in lesser VOC emissions

The proposed Regulations would include a provision for a permit allowing products to exceed the VOC concentration limits if, as a result of product design, formulation, delivery or other factors, the total VOC emissions from that product would be lower than those from a comparable compliant product when used in accordance with the manufacturer's written instructions. It is proposed that the permit would be valid for a period of four years from the date it is issued and could be renewed every four years, provided the application is submitted at least 90 days prior to the expiry of the previous period.

VOC Tradeable Unit Credit Program

The proposed Regulations would include a VOC Tradeable Unit Credit Program similar to CARB's *Alternative Control Plan Regulation for Consumer Products and Aerosol Coating Products*, with certain differences that take into consideration the Canadian context. ⁷ The program would provide an alternative method for complying with VOC concentration limits by providing a permit that would allow companies to manufacture or import products that exceed concentration limits in the following ways:

- Balancing emissions from products that exceed the concentration limits with credits earned from products that were reformulated to have a VOC concentration lower than the regulatory limits; or
- By purchasing credits from other companies.

To apply, participate and maintain a permit in the program, companies would be required to follow the requirements and deadlines as set out by the proposed Regulations. Permits under the program would be valid indefinitely if participating companies continue to submit the required annual reports and meet conditions set out by the proposed Regulations. Further, regulated parties would be required to submit a report for each calendar year during which they participate in the program. ⁸

Regulatory development

Consultations

Official consultations regarding the proposed Regulations took place in two stages. Preliminary consultations with industry, provincial and territorial governments, and environmental non-governmental organizations (ENGOs) took place in 2013. Follow-up consultations with industry associations and ENGOs regarding the cost-benefit analysis framework and regulatory text took place in 2018.

The preliminary consultations were officially launched in January 2013 and concluded in March 2013. A consultation document titled *Revisions to the Proposed Volatile Organic Compound (VOC) Concentration Limits for Certain Products Regulations* was released by the Department for a 60-day public comment period. The document provided background information and outlined the path forward with respect to revising the proposed Regulations. ⁹

A formal public consultation session was held in Toronto in February 2013. The purpose of the meeting was to discuss the next steps in the regulatory development process and gather information regarding the challenges and needs of small businesses and other stakeholders that would be impacted by the proposed Regulations. The stakeholder meeting was attended by approximately 130 representatives from industry, industry associations, environmental non-governmental organizations and other government departments. Twenty-nine stakeholders, including 10 industry associations provided comments on the consultation document.

A letter was also sent by email to the members of the CEPA National Advisory Committee (CEPA NAC) and relevant federal government departments were also consulted on the proposed Regulations. No major concerns were raised by federal government departments or CEPA NAC.

In April 2018, the Department shared a cost-benefit analysis framework with industry associations and ENGOs. This framework outlined the methodology, assumptions, and sources of data used to estimate the costs and benefits of the proposed Regulations. In 2018 and 2019, the Department also met with key industry associations including Cosmetics Alliance Canada, the Canadian Consumer Specialty Products Association, the Adhesives and Sealants Manufacturers Association of Canada,

the Canadian Paint and Coatings Association, the Retail Council of Canada and the Canadian Vehicle Manufacturers Association to update them on the regulatory proposal and address any outstanding concerns.

Feedback received from stakeholders prior to the publication of the proposed Regulations in the *Canada Gazette*, Part I, helped identify areas requiring clarification and areas of concern for regulated and interested parties. A detailed comment and response document has been published on the Department's website. Accordingly, the Department has made numerous changes to the proposed Regulations. A summary of stakeholder comments and responses is presented below.

Industry members and associations

Through regular meetings and written feedback, industry representatives expressed their general support of the proposed Regulations. However, some industry members were concerned that the coming-into-force dates would not provide enough time to modify the manufacturing and importing processes to meet the proposed VOC concentration limits. Concerns were also raised regarding Canadian companies being placed at a competitive disadvantage due to the steep learning curve associated with the development of compliant products.

The Department has deemed the current timeline sufficient as the proposed Regulations would come into force two years after the date on which they are published, with the exception of disinfectants, which have an additional year to comply. The delayed coming-into-force date for the proposed Regulations provides regulated parties with time to align with the proposed VOC concentration limits. In addition, with CARB limits already in place, it is expected that some regulated parties will already have experience in complying with the proposed standards. Alternative compliance options were also designed to assist Canadian manufacturers and importers in meeting the regulatory requirements.

Further, some industry members indicated that the exclusion of sellers from the proposed Regulations could create an opportunity for distributors to stockpile noncompliant products. This would affect the market as compliant products are generally more expensive and would not sell in a market saturated with less expensive non-compliant products. The Department believes that the exclusion of sellers would reduce administrative burden on businesses, especially small- and medium-sized enterprises. According to a technical study commissioned by the Department in 2014, a large number of products in the Canadian market are already compliant with the proposed Regulations. Further the study indicated that compliant products are not likely to be significantly more expensive than non-compliant products within the same category. Price increases are expected to vary between categories. However, it is estimated that prices of compliant products would increase by 0.05% to 0.5% when compared to non-compliant products. In addition, once the proposed Regulations are in place, they are expected to eliminate the presence of non-compliant products in the Canadian market over time as the sell-through period of non-compliant products is expected to be relatively short.¹⁰

Some industry members also suggested modifying the VOC Tradable Unit Credit Program to remove the trading aspect and only allow averaging to take place within a single company's product lines. Increasing the time allowed for the building and use of credits beyond the suggested one-year period following reformulation was also requested. In response, the Department has revised the proposed Regulations to allow regulated parties to earn credits for all products reformulated below the regulatory limit and use issued credits for up to two years. The Department has included the trading provisions to ensure a level playing field for small enterprises with limited product lines.

The Department has consulted with industry to verify the alignment of product categories with CARB's Consumer Product Regulations. One industry association has continued to request the adoption of the exact text used in CARB's definitions. The Department has harmonized product category definitions with the 2010 CARB Regulations, except for a few specific product categories required in Canada. However, Canadian regulatory drafting conventions do not often allow for verbatim adoption of the product category definitions as found in CARB's Regulations. Canadian regulations are drafted in two languages, and must be drafted in a way that can be interpreted in both languages and under both the common and civil systems of law. The Government of Canada also does not define commonly known terms or dictionary definitions.

Industry members and associations were briefed on the modifications and were generally satisfied with the clarifications provided by the Department. One association continues to express concern regarding the timing for the coming into force.

Adapting the proposed Regulations to the Canadian context

Industry members have made requests to further align certain aspects of the proposed Regulations with the CARB regulations. For example, some industry members suggested automatically allowing the manufacture and import of products already exempt under the CARB Innovative Product

Exemption, without needing a permit under the proposed Regulations. In response, the Department has clarified that the permit application process would be necessary as Canada-specific data is needed. Where appropriate, applicants may submit similar technical information provided to the CARB as part of their application. This is expected to reduce the administrative burden on companies already exempt under the CARB.

In addition, industry members indicated that the proposed VOC concentration limits of 1.5% for non-chemically curing sealant and caulking products and 3% for the chemically curing products would not be viable due to Canada's colder climate. It was suggested that the Department align the VOC concentration limits with those of the Ozone Transport Commission rather than those of the CARB for these product categories.¹¹ Industry members also requested the addition of an acoustical sealant product category, as it is used in areas in Canada that experience freezing temperatures. In response, the Department has amended the proposed Regulations to align the VOC concentration limits with those of the Ozone Transport Commission, namely 4% for these sealants and caulking compounds. The proposed Regulations have also been modified to include an acoustical sealant product category.

Industry members have also requested that windshield washer fluid be removed from the proposed Regulations. Higher VOC concentration limits in these products are required to ensure performance and road safety in Canada's colder climate. In response to these concerns, the Department has removed the windshield washer fluid category from the proposed Regulations.

Industry members and associations were satisfied with the modifications and clarifications provided by the Department on the regulatory limits and permit provisions.

Environmental non-governmental organizations

ENGOS were supportive of the proposed Regulations and their potential to address the adverse impacts of VOC emissions. However, they requested the elimination of temporary exemption permits provided to regulated parties unable to meet the regulatory requirements for technical or economic reasons. Other ENGOS requested that the permit be non-renewable. The temporary exemption permit and associated timelines would provide regulated parties, especially small and medium enterprises, with sufficient time to lower VOC concentrations in products whose reformulation poses technical or economic difficulties. It is also consistent with the permit provisions under the *Volatile Organic Compound (VOC) Concentration Limits for Automotive Refinishing Products Regulations* and the *Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations*.

ENGOS have not expressed concern with the modifications and clarifications provided by the Department.

Cost-benefit analysis framework

Feedback was received from one industry association regarding the cost-benefit analysis framework shared by the Department. The association expressed concerns regarding the accuracy and relevance of data on costs and product compliance collected by the Department. In response, the Department invited the association to provide any new information and to redistribute the survey to their members to provide updated data. Subsequently, the association noted that the survey format was insufficient to support the cost-benefit analysis and did not provide updated information. To address these concerns, the Department has conducted a sensitivity analysis that takes into account a high cost scenario. This analysis demonstrates that the proposed Regulations would result in net benefits over a range of cost assumptions.

Instrument choice

Status quo approach

Without the proposed Regulations, the only measures in place to limit VOC emissions from certain product categories are voluntary measures. The *Guidelines for Volatile Organic Compounds in Consumer Products*, published in November 2002, recommended voluntary VOC concentration limits for 41 product categories and subcategories.¹² While the majority of imported products are expected to be compliant with the proposed Regulations, there has been limited uptake of these voluntary standards by domestic manufacturers and importers. Maintaining the status quo approach would not meet the Government of Canada's objectives to reduce the health and environmental risks associated with VOC emissions, nor fulfill national and international commitments. Therefore, this option was rejected.

Additional voluntary measures approach

To date, voluntary measures as well as education and awareness programs have not achieved significant VOC emission reductions from certain products. Since the majority of certain products are imported, it is difficult to convince importers and foreign manufacturers to follow additional voluntary measures. Further, since the existing voluntary measures have resulted in minimal reductions of VOC emissions, additional voluntary measures are unlikely to result in greater reductions. Implementing additional voluntary measures would not meet the Government of Canada's objectives to reduce the health and environmental risks associated with VOC emissions, nor fulfill national and international commitments. Therefore, this option was rejected.

Regulatory approach

The approach that has been chosen to meet the Government of Canada's objectives and commitments is to place VOC limits on consumer products being imported or manufactured in Canada. During the period of 2003 to 2013, the Department collected VOC concentration data for a broad range of products sold in Canada. This data was assessed against various VOC concentration limits in other United States jurisdictions. This assessment indicated that the greatest potential for VOC emission reductions in Canada would be achieved by establishing VOC concentration limits similar to the CARB Consumer Product Regulations. Other jurisdictions in the United States, such as the Ozone Transport Commission, the South Coast Air Quality Management District and the Lake Michigan Air Directors Consortium, have either adopted or are in the process of moving towards VOC limits established by the CARB.

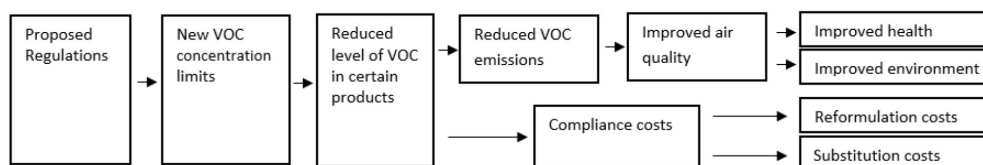
The proposed Regulations would therefore align with the CARB Consumer Product Regulations to facilitate consistency across North America and ensure a level playing field for Canadian manufacturers and importers. The mandatory nature of the proposed Regulations would also provide a level of certainty in ensuring VOC emission reductions. Therefore, the proposed Regulations would help the Government of Canada reduce the health and environmental risks associated with VOC emissions, and meet national and international commitments.

Regulatory analysis

Benefits and costs

The impacts of the proposed Regulations have been assessed in accordance with the Treasury Board Secretariat (TBS) Canadian Cost-Benefit Analysis Guide. The analysis compares the incremental impacts of two scenarios: a baseline scenario maintaining the status quo in which the proposed Regulations are not in place and VOC concentration limits are unchanged and remain voluntary, and a policy scenario in which VOC concentration limits are set in accordance with the proposed Regulations. As illustrated by the logic model below, compliance with VOC concentration limits is expected to reduce VOC emissions and improve overall air quality. This would result in both health and environmental benefits for Canadians.

Figure 1: Logic model for the analysis of the proposed Regulations



The VOC concentration limits set out by the proposed Regulations are expected to come into force two years after the date on which they are registered. It is expected that by the year 2023, all regulated certain products would be compliant with the proposed Regulations, which would lead to reductions in VOC emissions. Compliance costs are expected in the form of one-time product reformulation costs to be assumed at the beginning of the compliance period (assumed to be 2023) and ongoing raw material substitution costs to be assumed annually. The time frame for assessing the impacts of the proposed Regulations is the period from 2023 to 2030, which is sufficient to demonstrate that the benefits are likely to exceed the associated costs. Costs and health benefits have been quantified, monetized and presented in 2018 Canadian dollars wherever possible. Future year impacts have been discounted at 3% per year to 2019 (the year of analysis) as set out by TBS guidelines. Due to time constraints associated with this regulatory analysis, as well as the significance of the associated health benefits, environmental benefits were not estimated but were qualitatively described.

The proposed Regulations are expected to result in approximately 200 kt of VOC emission reductions between 2023 and 2030. The benefits of these reductions, which are due to improved health

outcomes resulting from improved air quality, are valued at about \$697 million over the time frame of the analysis. Further, compliance costs of about \$191 million are expected to be assumed by industry. The net benefits of the proposed Regulations are estimated to be approximately \$496 million.

Regulatory coverage and compliance options

To estimate the incremental benefits of the proposed Regulations, the analysis considered who would be affected (regulatory coverage), how they would likely respond, and alternative compliance options available (compliance options), as described below.

Regulatory coverage

The regulatory coverage would extend and apply equally to the manufacturers and importers of products in approximately 130 categories and subcategories. These manufacturers and importers would be directly regulated and would need to manufacture or import certain products in line with the proposed VOC concentration limits.

Importers: Products imported into Canada would be required to be compliant with the proposed VOC concentration limits. According to a study commissioned by the Department, an estimated 65% of products expected to be subject to the proposed Regulations are imported into Canada. The majority of these products, around 80% to 90%, depending on product category, are imported from the United States.¹³ Some importers currently import both compliant and non-compliant products under the same category. In this case, importers would be able to discontinue the import of non-compliant products. Importers also have the option of switching over to importing products that are already compliant with the proposed Regulations and would not require any reformulation. However, for the purposes of this analysis, it is assumed that both reformulation costs and annual raw material substitute costs would be passed on to Canadian importers.

Manufacturers: Products manufactured in Canada would be required to be compliant with the proposed VOC concentration limits. Some manufacturers currently produce both compliant and non-compliant products under the same category. In this case, manufacturers would be able to discontinue the production of non-compliant products and replace them with their existing compliant products, without carrying incremental raw material substitute costs. Manufacturers not currently producing compliant products would be expected to carry upfront reformulation costs, in addition to annual raw material substitute costs. For the purposes of this analysis, it is assumed that all non-compliant products manufactured in Canada would be reformulated, resulting in associated upfront costs and annual raw material substitute costs.

Sellers of certain products containing VOCs would not be directly regulated or affected by the proposed Regulations. Sellers would be able to sell products exceeding the proposed VOC concentration limits until stock is depleted. Further, the proposed Regulations are expected to eliminate the presence of non-compliant products in the Canadian markets in the near future, as the sell-through period of non-compliant products is expected to be short.

According to survey results reported in a study commissioned by the Department, approximately 29 283 products currently in the Canadian market would be compliant with the proposed VOC concentration limits while approximately 3 045 products would be non-compliant.¹⁴ For the purposes of this analysis, products have been grouped into three main categories according to primary and secondary NAICS (North American Industry Classification System) codes and in line with intended use. These categories are displayed in Table 1 below.

Table 1: Product categories, compliant products and non-compliant products¹⁵

Type of Products	Product Categories and Subcategories	Estimated Compliant Products	Estimated Non-compliant Products
Personal care products	20	10 045	370
Maintenance products	90	18 958	2 486
Adhesive products	20	280	189
Total	130	29 283	3 045

Personal care products encompass products within the Toilet Preparation and Manufacturing category (NAICS 325620). Examples of products regulated under this category include deodorant, nail polish remover, hairspray and shaving gel/cream.

Maintenance products encompass products within the Soap and Cleaning Compound Manufacturing category (NAICS 325611 and 325612) and All Other Miscellaneous Chemical Product and Preparation Manufacturing category (NAICS 325999). Examples of products regulated under these categories include degreasers, air fresheners, furniture maintenance products and multipurpose solvents.

Adhesive products encompass products within the Adhesives Manufacturing category (NAICS 325520). Examples of products regulated under this category include spray adhesives, sealants and caulks.

Non-stick cooking sprays would also be subject to the proposed Regulations but they are not considered in the analysis of costs and benefits, as manufacturers and importers are expected to already be manufacturing or importing compliant alternatives or have access to compliant formulations that are not likely to require raw material substitutes.

Compliance options for manufacturers and importers

As importers and manufacturers comply with the proposed Regulations, the supply of certain products containing higher VOC concentration limits in the Canadian market would be reduced. The analysis assumes that all manufactured non-compliant products would be reformulated and would require raw material substitutes.

However, a variety of reformulation strategies exists and may include simple dilution of VOC contents, replacement of VOC content with non-VOC materials, replacement of VOC content with exempt VOCs or change in resin base of products to allow for lower VOC formulations. Further, regulated parties may also opt for voluntary compliance flexibilities in the form of temporary exemptions and access to a credit and trading program.

The permits relating to exemptions are expected to defer the costs and benefits associated with the proposed Regulations. Due to uncertainty regarding the degree to which these options would be adopted, they have not been considered in the analysis. Voluntary alternative compliance options are listed below.

Permit — Compliance not technically or economically feasible: Regulated parties producing and manufacturing products that are unable to meet the regulatory requirements due to technical or economic reasons could apply for temporary permits. These permits would allow the regulated parties to continue manufacturing and importing these products under conditions set out by the proposed Regulations.

Permit — Product resulting in lesser VOC emissions: Regulated parties would be able to apply for permits that allow products to exceed the VOC concentration limits, if as a result of product design, formulation, delivery, or other factors, the total VOC emissions would be lower than those from a comparable compliant product of the same category.

VOC Tradeable Unit Credit Program: Regulated parties would be able to continue manufacturing or importing products exceeding the proposed VOC concentration limits by applying for permits to participate in the credit and trading program under the proposed Regulations.

Costs of the proposed Regulations

Compliance with the proposed Regulations would lead to incremental costs to manufacturers and importers in the form of product reformulation costs and raw material substitute costs. They are also expected to result in administrative costs for the federal government.

Product reformulation costs

Non-recurring reformulation costs are based on average time and laboratory costs required to reformulate a typical product. According to data obtained through industry-wide surveys and research reported in a study commissioned by the Department, the average cost of reformulation is estimated to be about \$29,300 per product per company.¹⁶ These costs are expected to vary across firms and products.

The analysis uses the average reformulation cost of \$29,300 per product per company to estimate compliance costs for Canadian regulated parties manufacturing or importing non-compliant products. To comply with the proposed Regulations, manufacturers and importers would be expected to assume approximately \$86 million in direct or passed down reformulation costs. Since the number of

non-compliant products varies across product categories, the total impact of reformulation costs would also be expected to vary, as demonstrated in Table 2. The lack of current and available data does not allow for the disaggregation of one-time reformulation costs between importers and manufacturers.

Reformulation costs could vary according to the size of the manufacturer. For example, according to the technical study commissioned by the Department, reformulation costs for large multinational manufacturers could be as much as 50% lower, since these firms often have considerable experience with product reformulation. Further, they may have existing formulations for compliant products used in other jurisdictions that have similar VOC concentration limits in place. ¹⁷

Raw material substitute costs

The analysis assumes that all products requiring reformulation would also require raw material substitutes to lower VOC concentration limits of non-compliant products. Depending on the reformulation options, raw material costs are expected to vary across and within product categories covered by the proposed Regulations. Similar to reformulation costs, specialized products and products requiring specialized uses are more likely to require costly substitute material. Depending on the product, substitute material costs can range from cost savings of -\$0.1 per kg to costs of \$4 per kg. Raw material costs are expected to constitute the majority of compliance costs for most product categories. ¹⁸ Over the time frame of analysis (2023–2030), complying with the proposed Regulations is expected to result in approximately \$106 million of raw material substitute costs.

Table 2 below provides detailed insight into the costs of the proposed Regulations on regulated parties. The overall compliance costs (i.e. reformulation costs and substitution costs) for all product categories are expected to be approximately \$191 million over the time frame of analysis (2023–2030). Personal care products would account for approximately \$25 million in total compliance costs. Total compliance costs for maintenance products would be approximately \$142 million. Adhesive products would account for a total compliance cost of approximately \$24 million.

Table 2: Total VOC quantities and compliance costs per product category

Type of Products	Quantity of Products Used in Canada (2012)	Reformulation Costs (2023)	Raw Substitute Material Costs (2023–2030)	Total Costs (2023–2030)
Personal care products	16 kt	\$15,700,000	\$9,600,000	\$25,400,000
Maintenance products	143 kt	\$64,800,000	\$76,800,000	\$141,600,000
Adhesive products	22 kt	\$4,900,000	\$19,000,000	\$23,900,000
Total	181 kt	\$85,500,000	\$105,500,000	\$190,900,000

Note: Monetized values in 2018 dollars and discounted to present value using a 3% discount rate. Numbers may not add up due to rounding.

Total raw material substitute costs are expected to differ for manufacturers and importers. Domestic manufacturers are expected to assume approximately \$39 million in raw material substitute costs over the period of analysis (2023–2030). As for importers, they are expected to assume approximately \$66 million in raw material substitute costs over the period of analysis (2023–2030).

Industry and government administrative costs

The proposed Regulations would not require regulated parties to submit any notifications, reports, or maintain records unless they choose to apply for one of the voluntary alternative compliance options. Uptake of these voluntary compliance options is expected to provide cost savings that exceed the associated administrative costs. Since these cost savings were not estimated as part of this analysis, industry administrative costs were not estimated.

The Department would incur costs to enforce and administer the proposed Regulations and to conduct compliance promotion. Before the coming-into-force date, non-recurrent costs of about \$362,000 would be expected as a result of training enforcement officers and \$1,748,000 would be

required for strategic intelligence assessment work. The cost of annual inspections, measures to deal with alleged violations, investigations, prosecutions, and intelligence is estimated to be \$846,000. Overall, enforcement costs are estimated at \$8,143,000 between 2022 and 2030.

Compliance promotion activities are intended to encourage the regulated community to achieve compliance. Compliance promotion costs include costs of distributing the proposed Regulations and developing and distributing promotional materials (such as fact sheets and web material). These costs are estimated to be \$192,000 between 2020–2030.

There would also be costs to Government for the review and approval of permits submitted for voluntary compliance options. The total cost of permit reviews is estimated to be \$1,130,000 between 2022–2030. Table 3 below summarizes government administrative costs to ensure compliance.

Table 3: Administrative costs for Government

Sector	2020–2022	2023–2026	2027–2030	Total
Government administrative costs	\$3,000,000	\$3,400,000	\$3,000,000	\$9,500,000
Industry administrative costs	—	—	—	—
Total administrative costs	\$3,000,000	\$3,400,000	\$3,000,000	\$9,500,000

Note: Monetized values in 2018 dollars and discounted to present value using a 3% discount rate. Numbers may not add up due to rounding.

Benefits of the proposed Regulations

The proposed Regulations are expected to reduce VOC concentration limits in certain products being manufactured and imported in Canada. VOCs are precursor pollutants that contribute to the formation of ground-level ozone and PM_{2.5}, which are the main constituents of smog. Exposure to ground-level ozone and PM_{2.5} can lead to adverse health impacts such as respiratory and cardiac symptoms that can, in some cases, lead to premature mortality. For the purposes of this analysis, it is assumed that the proposed Regulations would take effect in 2023 and that VOC emission reductions would begin concurrently. As a result, health benefits would be gained from avoided adverse health impacts linked to exposure to ground-level ozone and PM_{2.5}.

VOC emission reduction scenarios

A study commissioned by the Department found that the proposed Regulations could result in approximately 25 kt of annual VOC emission reductions, which represents approximately a 50% reduction in VOC emissions from certain products.¹⁹ The study compiled and analyzed data collected from a survey shared by the Department with Canadian manufacturers or importers expected to be impacted by the proposed Regulations. Where data gaps were identified, the study incorporated secondary sources.²⁰ The data was then used throughout the study to arrive at an estimate of annual VOC emission reductions.

The Department assessed annual VOC emission reduction scenarios of 10, 25, and 50 kt. These scenarios were chosen to represent a range of potential regulatory scenarios and to assess how impacts vary by size of emissions. The scenarios assumed that the reductions would be located proportional to population density in line with census data. Given the resource-intensive and time-consuming nature of the detailed modelling to estimate emission reductions, changes in ambient air quality, and the associated benefits, the Department chose 2025 as a representative year for modelling purposes. This may underestimate or overestimate air quality benefits associated with the estimated VOC emission reductions, as changes in baseline ambient air quality would change the expected benefits from the proposed Regulations.

The scenario assessing 25 kt of VOC emission reductions per year was selected as a rough approximation of the expected incremental reductions attributable to the proposed Regulations. The 10 and 25 kt scenarios were used for the purposes of sensitivity analysis. It was assumed that this reduction level would remain constant over the period of analysis.

Air quality modelling

The VOC emission reduction scenario was then used as input within A Unified Regional Air-Quality Modelling System (AURAMS). AURAMS was used to estimate impacts on ambient air quality

resulting from the interaction of VOC emission reductions with existing ambient air quality, daily weather, and wind patterns. Key outputs from AURAMS used in the benefits analysis include different metrics, such as hourly and daily ambient concentrations of PM_{2.5}, nitrogen dioxide (NO₂) and ground-level ozone, reported by census division and statistically aggregated.

Health benefits modelling and valuation

Health Canada applied the Air Quality Benefits Assessment Tool (AQBAT) to estimate the health and economic impacts associated with air quality projections generated by AURAMS for the year 2025. The modelled changes in ambient air quality levels were allocated to each Canadian census division and used as inputs for AQBAT. Based on changes in local ambient air quality, AQBAT estimated the likely reductions in average per capita risks for a range of health impacts known to be associated with air pollution exposure. These changes in per capita risks were then multiplied by the affected populations to estimate the reduction in the number of health problems experienced by Canadians. AQBAT also applied economic values drawn from the available literature to estimate the average per capita economic benefits of lowered health risks. The method used by AQBAT is similar to those used by other health organizations, both in Canada and internationally.

Health benefits were estimated over an eight-year time frame (2023–2030) beginning when the proposed Regulations take effect, and assuming that the incremental reductions and resulting impacts are constant over this period. Over this time frame, health benefits attributable to changes in air quality resulting from the proposed Regulations are estimated to be approximately \$697 million (values presented in 2018 dollars and discounted by 3%). The projected benefits are primarily associated with reductions in ambient levels of PM_{2.5} and ground-level ozone and may vary by province (see Table 4). VOC emission reductions in Canadian territories were considered to be negligible and were not considered within the scope of this analysis.

The majority of the benefits are expected to be a result of estimated reductions in the risk of premature death. Values based on average willingness to pay for small reductions in the risk of premature death are based on Treasury Board of Canada Secretariat guidance.²¹ Additional benefits are derived from reduced risk of chronic and short-term respiratory problems.

Table 4: Emission reduction benefits by province and pollutant

Province	PM _{2.5} (2025)	Ground-level Ozone (2025)
Newfoundland and Labrador	\$3,000	\$3,000
Prince Edward Island	\$10,000	\$3,000
Nova Scotia	\$23,000	\$14,000
New Brunswick	\$39,000	\$27,000
Quebec	\$1,400,000	\$5,200,000
Ontario	\$10,600,000	\$28,900,000
Manitoba	\$183,000	\$187,000
Saskatchewan	\$68,000	\$81,000
Alberta	\$1,400,000	\$1,300,000
British Columbia	\$16,000,000	\$25,700,000
Total	\$29,800,000	\$61,400,000
Total benefits of overall VOC emission reductions modelled for the year 2025	\$91,000,000	

Note: monetized values in 2018 dollars and discounted to present value using a 3% discount rate.

Numbers may not add up to total due to negligible NO₂ variation not displayed in the table above and due to rounding.

Air quality modelling and the associated health benefits considered only the benefits of reductions in ground-level ozone and PM_{2.5}, as per the intent of the proposed Regulations. Therefore, the analysis did not consider the health benefits of reduced VOCs on indoor air quality, as only specific VOCs are known to be hazardous (such as benzene or formaldehyde), and it is unclear whether and in what proportion these VOCs would be reduced as a result of the proposed Regulations. This analysis has only considered the benefits of reductions in ground-level ozone and PM_{2.5}.

Environmental benefits

As precursors to the formation of PM_{2.5} and ground-level ozone, the primary constituents of smog, VOC emissions may lead to environmental impacts by damaging forest ecosystems, crops, and wildlife. Ground-level ozone is associated with reductions in agricultural crops and commercial forest yields, reduced growth and survivability of tree seedlings, increased plant susceptibility to disease, pests, and other environmental stresses (e.g. harsh weather). Suspended particles may respectively impair visibility and result in soiling of surfaces, reducing household welfare and potentially increasing cleaning expenditures. Therefore, the proposed Regulations could lead to a reduction in negative environmental impacts associated with VOC emissions. Due to time constraints associated with this regulatory analysis and the significance of the associated health benefits, the environmental benefits were not quantitatively estimated.

Summary of costs and benefits

By 2030, the proposed Regulations would be expected to result in cumulative health benefits of approximately \$697 million, non-recurring reformulation costs of approximately \$86 million, raw material substitute costs of approximately \$106 million, and net benefits for Canadians of approximately \$496 million.

Table 5: Statement of benefits and costs

Monetized Impacts	2019–2022	2023–2026	2027–2030	Total
Health benefits	—	\$369,600,000	\$326,900,000	\$696,500,000
Total benefits	—	\$369,600,000	\$326,900,000	\$696,500,000
Reformulation costs	—	\$85,500,000	—	\$85,500,000
Raw material substitute costs	—	\$55,800,000	\$49,600,000	\$105,500,000
Government costs	\$3,000,000	\$3,400,000	\$3,000,000	\$9,500,000
Total costs	—	\$144,700,000	\$52,600,000	\$200,400,000
Net benefits	—	\$224,800,000	\$274,300,000	\$496,100,000
Quantitative impacts	<ul style="list-style-type: none"> • Approximately 25 kt of VOC emission reductions as a result of the proposed VOC concentration limits. 			
Qualitative impacts	<ul style="list-style-type: none"> • Environmental benefits due to reduced VOC emissions. • Meeting commitments under the United States–Canada Air Quality Agreement. 			

Note: Monetized values in 2018 dollars and discounted to present value using a 3% discount rate. Numbers may not add up due to rounding.

Uncertainty of impacts and sensitivity analysis

The results of this analysis are based on key parameter estimates and industry-wide surveys, which could be higher or lower than indicated by available evidence. Given this uncertainty, alternate estimates of the benefits and costs have been considered to assess their impact on expected net benefits. A wider range of uncertainty was considered for alternate benefit estimates, since there is a

higher degree of uncertainty around the valuation of cost estimates. A worst-case scenario of higher costs and lower benefits was also considered.

The estimated prices of VOC substitute material are one driver of uncertainty as they may be higher or lower than estimated. Future prices of these substances are subject to various market forces that are difficult to predict with certainty. Another key driver of uncertainty is whether products would be reformulated or discontinued in favour of compliant products within the same product category. Further, if products are reformulated, there are different reformulation options that range from dilution of VOC content (e.g. using water) to using VOC content with lower limits. As for estimated benefits, the physical and chemical processes through which VOC emissions are converted to ground-level ozone and PM_{2.5} are extremely complex and not completely understood. The estimated changes in air pollutant concentrations and the associated health benefits are therefore subject to uncertainty.

These uncertainties would affect the estimates of incremental compliance costs assumed by Canadian manufacturers and the expected health benefits for Canadian society.

Over the chosen time frame of analysis, estimated benefits were greater than costs (a benefit-to-cost-ratio of 3:1 in the central case). A sensitivity analysis was conducted to consider scenarios assuming higher costs (+50%) and lower benefits (-50%), only higher costs (50%), and only lower benefits (-50%). A scenario assuming a higher discount rate (7%) was assessed. Analysis was also conducted assuming 10 and 50 kt emission reductions scenarios. As shown in Table 6, there are expected net benefits over a range of alternate impact estimates and under an alternate discount rate, which is evidence that the net benefit results are likely robust.

Table 6: Sensitivity analysis for alternate estimates of costs, benefits and discount rate

Alternate Impact Analysis Estimates	Benefits	Costs	Net Benefits	Benefit-Cost Ratio
Central case	\$696,500,000	\$200,400,000	\$496,100,000	3.5:1
Higher cost (+50%), lower benefit (-50%) estimate	\$348,300,000	\$300,600,000	\$47,700,000	1.2:1
Higher cost estimate (+50%)	\$696,500,000	\$300,600,000	\$395,900,000	2.3:1
Lower benefit estimate (-50%)	\$348,300,000	\$200,400,000	\$147,900,000	1.7:1
Higher discount rate (7%)	\$528,600,000	\$161,000,000	\$367,700,000	3.3:1
10 kt emission reductions scenario	\$278,600,000	\$137,100,000	\$141,500,000	2.0:1
50 kt emission reductions scenario	\$1,393,000,000	\$305,800,000	\$611,700,000	4.6:1

Note: Monetized values in 2018 dollars and discounted to present value using a 3% discount rate, except in the case in which a 7% rate is used. Numbers may not add up due to rounding.

Distributional analysis of regulatory impacts

The impacts of the proposed Regulations are not uniformly distributed across society. Therefore, the analysis has considered a range of distributional impacts.

Competitiveness and consumer impacts

A study conducted by CARB found that businesses with a national presence in the United States had generally formulated products that were compliant with CARB standards for the entire nation, rather than incur the additional cost of setting up a separate product distribution system for California.²² Therefore, it is not expected that alignment with the proposed VOC concentration limits would have a significant impact on the competitiveness of the regulated industries. The study commissioned by the Department indicated that it is unlikely that regulated parties would cease operations as a result of the proposed Regulations since viable reformulations for the majority of products exist. Further, consultations with industry and regulated parties helped identify products that may cause technical issues in reformulations. As a result, the Department has adjusted the proposed VOC concentration limits for some products to ensure that the standards can be met. This includes products such as multi-purpose solvents, paint thinners, and acoustical sealants.

As for impacts on product competitiveness and consumer choices, California has had similar VOC concentration limits in place since 2010 that have addressed concerns regarding the performance of these products. The proposed Regulations would align with these revised limits. The proposed Regulations have also adjusted the proposed VOC concentration limits for some products to account for weather differences between California and Canada in order to maintain product effectiveness. Further, compliant and effective products already exist in the Canadian market. Product effectiveness and consumer choices are therefore not expected to be significantly impacted by the proposed Regulations.

An analysis of survey data collected as part of a study commissioned by the Department concluded that compliant products are not significantly more expensive than non-compliant products within the same category. Cost increases are expected to vary between 0.05% to 0.5%, depending on the product. In the case of non-compliant products, incremental compliance costs may be absorbed by regulated parties or passed on to consumers. It is difficult to predict with certainty the likelihood of regulated parties passing on costs to consumers as this would depend on the compliance scenarios of individual products as well as the size of manufacturers.

Regional impacts

Assuming that the costs of the proposed Regulations would be distributed across Canada based on the location of the manufacturers of regulated products, it is expected that certain provinces would carry a higher portion of the compliance costs. In this regard, 41% of all manufacturers of regulated products are located in Ontario, 27% are located in Quebec, 16% are located in the Prairie Provinces (mainly Alberta), 12% are located in British Columbia, and 4% are located in the Atlantic Provinces. Figures related to manufacturers of regulated products located in Canadian territories were not reported in the industry-wide survey and research conducted as part of a study commissioned by the Department. Therefore, compliance costs for manufacturers within these regions were not estimated as part of this analysis.

Estimated air quality benefits depend on many location-specific factors, including ambient air quality, the mix of emissions, location and type of emission sources, as well as the population densities of affected areas (see Table 4). The majority of benefits would be expected in British Columbia (approximately 46%) and Ontario (approximately 43%). This is followed by Quebec (approximately 7%) and the Prairie Provinces (approximately 3%). The Atlantic Provinces would account for approximately 0.1% of the estimated benefits. VOC emission reductions in the Canadian territories were considered to be negligible. Therefore, health benefits for these regions were not considered within the scope of this analysis.

Impacts on domestic manufacturers

Domestic manufacturers are estimated to carry up to \$39 million in raw material substitute costs over the period of analysis (2023–2030). They are also expected to assume some portion of the \$86 million estimated as total reformulation costs, based on an estimated reformulation cost of \$29,300 per product. Larger manufacturers could face per product reformulation costs that are lower, as they may already have experience in reformulating products and may have an existing compliant product being used in other jurisdictions with similar VOC limits. For smaller domestic manufacturers, flexible compliance options exist to help mitigate their compliance cost burden, as discussed below.

Small business lens

It is estimated that there are 1 950 manufacturers and importers that would be impacted by the proposed Regulations. Of these, it is estimated that 1 285 manufacturers and importers are small businesses.

The proposed Regulations would provide additional flexibility to businesses, including small businesses, in the form of voluntary alternative compliance options that include permits available to products for which it is not feasible to reduce VOC content and permits for products resulting in lesser VOC emissions. Further, the trading option available under the VOC Tradeable Unit Credit Program was included to ensure a level playing field for small businesses with limited product lines. The program would allow small businesses to purchase credits from other companies for products they are unable to reformulate.

Some industry members have raised concerns about the lack of adequate phase-out time to reformulate some products. The proposed Regulations would come into force on January 1 of the year following the second anniversary of the day on which they are registered. In consideration of concerns regarding disinfectants, these products have one additional year before the VOC concentration limits come into force to allow time for reformulation of products and, if necessary,

approval from the Department of Health.

As demonstrated by Table 7 below, the proposed Regulations are expected to result in cumulative costs of approximately \$34 million for small business, or \$26,263 per small business.

Table 7: Small business lens summary

Small Business Lens Summary		
Number of small businesses impacted	1 285	
Number of years	2023–2030	
Base year for costing	2019	
Compliance costs	Annualized Value (\$)	Present Value (\$)
Personal care products	576,000	4,484,000
Maintenance products	3,215,000	25,034,000
Adhesive products	543,000	4,229,000
Total	4,334,000	33,747,000
Administrative costs	Annualized Value (\$)	Present Value (\$)
Personal care products	NA	NA
Maintenance products	NA	NA
Adhesive products	NA	NA
Total	NA	NA
Total cost (all impacted small businesses)	4,334,301	33,747,000
Cost per impacted small business	3,373	26,263

Note: Monetized values in 2018 dollars and discounted to present value using a 3% discount rate. Numbers may not add up due to rounding.

“One-for-One” Rule

Since an increase in administrative burden is not expected, the proposed Regulations would not be considered an “IN” under the Government of Canada’s “One-for-One” Rule. It is projected that the requirements under the proposed Regulations would not increase the administrative burden for businesses unless they choose to apply for one of the voluntary alternative compliance options. In that case, regulated parties would apply for a permit and, depending on the alternative compliance option chosen, would be subject to annual reporting requirements. The total number of expected voluntary permit applications is uncertain. Due to the voluntary nature of these compliance options, administrative costs were not considered and the associated administrative burden was not estimated.

Regulatory cooperation and alignment

The proposed Regulations have been developed to enable the Government of Canada to meet its international commitments under the Ozone Annex of the Canada–United States Air Quality Agreement and harmonize its VOC regulations with those of other jurisdictions. To date, regulations have been put in place to address VOC emissions from paints and coatings through the *Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations* and the *Volatile Organic Compound Concentration Limits for Automotive Refinishing Products Regulations*. The proposed Regulations would address the Government of Canada’s commitment to lower and

control VOC emissions from products used by consumers for institutional, industrial and commercial applications.

As part of the regulatory development process, the Department held discussions with United States government agencies and organizations regarding VOC concentration limits and their experience with the implementation of their regulations. The Department conducted an analysis and comparison of the VOC concentration limits established by the U.S. EPA, CARB, the Ozone Transport Commission and Lake Michigan Air Directors Consortium. As a result, CARB's *Consumer Product Regulations* were selected as the basis for the proposed Regulations.

This selection was based on the expected VOC reductions resulting from the VOC concentration limits set by CARB, the economic and technological feasibility of the VOC concentration limits, and the benefit of harmonizing Canada's VOC concentration limits with concentration limits that are adopted by California. Other jurisdictions across the United States (16) have either already adopted or are in the process of adopting the limits established by CARB.

Some modifications were applied to reflect the Canadian context and input from stakeholders ²³. In this regard, certain variations exist to accommodate climate differences, streamline the proposed Regulations, align with Canadian regulations, and reduce administrative burden.

Other states that have not legally adopted the CARB standards would fall under the U.S. EPA rule. The EPA rule includes 40 product categories/subcategories based on California's early regulations. As previously mentioned, a study conducted by CARB found that businesses with a national presence in the United States had generally formulated products that were compliant with CARB standards for the entire nation, rather than incur the additional cost of setting up a separate product distribution system for California.

California has amended its *Consumer Products Regulations* three times since 2010, with the latest amendments coming into effect in January 2015. California's current regulations are more stringent in four product subcategories out of the roughly 130 subcategories in the proposed Regulations. Due to the limited changes, this proposal maintains the product categories and limits that were used in the consultation process in all but four categories where changes were needed to address the Canadian market and climate concerns. The Department intends to continue monitoring California's program and will consider changes to the VOC standards in the future if these changes are feasible for Canada.

Strategic environmental assessment

The proposed Regulations would fall under the federal government's Addressing Air Pollution Horizontal Initiative. A strategic environmental assessment was conducted and concluded that actions under this initiative would protect the health of Canadians and the environment from the effects of air pollution. ²⁴

Gender-based analysis plus (GBA+)

The proposed Regulations are expected to improve the overall health of Canadians by proposing VOC concentration limits on certain products being manufactured and imported in Canada. The proposed Regulations could affect the prices of some goods consumed in greater quantities by gender-differentiated groups or vulnerable populations (e.g. young children, seniors and other Canadians with existing respiratory or cardiovascular conditions). However, given the magnitude of expected costs and the varying abilities of regulated parties to pass on compliance costs to consumers, it is anticipated that these price impacts would not be substantial. Therefore, gender-differentiated groups and vulnerable populations are not expected to be significantly affected by the proposed Regulations.

Rationale

VOC emissions are precursors to the formation of ground-level ozone and PM_{2.5}, two main components of smog. These emissions can have adverse impacts on the health of Canadians and the environment. The existing voluntary guidelines recommending VOC concentration limits for consumer product categories have not achieved significant VOC emission reductions. To achieve significant VOC emissions reductions and help Canada meet its national and international commitments, the proposed Regulations would limit VOC emissions from a wide range of products used by consumers and in institutional, industrial, and commercial applications.

The proposed Regulations would set VOC concentration limits for approximately 130 product categories and subcategories being manufactured or imported in Canada. They would align with CARB's *Consumer Product Regulations* with minor changes to account for the Canadian context. ²⁵

Alternative compliance options would be made available and are intended to help industry meet the proposed VOC concentration limits and ensure reductions in VOC emissions are achieved.

Preliminary consultations with industry, provincial and territorial governments, and ENGOs took place in 2013. Follow-up consultations regarding the cost-benefit analysis framework and regulatory text took place in 2018. The Department has taken all comments and feedback received during both consultation processes into consideration when developing the proposed Regulations and accompanying analysis.

The VOC emission reductions associated with the proposed Regulations are expected to lead to improvements in air quality. Between 2023 and 2030, the proposed Regulations are expected to result in 200 kt of VOC emission reductions. The benefits of the proposed Regulations would be approximately \$697 million over the time frame of analysis. Compliance costs assumed by regulated parties are expected to be around \$191 million. The net benefits of the proposed Regulations are estimated to be approximately \$496 million.

Implementation, compliance and enforcement, and service standards

Implementation, enforcement and service standards

The Regulations would come into force on January 1 of the year following the second anniversary of the day on which they are registered. In the case of disinfectants, these products have one additional year before the VOC concentration limits come into force to allow time for reformulation of products and, if necessary, approval from Health Canada.

The compliance promotion approach would include the development and distribution of promotional materials (e.g. fact sheets, website material) to explain the provisions of the proposed Regulations. The Department would work with industry associations and organizations to ensure that the appropriate information is available to the regulated community. As the regulated community becomes more familiar with the requirements of the proposed Regulations, these activities are expected to decline to a maintenance level.

Enforcement officers would, when verifying compliance with the proposed Regulations, act in accordance with the *Canadian Environmental Protection Act: compliance and enforcement policy*. Verification of compliance with the proposed Regulations would include inspection activities such as sample analysis, site visits and reviews of written transit documents. ²⁶

The proposed Regulations would include voluntary permit options that would allow the manufacture and import of non-compliant products under certain circumstances. Permit applications would be reviewed by the Department. The service standards attached to the permit application process include an administrative procedure that may take up to 90 working days. Compliance with the service standards for processing permit applications would be monitored and evaluated as part of the regulatory evaluation process.

Implementation, compliance promotion and enforcement activities as well as processing of permit applications activities would be resourced by existing resources and allocated accordingly within the existing departmental reference level.

Performance measurement and evaluation

Quantitative indicators and targets, where applicable, would be defined and developed as part of the implementation strategy for the proposed Regulations. Examples of performance indicators would include the availability of non-compliant products.

Through its enforcement activities, the Department would be able to assess compliance after the coming into force of the proposed Regulations. Information gathered from sources, such as reporting for permits and sampling/testing campaigns to determine if products being sold meet the regulatory limits, will provide the performance information necessary to measure progress towards the objective and the effectiveness of the Regulations. Once completed, the performance information collected would be summarized and reported.

Further, the Department would continue to report the progress, performance and overall effectiveness of the proposed Regulations in CEPA annual reports and departmental performance reports.

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PROPOSED REGULATORY TEXT

Notice is given, pursuant to subsection 332(1) ^a of the *Canadian Environmental Protection Act, 1999* ^b, that the Governor in Council proposes, pursuant to subsection 93(1) and sections 286.1 ^c and 326 of that Act, to make the annexed *Volatile Organic Compound Concentration Limits for Certain Products Regulations*.

Any person may, within 75 days after the date of publication of this notice, file with the Minister of the Environment comments with respect to the proposed Regulations or, within 60 days after the date of publication of this notice, file with the Minister a notice of objection requesting that a board of review be established under section 333 of that Act and stating the reasons for the objection. All comments and notices must cite the *Canada Gazette*, Part I, and the date of publication of this notice, and be addressed to the Director, Products Division, Department of the Environment, 351 Saint-Joseph Boulevard, Gatineau, Quebec K1A 0H3 (email: ec.produits-products.ec@canada.ca (<mailto:ec.produits-products.ec@canada.ca>); fax: 819-938-4480).

A person who provides information to the Minister of the Environment may submit with the information a request for confidentiality under section 313 of that Act.

Ottawa, June 20, 2019

Julie Adair
Assistant Clerk of the Privy Council

Volatile Organic Compound Concentration Limits for Certain Products Regulations

Interpretation

Definitions

1 (1) The following definitions apply in these Regulations.

adhesive does not include a product for use on humans or animals or any product with an adhesive incorporated onto or in an inert substrate. (*adhésif*)

fragrance means a substance or mixture of aroma chemicals, natural essential oils and other components, with a combined vapour pressure that is less than or equal to 0.267 kPa when measured at 20°C, the sole purpose of which is to impart an odour or scent or to counteract a malodour. (*parfum*)

high vapour pressure VOC or **HVOC**, in respect of an antiperspirant or deodorant for the human axilla, means a VOC that has a vapour pressure of greater than 10.67 kPa when measured at 20°C. (*COV à pression de vapeur élevée* ou *COVE*)

low vapour pressure VOC or **LVOC**, in respect of a product other than an antiperspirant or deodorant for the human axilla, means a VOC that

(a) has a vapour pressure of less than 0.013 kPa when measured at 20°C;

(b) has a boiling point that is greater than 216°C; or

(c) contains more than 12 carbon atoms per molecule. (*COV à faible pression de vapeur ou COVF*)

medium vapour pressure VOC or MVOC, in respect of an antiperspirant or deodorant for the human axilla, means a VOC that has a vapour pressure of greater than 0.267 kPa but less than or equal to 10.67 kPa when measured at 20°C. (*COV à pression de vapeur moyenne ou COVM*)

reformulated product means a product that belongs to a product category set out in column 1 of the table to Schedule 1 and that has been reformulated to reduce its VOC concentration to a level that is less than the VOC concentration limit set out in column 3 for the product category and, if applicable, subcategory to which it belongs. (*produit à composition modifiée*)

volatile organic compound or VOC means a compound that participates in atmospheric photochemical reactions and that is not excluded under item 65 of Schedule 1 to the *Canadian Environmental Protection Act, 1999*. (*composé organique volatil ou COV*)

Determination of vapour pressure

(2) For the purpose of these Regulations, the vapour pressure of a VOC is to be determined in accordance with the methods referred to in section 3.6.1 of Method 310 of the California Environmental Protection Agency, Air Resources Board, entitled *Determination of Volatile Organic Compounds (VOC) in Consumer Products and Reactive Organic Compounds (ROC) in Aerosol Coating Products*, as amended from time to time.

VOC concentration

(3) For the purpose of these Regulations, the concentration of VOCs in a product is measured and expressed as a percentage of the product's net weight.

Net quantity

(4) For the purposes of these Regulations, the quantity of a product or the quantity of VOCs in a product is the net quantity, measured and expressed in kilograms or litres, as applicable.

Product category

(5) For the purposes of these Regulations, a product belongs to a product category referred to in column 1 of the table to Schedule 1 or column 1 of Schedule 2 if it is indicated anywhere on its container, or in any documentation relating to the product that is supplied by the product's manufacturer, importer or their authorized representative, that the product may be used as a product that fits within that product category.

Application

Products

2 (1) These Regulations apply in respect of any product that contains VOCs and belongs to a product category that is set out in column 1 of the table to Schedule 1 or column 1 of Schedule 2.

Non-application — certain products

(2) These Regulations do not apply to products that are

- (a) designed to be used solely in a manufacturing or processing activity;
- (b) to be used solely in a laboratory for analysis, in scientific research or as a laboratory analytical standard;
- (c) regulated under the *Pest Control Products Act*;
- (d) manufactured or imported for export only;
- (e) adhesives that are to be sold in containers of 0.03 L or less;
- (f) regulated under the *Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations* or the *Volatile Organic Compound (VOC) Concentration Limits for Automotive Refinishing Products Regulations*;
- (g) are used in or on a new car at the time of its manufacture; or
- (h) in transit through Canada, from a place outside Canada to another place outside Canada.

VOC Limits

Prohibition

3 (1) A person must not manufacture or import a product that belongs to a product category set out in column 1 of the table to Schedule 1 and, if applicable, a subcategory set out in column 2 that has a VOC concentration that is greater than the applicable limit set out in column 3, unless

(a) the product is to be diluted before use and the instructions for dilution are set out in both official languages on the product's label or in any accompanying documentation and provide for the product to be diluted only to a level at which the VOC concentration is equal to or less than the applicable limit set out in column 3; or

(b) a permit has been issued under section 8, 15 or 18 in respect of the product.

Product category set out in Schedule 2

(2) A person must not manufacture or import a product that belongs to a product category set out in column 1 of Schedule 2 that has a VOC emission potential that exceeds the applicable limit set out in column 2, unless a permit has been issued under section 18 in respect of the product.

Non-application of paragraph 1(a)

(3) The exception set out in paragraph (1)(a) does not apply to a multi-purpose solvent or paint thinner referred to in items 48 and 52 of the table to Schedule 1, respectively.

Lowest applicable concentration limit

4 (1) For the purposes of subsection 3(1) and subject to subsection (2), if a product belongs to more than one product category listed in column 1 of the table to Schedule 1, the product's VOC concentration must be less than or equal to the lowest of the applicable VOC concentration limits set out in column 3.

Exception for certain categories

(2) The VOC concentration of a product belonging to one of the following product categories must be less than or equal to the VOC concentration limit set out in column 3 of the table to Schedule 1 for the applicable subcategory set out in column 2 to which it belongs, regardless of whether the product also belongs to a product category with a lower VOC concentration limit:

(a) antiperspirant for the human axilla referred to in item 2 of the table to Schedule 1;

(b) deodorant for the human axilla referred to in item 3 of the table to Schedule 1; and

(c) general-purpose cleaner referred to in item 42 of the table to Schedule 1.

VOC concentration — exclusions

5 (1) For the purposes of subsection 3(1) and (2), the following elements are excluded when determining the VOC concentration or VOC emission potential, as the case may be, of a product other than antiperspirant for the human axilla or deodorant for the human axilla referred to in items 2 and 3 of the table to Schedule 1, respectively:

(a) LVOCs;

(b) fragrances, if the product is a personal fragrance product referred to in item 11 of the table to Schedule 1; and

(c) fragrances that, combined, constitute 2% or less of the product's net weight, if the product is a product other than a personal fragrance product referred to in item 11 of the table to Schedule 1, a pressurized gas duster referred to in item 53 of the table to Schedule 1 or fabric softener that is a single use dryer product referred to in item 2 of Schedule 2.

Antiperspirants and deodorants

(2) For the purposes of subsection 3(1), the VOC concentration of antiperspirant for the human axilla or deodorant for the human axilla referred to in items 2 and 3 of the table to Schedule 1, respectively, is determined separately for MVOCs and HVOCs and the following elements are excluded:

(a) VOCs that have a vapour pressure of 0.267 kPa or less when measured at 20°C or, if the vapour pressure is unknown, that contain more than 10 carbon atoms per molecule;

(b) colourants and fragrances that, combined, constitute 2% or less of the product's net weight; and

(c) ethanol.

VOC Tradeable Unit Credit Program

Participation

Object of program

6 A person may, in respect of any product that belongs to a product category set out in column 1 of the table to Schedule 1 that they manufacture or import, elect to participate in a tradeable unit credit program under which they may do one or more of the following:

- (a) generate kilograms of credit in accordance with section 10 in respect of all of the reformulated products that are included in the program;
- (b) transfer unused kilograms of credit to another person in accordance with section 11;
- (c) use kilograms of credit that are generated by them or transferred from another person to compensate for the quantity of VOC determined under paragraph 12(d) in respect of a product.

Permit — participants in program

7 (1) A person that elects to participate in the program referred to in section 6 may make an application for a permit authorizing them to manufacture or import a product that belongs to a product category set out in column 1 of the table to Schedule 1 and, if applicable, a subcategory set out in column 2 that has a VOC concentration that is greater than the applicable limit set out in column 3.

Required information

(2) The application must be submitted to the Minister and must contain the following information:

- (a) the applicant's name, civic and postal addresses, telephone number and, if any, fax number and email address;
- (b) the name, title, civic and postal addresses, telephone number and, if any, fax number and email address of their authorized representative, if applicable;
- (c) for each product in respect of which a permit is sought,
 - (i) its common or generic name and its trade name, if any,
 - (ii) the product category and, if applicable, subcategory set out in the table to Schedule 1 to which it belongs, as well as the information used to determine its categorization,
 - (iii) its VOC concentration,
 - (iv) the quantity of the product that the applicant expects to manufacture or import at any given VOC concentration per calendar year, expressed in kilograms, excluding any quantity that is manufactured or imported for export only, and
 - (v) the quantity of VOC contained in the product that exceeds the quantity of VOC that would have been contained in the product if its VOC concentration were equal to the applicable limit set out in column 3 of the table to Schedule 1, determined in accordance with the following formula:

$$(A - B) / 100 \times W$$

where

A is the VOC concentration for the product,

B is the VOC concentration limit set out in column 3 of the table to Schedule 1 for the product category and, if applicable, subcategory to which the product belongs; and

W is the quantity of the product that the applicant expects to manufacture or import at any given VOC concentration per calendar year, expressed in kilograms, excluding the quantity that is to be manufactured or imported for export only; and

- (d) a plan indicating how the applicant intends to compensate for the quantity of VOC determined under subparagraph (c)(v) for all of the products in respect of which a permit is sought by using kilograms of credit generated by them or transferred from another person in accordance with sections 6, 10 and 11.

Additional information

(3) The Minister may, on receiving an application made under this section, require further details that pertain to the information contained in the application and that are necessary for the application to be processed.

Notice of change to information

(4) The applicant must notify the Minister in writing of any change to the information provided under

this section — other than that provided under subparagraph (2)(c)(iv) — within 30 days after the day on which the change occurs.

Issuance

8 (1) Subject to subsection (2), the Minister must issue the permit referred to in subsection 7(1) if the applicant has demonstrated how they will compensate for the quantity of VOC determined under subparagraph 7(2)(c)(v).

Refusal

(2) The Minister must refuse to issue the permit if

- (a)** the Minister has reasonable grounds to believe that the applicant has provided false or misleading information in support of their application; or
- (b)** the information required under subsections 7(2) to (4) and the certification required under section 25 have not been provided or are insufficient to enable the Minister to process the application.

Revocation — grounds

9 (1) The Minister must revoke a permit issued under subsection 8(1) if

- (a)** the permit holder has not submitted the annual report referred to in section 12 within the prescribed time;
- (b)** the Minister has reasonable grounds to believe that the permit holder has not compensated for the quantity of VOC determined under paragraph 12(d); or
- (c)** the Minister has reasonable grounds to believe that the permit holder has provided false or misleading information.

Notice of revocation

(2) Before revoking a permit, the Minister must provide the permit holder with

- (a)** written reasons for the revocation; and
- (b)** an opportunity to make written representations concerning the revocation.

Generation and transfer of kilograms of credit

Notice of participation

10 (1) A person that intends to generate kilograms of credit in respect of a reformulated product must submit a notice to the Minister no later than October 1 of the first calendar year during which they elect to participate in the tradeable unit credit program in respect of that product. The notice must contain the following information:

- (a)** the person's name, civic and postal addresses, telephone number and, if any, fax number and email address;
- (b)** the name, title, civic and postal addresses, telephone number and, if any, fax number and email address of their authorized representative, if applicable;
- (c)** respecting each product to be included in the program,
 - (i)** its common or generic name and its trade name, if any,
 - (ii)** the product category set out in column 1 of the table to Schedule 1 and, if applicable, the subcategory set out in column 2 to which it belongs, as well as the information used to determine its categorization,
 - (iii)** its lowest VOC concentration prior to reformulation, the date of reformulation and its VOC concentration after reformulation, and
 - (iv)** the quantity of the product that the person expects to manufacture or import during the period beginning on the day on which the notice is submitted and ending on December 31 of the same calendar year, expressed in kilograms, excluding the quantity that is to be manufactured or imported for export only.

Generation of kilograms of credit

(2) A person that has submitted a notice under subsection (1) may generate kilograms of credit in accordance with the following formula for all of the reformulated products that they manufacture or import during a given calendar year:

$$\Sigma [(A_i - B_i) / 100] \times W_i$$

where

A_i is the VOC concentration limit set out in column 3 of the table to Schedule 1 for the product category and, if applicable, subcategory to which product *i* belongs;

B_i is product *i*'s VOC concentration after reformulation;

W_i is the quantity of product *i* that is manufactured or imported during the calendar year, expressed in kilograms, excluding the quantity that is manufactured or imported for export only; and

i is each reformulated product.

First year of participation

(3) For the first calendar year that the person participates in the program, the value of *W_i* in the formula set out in subsection (2) is the quantity of product *i* that is manufactured or imported during the period beginning on the day on which the notice referred to in subsection (1) is submitted or the day on which the product is reformulated, whichever is later, and ending on December 31 of that year.

Confirmation by Minister

(4) The Minister must provide the person with written confirmation of the number of kilograms of credit that are available to them within 60 days after the day on which the person submits the report referred to in section 13.

Availability for use

(5) The kilograms of credit that are generated by a person in respect of a calendar year and confirmed by the Minister are available for use as of January 1 of the calendar year following the calendar year during which they are generated and remain valid until December 31 of the following calendar year.

Transfer of kilograms of credits

11 (1) A person that participates in the tradeable unit credit program may transfer unused kilograms of credit to another person if the kilograms of credit are still valid and the Minister approves the transfer.

Application for approval to transfer

(2) The transferee and transferor must, at least 90 days before the kilograms of credit expire, submit a joint application to the Minister, using the form provided by the Minister, that includes the following information:

(a) the names of the transferee and transferor and their civic and postal addresses, telephone number and, if any, fax number and email address;

(b) the number kilograms of credit to be transferred;

(c) the calendar year during which the kilograms of credit were generated; and

(d) the effective date of the transfer.

Approval by Minister

(3) The Minister must approve the transfer and inform the transferee and transferor of the approval in writing if the transferor has at least the number of unused kilograms of credit as are proposed to be transferred to the transferee.

Use by transferee

(4) The transferee may use the kilograms of credit during the calendar year of their transfer and, if there are kilograms of credit remaining and they are still valid, during the following calendar year.

Invalid transfer

(5) For greater certainty, if the transferor does not have at least the number of unused kilograms of credit as are proposed to be transferred to the transferee, the transfer is invalid.

Annual reports

Holder of permit issued under s. 8

12 A person that holds a permit issued under subsection 8(1) must submit a report to the Minister

each calendar year. The report must contain the following information in respect of the calendar year in question and be submitted no later than January 31 of the following calendar year:

(a) the person's name, civic and postal addresses, telephone number and, if any, fax number and email address;

(b) the name, title, civic and postal addresses, telephone number and, if any, fax number and email address of their authorized representative, if applicable;

(c) for each product that the person manufactured or imported under a permit issued under subsection 8(1) during the calendar year,

(i) its common or generic name and its trade name, if any,

(ii) the permit number,

(iii) its VOC concentration, and

(iv) the quantity of the product that was manufactured or imported at that VOC concentration during the calendar year, expressed in kilograms, excluding the quantity that was manufactured or imported for export only;

(d) for all of the products that the person manufactured or imported under a permit issued under subsection 8(1) during the calendar year, the quantity of VOC contained in the products that exceeds the quantity of VOC that would have been contained in the products if their VOC concentrations were equal to the applicable concentration limits set out in column 3 of the table to Schedule 1, determined in accordance with the following formula:

$$\Sigma [(A_i - B_i) / 100] \times W_i$$

where

A_i is the VOC concentration for product i ,

B_i is the VOC concentration limit set out in column 3 of the table to Schedule 1 for the product category and, if applicable, subcategory to which product i belongs,

W_i is the quantity of product i that is manufactured or imported at a given VOC concentration during the calendar year, expressed in kilograms, excluding the quantity that is manufactured or imported for export only, and

i is each product in respect of which a permit was issued;

(e) the values and data used in the calculation under paragraph (d);

(f) the number of kilograms of credit that are being used to compensate for the quantity of VOC determined under paragraph (d) and

(i) a statement as to whether those kilograms of credit were generated by the person or were transferred from another person, and

(ii) if the kilograms of credit were transferred from another person, the date of the transfer and the name of the transferor; and

(g) confirmation of whether the person intends to continue manufacturing or importing products under a permit issued under subsection 8(1) during the calendar year following the calendar year in question and, if so, the quantity of each product that they expect to manufacture or import during that calendar year, expressed in kilograms, excluding any quantity to be manufactured or imported for export only, and the expected VOC concentration for each product.

Generation of kilograms of credits

13 A person that generates kilograms of credits during a calendar year must submit a report to the Minister in respect of that year. The report must contain the following information and be submitted no later than January 31 of the following calendar year:

(a) the person's name, civic and postal addresses, telephone number and, if any, fax number and email address;

(b) the name, title, civic and postal addresses, telephone number and, if any, fax number and email address of their authorized representative, if applicable;

(c) for each reformulated product that is included in the program for the calendar year in question,

(i) its common or generic name and its trade name, if any,

(ii) the product category set out in column 1 of the table to Schedule 1 and, if applicable, the

subcategory set out in column 2 to which it belongs, as well as the information used to determine its categorization,

(iii) its VOC concentration after reformulation and the date of the reformulation, and

(iv) the quantity of the product that the person manufactured or imported during the calendar year in question, expressed in kilograms, excluding the quantity that was manufactured or imported for export only;

(d) the values and data used in the calculation under subsection 10(2) for the calendar year in question and the result of that calculation; and

(e) confirmation of whether the person intends to continue participating in the program for the calendar year following the calendar year in question and, if so, the quantity of each product that they expect to manufacture or import during that calendar year, expressed in kilograms, excluding any quantity to be manufactured or imported for export only, and the expected VOC concentration for each product.

Permit — Product Resulting in Lesser VOC Emissions

Application

14 (1) A person may make an application for a permit authorizing them to manufacture or import a product that belongs to a product category set out in column 1 of the table to Schedule 1 and, if applicable, a subcategory set out in column 2 that has a VOC concentration that is greater than the applicable limit set out in column 3, but that, when used in accordance with the manufacturer's written instructions, results in VOC emissions that are less than those that would result from the use of another product belonging to the same category and, if applicable, subcategory that has a VOC concentration that is less than or equal to that limit.

Required information

(2) The application must be submitted to the Minister and must contain the following information:

- (a) the applicant's name, civic and postal addresses, telephone number and, if any, fax number and email address;
- (b) the name, title, civic and postal addresses, telephone number and, if any, fax number and email address of their authorized representative, if applicable;
- (c) the product's common or generic name and trade name, if any;
- (d) the product category set out in column 1 of the table to Schedule 1 and, if applicable, the subcategory set out in column 2 to which the product belongs, as well as the information used to determine its categorization;
- (e) the product's VOC concentration;
- (f) the quantity of the product that the applicant expects to manufacture or import per calendar year, excluding any quantity that is manufactured or imported for export only;
- (g) in the case of an application referred to in subsection 15(3) for the renewal of a permit in respect of the product, the number of the existing permit; and
- (h) evidence that establishes that the use of the product in accordance with the manufacturer's written instructions results in VOC emissions that are less than those that would result from the use of another product belonging to the same category and, if applicable, subcategory that has a VOC concentration that is less than or equal to the applicable limit set out in column 3 of the table to Schedule 1.

Additional information

(3) The Minister may, on receiving an application made under this section, require further details that pertain to the information contained in the application and that are necessary for the application to be processed.

Notice of change to information

(4) The applicant must notify the Minister in writing of any change to the information provided under this section — other than that provided under paragraph (2)(f) — within 30 days after the day on which the change occurs.

Issuance

15 (1) Subject to subsection (2), the Minister must issue a permit referred to in subsection 14(1) if the applicant has demonstrated that, despite the fact that the product's VOC concentration is greater than the applicable limit set out in column 3 of the table to Schedule 1, the use of the product, in accordance with the manufacturer's written instructions, results in VOC emissions that are less than those that would result from the use of another product belonging to the same category and, if applicable, subcategory that has a VOC concentration that is less than or equal to that limit.

Refusal

(2) The Minister must refuse to issue the permit if

(a) the Minister has reasonable grounds to believe that the applicant has provided false or misleading information in support of their application; or

(b) the information required under subsections 14(2) to (4) and the certification required under section 25 have not been provided or are insufficient to enable the Minister to process the application.

Expiry

(3) A permit expires on the fourth anniversary of the day on which it is issued unless, at least 90 days before the day on which the permit expires, the permit holder submits an application for renewal and the application is approved by the Minister, in which case the permit expires on the fourth anniversary of the day on which the permit is renewed.

Application for renewal

(4) An application for renewal must be made in accordance with section 14.

Additional information

(5) The Minister may, on receiving an application for renewal, require further details that pertain to the information contained in the application and that are necessary for the application to be processed.

Approval or denial of application for renewal

(6) The criteria set out in subsection (1) apply in respect of the approval of an application for renewal and the criteria set out in subsection (2) apply in respect of the denial of an application for renewal.

Notice of change to information

(7) The applicant must notify the Minister in writing of any change to the information provided under this section — other than the quantity of the product that the applicant expects to manufacture or import per calendar year, excluding any quantity that is manufactured or imported for export only — within 30 days after the day on which the change occurs.

Revocation — grounds

16 (1) The Minister must revoke a permit issued under subsection 15(1) in respect of a product if

(a) the Minister has reasonable grounds to believe that the use of the product, in accordance with the manufacturer's written instructions, no longer results in VOC emissions that are less than those that would result from the use of another product belonging to the same category and, if applicable, subcategory that has a VOC concentration that is less than or equal to the applicable limit set out in column 3 of the table to Schedule 1;

(b) the Minister has reasonable grounds to believe that the permit holder has provided false or misleading information; or

(c) the product does not bear a label, or is not accompanied by documentation, that sets out the instructions referred to in section 22.

Notice of revocation

(2) Before revoking a permit, the Minister must provide the permit holder with

(a) written reasons for the revocation; and

(b) an opportunity to make written representations concerning the revocation.

Permit — Compliance not Technically or Economically Feasible

Application

17 (1) A person that, at the time these Regulations come into force, manufactures or imports a product that has a VOC concentration or VOC emission potential that is greater than the applicable

limit set out in column 3 of the table to Schedule 1 or column 2 of Schedule 2, as the case may be, may make an application for a permit authorizing them to manufacture or import that product if it is not technically or economically feasible for them at the time of the application to reduce its VOC concentration or VOC emission potential to a level that is less than or equal to that limit.

Required information

(2) The application must be submitted to the Minister and contain the following information:

- (a) the applicant's name, civic and postal addresses, telephone number and, if any, fax number and email address;
- (b) the name, title, civic and postal addresses, telephone number and, if any, fax number and email address of their authorized representative, if applicable;
- (c) the product's common or generic name and trade name, if any;
- (d) the product category set out in column 1 of the table to Schedule 1 or column 1 of Schedule 2 and, if applicable, the subcategory set out in column 2 of the table to Schedule 1 to which the product belongs, as well as the information used to determine its classification;
- (e) the product's VOC concentration or, in the case of a product belonging to a product category set out in column 1 of Schedule 2, its VOC emission potential;
- (f) the quantity of the product that the applicant expects to manufacture or import per calendar year, excluding any quantity that is manufactured or imported for export only;
- (g) in the case of an application referred to in subsection 18(3) for the renewal of a permit in respect of the product, the number of the existing permit;
- (h) the requested validity period for the permit, up to a maximum of two years;
- (i) evidence that demonstrates that it is not technically or economically feasible for the applicant at the time of the application to reduce the product's VOC concentration or VOC emission potential, as the case may be, to a level that is less than or equal to the applicable limit set out in column 3 of the table to Schedule 1 or column 2 of Schedule 2, as the case may be;
- (j) a plan describing the measures that will be taken to reduce the product's VOC concentration or VOC emission potential, as the case may be, to a level that is less than or equal to the applicable limit set out in column 3 of the table to Schedule 1 or column 2 of Schedule 2, as the case may be; and
- (k) a statement of the period within which the plan is to be fully implemented, up to a maximum of two years.

Additional information

(3) The Minister may, on receiving an application made under this section, require further details that pertain to the information contained in the application and that are necessary for the application to be processed.

Notice of change to information

(4) The applicant must notify the Minister in writing of any change to the information provided under this section — other than that provided under paragraph (2)(f) — within 30 days after the day on which the change occurs.

Issuance

18 (1) Subject to subsection (2), the Minister must issue a permit referred to in subsection 17(1) if the applicant has demonstrated that, at the time of the application, it is not technically or economically feasible for them to reduce the product's VOC concentration or VOC emission potential, as the case may be, to a level that is less than or equal to the applicable limit set out in column 3 of the table to Schedule 1 or column 2 of Schedule 2, as the case may be.

Refusal

(2) The Minister must refuse to issue a permit if

- (a) the Minister has reasonable grounds to believe that the applicant has provided false or misleading information in support of their application; or
- (b) the information required under subsections 17(2) to (4) and the certification required under section 25 have not been provided or are insufficient to enable the Minister to process the application.

Expiry

(3) A permit expires on the date specified in the permit or on the second anniversary of the day on which it is issued, whichever is earlier, unless, at least 90 days before the day on which the permit expires, the permit holder submits an application for renewal and the application is approved by the Minister, in which case the permit expires on the date specified in the renewal or on the second anniversary of the day on which the permit is renewed, whichever is earlier.

Application for renewal

(4) An application for renewal may only be made once and section 17 applies in respect of the application.

Explanation of reasons

(5) An application for renewal must include an explanation of the reasons why the plan that was submitted in the initial permit application was not implemented within the period identified in that application.

Approval or denial of application for renewal

(6) The criteria set out in subsection (1) apply in respect of the approval of an application for renewal and the criteria set out in subsection (2) apply in respect of the denial of an application for renewal.

Revocation — grounds

19 (1) The Minister must revoke a permit issued under subsection 18(1) if the Minister has reasonable grounds to believe that the permit holder has provided false or misleading information.

Notice of revocation

(2) Before revoking a permit, the Minister must provide the permit holder with

- (a) written reasons for the revocation; and
- (b) an opportunity to make written representations concerning the revocation.

Accredited Laboratory

Accredited laboratory

20 (1) Any analysis or determination performed for the purposes of these Regulations must be performed by a laboratory that meets the following conditions at the time of the analysis or determination:

- (a) it is accredited
 - (i) under the International Organization for Standardization standard ISO/IEC 17025, entitled *General requirements for the competence of testing and calibration laboratories*, by an accrediting body that is a signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement, or
 - (ii) under the *Environment Quality Act*, CQLR, c. Q-2; and
- (b) subject to subsection (2), the scope of its accreditation includes the specific parameters that are analyzed or determined.

Standards of good practice

(2) If no method has been recognized by a standards development organization in respect of the parameters that are analyzed or determined and the scope of the laboratory's accreditation does not therefore include those parameters, the analysis or determination must be performed in accordance with standards of good scientific practice that are generally accepted at the time that it is performed.

Labelling

Date of manufacture

21 (1) Any person that manufactures or imports a product that belongs to a product category that is set out in the table to Schedule 1 or in Schedule 2 must indicate, on the container in which the product is offered for sale or sold, the date on which the product was manufactured or a code representing that date. If a code is used, the person must provide the Minister, on request, with an explanation of the code.

Exemption

(2) Subsection (1) does not apply to the following:

- (a) a personal fragrance product referred to in item 11 of the table to Schedule 1 that is in a container of 2 ml or less; or
- (b) any product that belongs to a product category set out in the table to Schedule 1 and has a VOC concentration of 0.10% or less.

Usage instructions

22 If a product is authorized to be manufactured or imported by a permit issued under subsection 15(1), the manufacturer or importer must ensure that, before the product is offered for sale or sold, it bears a label, or is accompanied by documentation, that sets out instructions in both official languages for the use of the product so that its use results in VOC emissions that are less than those that would result from the use of another product belonging to the same category and, if applicable, subcategory that has a VOC concentration that is less than or equal to the applicable limit set out in column 3 of the table to Schedule 1.

Record Keeping

Records to be maintained

23 (1) Any person that manufactures or imports a product that contains VOCs and belongs to a product category that is set out in column 1 of the table to Schedule 1 or column 1 of Schedule 2 must maintain records containing the following information and any supporting documents:

- (a) in the case of a manufacturer,
 - (i) the product's common or generic name and trade mark and trade name, if any, and
 - (ii) the quantity of the product that is manufactured at each manufacturing plant and the date of its manufacture; and
- (b) in the case of an importer,
 - (i) the product's common or generic name and trade mark and trade name, if any,
 - (ii) the quantity of the product that is imported, the date on which it is imported and the port of entry through which it is imported,
 - (iii) the name, civic and postal addresses, telephone number, and, if any, fax number and email address of the principal place of business of the product's sender,
 - (iv) the Harmonized Commodity Description and Coding System number for the product, as set out in the *Customs Tariff*, and
 - (v) the business number assigned to the importer by the Minister of National Revenue.

Records — information submitted to Minister

(2) Any person that submits information to the Minister under these Regulations must maintain records containing a copy of that information and any supporting documents.

Five years

(3) The records must be kept for a period of at least five years after

- (a) the day on which they are made, in the case of the records referred to in subsection (1); and
- (b) the day on which they are submitted to the Minister, in the case of the records referred to in subsection (2).

Location of records

24 (1) The records referred to in section 23 must be kept at the person's principal place of business in Canada or at any other place in Canada where they can be inspected. If the records are kept at any place other than the person's principal place of business, the person must provide the Minister with the civic address of the place where they are kept.

Change of address

(2) If the civic address referred to in subsection (1) changes, the person must notify the Minister in writing within 30 days after the change.

Submission Requirements

Certification

25 Any information that is submitted under these Regulations must be accompanied by a certification, dated and signed by the person or persons submitting the information or by their authorized representative, stating that the information is accurate and complete.

Format

26 (1) Any document that is submitted under these Regulations may be submitted either in paper format or in an electronic format that is compatible with the format that is used by the Minister.

Electronic signature

(2) If the document is submitted in electronic format and is required to bear a signature, the document may be signed electronically.

Related Amendment to the Regulations Designating Regulatory Provisions for Purposes of Enforcement (Canadian Environmental Protection Act, 1999)

27 The schedule to the *Regulations Designating Regulatory Provisions for Purposes of Enforcement (Canadian Environmental Protection Act, 1999)* ²⁷ is amended by adding the following in numerical order:

Item	Column 1 Regulations	Column 2 Provisions
34	<i>Volatile Organic Compound Concentration Limits for Certain Products Regulations</i>	(a) subsections 3(1) and (2)

Coming into Force**January 1, two years after registration**

28 (1) Subject to subsection (2), these Regulations come into force on January 1 of the calendar year that is two years after the calendar year during which they are registered.

January 1, three years after registration

(2) Item 31 of the table to Schedule 1 comes into force on January 1 of the calendar year that is three years after the calendar year during which these Regulations are registered.

SCHEDULE 1

(Subsections 1(1) and (5), 2(1) and 3(1) and (3), sections 4 to 6, subsection 7(1), subparagraphs 7(2)(c)(ii) and (v) and 10(1)(c)(ii), subsection 10(2), paragraph 12(d), subparagraph 13(c)(ii), subsection 14(1), subparagraph 14(2)(c)(ii), paragraph 14(2)(d), subsection 15(1), paragraph 16(1)(a), subsection 17(1), subparagraph 17(2)(c)(ii), paragraphs 17(2)(e) and (f), subsection 18(1), sections 21 and 22 and subsections 23(1) and 28(2))

Product Categories and VOC Concentration Limits**Interpretation**

1 The following definitions apply in this Schedule.

contact adhesive means an adhesive – other than rubber cement that is designed for use on paper substrates or vulcanizing fluid that is designed solely for tire repair — that

- (a) is designed for application to surfaces to be bonded together;
- (b) is to dry before the surfaces are placed in contact with each other;
- (c) forms an immediate bond that makes it impossible, or difficult, to reposition the adhesive-coated surfaces after they are placed in contact with each other; and
- (d) does not require sustained pressure or the clamping of surfaces after the adhesive-coated surfaces have been brought together using momentary pressure to establish contact between the surfaces. (*adhésif de contact*)

energized electrical cleaner means a product that is designed for cleaning or degreasing electrical equipment while there is an electrical current in the electrical equipment or while there is a residual electrical potential from a component, such as a capacitor, but does not include a product that is designed for use in the maintenance of motorized vehicles or their parts. (*nettoyant d'équipements électriques sous tension*)

Aerosol

2 For greater certainty, in this Schedule, *aerosol* does not include pump sprays.

Overview

3 The table to this Schedule sets out VOC concentration limits for each product category and, if applicable, subcategory. Personal care products are set out in items 1 to 13, maintenance products are set out in items 14 to 56, adhesives, adhesive removers, sealants and caulks are set out in items 57 to 62 and miscellaneous products are set out in items 63 and 64.

Table

Item	Column 1	Column 2	Column 3
	Product Category	Subcategory	Maximum VOC Concentration (% w/w)
Personal Care Products			
1	Astringent or toner, excluding astringent or toner that is regulated as a drug under the <i>Food and Drugs Act</i>		35
2	Antiperspirant for the human axilla	(i) aerosol,	(I) in the case of HVOC, 40 (II) in the case of MVOC, 10
		(ii) non-aerosol	0
3	Deodorant for the human axilla	(i) aerosol,	(I) in the case of HVOC, 0 (II) in the case of MVOC, 10
		(ii) non-aerosol	0
4	Heavy-duty hand cleaner or soap, excluding prescription drug products, antimicrobial hand or body cleaners or soaps, astringents or toners, general-use hand or body cleaners or soaps and rubbing alcohol	(i) non-aerosol,	1
		(ii) all other forms	8
5	Hair mousse		6
6	Hair products that are designed for the primary purpose of creating a shine when applied to the hair, excluding products whose purpose is to condition or hold the hair		55
7	Hair spray, excluding spray products that aid in styling without holding the hair		55
8	Temporary hair colour products that are designed to add colour or glitter to hair, wigs or fur or to cover thinning or balding areas	aerosol	55

SCHEDULE 2

(Subsections 1(5), 2(1) and 3(2), paragraph 5(1)(c), subsection 17(1), subparagraphs 17(2)(c)(ii) and (iii), paragraphs 17(2)(e) and (f) and subsections 18(1), 21(1) and 23(1))

Product Categories and VOC Emission Potential Limits

Item	Column 1	Column 2
	Product Category	Maximum VOC Emission Potential
1	Charcoal lighter material that is incorporated in or designed to be used with charcoal to enhance ignition, excluding <ul style="list-style-type: none"> (a) electrical starters and probes; (b) metallic cylinders using paper tinder; (c) natural gas; (d) propane; and (e) wood kindling with naturally occurring levels of sap or resin that enhance ignition of the kindling 	9 g per ignition, when used in accordance with the manufacturer's instructions
2	Fabric softener that is a single use dryer product	0.05 g per load, when used in accordance with the manufacturer's instructions

Footnotes

- 1 Information regarding the impacts of ground-level ozone and smog on Canadians' health and environment can be found in the *Canadian Smog Science Assessment* published in 2012 and co-authored by the Department of Environment and the Department of Health. The assessment is available at the following link: http://publications.gc.ca/collections/collection_2012/ec/En88-5-2011-eng.pdf (PDF) (http://publications.gc.ca/collections/collection_2012/ec/En88-5-2011-eng.pdf)
- 2 Canada's commitments under the Ozone Annex can be found at the following link: <https://www.canada.ca/en/environment-climate-change/services/air-pollution/issues/transboundary/canada-united-states-air-quality-agreement-overview.html> (<https://www.canada.ca/en/environment-climate-change/services/air-pollution/issues/transboundary/canada-united-states-air-quality-agreement-overview.html>)
- 3 Information regarding the *Federal Agenda on the Reduction of Emissions of Volatile Organic Compounds from Consumer and Commercial Products* can be found at the following link: <http://www.ec.gc.ca/cov-voc/Default.asp?lang=En&n=A6586DEE-1> (<http://www.ec.gc.ca/cov-voc/Default.asp?lang=En&n=A6586DEE-1>)
- 4 Further information about the *Code of Practice for the Reduction of Volatile Organic Compound (VOC) Emissions from Cutback and Emulsified Asphalt* can be found at the following link: <https://www.canada.ca/en/environment-climate-change/services/managing-pollution/sources-industry/volatile-organic-compounds-consumer-commercial/cutback-asphalt-emulsified.html> (<https://www.canada.ca/en/environment-climate-change/services/managing-pollution/sources-industry/volatile-organic-compounds-consumer-commercial/cutback-asphalt-emulsified.html>)
- 5 Further information regarding the *Volatile Organic Compound (VOC) Concentration Limits in Automotive Refinishing Products Regulations* can be found at the following link: <https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=93> (<https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=93>)

- 6 Further information regarding the *Volatile Organic Compound (VOC) Concentration Limits for Architectural Coatings Regulations* can be found at the following link: <https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=92> (<https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=92>)
- 7 More information regarding CARB's *Alternative Control Plan Regulation for Consumer Products and Aerosol Coating Products* can be found at the following link: <https://www.arb.ca.gov/consprod/regs/2012/5acp50411rev.pdf> (PDF) (<https://www.arb.ca.gov/consprod/regs/2012/5acp50411rev.pdf>)
- 8 Information regarding record-keeping and reporting requirements can be found in sections 12, 13 and 23 of the proposed Regulations.
- 9 The consultation document *Revisions to the Proposed Volatile Organic Compound (VOC) Concentration Limits for Certain Products Regulations* can be found at the following link: <https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/consultation-document-revisions-volatile-organic-compounds.html> (<https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/consultation-document-revisions-volatile-organic-compounds.html>)
- 10 Information regarding behaviours and Canadian market conditions were based on the "*Technical and Socio-Economic Study on Certain Products Containing Volatile Organic Compounds*" conducted by ToxEcology Environmental Consulting Ltd. in 2014.
- 11 The Ozone Transport Commission is a multi-state organization created under the *Clean Air Act* to advise the U.S. EPA on air pollution issues. Information regarding member states and the commission can be found at the following link: <https://otcair.org/> (<https://otcair.org/>).
- 12 More information regarding the *Guidelines for Volatile Organic Compounds in Consumer Products* can be found at the following link: <https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/publications/guidelines-volatile-organic-compounds-consumer.html> (<https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/publications/guidelines-volatile-organic-compounds-consumer.html>).
- 13 Trade data regarding industries regulated under the proposed Regulations can be found at the following link: <https://www.ic.gc.ca/eic/site/tdo-dcd.nsf/eng/home> (<https://www.ic.gc.ca/eic/site/tdo-dcd.nsf/eng/home>)
- 14 Information regarding compliant and non-compliant products was obtained through the *Technical and Socio-Economic Study on Certain Products Containing Volatile Organic Compounds* conducted by ToxEcology Environmental Consulting Ltd. in 2014.
- 15 Ibid.
- 16 Information regarding compliance costs was obtained through the *Technical and Socio-Economic Study on Certain Products Containing Volatile Organic Compounds* conducted by ToxEcology Environmental Consulting Ltd. in 2014.
- 17 Ibid.
- 18 Information regarding compliance costs was obtained through the *Technical and Socio-Economic Study on Certain Products Containing Volatile Organic Compounds* conducted by ToxEcology Environmental Consulting Ltd. in 2014.
- 19 Information regarding expected VOC emission reductions was based on the *Technical and Socio-Economic Study on Certain Products Containing Volatile Organic Compounds* conducted by ToxEcology Environmental Consulting Ltd. in 2014.

- 20 Secondary data sources include previous surveys and analysis, emission information shared by CARB, and market research reports.
- 21 More information on the value of the statistical life is available in the *Canadian Cost-Benefit Analysis Guide: Regulatory Proposals*, which can be found at the following link: <https://www.canada.ca/en/treasury-board-secretariat/services/reporting-government-spending/what-we-are-doing/canadian-cost-benefit-analysis-guide-regulatory-proposals.html> (<https://www.canada.ca/en/treasury-board-secretariat/services/reporting-government-spending/what-we-are-doing/canadian-cost-benefit-analysis-guide-regulatory-proposals.html>).
- 22 Information regarding compliance of businesses in the United States can be found at the following link: <https://www.arb.ca.gov/regact/conprod/fsor.pdf> (PDF) (<https://www.arb.ca.gov/regact/conprod/fsor.pdf>)
- 23 For more information see the “Consultations” section, “*Adapting the proposed Regulations to the Canadian context.*”
- 24 More information regarding Addressing Air Pollution Horizontal Initiative can be found at the following link: <https://www.canada.ca/en/environment-climate-change/services/sustainable-development/strategic-environmental-assessment/public-statements/addressing-air-pollution.html> (<https://www.canada.ca/en/environment-climate-change/services/sustainable-development/strategic-environmental-assessment/public-statements/addressing-air-pollution.html>)
- 25 For more information see the “Consultation” section, “*Adapting the proposed Regulations to the Canadian context.*”
- 26 More information regarding the *Canadian Environmental Protection Act: compliance and enforcement policy* can be found at the following link: <https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/publications/compliance-enforcement-policy.html> (<https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/publications/compliance-enforcement-policy.html>)
- 27 SOR/2012-134
- a S.C. 2004, c. 15, s. 31
- b S.C. 1999, c. 33
- c S.C. 2009, c. 14, s. 80

Government of Canada activities and initiatives

#YourBudget2018 – Advancement



(https://www.budget.gc.ca/2018/docs/themes/advancement-advancement-en.html?utm_source=CanCa&utm_medium=Activities_e&utm_content=Advancement&utm_campaign=CABdgt18)

Advancing our shared values

#YourBudget2018 – Reconciliation





https://www.budget.gc.ca/2018/docs/themes/reconciliation-reconciliation-en.html?utm_source=CanCa&utm_medium=%20Activities_e&utm_content=Reconciliation&utm_campaign=CAbdgt18

Advancing reconciliation with Indigenous Peoples

#YourBudget2018 – Progress



https://www.budget.gc.ca/2018/docs/themes/progress-progres-en.html?utm_source=CanCa&utm_medium=Activities_e&utm_content=Progress&utm_campaign=CAbdgt18

Supporting Canada's researchers to build a more innovative economy